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Individual Life Experience Committee Completes 2005-2007 Mortality Study

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Mortality for Standard Individually Underwritten Life Insurance Between 2005 and 2007 Policy Anniversaries" is the latest report of the Individual Life Experience Committee (ILEC). The report and underlying data in pivot table format can be located at www.soa.org/research/individual-life/2005-2007-ind-life-report.aspx. The overall actual-to-expected ratio in the 25-year select period using the 2001 Valuation Basic Tables is 66.3 percent by face amount and 80.6 percent by policy count. The five-year change in select period mortality ratios is an average annual decrease of 3.3 percent on a common company basis. Overall results for companies with the highest actual-to-expected ratios range from about 155 percent to 200 percent of the results for companies with the lowest ratios. The purpose of this article is to briefly give further background on the ILEC and then provide additional highlights of this latest report.

The Individual Life Experience Committee (ILEC) is the Society of Actuaries committee responsible for publishing intercompany mortality studies. The committee consists of members generally with significant background at designing and analyzing mortality studies. Underwriters are also included as their input is valuable in providing insight on how trends in underwriting influence results. The group seeks diverse perspectives with representatives from direct writers, reinsurers and consulting firms. The processing and collection of the data is handled by the MIB with oversight from the SOA and ILEC. Therefore, representatives from SOA and MIB participate in ILEC meetings and will guide and make decisions related to the data processing with cost and timing always as key considerations. The chairperson of the committee is Rick Bergstrom and Sharon Brody is the vice chairperson.

The report includes policy anniversary to policy anniversary mortality experience for 2005–2007, a two-year study period. Thirty-nine companies contributed data to the SOA for the 2005–2007 study period. The face amount exposure is about $8.8 trillion and the number of deaths is 209,089 in the select period (policy years 1–25) in this two-year study. Consistent with prior reports, the study was performed on a gross basis without consideration of reinsurance. Although the study is designed to include only individually underwritten life insurance and excludes rated, converted, and other guaranteed or simplified issued business as indicated by the individual company data submissions, high mortality ratios, particularly at the lower face amount bands for recent issues, suggests that the data may include policies that are not fully underwritten. Policies in force under non-forfeiture provisions are also excluded.

The reader is cautioned in any direct application of results in the summary text or appendices as they are generally presented in a one dimensional view. Results can be influenced by the distributions within the one dimensional view, e.g., by face amounts, issue ages, and policy durations. The user is encouraged to use the detailed Excel pivot tables that accompany the study in order to examine multi-dimensional views relevant to the user.

The report has several enhancements from the prior study including details on company variability, five years of common company experience (three years only for preferred experience), product details, and introduction of the 2008 VBT as an expected basis in addition to the 2001 VBT and 75–80 basic tables.

SELECT PERIOD RESULTS

Overall, all company mortality experience in the 25-year select period is as follows:

Study Period			
	2002-04	2004-05	2005-07
By Face Amount	71.5%	67.4%	66.3%
By Policy	88.2%	82.7%	80.6%

Comparing common company vs. all company mortality experience (by amount), the individual study-year ratios are as follows:

Study Period					
	2002-03	2003-04	2004-05	2005-06	2006-07
All Companies	72.9%	70.3%	67.4%	66.9%	65.8%
Common Companies	73.9%	71.2%	68.9%	65.3%	64.7%

Of note, the five-year change in mortality ratios is 64.7percent/73.9 percent = 87.5 percent (for an average annual decrease of 3.3 percent) on a common company basis but only 65.8 percent/72.9 percent = 90.2 percent (for an average annual decrease of 2.5 percent) on the all company basis. Although the common com-

pany results can be viewed as a more reliable indicator of trends in overall reductions in mortality ratios as this measure removes the impact on experience of changes in the list of participating companies, other factors, such as changes in the relative contributions of the common companies and the mix of business in each year can influence results.

The A/E ratio (by amount) for females is generally slightly higher than for males and the average annual decrease is lower. (See table 1 on pg. 31)

Additionally, we see that the substantial overall reductions in mortality ratios vary considerably by the combination of gender and smoker status, with the largest reduction for male nonsmokers, and the smallest reduction for female nonsmokers.

The smoker status mortality ratios (by amount) as a percentage of the corresponding 2001 VBT are as follows. (see table 2 on pg. 31)

The A/Es by face amount are generally significantly lower than A/Es by policy count. This is primarily due to the impact of significantly poorer mortality experience of smaller size policies. These differences largely go away when comparing groups with a similar mix of business by face amount.

By issue age, A/E ratios (by amount) drop significantly after age 24, with age 25+ A/E ratios ranging from 61.5 percent – 83.2 percent with a spike in age 70 – 79 (72.2 percent excluding issue age band 70 – 79). At ages below 25, A/E ratios range from 68.6 percent – 100.5 percent.

Mortality ratios are 52.5 percent and 56.9 percent (by amount) in durations one and two respectively, increasing to the 68.8 percent – 70.7 percent range at durations three – five. Ratios drop to the 63.4 percent – 67.6 percent range at durations six – 20, and increase to 70.5 percent at select durations 21– 25.

The reader is encouraged to drill further into multidimensional views via manipulation of the pivot table to find other distinctive patterns. However, the reader is

Table 1						
		2002-03	2003-04	2004-05	2005-06	2006-07
All Companies	Male	72.6%	69.5%	67.0%	66.1%	64.2%
	Female	73.8%	72.3%	68.6%	69.2%	70.2%
Common Companies	Male	73.9%	71.6%	67.9%	63.7%	62.7%
	Female	73.9%	70.4%	71.5%	69.7%	70.2%

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also cautioned that large numbers of deaths are required for highly credible mortality statistics and as the data gets split into more dimensions, the resulting smaller cells have less credibility.

One example of a distinct pattern is for male policies below $500,000, the A/E ratios (by amount) exhibit a "U" shape with respect to issue age with the lowest ratios in the very narrow range 66.1 percent – 68.7 percent at issue ages 30 – 59. As with the female-to-male relationship discussed above, the source of such relationships can often be traced to the distribution of business. In this instance, one contributing factor to the significantly higher A/E ratios at issue ages below 25 is the smaller size policies issued at these ages.

A second example, by sex and insurance plan, shows that although male ratios are lower than female ratios for all plans combined, the male ratios exceed the female ratios for Term and VUL plans. This suggests

that further analysis should be done to determine if product category is a consideration in setting mortality assumptions.

A third example, by gender and issue age, shows that although male ratios are moderately lower than female ratios for all issue ages combined, the male ratios are considerably higher than the female ratios at issue ages below 30, and considerably lower (especially for smokers) at issue ages 70+. If credible, these differences may be an important consideration in the setting of higher issue age premiums (assuming the 2001 VBT is the assumed mortality table basis).

The report contains some experience summaries by quintile for each of the eight combinations of gender, smoking status and policies with face amounts under $100,000 and $100,000 and over. For a given combination, companies were assigned to a quintile based on their overall actual-to-expected ratio for that gender/

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Table 2						
		2002-03	2003-04	2004-05	2005-06	2006-07
All Companies	Nonsmoker	69.9%	66.9%	64.3%	63.6%	63.1%
	Smoker	84.6%	85.4%	83.5%	83.0%	80.8%
	Unknown Status	84.9%	85.5%	83.1%	79.9%	77.2%
Common Companies	Nonsmoker	70.6%	67.3%	65.0%	62.0%	62.2%
	Smoker	86.4%	87.8%	87.2%	82.8%	79.4%
	Unknown Status	85.1%	85.3%	81.9%	77.1%	73.6%

Table 3
A/E Ratios by Amount and Quintile
Durations 1-25 Only
(Expected Basis = 2001 VBT)

Face Amount	Gender	Smoking Status	A/E Ratio					
			1	2	3	4	5	All
<$100k	Male	NS	63.3%	74.6%	78.5%	82.9%	105.8%	75.9%
		S	81.7%	88.7%	98.4%	107.4%	128.8%	91.9%
	Female	NS	55.1%	67.9%	72.3%	78.6%	90.4%	71.6%
		S	74.9%	87.0%	89.6%	104.4%	117.2%	89.0%
>=$100k	Male	NS	48.1%	58.0%	62.4%	69.4%	76.2%	59.5%
		S	54.6%	69.0%	79.1%	84.9%	106.2%	76.6%
	Female	NS	47.1%	58.7%	64.4%	68.6%	87.0%	65.6%
		S	57.1%	72.7%	81.0%	87.0%	113.9%	78.4%

smoking status/size combination. Table 3 on pg. 32 summarizes the overall actual-to-expected ratios by quintile grouping of the companies for each of the eight combinations. The quintile is determined separately for male non-smokers for policies with face amounts less than $100,000, male non-smokers for policies with face amounts $100,000 and greater, female non-smokers for policies with face amounts less than $100,000, and female non-smokers for policies with face amounts $100,000 and greater. The range of actual-to-expected ratios is quite broad.

ULTIMATE PERIOD RESULTS

Overall for 2005 – 2007, the A/E ratio (by amount) in the ultimate period (durations 26+) was 81.1 percent of

Table 4
$100-2,499k – Male/Female Combined – Issue Ages 25-79
Durations 1-10 Combined—Common Companies
(Expected Basis: 2001 VBT)

S/NS	# of Risk Classes	Risk Class	2004-2005			2005-2007		
			# of Deaths	A/E (by Amount)	Ratios of A/Es	# of Deaths	A/E (by Amount)	Ratios of A/Es
NS	2	1	913	53.8%	100%	1,654	53.7%	100%
		2	790	81.2	151	1,509	75.5	140
	3	1	287	46.2%	100%	730	44.5%	100%
		2	373	56.5	122	785	56.0	126
		3	547	81.8	177	1,225	76.1	171
S	2	1	265	76.3%	100%	493	62.3%	100%
		2	243	96.3	126	536	82.1	132

the 2001 VBT. Female ratios are significantly higher (88.8 percent versus 79.6 percent for males). Results by attained age show the highest A/E ratios for both males and females under age 50. At these ages, as well as female ages 90 and over, the ratios are often more than 100 percent. As they do in the select period, mortality ratios generally decrease by increasing face amount suggesting that some impact of underwriting may persist beyond the 25-year select period. For the 21 common companies, the mortality experience improved each year of the five-year period of 2002 – 07. The actual-to-expected ratios (by amount) were 90.7 percent, 88.4 percent, 84.8 percent, 81.3 percent and 78.9 percent, resulting in an average annual decrease of 3.4 percent. This yearly decrease in A/E was also evident across gender and in the majority of face amount bands.

RESULTS BY PREFERRED CLASS STRUCTURE

As was true for the 2004 – 2005 study, contributors to the 2005 – 2007 Intercompany Study were asked to provide information related to their preferred risk class structure. The study contains experience for two, three, or four non-smoker classes and two smoker classes. Thirty-five companies contributed preferred experience for 2005 – 06 and 2006 – 07 and one company contributed preferred experience to only one of the two study years. Twenty-three of the companies that contributed preferred experience for the 2004 – 05 study also contributed preferred experience for both the 2005 – 06 and 2006 – 07. These are referred to as the preferred "common companies." The preferred experience is for face amounts of $100,000 and up and issue ages 25 – 90. There is limited data beyond duration 10.

Overall ($100,000 – $2,499,999, durations one – 15, all companies, smoker/non-smoker and male/female combined), 2005 – 2007 actual-to-expected ratios (2001 VBT S/NS expected basis) for this block of multiple risk class business are 66.8 percent by policy and 63.5 percent by amount.

Table 4 provides some high-level comparisons for the 23 common companies of 2004 – 05 preferred experience to corresponding 2005 – 07 experience for two and three non-smoker classes. Differences in the ratios of A/Es between the best preferred and residual

		Durations 1-5		Durations 6-10	
Issue Ages	Description	# of Deaths	A/E	# of Deaths	A/E
25-39	Class 1	153	57.9%	365	55.0%
	Class 2	109	87.0	234	84.5
		Ratio of Class 2 A/E to Class 1 A/E			
	Ratio 2 to 1		1.50		1.54
40-59	Class 1	344	54.7%	815	52.1%
	Class 2	320	68.1	691	67.7
		Ratio of Class 2 A/E to Class 1 A/E			
	Ratio 2 to 1		1.24		1.30
60-79	Class 1	130	58.1%	254	57.5%
	Class 2	226	78.7	470	82.2
		Ratio of Class 2 A/E to Class 1 A/E			
	Ratio 2 to 1		1.35		1.43

Table 5
2005-2007 Experience by Amount—All Preferred Companies
$100-2,499k—Male/Female Combined—Durations 1-10—2 Nonsmoker Classes
(Expected Basis: 2001 VBT)

non-smoker classes appear to be somewhat less for the 2005 – 2007 experience study than for the 2004 – 2005 study. The opposite is true for smokers.

Tables 5 – 7 summarize experience by issue age band for durations one – five and six – 10 for two-class smoker and non-smoker experience and three-class non-smoker experience. Experience for durations after 10 was excluded because we cannot isolate the impact of lapse driven mortality anti-selection.

Relative mortality ratios provide a basis for preliminary observations about wearoff of preferred. It appears that:

• For issue ages 40 – 59, which have the most credible experience, there is not much preferred wearoff—relative mortality ratios for durations one – 5 and six – 10 are quite similar.
• Results are more volatile elsewhere.

Table 6
2005-2007 Experience by Amount—All Preferred Companies $100-2,499k—Male/Female Combined—Durations 1-10—2 Smoker Classes
(Expected Basis: 2001 VBT)

		Durations 1-5		Durations 6-10	
Issue Ages	Description	# of Deaths	A/E	# of Deaths	A/E
25-39	Class 1	97	58.3%	105	60.1%
	Class 2	77	79.8	59	64.5
		Ratio of Class 2 A/E to Class 1 A/E			
	Ratio 2 to 1		1.37		1.07
40-59	Class 1	245	64.1%	264	69.1%
	Class 2	248	81.7	230	83.4
		Ratio of Class 2 A/E to Class 1 A/E			
	Ratio 2 to 1		1.27		1.21
60-79	Class 1	47	48.8%	54	107.2%
	Class 2	79	90.9	85	133.9
		Ratio of Class 2 A/E to Class 1 A/E			
	Ratio 2 to 1		1.86		1.25

		Durations 1-5		Durations 6-10	
Table 7 **2005-2007 Experience by Amount—All Preferred Companies \$100-2,499k—Male/Female Combined—Durations 1-10—3 Nonssmoker Classes (Expected Basis: 2001 VBT)**					
Issue Ages	Description	# of Deaths	A/E	# of Deaths	A/E
25-39	Class 1	130	48.2%	140	50.5%
	Class 2	123	53.7	123	77.2
	Class 3	184	83.9	103	66.2
	Ratio of Class 2 or 3 A/E to Class 1 A/E				
	Ratio of 2 to 1		1.11		1.53
	Ratio of 3 to 1		1.74		1.31
40-59	Class 1	276	48.0%	304	40.1%
	Class 2	345	56.6	338	55.4
	Class 3	584	83.4	456	70.7
	Ratio of Class 2 or 3 A/E to Class 1 A/E				
	Ratio of 2 to 1		1.18		1.38
	Ratio of 3 to 1		1.74		1.76
60-79	Class 1	53	39.0%	102	53.4%
	Class 2	143	52.9	134	65.6
	Class 3	267	73.1	206	63.5
	Ratio of Class 2 or 3 A/E to Class 1 A/E				
	Ratio of 2 to 1		1.36		1.23
	Ratio of 3 to 1		1.87		1.19

The ILEC encourages further review of the report and appendices and hopes that many will take the time to explore the vast amount of mortality data contained within the Excel pivot tables.

There are four separate pivot tables organized in the following categories:
- all experience (2005 – 2007 all companies),
- all experience (2002 – 2007 common companies),
- preferred structure (2005 – 2007 all companies),
- preferred structure (2004 – 2007 common companies).

The committee has made great strides in both the timeliness and depth of the mortality studies and believes the study includes valuable information that companies can use to supplement their own internal mortality analysis.

The next mortality report will cover 2007 – 2009 policy anniversaries and the data collection for this study will be performed in 2010.

If you have questions about the report or next study, please contact Jack Luff (jluff@soa.org). ∎