

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

**REINSURANCE INTERCOMPANY MORTALITY STUDY
FOR ADVANCED AGE
(1995 EXPERIENCE)**

VERA LJUCOVIC AND JOHN A. LUFF*

DESCRIPTION OF THE STUDY

Observation Period and Policy Issue Years

This report covers the experience for calendar year 1995. The earliest issue year for all policies reported by participants was 1971.

Policies Included in the Study

Policies for advanced age are those with an issue age of 70 and over regardless of face amount level, where the residence of the insured at issue is the U.S., and the currency of the policy is in U.S. dollars. This study includes only single life policies and exposure, which is equal to the net amount at risk reinsured to the participants.

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 1995, 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. The extension is described in Appendix F.

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 1995 study, 11 of the 17 participants from 1994 remained and two new participants 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 (1995)

Overall Experience

The experience (see Tables 1–6) underlying the year 1995 data is based on a total exposure of \$2.04 billion and claims of \$20.2 million. The total 1995 exposure by number is 12,444 policies and 243 deaths.

Eleven of the seventeen participants from the 1994 study remained, and two new participants entered. There is a 13% increase in business from the previous participants and 29% from the new participants.

The overall mortality ratio by amounts for the 1995 study is 29.3%. The overall mortality ratio by number for the 1995 study is 52.7%.

Experience by Sex

A total of 57% of the total exposure by amount was from policies issued on male lives.

The mortality ratio by amount for males is 28.1%. The mortality ratio for females is 31.8%. The 1994 report showed 28.3% and 46.9%, respectively.

The mortality ratios by number are 49.3% and 59.9% for males and females, respectively. The 1994 report showed 47.8% and 56.9%, respectively.

Experience by Issue Age

Almost all of the claims occur between the ages of 70 and 79 since over 96% of the exposure by both number and by amount is in this age range.

Experience by Policy Years

The mortality ratio by amount varies greatly by policy year, with the highest ratio at duration 11–15. The mortality ratio by number is less than the overall ratio for durations 1–5, with the exception of duration 3.

Experience by Classification Amount

The \$500,000–\$1M band showed the highest mortality ratio by amount and by number, and fluctuated between 40 and 55% for other bands under \$1M. Low exposures exist at the greater than \$5M band.

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 higher classification amounts.

A total of 243 claims were reported. When analyzing each claim individually, it was possible to observe that some deaths involved multiple policies.

Experience by Smoking Status

The mortality ratio by amount for nonsmoker is 24.9% (32.0% in 1994). The ratio for smoker is 62.6% (75.1% in 1994). The expected level of mortality for smoker is roughly 1.4 times the mortality for nonsmoker. The A75-80 Basic Tables are not differentiated by smoking status.

Experience by Underwriting Status

The mortality ratio by amount for standard policies is 29.0%. The ratio is 29.8% for substandard policies. The exposure amounts are distributed 81.6% and 18.4%, respectively.

Experience by Reinsurance Status

The mortality experience for facultative business is lower than the mortality experience for automatic business in 1995. Since the automatic business has lower medical underwriting standards, the higher ratio indicates the value of underwriting.

The mortality ratio by amount for policies reinsured automatically is 34.8%, and for policies reinsured facultatively, 26.0%.

Facultative business accounted for over 55% by exposure amounts. There was no shopped business reported. Shopped policies are defined as those sent facultatively to one or more reinsurer(s) to obtain the most competitive underwriting assessment.

Historically, there has been about twice as much facultative business as automatic, with significant mortality fluctuation in both sets of mortality ratios.

Experience by Plan of Insurance

The plan of insurance was provided for 9,515 policies (76.5%; 73.1% in 1994). These were grouped as universal life (5,435 policies; 57.1%), whole life (1,641; 17.3%), and term (2,439; 25.6%).

Experience by Method of Reinsurance

The method of reinsurance was provided for 11,836 policies (95.1%). These were grouped as yearly renewable term (YRT) (9,359 policies; 79.1%), coinsurance (2,469; 20.9%), and modified coinsurance (8; 0.01%).

Experience by Level of Retention

The level of retention of the ceding company was provided for 4,755 policies (38%; 42% in 1994). These were grouped as full retention (3,991 policies; 83.9%), partial retention (381 policies; 8.0%), and no retention (383 policies; 8.1%).

TABLE 1

TRENDS IN MORTALITY RATIOS BY NUMBER OF POLICIES—AGES 70 AND OVER
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	1990	1991	1992	1993*	1994	1995	1990-95
Sex							
Male	72.3%	58.6%	45.9%	55.5%	47.8%	49.3%	53.9%
Female	63.0	73.7	60.5	65.5	56.9	59.9	62.5
All	70.0%	62.4%	49.9%	58.3%	50.5%	52.7%	56.3%
Issue Ages							
70-74	82.2%	70.3%	56.4%	66.0%	52.4%	55.9%	62.4%
75-79	44.1	46.2	42.3	46.3	49.5	44.6	45.6
80-84	54.6	31.7	11.0	39.5	35.1	64.9	41.2
85-89	98.4	246.5	0.0	0.0	0.0	0.0	54.6
90 and Over	0.0	81.3	0.0	0.0	0.0	0.0	24.5
All	70.0%	62.4%	49.9%	58.3%	50.5%	52.7%	56.3%
Policy Years							
1	91.8%	67.1%	24.0%	45.3%	18.4%	36.6%	43.6%
2	66.4	74.7	57.4	86.4	36.9	39.8	58.7
3	54.2	43.9	38.6	31.7	37.6	56.0	43.7
4	70.4	82.4	38.8	43.0	37.7	47.3	54.5
5	49.1	50.5	40.9	28.6	52.3	50.6	46.0
6-10	82.1	60.5	47.9	56.2	54.9	57.3	57.8
11-15	64.4	55.6	74.7	81.8	71.7	55.5	67.8
16 and Over†	68.2	217.2	253.9	374.0	61.0	76.9	105.4
All	70.0%	62.4%	49.9%	58.3%	50.5%	52.7%	56.3%
Classification Amounts							
Less than \$100,000	70.5%	62.1%	54.3%	60.0%	61.4%	50.6%	59.4%
\$100,000-\$249,999	82.5	73.7	46.1	64.0	45.8	55.7	59.2
\$250,000-\$499,999	58.5	43.3	61.5	62.2	51.8	51.8	54.5
\$500,000-\$999,999	39.6	67.1	22.5	50.0	43.3	74.1	50.6
\$1,000,000-\$1,999,999	56.1	33.6	55.4	36.1	20.4	36.7	37.9
\$2,000,000-\$2,999,999	0.0	61.4	76.8	41.5	12.8	21.3	35.8
\$3,000,000-\$4,999,999	181.0	33.1	0.0	38.8	80.7	59.9	62.6
\$5,000,000 and Over	0.0	176.5	0.0	0.0	41.2	0.0	32.1
All	70.0%	62.4%	49.9%	58.3%	50.5%	52.7%	56.3%
Smoking Status							
Nonsmoker	67.0%	56.4%	35.1%	45.8%	45.6%	50.2%	48.4%
Smoker	114.4	104.4	67.2	74.5	79.4	62.4	82.0
Aggregate	64.3	62.7	82.0	82.5	55.4	60.3	67.9
All	70.0%	62.4%	49.9%	58.3%	50.5%	52.7%	56.3%
Underwriting Status							
Standard	69.6%	62.6%	52.7%	61.0%	52.2%	55.3%	57.8%
Substandard	70.5	62.0	44.7	53.5	47.0	47.0	53.5
All	70.0%	62.4%	49.9%	58.3%	50.5%	52.7%	56.3%
Reinsurance Status							
Automatic	76.0%	67.4%	58.1%	65.0%	54.9%	56.3%	61.5%
Facultative	65.2	58.1	42.4	52.0	45.4	48.0	51.1
Shopped	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	70.0%	62.4%	49.9%	58.3%	50.5%	52.7%	56.3%
Plan of Insurance							
Whole Life		61.9%	41.2%	55.2%	48.3%	54.5%	
Term		54.9	43.2	43.8	32.7	57.0	
Universal Life		64.4	54.6	45.3	64.5	41.3	
Unknown		66.2	57.3	94.0	63.0	68.7	
All		62.4%	49.9%	58.3%	50.5%	52.7%	
Reinsurance Method							
Coinsurance		111.2%	79.6%	90.8%	70.4%	49.9%	
Modified Coinsurance		222.3	130.0	69.8	160.9	0.0	
Yearly Renewable Term		56.6	43.8	53.7	43.4	55.6	
Unknown		38.4	54.4	0.0	118.4	17.4	
All		62.4%	49.9%	58.3%	50.5%	52.7%	

*An error was found in the 1993 data. This affected the expected claim by number only. The previous reported mortality ratio for 1993 was 59.7%.

†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

TRENDS IN MORTALITY RATIOS BY AMOUNT (1,000'S)—AGES 70 AND OVER
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	1990	1991	1992	1993*	1994	1995	1990-95
Sex							
Male	35.3%	63.3%	39.9%	56.0%	28.3%	28.1%	40.8%
Female	68.0	85.0	34.9	30.5	46.9	31.8	46.9
All	43.5%	69.3%	38.4%	47.4%	34.4%	29.3%	42.6%
Issue Ages							
70-74	41.5%	82.6%	43.7%	54.0%	31.1%	33.2%	47.2%
75-79	30.0	50.4	33.5	42.2	39.0	12.8	33.1
80-84	122.5	10.1	1.8	7.0	46.3	72.4	46.2
85-89	1.4	2.4	0.0	0.0	0.0	0.0	0.6
90 and Over	0.0	1.8	0.0	0.0	0.0	0.0	0.5
All	43.5%	69.3%	38.4%	47.4%	34.4%	29.3%	42.6%
Policy Years							
1	120.0%	57.2%	8.5%	38.4%	10.6%	17.1%	38.2%
2	36.2	160.3	28.2	96.9	30.4	7.1	59.7
3	10.1	38.0	31.7	13.4	17.6	24.0	23.8
4	23.6	45.6	7.1	40.4	8.4	10.5	21.5
5	34.9	16.9	28.9	15.4	27.5	30.2	26.0
6-10	44.2	79.4	56.0	42.9	53.7	36.4	52.5
11-15	40.2	30.6	43.1	100.3	38.1	76.6	56.0
16 and Over†	33.6	100.0	107.2	659.6	85.0	46.5	102.6
All	43.5%	69.3%	38.4%	47.4%	34.4%	29.3%	42.6%
Classification Amounts							
Less than \$100,000	50.1%	43.5%	36.4%	38.3%	54.0%	45.0%	44.3%
\$100,000-\$249,999	64.0	60.1	43.4	50.5	40.0	42.9	49.7
\$250,000-\$499,999	35.5	40.7	51.8	53.0	50.5	47.2	47.0
\$500,000-\$999,999	26.7	41.3	29.5	58.8	45.1	52.2	43.2
\$1,000,000-\$1,999,999	53.1	34.1	48.7	37.4	20.5	14.3	32.2
\$2,000,000-\$2,999,999	0.0	52.9	81.5	58.7	27.4	14.1	39.3
\$3,000,000-\$4,999,999	123.6	101.4	0.0	68.9	45.0	24.6	54.7
\$5,000,000 and Over	0.0	258.5	0.0	0.0	3.8	0.0	44.4
All	43.5%	69.3%	38.4%	47.4%	34.4%	29.3%	42.6%
Smoking Status							
Nonsmoker	47.6%	56.9%	31.0%	36.6%	32.0%	24.9%	35.9%
Smoker	34.1	152.3	70.4	102.2	75.1	62.6	84.0
Aggregate	38.7	79.9	55.2	76.7	34.1	50.2	56.4
All	43.5%	69.3%	38.4%	47.4%	34.4%	29.3%	42.6%
Underwriting Status							
Standard	41.6%	80.5%	36.2%	43.3%	37.9%	29.0%	43.5%
Substandard	47.2	46.6	43.1	56.9	26.0	29.8	40.5
All	43.5%	69.3%	38.4%	47.4%	34.4%	29.3%	42.6%
Reinsurance Status							
Automatic	56.4%	20.5%	39.3%	37.7%	45.2%	34.8%	37.6%
Facultative	38.1	100.5	38.0	52.0	29.4	26.0	45.4
Shopped	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	43.5%	69.3%	38.4%	47.4%	34.4%	29.3%	42.6%
Plan of Insurance							
Whole Life		37.2%	19.5%	53.4%	33.5%	25.4%	
Term		139.6	45.7	38.9	23.2	38.5	
Universal Life		33.1	52.1	53.3	46.0	20.9	
Unknown		72.9	39.1	44.8	36.9	45.7	
All		69.3%	38.4%	47.4%	34.4%	29.3%	
Reinsurance Method							
Coinsurance		148.2%	16.1%	27.3%	19.0%	18.0%	
Modified Coinsurance		17.4	108.1	12.0	33.7	0.0	
Yearly Renewable Term		60.4	39.7	49.6	30.6	31.9	
Unknown		76.1	68.7	0.0	197.1	36.8	
All		69.3%	38.4%	47.4%	34.4%	29.3%	

*An error was found in the 1993 data. This affected the expected claim by number only. The previous reported mortality ratio for 1993 was 54.5%.

†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 3

1995 EXPERIENCE BY NUMBER OF POLICIES—AGES 70 AND OVER
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Sex				
Male	7,154	156	316.27	49.3%
Female	5,290	87	145.18	59.9
All	12,444	243	461.45	52.7%
Issue Ages				
70-74	9,502	164	293.45	55.9%
75-79	2,553	61	136.69	44.6
80-84	359	18	27.74	64.9
85-89	29	0	3.29	0.0
90 and Over	2	0	0.28	0.0
All	12,444	243	461.45	52.7%
Policy Years				
1	3,000	17	46.45	36.6%
2	1,875	15	37.66	39.8
3	1,361	20	35.70	56.0
4	1,183	18	38.09	47.3
5	1,206	23	45.42	50.6
6-10	3,188	107	186.65	57.3
11-15	536	31	55.87	55.5
16 and Over	95	12	15.61	76.9
All	12,444	243	461.45	52.7%
Classification Amounts				
Less than \$100,000	3,845	96	189.67	50.6%
\$100,000-\$249,999	3,073	63	113.18	55.7
\$250,000-\$499,999	2,004	31	59.88	51.8
\$500,000-\$999,999	1,651	36	48.60	74.1
\$1,000,000-\$1,999,999	1,250	12	32.74	36.7
\$2,000,000-\$2,999,999	346	2	9.39	21.3
\$3,000,000-\$4,999,999	155	3	5.01	59.9
\$5,000,000 and Over	119	0	2.99	0.0
All	12,444	243	461.45	52.7%
Smoking Status				
Nonsmoker	10,509	179	356.47	50.2%
Smoker	818	20	32.06	62.4
Aggregate	1,117	44	72.92	60.3
All	12,444	243	461.45	52.7%
Underwriting Status				
Standard	9,995	175	316.65	55.3%
Substandard	2,449	68	144.79	47.0
All	12,444	243	461.45	52.7%
Reinsurance Status				
Automatic	8,562	146	259.20	56.3%
Facultative	3,881	97	202.25	48.0
Shopped	0	0	0.00	0.0
All	12,444	243	461.45	52.7%
Plan of Insurance				
Whole Life	1,641	44	80.77	54.5%
Term	2,439	50	87.73	57.0
Universal Life	5,435	79	191.11	41.3
Unknown	2,929	70	101.84	68.7
All	12,444	243	461.45	52.7%
Reinsurance Method				
Coinsurance	2,469	38	76.21	49.9%
Modified Coinsurance	8	0	0.73	0.0
Yearly Renewable Term	9,359	201	361.50	55.6
Unknown	608	4	23.00	17.4
All	12,444	243	461.45	52.7%

TABLE 4

1995 EXPERIENCE BY AMOUNT (1,000'S)—AGES 70 AND OVER
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Sex				
Male	1,169,967	13,258	47,209	28.1%
Female	873,097	6,899	21,705	31.8
All	2,043,063	20,158	68,915	29.3%
Issue Ages				
70-74	1,472,157	13,140	39,572	33.2%
75-79	492,545	3,010	23,462	12.8
80-84	75,717	4,008	5,539	72.4
85-89	2,404	0	304	0.0
90 and Over	240	0	38	0.0
All	2,043,063	20,158	68,915	29.3%
Policy Years				
1	492,784	1,346	7,852	17.1%
2	339,566	544	7,621	7.1
3	280,524	1,821	7,591	24.0
4	240,446	820	7,810	10.5
5	212,775	2,622	8,685	30.2
6-10	416,820	8,454	23,217	36.4
11-15	56,593	4,314	5,630	76.6
16 and Over	3,555	237	510	46.5
All	2,043,063	20,158	68,915	29.3%
Classification Amounts				
Less than \$100,000	66,623	1,421	3,157	45.0%
\$100,000-\$249,999	167,541	2,971	6,930	42.9
\$250,000-\$499,999	222,085	3,645	7,725	47.2
\$500,000-\$999,999	381,619	7,152	13,694	52.2
\$1,000,000-\$1,999,999	547,486	2,492	17,419	14.3
\$2,000,000-\$2,999,999	283,813	1,246	8,842	14.1
\$3,000,000-\$4,999,999	168,426	1,230	5,004	24.6
\$5,000,000 and Over	205,470	0	6,144	0.0
All	2,043,063	20,158	68,915	29.3%
Smoking Status				
Nonsmoker	1,780,683	14,584	58,518	24.9%
Smoker	80,127	1,804	2,881	62.6
Aggregate	182,254	3,770	7,516	50.2
All	2,043,063	20,158	68,915	29.3%
Underwriting Status				
Standard	1,666,694	14,595	50,241	29.0%
Substandard	376,369	5,563	18,674	29.8
All	2,043,063	20,158	68,915	29.3%
Reinsurance Status				
Automatic	912,453	8,882	25,554	34.8%
Facultative	1,130,610	11,276	43,361	26.0
Shopped	0	0	0	0.0
All	2,043,063	20,158	68,915	29.3%
Plan of Insurance				
Whole Life	456,840	4,118	16,184	25.4%
Term	341,591	4,972	12,907	38.5
Universal Life	874,340	6,025	28,785	20.9
Unknown	370,292	5,043	11,039	45.7
All	2,043,063	20,158	68,915	29.3%
Reinsurance Method				
Coinsurance	436,585	2,367	13,186	18.0%
Modified Coinsurance	1,397	0	184	0.0
Yearly Renewable Term	1,545,146	17,390	54,455	31.9
Unknown	59,935	401	1,089	36.8
All	2,043,063	20,158	68,915	29.3%

TABLE 5
 1990-95 EXPERIENCE BY NUMBER OF POLICIES—AGES 70 AND OVER
 (MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Sex				
Male	36,575	902	1,674.22	53.9%
Female	23,602	407	651.33	62.5
All	60,177	1,309	2,325.55	56.3%
Issue Ages				
70-74	46,878	944	1,512.29	62.4%
75-79	11,894	312	684.40	45.6
80-84	1,314	46	111.55	41.2
85-89	66	5	9.16	54.6
90 and Over	26	2	8.15	24.5
All	60,177	1,309	2,325.55	56.3%
Policy Years				
1	11,115	71	162.84	43.6%
2	9,103	108	183.87	58.7
3	7,759	92	210.45	43.7
4	6,873	126	231.36	54.5
5	6,051	112	243.74	46.0
6-10	16,047	553	957.37	57.8
11-15	2,749	193	284.71	67.8
16 and Over	481	54	51.21	105.4
All	60,177	1,309	2,325.55	56.3%
Classification Amounts				
Less than \$100,000	22,182	631	1,061.50	59.4%
\$100,000-\$249,999	15,665	351	593.23	59.2
\$250,000-\$499,999	8,230	140	256.68	54.5
\$500,000-\$999,999	6,650	105	207.42	50.6
\$1,000,000-\$1,999,999	4,912	52	137.15	37.9
\$2,000,000-\$2,999,999	1,343	13	36.32	35.8
\$3,000,000-\$4,999,999	675	13	20.77	62.6
\$5,000,000 and Over	519	4	12.48	32.1
All	60,177	1,309	2,325.55	56.3%
Smoking Status				
Nonsmoker	44,176	732	1,513.37	48.4%
Smoker	4,352	150	182.94	82.0
Aggregate	11,650	427	629.24	67.9
All	60,177	1,309	2,325.55	56.3%
Underwriting Status				
Standard	46,283	873	1,510.27	57.8%
Substandard	13,894	436	815.27	53.5
All	60,177	1,309	2,325.55	56.3%
Reinsurance Status				
Automatic	36,487	724	1,177.42	61.5%
Facultative	23,616	585	1,145.47	51.1
Shopped	75	0	2.66	0.0
All	60,177	1,309	2,325.55	56.3%

TABLE 6

1990-95 EXPERIENCE BY AMOUNT (1,000's)—AGES 70 AND OVER
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Sex				
Male	5,591,424	93,171	228,637	40.8%
Female	4,328,329	46,892	100,072	46.9
All	9,919,753	140,063	328,709	42.6%
Issue Ages				
70-74	7,593,346	97,662	206,844	47.2%
75-79	2,054,900	33,079	99,987	33.1
80-84	262,388	9,312	20,139	46.2
85-89	7,650	8	1,298	0.6
90 and Over	1,468	2	440	0.5
All	9,919,753	140,063	328,709	42.6%
Policy Years				
1	2,103,593	11,721	30,656	38.2%
2	1,804,514	21,313	35,678	59.7
3	1,449,120	8,946	37,656	23.8
4	1,133,758	7,938	36,856	21.5
5	954,344	9,813	37,802	26.0
6-10	2,203,851	65,435	124,722	52.5
11-15	253,270	13,362	23,843	56.0
16 and Over	17,302	1,534	1,495	102.6
All	9,919,753	140,063	328,709	42.6%
Classification Amounts				
Less than \$100,000	484,322	9,606	21,692	44.3%
\$100,000-\$249,999	1,054,764	21,275	42,774	49.7
\$250,000-\$499,999	1,107,046	18,390	39,146	47.0
\$500,000-\$999,999	1,776,789	27,327	63,235	43.2
\$1,000,000-\$1,999,999	2,388,224	24,106	74,964	32.2
\$2,000,000-\$2,999,999	1,120,977	12,760	32,448	39.3
\$3,000,000-\$4,999,999	854,146	12,829	23,437	54.7
\$5,000,000 and Over	1,133,486	13,770	31,013	44.4
All	9,919,753	140,063	328,709	42.6%
Smoking Status				
Nonsmoker	8,001,044	88,562	246,823	35.9%
Smoker	551,457	16,176	19,251	84.0
Aggregate	1,367,252	35,325	62,635	56.4
All	9,919,753	140,063	328,709	42.6%
Underwriting Status				
Standard	7,854,728	99,167	227,808	43.5%
Substandard	2,065,025	40,896	100,901	40.5
All	9,919,753	140,063	328,709	42.6%
Reinsurance Status				
Automatic	3,763,839	42,831	113,869	37.6%
Facultative	6,131,190	97,232	214,016	45.4
Shopped	24,724	0	824	0.0
All	9,919,753	140,063	328,709	42.6%

CLAIMS ANALYSIS

A total of 13 companies submitted data for this mortality study. This study included the year 1995 mortality experience. A total of 243 claims were submitted. The cause of death was provided for all claims, except 36.

Tables 5 and 6 show the number of claims and the percentage of claims for each cause of death reported. A total of 11 out of 16 causes of death were reported. There were no reported cases for AIDS, aviation, motor vehicle, endocrine, digestive, or genitourinary.

The following seven Categories list the different causes of death included in the analysis (See Tables 7-14):

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 243 claims are included in the claims analysis. Of those, 76 (31.3%) have Circulatory for cause of death, and 82 (33.7%) have Cancer for cause of death. A total of 20 claims (8.2%) are reported in the Misadventure category.

A total of 17 (7%) "Other Disease" claims are reported.

Experience by Sex

A total of 156 claims are reported on male lives. This represents 64.2% of all the claims. Male exposure by number is 57.7%.

Experience by Issue Age

A total of 164 claims occur in the issue age group 70–74. Of those, 28.0% are Circulatory, 35.4% are Cancer, and 9.0% are Misadventure. Sixty-one claims are in the 75–79 age group, with 32.8% Circulatory, 37.7% Cancer, and 8.2% Misadventure. Eighteen claims are reported for ages 80 and over.

Experience by Policy Years

Circulatory deaths account for at least 20% in durations 1–4 and 30% in durations 5–15. Cancer claims increase in percentage by duration and drop significantly after ten years. Respiratory deaths occur mostly after five years.

Experience by Classification Amount

A total of 81% of all claims are reported in the first three bands (i.e., amounts less than \$500,000). Almost 40% of claims are in the less than \$100,000 band, and 26% in the \$100,000–\$250,000 band. Circulatory and Cancer claims account for over 60% of claims by band.

Experience by Smoking Status

As expected, 50% of smoker deaths are Cancer and 25% are Circulatory. Of nonsmokers, 31% were Circulatory and 35% Cancer.

Experience by Reinsurance Status

Over 60% of claims are reinsured on an automatic basis. The percentages of Circulatory and Cancer claims are similar for both automatic and facultative methods.

Experience by Underwriting Status

Approximately 72% of claims are rated as standard cases. Some 28% of Standard cases are Circulatory deaths, and 37% are Cancer deaths.

TABLE 7
 NUMBER OF CLAIMS FOR EACH CAUSE OF DEATH BY SEX AND ISSUE AGES

Category	All	Male	Female	Issue Ages				
				70-74	75-79	80-84	85-89	90 and Over
Other Accident	12	8	4	11	1	0	0	0
Homicide	5	5	0	1	4	0	0	0
Suicide	3	3	0	3	0	0	0	0
Aviation	0	0	0	0	0	0	0	0
Motor Vehicle	0	0	0	0	0	0	0	0
"Misadventure"	20	16	4	15	5	0	0	0
Cardiovascular	63	33	30	43	17	3	0	0
Cerebrovascular	13	8	5	3	3	7	0	0
Circulatory	76	41	35	46	20	10	0	0
Respiratory	7	4	3	3	2	2	0	0
Pneumonia	1	0	1	1	0	0	0	0
All Respiratory	8	4	4	4	2	2	0	0
Cancer	82	59	23	58	23	1	0	0
AIDS	0	0	0	0	0	0	0	0
Other Disease	17	14	3	12	4	1	0	0
Digestive	0	0	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0	0	0
Genitourinary	0	0	0	0	0	0	0	0
Nervous System	4	2	2	4	0	0	0	0
Other	21	16	5	16	4	1	0	0
Unknown	36	20	16	25	7	4	0	0
All	243	156	87	164	61	18	0	0

TABLE 8
NUMBER OF CLAIMS FOR EACH CAUSE OF DEATH BY POLICY YEARS

Category	Policy Years							
	1	2	3	4	5	6-10	11-15	16 and Over
Other Accident	0	1	1	3	1	5	1	0
Homicide	1	0	0	0	0	3	1	0
Suicide	0	0	0	0	0	3	0	0
Aviation	0	0	0	0	0	0	0	0
Motor Vehicle	0	0	0	0	0	0	0	0
“Misadventure”	1	1	1	3	1	11	2	0
Cardiovascular	5	3	9	3	7	24	11	1
Cerebrovascular	2	0	1	0	2	7	1	0
Circulatory	7	3	10	3	9	31	12	1
Respiratory	2	1	0	0	0	1	2	1
Pneumonia	0	0	0	0	0	1	0	0
All Respiratory	2	1	0	0	0	2	2	1
Cancer	4	10	5	10	10	33	9	1
AIDS	0	0	0	0	0	0	0	0
Other Disease	1	0	3	0	1	9	0	3
Digestive	0	0	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0	0	0
Genitourinary	0	0	0	0	0	0	0	0
Nervous System	0	0	0	0	0	4	0	0
Other	1	0	3	0	1	13	0	3
Unknown	2	0	1	2	2	17	6	6
All	17	15	20	18	23	107	31	12

TABLE 9
NUMBER OF CLAIMS FOR EACH CAUSE OF DEATH BY CLASSIFICATION AMOUNT

Category	Classification Amounts							
	Less than \$0.1 M	\$0.1-0.25 M	\$0.25-0.5 M	\$0.5-1 M	\$1-2 M	\$2-3 M	\$3-5 M	More than \$5 M
Other Accident	0	4	5	2	0	1	0	0
Homicide	1	1	1	1	1	0	0	0
Suicide	1	0	2	0	0	0	0	0
Aviation	0	0	0	0	0	0	0	0
Motor Vehicle	0	0	0	0	0	0	0	0
"Misadventure"	2	5	8	3	1	1	0	0
Cardiovascular	33	10	8	8	4	0	0	0
Cerebrovascular	3	4	6	0	0	0	0	0
Circulatory	36	14	14	8	4	0	0	0
Respiratory	2	1	2	1	1	0	0	0
Pneumonia	0	0	0	0	1	0	0	0
All Respiratory	2	1	2	1	2	0	0	0
Cancer	31	23	11	11	3	1	2	0
AIDS	0	0	0	0	0	0	0	0
Other Disease	8	8	1	0	0	0	0	0
Digestive	0	0	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0	0	0
Genitourinary	0	0	0	0	0	0	0	0
Nervous System	1	1	0	2	0	0	0	0
Other	9	9	1	2	0	0	0	0
Unknown	16	11	1	5	2	0	1	0
All	96	63	37	30	12	2	3	0

TABLE 10

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	12	0	0	9	3	9	3	0
Homicide	4	0	1	2	3	3	2	0
Suicide	3	0	0	2	1	2	1	0
Aviation	0	0	0	0	0	0	0	0
Motor Vehicle	0	0	0	0	0	0	0	0
“Misadventure”	19	0	1	13	7	14	6	0
Cardiovascular	47	4	12	41	22	35	28	0
Cerebrovascular	8	1	4	8	5	5	8	0
Circulatory	55	5	16	49	27	40	36	0
Respiratory	5	0	2	6	1	5	2	0
Pneumonia	1	0	0	1	0	1	0	0
All Respiratory	6	0	2	7	1	6	2	0
Cancer	63	10	9	65	17	52	30	0
AIDS	0	0	0	0	0	0	0	0
Other Disease	12	1	4	10	7	6	11	0
Digestive	0	0	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0	0	0
Genitourinary	0	0	0	0	0	0	0	0
Nervous System	2	1	1	4	0	3	1	0
Other	14	2	5	14	7	9	12	0
Unknown	22	3	11	27	9	25	11	0
All	179	20	44	175	68	146	97	0

TABLE 11

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

Category	All	Male	Female	Issue Ages				
				70-74	75-79	80-84	85-89	90 and Over
Other Accident	4.9%	5.1%	4.6%	6.7%	1.6%	0.0%	0.0%	0.0%
Homicide	2.1	3.2	0.0	0.6	6.6	0.0	0.0	0.0
Suicide	1.2	1.9	0.0	1.8	0.0	0.0	0.0	0.0
Aviation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
“Misadventure”	8.2%	10.3%	4.6%	9.1%	8.2%	0.0%	0.0%	0.0%
Cardiovascular	25.9%	21.2%	34.5%	26.2%	27.9%	16.7%	0.0%	0.0%
Cerebrovascular	5.3	5.1	5.7	1.8	4.9	38.9	0.0	0.0
Circulatory	31.3%	26.3%	40.2%	28.0%	32.8%	55.6%	0.0%	0.0%
Respiratory	2.9%	2.6%	3.4%	1.8%	3.3%	11.1%	0.0%	0.0%
Pneumonia	0.4	0.0	1.1	0.6	0.0	0.0	0.0	0.0
All Respiratory	3.3%	2.6%	4.6%	2.4%	3.3%	11.1%	0.0%	0.0%
Cancer	33.7%	37.8%	26.4%	35.4%	37.7%	5.6%	0.0%	0.0%
AIDS	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Disease	7.0%	9.0%	3.4%	7.3%	6.6%	5.6%	0.0%	0.0%
Digestive	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Endocrine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Genitourinary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nervous System	1.6	1.3	2.3	2.4	0.0	0.0	0.0	0.0
Other	8.6%	10.3%	5.7%	9.8%	6.6%	5.6%	0.0%	0.0%
Unknown	14.8%	12.8%	18.4%	15.2%	11.5%	22.2%	0.0%	0.0%
All	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%

APPENDIX A
LIST OF PARTICIPANTS
1995 INTERCOMPANY MORTALITY STUDY

Allianz Life Insurance Company of North America
American United Life Insurance Company
Business Men's Assurance Company of America
Continental Assurance Company (RE)
Employers Reassurance Corporation

Equitable Life Assurance Society (RE)
Life Reassurance Corporation of America
Manufacturers Life Insurance Company (RE)
Munich American RE
Mutual Life of Canada (US)

Reinsurance Group of America Incorporated (US)
Reinsurance Group of America Incorporated (Canada)
Security Life of Denver

APPENDIX B

TABLE B-1

LIST OF LARGE CLAIMS OVER \$1 MILLION ON ONE LIFE FOR THE PERIOD 1995

Claim	Direct Face Amount	Sex	Age Group	Policy Year	Smoking Class	Rating	Cause of Death
1	1.53 M	Female	70-74	2	Nonsmoker	100%	Cardiovascular
2	2.00 M	Female	70-74	4	Nonsmoker	100	Other Accident
3	1.00 M	Female	70-74	5	Nonsmoker	100	Cardiovascular
4	3.44 M	Female	70-74	5	Nonsmoker	100	Cancer
5	1.00 M	Female	70-74	6-10	Nonsmoker	100	Cardiovascular
6	1.00 M	Female	70-74	6-10	Nonsmoker	100	Pneumonia
7	2.00 M	Female	70-74	11-15	Aggregate	100	Cancer
8	4.50 M	Male	70-74	3	Nonsmoker	100	Unknown
9	1.00 M	Male	70-74	4	Nonsmoker	100	Cancer
10	1.00 M	Male	70-74	4	Nonsmoker	100	Cancer
11	1.00 M	Male	70-74	6-10	Nonsmoker	100	Unknown
12	3.28 M	Male	70-74	6-10	Nonsmoker	100	Cancer
13	1.00 M	Male	70-74	11-15	Nonsmoker	300	Homicide
14	1.37 M	Male	70-74	11-15	Smoker	150	Cancer
15	1.50 M	Male	70-74	11-15	Smoker	175	Unknown
16	1.56 M	Female	75-79	3	Smoker	100	Cardiovascular
17	1.00 M	Female	80-84	1	Nonsmoker	100	Respiratory

TABLE B-2

LIST OF LARGE CLAIMS OVER \$1 MILLION ON ONE LIFE FOR THE PERIOD 1990-94

Claim	Direct Face Amount	Sex	Age Group	Policy Year	Smoking Class	Rating	Cause of Death
1	1.00 M	Female	70-74	1	Nonsmoker	100%	Homicide
2	1.42 M	Female	70-74	1	Aggregate	100	Cancer
3	1.00 M	Female	70-74	2	Nonsmoker	200	Cancer
4	1.42 M	Female	70-74	2	Smoker	100	Cancer
5	3.00 M	Female	70-74	2	Aggregate	100	Cardiovascular
6	3.00 M	Female	70-74	2	Aggregate	100	Cardiovascular
7	1.00 M	Female	70-74	3	Nonsmoker	100	Cardiovascular
8	1.56 M	Female	70-74	3	Aggregate	100	Cancer
9	1.20 M	Female	70-74	4	Nonsmoker	100	Cancer
10	1.00 M	Female	70-74	5	Nonsmoker	100	Cancer
11	1.00 M	Female	70-74	6-10	Nonsmoker	100	Cardiovascular
12	1.00 M	Female	70-74	6-10	Nonsmoker	100	Cancer
13	1.00 M	Female	70-74	6-10	Nonsmoker	100	Unknown
14	1.50 M	Female	70-74	6-10	Aggregate	100	Unknown
15	2.00 M	Female	70-74	6-10	Nonsmoker	100	Unknown
16	2.00 M	Female	70-74	6-10	Nonsmoker	100	Cancer
17	2.51 M	Female	70-74	6-10	Aggregate	100	Cancer
18	2.51 M	Female	70-74	6-10	Aggregate	100	Cancer
19	4.21 M	Female	70-74	6-10	Aggregate	300	Cardiovascular
20	4.28 M	Female	70-74	6-10	Smoker	100	Cancer
21	7.50 M	Female	70-74	6-10	Aggregate	100	Cancer
22	1.00 M	Female	70-74	11-15	Smoker	100	Cancer
23	1.15 M	Male	70-74	1	Nonsmoker	225	Cardiovascular
24	1.00 M	Male	70-74	2	Aggregate	150	Other Disease
25	1.00 M	Male	70-74	2	Aggregate	100	Digestive
26	1.50 M	Male	70-74	2	Smoker	100	Cerebrovascular
27	2.24 M	Male	70-74	2	Smoker	100	Cardiovascular
28	7.50 M	Male	70-74	2	Nonsmoker	100	Other Disease
29	1.00 M	Male	70-74	3	Nonsmoker	150	Cancer
30	1.00 M	Male	70-74	3	Nonsmoker	100	Cardiovascular
31	2.00 M	Male	70-74	3	Nonsmoker	100	Other Accident
32	1.83 M	Male	70-74	4	Aggregate	100	Unknown
33	1.94 M	Male	70-74	4	Nonsmoker	100	Pneumonia
34	1.00 M	Male	70-74	6-10	Nonsmoker	250	Cerebrovascular
35	1.00 M	Male	70-74	6-10	Nonsmoker	100	Cancer
36	1.00 M	Male	70-74	6-10	Nonsmoker	100	Aviation
37	1.00 M	Male	70-74	6-10	Nonsmoker	100	Cancer
38	1.00 M	Male	70-74	6-10	Nonsmoker	100	Unknown
39	1.00 M	Male	70-74	6-10	Aggregate	100	Other Disease
40	1.13 M	Male	70-74	6-10	Smoker	100	Cardiovascular
41	1.30 M	Male	70-74	6-10	Smoker	100	Cerebrovascular
42	1.46 M	Male	70-74	6-10	Aggregate	200	Cancer
43	1.50 M	Male	70-74	6-10	Nonsmoker	100	Cardiovascular
44	1.90 M	Male	70-74	6-10	Aggregate	200	Cancer
45	2.00 M	Male	70-74	6-10	Nonsmoker	100	Cancer
46	2.50 M	Male	70-74	6-10	Nonsmoker	250	Cancer
47	3.00 M	Male	70-74	6-10	Nonsmoker	100	Cancer
48	5.00 M	Male	70-74	6-10	Aggregate	100	Cardiovascular
49	3.00 M	Male	70-74	11-15	Aggregate	100	Cardiovascular
50	2.00 M	Female	75-79	1	Nonsmoker	100	Cancer
51	1.00 M	Female	75-79	1	Nonsmoker	200	Cardiovascular
52	15.26 M	Female	75-79	5	Nonsmoker	100	Cancer
53	1.00 M	Female	75-79	11-15	Aggregate	100	Cerebrovascular
54	1.00 M	Male	75-79	2	Nonsmoker	100	Other Disease
55	2.00 M	Male	75-79	2	Nonsmoker	200	Cardiovascular
56	1.80 M	Male	75-79	3	Nonsmoker	150	Cancer
57	1.80 M	Male	75-79	3	Nonsmoker	150	Cancer
58	1.00 M	Male	75-79	6-10	Nonsmoker	100	Cardiovascular
59	2.28 M	Male	75-79	6-10	Nonsmoker	100	Cancer
60	3.00 M	Female	80-84	1	Nonsmoker	100	Cardiovascular
61	1.43 M	Female	80-84	6-10	Nonsmoker	100	Nervous System
62	1.00 M	Male	80-84	2	Nonsmoker	100	Cardiovascular

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 1995 and the 1990–95 experience by amount of insurance and their standard deviations are shown in Tables C-1 and C-2.

TABLE C-1
 STANDARD DEVIATIONS* FOR THE PERIOD 1995
 (MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Actual Claims	Mortality Ratio	Standard Deviation
All Combined	243	29.3%	1.88
Sex			
Male	156	28.1%	2.25
Female	87	31.8	3.41
Issue Ages			
70-74	164	33.2%	2.59
75-79	61	12.8	1.64
Policy Years			
6-10	107	36.4%	3.52
11-15	31	76.6	13.76
Classification Amounts			
Less than \$100,000	96	45.0%	4.60
\$100,000-\$249,999	63	42.9	5.40
\$249,999-\$499,999	31	47.2	8.47
\$499,999-\$999,999	36	52.2	8.70
Smoking Status			
Nonsmoker	179	24.9%	1.86
Aggregate	44	50.2	7.56
Underwriting Status			
Standard	175	29.0%	2.20
Substandard	68	29.8	3.61
Reinsurance Status			
Automatic	146	34.8%	2.88
Facultative	97	26.0	2.64
Plan of Insurance			
Whole Life	44	25.4%	3.84
Term	50	38.5	5.45
Universal Life	79	20.9	2.35
Unknown	70	45.7	5.46
Reinsurance Method			
Coinsurance	38	18.0%	2.91
Yearly Renewable Term	201	31.9	2.25

*Standard deviations are done for cases in which at least 35 deaths are observed.

TABLE C-2
STANDARD DEVIATIONS* FOR THE PERIOD 1990-95
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Categories	Actual Claims	Mortality Ratio	Standard Deviation
All Combined	1,309	42.6%	1.18
Sex			
Male	902	40.8%	1.36
Female	407	46.9	2.32
Issue Ages			
70-74	944	47.2%	1.54
75-79	312	33.1	1.87
80-84	46	46.2	6.82
Policy Years			
1	71	38.2%	4.54
2	108	59.7	5.75
3	92	23.8	2.48
4	126	21.5	1.92
5	112	26.0	2.45
6-10	553	52.5	2.23
11-15	193	56.0	4.03
16 and Over	54	102.6	13.97
Classification Amounts			
Less than \$100,000	631	44.3%	1.76
\$100,000-\$249,999	351	49.7	2.65
\$250,000-\$499,999	140	47.0	3.97
\$500,000-\$999,999	105	43.2	4.22
\$1,000,000-\$1,999,999	52	32.2	4.46
Smoking Status			
Nonsmoker	732	35.9%	1.33
Smoker	150	84.0	6.86
Aggregate	427	56.4	2.73
Underwriting Status			
Standard	873	43.5%	1.47
Substandard	436	40.5	1.94
Reinsurance Status			
Automatic	724	37.6%	1.40
Facultative	585	45.4	1.88

*Standard deviations are done for cases in which at least 35 deaths are observed.

APPENDIX D

TABLE D-1

1995 EXPERIENCE BY NUMBER OF POLICIES—AGES 70 AND OVER
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Policy Years	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Issue Ages 70-74				
1	2,130	8	21.16	37.8%
2	1,370	10	20.16	49.6
3	1,044	15	21.41	70.0
4	915	14	23.15	60.5
5	923	16	27.36	58.5
6-10	2,605	68	126.82	53.6
11-15	430	23	40.26	57.1
16 and Over	84	10	13.13	76.2
All	9,502	164	293.45	55.9%
Issue Ages 75-79				
1	698	4	16.02	25.0%
2	457	5	14.32	34.9
3	277	5	11.56	43.2
4	239	4	12.57	31.8
5	258	7	15.34	45.6
6-10	519	28	51.16	54.7
11-15	96	7	13.96	50.2
16 and over	9	1	1.76	56.8
All	2,553	61	136.69	44.6%

TABLE D-2

1995 EXPERIENCE BY AMOUNT ('000's)—AGES 70 AND OVER
(MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES)

Policy Years	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Issue Ages 70-74				
1	337,628	430	3,313	13.0%
2	215,405	482	3,058	15.8
3	199,970	1,424	3,970	35.9
4	186,438	730	4,925	14.8
5	151,396	1,657	4,785	34.6
6-10	335,353	3,951	15,274	25.9
11-15	42,555	4,232	3,768	112.3
16 and Over	3,412	234	480	48.8
All	1,472,157	13,140	39,572	33.2%
Issue Ages 75-79				
1	123,570	157	2,903	5.4%
2	115,264	62	3,987	1.5
3	67,324	397	2,719	14.6
4	46,806	90	2,325	3.9
5	57,337	964	3,451	27.9
6-10	68,410	1,256	6,247	20.1
11-15	13,716	81	1,806	4.5
16 and Over	118	1	25	4.1
All	492,545	3,010	23,462	12.8%

APPENDIX E

TABLE E-1

1995 EXPERIENCE BY NUMBER OF POLICIES—AGES 70 AND OVER
MORTALITY RATIOS BASED ON THE 1975–80 BASIC TABLES

Plan of Insurance by Policy Years	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Whole Life				
1	238	1	3.91	25.6%
2	226	2	5.00	40.0
3	205	6	5.68	105.7
4	172	2	5.76	34.8
5	145	1	5.79	17.3
6–10	466	16	30.81	51.9
11–15	162	14	19.69	71.1
16 and Over	26	2	4.14	48.3
All	1,641	44	80.77	54.5%
Term				
1	810	5	11.49	43.5%
2	401	4	7.35	54.4
3	250	3	6.45	46.5
4	199	4	6.35	63.0
5	161	5	6.24	80.2
6–10	474	23	33.65	68.4
11–15	129	4	13.25	30.2
16 and Over	14	2	2.96	67.6
All	2,439	50	87.73	57.0%
Universal Life				
1	1,151	4	17.95	22.3%
2	765	4	15.69	25.5
3	613	5	16.12	31.0
4	566	10	18.40	54.3
5	632	11	24.60	44.7
6–10	1,613	40	90.18	44.4
11–15	95	5	8.16	61.3
16 and Over	0	0	0.00	0.0
All	5,435	79	191.11	41.3%
Unknown				
1	801	7	13.10	53.4%
2	482	5	9.62	52.0
3	293	6	7.45	80.5
4	246	2	7.57	26.4
5	268	6	8.79	68.3
6–10	635	28	32.02	87.5
11–15	149	8	14.77	54.2
16 and Over	55	8	8.51	94.0
All	2,929	70	101.84	68.7%

TABLE E-2
 1995 EXPERIENCE BY AMOUNT (000's)—AGES 70 AND OVER
 MORTALITY RATIOS BASED ON THE 1975-80 BASIC TABLES

Plan of Insurance by Policy Years	Exposure	Actual Claims	Expected Claims	Mortality Ratio
Whole Life				
1	83,197	29	1,371	2.1%
2	88,966	82	2,176	3.8
3	61,928	689	1,708	40.3
4	64,401	74	2,023	3.6
5	42,233	300	1,708	17.6
6-10	99,237	951	5,151	18.5
11-15	16,010	1,987	1,909	104.1
16 and Over	868	7	139	5.1
All	456,840	4,118	16,184	25.4%
Term				
1	82,433	138	1,196	11.6%
2	47,105	37	1,021	3.6
3	47,741	118	1,178	10.0
4	28,535	149	948	15.7
5	25,787	920	1,048	87.7
6-10	89,291	3,359	5,564	60.4
11-15	20,194	232	1,879	12.3
16 and Over	506	20	74	26.7
All	341,591	4,972	12,907	38.5%
Universal Life				
1	195,699	267	3,002	8.9%
2	137,583	303	2,968	10.2
3	131,048	375	3,684	10.2
4	110,158	418	3,767	11.1
5	116,365	1,094	4,940	22.1
6-10	174,320	2,789	9,660	28.9
11-15	9,167	780	764	102.1
16 and Over	0	0	0	0.0
All	874,340	6,025	28,785	20.9%
Unknown				
1	131,456	912	2,283	40.0%
2	65,913	122	1,457	8.4
3	39,806	639	1,021	62.6
4	37,352	179	1,073	16.7
5	28,390	309	988	31.2
6-10	53,972	1,355	2,842	47.7
11-15	11,222	1,315	1,078	122.0
16 and Over	2,181	210	297	70.7
All	370,292	5,043	11,039	45.7%

APPENDIX F A75–80 EXTENSION

The A75–80 Mortality Tables provided sex distinct rates for both age nearest and age last birthday basis, up to the issue age 70 on a 15-year select period basis and up to the attained age 100 on an ultimate age basis. A further extension from ultimate age 100 to age 105 uses the constant difference pattern implicit in the values at age 100 and immediately prior. The A75–80 Extension provides rates for issue ages 71 to 90 with decreasing select periods.

This appendix outlines the derivation of the Extension.

STEP 1—CALCULATE SELECT TO ULTIMATE RATIOS FOR ISSUE AGES 70 AND BELOW

The basic analysis used to extend the A75–80 Table is the select to ultimate ratio.

$$\text{Ratio} = \frac{q_{[x]+t}^{\text{Select}}}{q_{x+t}^{\text{Ultimate}}}$$

The ratios for issue ages 70 and below were obtained using the A75–80 Male Age Nearest Birthday Table.

STEP 2—ESTABLISH THE SELECT PERIODS

Based on expected underwriting experience, the following select periods are used:

- a. A 15-year select period at issue age 70, decreasing by one every year until issue age 78 (7-year select period).
- b. A 6-year select period for issue ages 79 and 80.
- c. A 5-year select period for issue ages 81 and 82.
- d. A 4-year select period for issue ages 83, 84, and 85.
- e. A 3-year select period for issue ages 86 to 90.

STEP 3—DEVELOP THE RATIOS FOR ISSUE AGES 71 TO 90

Duration 1

The ratios are obtained by linear interpolation between the following expected ratios:

Issue Age	Ratio
70	0.45
83	0.60
88–90	0.85

Duration 2

The midpoint between duration 1 and duration 3 is used.

Duration 3

An expected ratio of 0.95 is used for issue ages 88 to 90. Then, a linear interpolation is done between the issue ages 70 and 88.

Durations 4-5

The ratios are obtained by linear interpolation from issue age 70 down to the first issue age for that duration that uses the ultimate rate.

Durations 6-15

The ratios are obtained by linear interpolation from the attained age 75 diagonal down to the first issue age for that duration that uses the ultimate rate.

Finally, some manual changes are made to smooth the ratios. These ratios can be found in Table F-1.

When the final ratios are attached to the A75-80 ratios below age 70, the transition is not smooth. A smoother transition can be obtained by changing some of the ratios in the triangle formed by the attained age 75 diagonal and issue age 70. See Tables F-2 and F-3.

Please note, however, for purposes of the Mortality Study the existing A75-80 tables are used for issue ages 70 and lower.

STEP 4—CALCULATE MORTALITY RATES

To obtain the extended q_x :

$$q_{[x]+t} = \text{Ratio}_{[x]+t} * q_{x+t}^{\text{Ultimate}}$$

The same ratios are applied to obtain the Male Age Nearest Birthday (Table F-4) and the Female Age Nearest Birthday (Table F-5).

In the 1990 study, the ultimate attained age is 100. Extension to attained age 105 uses the constant difference pattern implicit in the values at age 100 and immediately prior.

STEP 5—AGE LAST BIRTHDAY

The Age Last Birthday tables are obtained using the following formulas:

Select

$$q_{[x]+t}^{\text{last}} = \frac{q_{[x]+t}^{\text{nearest}} + q_{[x+1]+t}^{\text{nearest}}}{2}$$

Ultimate

$$q_{x+t}^{\text{last}} = \frac{q_{x+t}^{\text{nearest}} + q_{x+1+t}^{\text{nearest}}}{2}$$

For issue age 90:

$$q_{[90]+t}^{\text{last}} = \frac{q_{[90]+t}^{\text{nearest}}}{q_{[89]+t}^{\text{nearest}}} \times q_{[89]+t}^{\text{last}}$$

The Male Age Last Birthday and Female Age Last Birthday tables can be found in Tables F-6 and F-7, respectively.

TABLE F-4

MORTALITY RATES—MALE AGE NEAREST BIRTHDAY

Issue Age	Duration																Attained Age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
71	9.53	14.60	19.60	24.97	29.44	34.32	41.78	48.80	57.45	65.58	74.61	84.52	95.47	107.84	121.31	132.05	86
72	11.40	16.64	22.87	28.77	34.15	39.89	48.34	56.16	65.58	74.61	84.52	95.39	107.67	121.31	132.05	143.63	87
73	13.52	19.13	26.61	33.20	39.52	46.21	55.72	64.40	74.61	84.52	95.39	107.62	121.31	132.05	143.63	156.05	88
74	15.94	22.46	30.70	38.25	45.60	53.35	64.01	73.58	84.52	95.39	107.62	121.31	132.05	143.63	156.05	169.12	89
75	18.71	26.26	35.35	43.95	52.45	61.35	73.23	83.67	95.39	107.62	121.31	132.05	143.63	156.05	169.12	182.61	90
76	21.88	30.62	40.61	50.35	60.12	70.26	83.39	94.78	107.62	121.31	132.05	143.63	156.05	169.12	182.61	196.52	91
77	25.51	34.90	46.52	57.51	68.66	80.09	94.57	107.29	121.31	132.05	143.63	156.05	169.12	182.61	196.52	210.85	92
78	29.63	40.42	53.12	65.47	78.04	90.90	107.18	121.31	132.05	143.63	156.05	169.12	182.61	196.52	210.85	225.60	93
79	34.65	46.62	60.45	74.20	88.36	103.10	121.31	132.05	143.63	156.05	169.12	182.61	196.52	210.85	225.60	240.77	94
80	40.30	53.54	68.50	83.78	99.99	116.79	132.05	143.63	156.05	169.12	182.61	196.52	210.85	225.60	240.77	256.36	95
81	46.63	61.18	77.33	94.56	113.02	132.05	143.63	156.05	169.12	182.61	196.52	210.85	225.60	240.77	256.36	272.37	96
82	53.65	69.60	87.27	106.64	127.54	143.63	156.05	169.12	182.61	196.52	210.85	225.60	240.77	256.36	272.37	288.80	97
83	61.41	79.10	98.40	120.07	143.63	156.05	169.12	182.61	196.52	210.85	225.60	240.77	256.36	272.37	288.80	305.65	98
84	72.42	89.77	110.78	134.94	156.05	169.12	182.61	196.52	210.85	225.60	240.77	256.36	272.37	288.80	305.65	322.92	99
85	84.92	104.32	124.48	151.33	169.12	182.61	196.52	210.85	225.60	240.77	256.36	272.37	288.80	305.65	322.92	340.61	100
86	99.04	117.78	139.58	169.12	182.61	196.52	210.85	225.60	240.77	256.36	272.37	288.80	305.65	322.92	340.61	358.72	101
87	114.90	134.20	155.97	182.61	196.52	210.85	225.60	240.77	256.36	272.37	288.80	305.65	322.92	340.61	358.72	377.25	102
88	132.64	152.21	173.48	196.52	210.85	225.60	240.77	256.36	272.37	288.80	305.65	322.92	340.61	358.72	377.25	396.20	103
89	143.75	164.35	186.69	210.85	225.60	240.77	256.36	272.37	288.80	305.65	322.92	340.61	358.72	377.25	396.20	415.57	104
90	155.22	176.87	200.31	225.60	240.77	256.36	272.37	288.80	305.65	322.92	340.61	358.72	377.25	396.20	415.57	435.36	105

TABLE F-5

MORTALITY RATES—FEMALE AGE NEAREST BIRTHDAY

Issue Age	Duration																Attained Age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
71	5.01	7.70	10.44	13.52	16.24	19.36	24.15	28.95	35.02	41.07	47.96	55.76	64.57	74.44	85.13	93.91	86
72	6.01	8.87	12.38	15.87	19.26	23.05	28.68	34.23	41.07	47.96	55.76	64.51	74.32	85.13	93.91	103.24	87
73	7.20	10.35	14.68	18.73	22.84	27.42	33.97	40.33	47.96	55.76	64.51	74.28	85.13	93.91	103.24	113.12	88
74	8.63	12.39	17.32	22.10	27.06	32.52	40.08	47.30	55.76	64.51	74.28	85.13	93.91	103.24	113.12	123.55	89
75	10.32	14.81	20.43	26.07	31.97	38.41	47.07	55.20	64.51	74.28	85.13	93.91	103.24	113.12	123.55	134.53	90
76	12.34	17.69	24.09	30.69	37.65	45.16	55.01	64.10	74.28	85.13	93.91	103.24	113.12	123.55	134.53	146.06	91
77	14.74	20.71	28.36	36.01	44.13	52.83	63.96	74.06	85.13	93.91	103.24	113.12	123.55	134.53	146.06	158.14	92
78	17.58	24.64	33.26	42.08	51.48	61.48	73.98	85.13	93.91	103.24	113.12	123.55	134.53	146.06	158.14	170.77	93
79	21.12	29.19	38.86	48.95	59.76	71.17	85.13	93.91	103.24	113.12	123.55	134.53	146.06	158.14	170.77	183.95	94
80	25.23	34.42	45.19	56.66	69.02	81.96	93.91	103.24	113.12	123.55	134.53	146.06	158.14	170.77	183.95	197.68	95
81	29.98	40.36	52.30	65.27	79.31	93.91	103.24	113.12	123.55	134.53	146.06	158.14	170.77	183.95	197.68	211.96	96
82	35.39	47.07	60.24	74.83	90.70	103.24	113.12	123.55	134.53	146.06	158.14	170.77	183.95	197.68	211.96	226.79	97
83	41.53	54.60	69.05	85.39	103.24	113.12	123.55	134.53	146.06	158.14	170.77	183.95	197.68	211.96	226.79	242.17	98
84	49.99	63.00	78.78	97.00	113.12	123.55	134.53	146.06	158.14	170.77	183.95	197.68	211.96	226.79	242.17	258.10	99
85	59.59	74.19	89.47	109.70	123.55	134.53	146.06	158.14	170.77	183.95	197.68	211.96	226.79	242.17	258.10	274.58	100
86	70.43	84.66	101.18	123.55	134.53	146.06	158.14	170.77	183.95	197.68	211.96	226.79	242.17	258.10	274.58	291.61	101
87	82.59	97.28	113.94	134.53	146.06	158.14	170.77	183.95	197.68	211.96	226.79	242.17	258.10	274.58	291.61	309.19	102
88	96.15	111.20	127.80	146.06	158.14	170.77	183.95	197.68	211.96	226.79	242.17	258.10	274.58	291.61	309.19	327.32	103
89	105.02	121.08	138.76	158.14	170.77	183.95	197.68	211.96	226.79	242.17	258.10	274.58	291.61	309.19	327.32	346.00	104
90	114.35	131.45	150.23	170.77	183.95	197.68	211.96	226.79	242.17	258.10	274.58	291.61	309.19	327.32	346.00	365.23	105

TABLE F-6

MORTALITY RATES—MALE AGE LAST BIRTHDAY

Issue Age	Duration																Attained Age																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																				
71	10.47	15.62	21.23	26.87	31.79	37.10	45.06	52.48	61.52	70.10	79.56	89.95	101.57	114.58	126.68	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	86
72	12.46	17.88	24.74	30.99	36.83	43.05	52.03	60.28	70.10	79.56	89.95	101.50	114.49	126.68	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	87	
73	14.73	20.79	28.66	35.72	42.56	49.78	59.87	68.99	79.56	89.95	101.50	114.47	126.68	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	88		
74	17.32	24.36	33.02	41.10	49.03	57.35	68.62	78.63	89.95	101.50	114.47	126.68	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	89			
75	20.30	28.44	37.98	47.15	56.29	65.81	78.31	89.23	101.50	114.47	126.68	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	90				
76	23.70	32.76	43.56	53.93	64.39	75.18	88.98	101.03	114.47	126.68	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	91					
77	27.57	37.66	49.82	61.49	73.35	85.50	100.87	114.30	126.68	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	92						
78	32.14	43.52	56.79	69.83	83.20	97.00	114.24	126.68	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	93							
79	37.47	50.08	64.48	78.99	94.18	109.95	126.68	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	94								
80	43.47	57.36	72.91	89.17	106.51	124.42	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	95									
81	50.14	65.39	82.30	100.60	120.28	137.84	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	96										
82	57.53	74.35	92.83	113.35	135.58	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	97											
83	66.91	84.44	104.59	127.51	149.84	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	98												
84	78.67	97.04	117.63	143.14	162.59	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	99													
85	91.98	111.05	132.03	160.23	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	100														
86	106.97	125.99	147.77	175.87	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	101															
87	123.77	143.21	164.72	189.57	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	102																
88	138.20	158.28	180.09	203.69	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	103																	
89	149.49	170.61	193.50	218.23	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	104																		
90	161.41	183.60	207.61	233.19	248.57	264.37	280.59	297.23	314.29	331.77	349.67	367.99	386.73	405.89	425.47	445.47	105																			

TABLE F-7

MORTALITY RATES—FEMALE AGE LAST BIRTHDAY

Issue Age	Duration																Attained Age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
71	5.51	8.28	11.41	14.70	17.75	21.20	26.41	31.59	38.04	44.51	51.86	60.13	69.44	79.78	89.52	98.58	86
72	6.61	9.61	13.53	17.30	21.05	25.24	31.32	37.28	44.51	51.86	60.13	69.40	79.72	89.52	98.58	108.18	87
73	7.92	11.37	16.00	20.42	24.95	29.97	37.02	43.81	51.86	60.13	69.40	79.71	89.52	98.58	108.18	118.34	88
74	9.47	13.60	18.87	24.09	29.51	35.47	43.58	51.25	60.13	69.40	79.71	89.52	98.58	108.18	118.34	129.04	89
75	11.33	16.25	22.26	28.38	34.81	41.79	51.04	59.65	69.40	79.71	89.52	98.58	108.18	118.34	129.04	140.30	90
76	13.54	19.20	26.22	33.35	40.89	49.00	59.49	69.08	79.71	89.52	98.58	108.18	118.34	129.04	140.30	152.10	91
77	16.16	22.67	30.81	39.05	47.81	57.16	68.97	79.59	89.52	98.58	108.18	118.34	129.04	140.30	152.10	164.46	92
78	19.35	26.92	36.06	45.51	55.62	66.32	79.55	89.52	98.58	108.18	118.34	129.04	140.30	152.10	164.46	177.36	93
79	23.18	31.80	42.02	52.80	64.39	76.56	89.52	98.58	108.18	118.34	129.04	140.30	152.10	164.46	177.36	190.82	94
80	27.61	37.39	48.74	60.97	74.17	87.93	98.58	108.18	118.34	129.04	140.30	152.10	164.46	177.36	190.82	204.82	95
81	32.68	43.71	56.27	70.05	85.01	98.58	108.18	118.34	129.04	140.30	152.10	164.46	177.36	190.82	204.82	219.38	96
82	38.46	50.83	64.64	80.11	96.97	108.18	118.34	129.04	140.30	152.10	164.46	177.36	190.82	204.82	219.38	234.48	97
83	45.76	58.80	73.91	91.19	108.18	118.34	129.04	140.30	152.10	164.46	177.36	190.82	204.82	219.38	234.48	250.14	98
84	54.79	68.59	84.13	103.35	118.34	129.04	140.30	152.10	164.46	177.36	190.82	204.82	219.38	234.48	250.14	266.34	99
85	65.01	79.42	95.33	116.62	129.04	140.30	152.10	164.46	177.36	190.82	204.82	219.38	234.48	250.14	266.34	283.10	100
86	76.51	90.97	107.56	129.04	140.30	152.10	164.46	177.36	190.82	204.82	219.38	234.48	250.14	266.34	238.10	300.40	101
87	89.37	104.24	120.87	140.30	152.10	164.46	177.36	190.82	204.82	219.38	234.48	250.14	266.34	283.10	300.40	318.26	102
88	100.58	116.14	133.28	152.10	164.46	177.36	190.82	204.82	219.38	234.48	250.14	266.34	283.10	300.40	318.26	336.66	103
89	109.68	126.27	144.50	164.46	177.36	190.82	204.82	219.38	234.48	250.14	266.34	283.10	300.40	318.26	336.66	355.62	104
90	119.43	137.09	156.45	177.36	190.82	204.82	219.38	234.48	250.14	266.34	283.10	300.40	318.26	336.66	355.62	375.12	105