



CYPRUS ASSOCIATION OF ACTUARIES

Investigation on the mortality of insured lives under individual policies in Cyprus

Coordinators:

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Introduction

This is the first investigation carried out by the Cyprus Association of Actuaries (CAA) on the mortality of assured lives under individual policies in Cyprus and it is expected to be the first of a series of mortality investigations to take place in the coming years. In addition to these, the CAA will proceed with experience reviews for Motor Insurance and Accident & Health insurance classes. A primary objective of these investigations is to identify differences in the experience between men and women.

The investigation was conducted by the Cyprus Association of Actuaries (CAA) with data gathered from life insurers operating in Cyprus.

Investigation Profile

Scope of study

Assured Lives covered under individual policies in Cyprus

Period of investigation

01.01.2004 – 31.12.2006

Ages Covered

15 – 65 (Attained age)

Participating Insurers

10 out of 11 life insurers operating in Cyprus (total market share 96%)

Data

Data was collected for all individual policies from each of the major categories of individual life assurance business. These are linked and non-linked business, including temporary and whole life. In order to maximise the data, all types of policies were combined for the purpose of this investigation.

The data collected by the CAA from each company consists of tables showing the number of insured lives at the end of each year (2003 – 2006) and the number of deaths occurred during that period. The data was also split between males and females for both 'assured lives' and 'insured amounts' bases.

The data did not contain any further detail such as cause of death, type of policy, duration etc., since this would lead to subdivision to other smaller size groups of

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data. In addition, every effort has been made to ensure that duplication of policies and deaths is avoided and do not distort the investigation.

Methodology

The aim was to produce two different sets of rates: A set of age related mortality rates and a set of crude unit death rates.

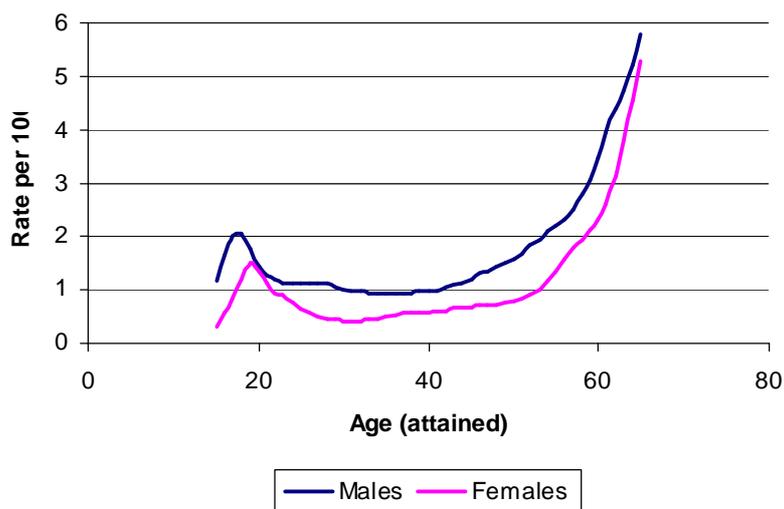
As far as the age related mortality rates, the exposed to risk lives for each age were calculated using the census method as the total of all lives insured during the 3 years investigation period. The number of deaths for each age group and sex during the same period was divided by the exposed to risk lives in order to derive the mortality rate. A smoothing process was carried out for the age related rates to remove high fluctuations caused either by the small number of deaths or the small size of the insured population in some ages.

As far as the crude unit death rates, the number of deaths during each calendar year was divided by the average number of insured lives during that year, i.e. the average of insured lives at beginning and end of year.

Results

The age related mortality rates curves for males and females derived from the investigation and also the respective Age Distribution are shown in Graphs 1 and 2 below. The rates supporting Graph 1 are shown in Appendix 1. The number of policies in-force at end of each year, the number of deaths in each year and the Crude Unit Death rates separately for males and females are shown in Table 1 below.

Graph 1 – Age related mortality rates





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Graph 2 – Age Distribution

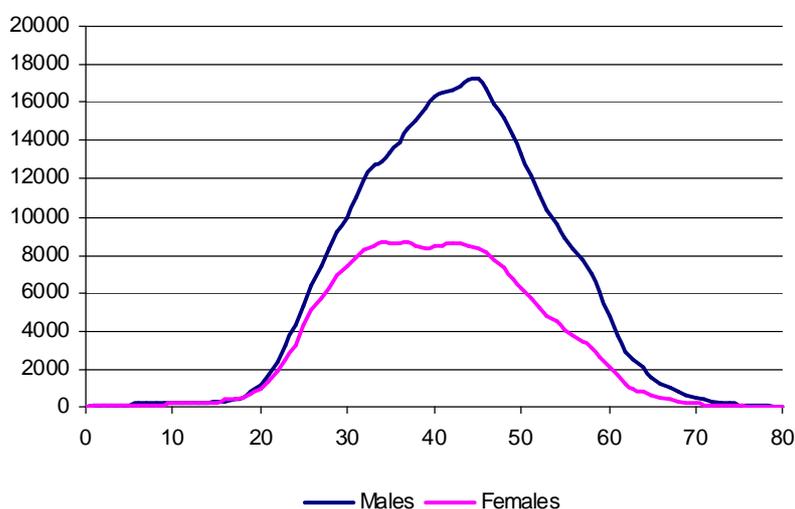


Table 1

Total Number of policies in force at year end

	<u>31/12/2003</u>	<u>31/12/2004</u>	<u>31/12/2005</u>	<u>31/12/2006</u>
Males	157,231	155,044	155,236	155,376
Females	86,909	86,152	86,684	87,534
Both	244,140	241,196	241,920	242,910

Deaths occurred during the year

	<u>2004</u>	<u>2005</u>	<u>2006</u>
Males	259	258	201
Females	67	77	69
Both	326	335	270

Crude Unit Death Rates (per thousand lives)

	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>3 yrs rate</u>
Males	1.66	1.67	1.29	1.54
Females	0.77	0.89	0.79	0.82
Both	1.34	1.39	1.11	1.28

Observations

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- (1) The crude death unit rate for assured lives under individual policies (ignoring ages) for all 3 years together, is 1.28 per mille. The respective rate for males only is 1.54 per mille and for females 0.82 per mille. Based on these result, **the crude unit rate for females is about 53% of that derived for males.**
- (2) In terms of the age specific mortality rates, male mortality appears to be consistently higher than female rates under all ages. The mortality rates table produced for both males and females (aggregate rates) are, on a weighted average basis, about 64% of the UK mortality table A67/70. **The mortality rates produced for females only are, again on a weighted average basis, about 57% of the respective male rates,** whereas the males only rates are about 74% of the A67/70 rates.
Note: The A67/70 table is, as of today, the most common table used as basis for life insurance pricing in Cyprus.
- (3) Compared to table A67/70 the mortality curve for males and females is more flat shaped, i.e. there are higher mortality rates at younger ages and lower rates at higher ages.
- (4) Compared to the same table, the hump at ages 18-23 appears to be steeper demonstrating the high frequency of fatal claims due to accidents at young ages in Cyprus.
- (5) The number of insured during the 3 years study period was pretty much stable, with an average of 242,542 insured (ages 1-75) from which 155,722 were males and 86,820 females. The above number of insured persons is about 33% of the total population in the non-occupied areas within ages 1-75 (722,000). The respective numbers for ages 15-65 are 240,000 for assured lives (based on our data) and 531,000 for the total population (again in the non-occupied areas), which brings this rate to 45%. The rate can even be higher, i.e. to 66%, if we take in consideration that the occupationally active population in Cyprus is about 360,000. The average age of females assured is around 39, while for males it is around 44.
- (6) The average Sum Insured was 24,700 in 2004 for males & females together and 26,700 for males only and 21,100 for females only. The respective figures for 2005 and 2006 were average Sum Insured of 26,700 for males & females together and 28,900 for males only and 22,900 for females only for 2005 and average Sum Insured of 29,200 for males & females together and 31,500 for males only and 25,100 for females only for 2006. Thus, there was an increase in average sum assured of 8% in 2005 and 9% in 2006.
- (7) The number of deaths was 326 in 2004, 335 in 2005 (which include 55 deaths from the Helios Airline accident) and 270 in 2006. The average number of deaths for the 3 years together was 310 for males & females together, 239

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for males only and 71 for females only. The average number of deaths for assured lives is about 15% of the deaths from the total population for ages 1-75, i.e. 2072 deaths.

(8) The average Death Claim fluctuated during the investigation period as follows:

	<u>2004</u>	<u>2005</u>	<u>2006</u>
Males	23,300	20,800	25,900
Females	17,600	19,600	25,300
Aggregate	22,100	20,600	25,700

It appears that there was a drop in average death claim of -7% in 2005, while in the following year there was a high increase of about +25%. This is probably due to the fact that some Companies may have included term or PA riders death claims in the sums assured in year 2006, while in 2005 they did not. Nevertheless, this did not affect the results and the burning cost unit rates based on sums assured for the period under investigation followed the same structure as that of the crude unit death rates based on number of deaths, i.e. the experience for females was always better and on the average it was around 60% of the experience of males.

Weaknesses of the study

The total exposed to risk assured lives for the 3 years together was 726,641 and the respective total number of deaths experienced was 931. Clearly this is a small statistical sample for a mortality investigation, and the rates produced cannot be used for pricing purposes.

Also, the pooling of data from different companies and from different product lines means that it is possible that a certain degree of heterogeneity is involved in the results.

These issues however are not expected to be a distorting factor for the crude observations made in the investigation.



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The Council of the Cyprus Association of Actuaries would like to thank the following life insurance companies for taking part in the study: Alico, Alpha, Allianz, Cyprialife, Ethniki, Eurolife, Interlife, Minerva, and Universal Life.

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Appendix 1

Resulted rates (before smoothing)			Rates used in Chart (after smoothing)		
Age	Males	Females	Age	Males	Females
15	1.1468	0.0000	15	1.1663	0.2860
16	2.0040	0.0000	16	1.6500	0.5516
17	2.3256	0.7596	17	2.0000	0.8015
18	2.2962	1.1976	18	2.0500	1.2000
19	1.9747	1.7982	19	1.7500	1.5000
20	1.6302	1.3093	20	1.4000	1.3500
21	1.1412	1.0969	21	1.2500	1.1000
22	1.0845	0.9498	22	1.1855	0.9500
23	1.1028	0.9150	23	1.1301	0.9100
24	1.0808	0.8959	24	1.1060	0.7521
25	1.0595	0.5540	25	1.1018	0.6435
26	1.0447	0.5289	26	1.1133	0.5448
27	1.2196	0.4073	27	1.1152	0.4910
28	1.2028	0.4210	28	1.1125	0.4537
29	1.1277	0.4355	29	1.0550	0.4357
30	0.9634	0.4053	30	1.0141	0.4225
31	0.9728	0.4661	31	0.9817	0.4260
32	0.8139	0.4462	32	0.9558	0.4277
33	0.9582	0.3536	33	0.9190	0.4433
34	0.9225	0.4277	34	0.9351	0.4585
35	1.0426	0.4262	35	0.9391	0.4971
36	0.8799	0.6587	36	0.9283	0.5238
37	0.8464	0.5825	37	0.9243	0.5523
38	0.9896	0.5873	38	0.9362	0.5490
39	0.9342	0.5129	39	0.9547	0.5597
40	0.9678	0.5529	40	0.9567	0.5696
41	0.8693	0.5097	41	0.9832	0.5888
42	1.0998	0.5860	42	1.0287	0.5992
43	1.0676	0.6648	43	1.0896	0.6551
44	1.0738	0.6867	44	1.1256	0.6769
45	1.1335	0.6794	45	1.2112	0.6857
46	1.3417	0.7410	46	1.3020	0.6976
47	1.4428	0.6044	47	1.3554	0.7176
48	1.4999	0.7367	48	1.4049	0.7033
49	1.4506	0.6903	49	1.4923	0.7348
50	1.4357	0.8001	50	1.5766	0.7645
51	1.5022	0.8095	51	1.6706	0.8015
52	1.7534	0.8575	52	1.8088	0.8770
53	2.2778	0.8937	53	1.9440	1.0083
54	2.2508	1.0502	54	2.0907	1.1593
55	2.1179	1.3043	55	2.1878	1.3564
56	2.0932	1.7699	56	2.3069	1.5713
57	2.4602	1.9221	57	2.5038	1.7771
58	2.7318	2.0444	58	2.7840	1.9511
59	3.0105	2.0257	59	3.0507	2.1211
60	3.2704	2.1865	60	3.4592	2.3197
61	4.3371	2.6181	61	3.9665	2.6051
62	4.9153	2.8497	62	4.4013	3.1437
63	4.7981	3.3031	63	4.7433	3.7913
64	5.0749	4.1356	64	5.2289	4.5457
65	5.5774	5.7797	65	5.7805	5.3053

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