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Is Regulation Driving Competition?

by Carolyn Cobb

"Most of the change we think we see in life is due to truths being in and out of favor."
— Robert Frost, *The Black Cottage* (1914)

I n the last "Reinsurance News," three prominent life reinsurer CEOs predicted the near-term future of the life reinsurance industry, each from a slightly different perspective. My perspective is a regulatory one. Reinsurance regulation is changing rapidly on every level—internationally, federally and at the NAIC. I see these oncoming changes shaping the future of the industry and determining the migration of capital and talent. In my opinion, now is the time for us to shape that regulation and our own future.

My argument is this: The reinsurance industry competes for capital. To do so effectively, it must pay investors a competitive return. If regulation—national, international or state—imposes frictional costs on reinsurers higher than those imposed on other financial sector participants, reinsurers will find it harder to pay a competitive return to investors and harder to attract capital over the long term. Since reinsurers' product is a form of capital, reinsurers must act forcefully—individually and collectively—to maintain the ability to win that competition by advocating regulation that lowers the frictional costs of regulation.

OVERVIEW

Cost of Capital: The Driver

According to the FDIC, the new Basel II capital requirements would let the most sophisticated banks recognize significant savings over their current capital requirements. Their current capital rules require all banks to hold $8 in capital for every $100 of commercial loans, regardless of the credit risk. Under Basel II, banks using the most advanced internal ratings system could hold between $0.37 and $4.45 of capital for each $100 of AAA-rated loans, between $1 and $14 for BBB-rated loans and between $4 and $42 for B loans. Basel II will be finalized this year and enforced starting in 2007.

Generalized Mortality Table Analysis

by Larry Warren

Editor's note: This article is a continuation of Larry Warren's previous article, "The Relationship of Mortality Projections and The Underlying Mortality Tables Used" ("Reinsurance News," Number 50, June 2002). If after reading this article, and/or after having reviewed the previous article, if you have any additional thoughts or comments, either in support of or with a differing point of view, no matter how long or short, please respond to me for possible inclusion in the next Reinsurance News. *Comments need to be completed and sent to dean_abbott@allianzlife.com by May 31, 2003, to be included in the next newsletter. (The June 2002 newsletter with Larry's previous article may be found in the Reinsurance Section of the Society of Actuaries' Web site, www.soa.org.)*

I n this article, we discuss the need to search for alternative mortality tables (other than the 1975-80 and 1990-95 tables), which may be more appropriate for a particular company or specific products. It must be recognized that differences or variations from company to company can exist in the following areas which impact future mortality patterns:

A. Underwriting Rules/Guidelines/Practices
Variations in underwriting rules/guidelines/and practices obviously impact future mortality patterns. While underwriting guidelines vary from company to company, the degree to which the underwriters adhere to these guidelines (i.e., are underwriting exceptions often made?) must also be considered.

B. Average Size of Policy (Face Amount)
The average face amount per life insured plays a dramatic role in the overall underwriting screening process. For example, two companies may have identical stringent underwriting guidelines, yet one company (Company A) may be writing policies with average face amounts in excess of $500,000, while another company (Company B) may be writing policies with face amounts averaging $100,000. Thus, the actual underwriting requirements being obtained from Company B would be very limited relative to Company A.

C. Distribution System

The nature of the distribution system of a company or for a particular product can have a significant impact on the degree of potential anti-selection of the policyholder.

D. Market Segment (Upscale, Middle America, etc.)

It is a well-known fact that the market segment has its own variation in mortality patterns, resulting from social, economic and cultural differences.

Traditionally, actuaries have been recognizing the impact of the above variations by utilizing scaling factors that were applied to the assumed underlying mortality table (i.e. 75-80 select/ultimate, 90-95 select/ ultimate, etc.). Higher scaling factors would normally be associated with less rigorous underwriting or higher risk classification (i.e. scaling factors for tobacco users exceed that for non tobacco users which exceeds that for preferreds).

I am proposing that in addition to utilizing scaling factors, we consider shortening the select period. It will be shown that even a modest decrease in the select period (e.g. two years) can have a major impact.

First-year select and ultimate mortality tables have typically been used as the starting point before applying scaling factors. Conceptually, first-year select mortality and the subsequent select mortality rates (e.g. years 2-15 in the 1975-80 select/ultimate table) would be representative of fully underwritten business. Ultimate mortality rates however, would be more reflective of business with minimal or no underwriting. Therefore, to the extent that the variations discussed above (i.e. underwriting, average size, distribution system and market segment) are properly recognized, the appropriate table to use should fall somewhere between a first-year select and ultimate table and a pure ultimate table. For example, the appropriate table may be to use a 13-year select period, thereby the starting point may be deemed the third year of the 15-year select period of the 7580 select/ultimate table. For purposes of analyzing the effect of this concept, we have developed the following new tables.

> # I am proposing that in addition to utilizing scaling factors, we consider shortening the select period.

Table A was constructed using a 13-year select period by shifting each issue age of our model office back two years and then starting with third-year select mortality of the 75-80 select/ultimate table.

Table B was constructed using an 11-year select period by shifting each issue age of our model office back four years and then starting with fifth-year select mortality of the 75-80 select/ ultimate table.

Table C was constructed using a 23-year select period by shifting each issue age of our model office back two years and then starting with third-year select mortality of the 90-95 select/ ultimate table.

Table D was constructed using a 21-year select period by shifting each issue age of our model office back four years and then starting with fifth-year select mortality of the 90-95 select/ultimate table.

The results of our analysis are shown in Exhibits 1, 2 and 3.

The relationships shown in Exhibit 1 on page 13 arise from differences in the ratio of the qx's (mortality rates) in the early years as compared to those in the later years.

For purposes of developing Exhibit 1, we assumed that a company had changed its underwriting guidelines/requirements three years ago. Therefore, we analyzed the mortality experience for all policies in their first, second and third durations. We started with a simple model using the assumption that a $10,000,000 face amount was issued each year for each issue age (25, 35, 45 and 55) and experiencing Linton "B" lapse rates (20 percent, 12 percent, 10 percent, 8.8 percent, 8 percent, etc.). We also formed a composite issue age by assuming the distribution of face amount by age was 15 percent, 35 percent, 35 percent and 15 percent for male issue ages 25, 35, 45 and 55 respectively.

We used the model to calculate actual to expected mortality ratios (for each mortality

table) for policies in their first three policy years. (Expected mortality was calculated applying lapse rates and multiplying the appropriate qx's to the face amount exposed in durations one through three). Actual mortality was arbitrarily assumed to equal 80 percent of the 1990-95 table. This assumption was totally arbitrary and has no impact on this analysis. Next, we calculated the 20-year present value of future claims (for a single year of issue, representing new business) using the qx's of each mortality table separately. That is, the actual to expected mortality ratio obtained by using the 1975-80

mortality table was applied to the 1975-80 mortality table in calculating the 20-year present value of claims, and analogously for the other mortality tables (i.e. tables A, B, C, D, 90-95 Select and Ultimate).

In Exhibit 1, Scenario 1, we find that for Table A, the present value of future claims is 16.6 percent lower than the 1975-80 Table and for Table B, 21.8 percent lower*.

In Scenario 2, using the 1990-95 table as a base, we find that the corresponding reductions

Exhibit 1: Relationship of Mortality Projections and the Underlying Mortality Tables For A Single Year of Issue

The relationships shown in Exhibit 1 arise from differences in the ratio of the qx's in the early years as compared to those in the later years.

	Scenario 1: Present Value of Future Claims * (based on the mortality experience of the first three policy years)						
	1	2	3	4=2/1	5=3/1	6	7
	males	based on	based on	ratio	reduction	reduction	reduction
issue	based on	table A	table B	table A	table B	table A	table B
age	75-80 table	(2-yr shift)	(4-yr shift)	(2-yr shift)	(4-yr shift)	(2-yr shift)	(4-yr shift)
25	$27,337	$27,337	$25,892	99.8%	94.7%	0.2%	5.3%
35	$54,334	$45,375	$44,736	83.5%	82.3%	16.5%	17.7%
45	$123,820	$100,759	$98,616	81.4%	79.6%	18.6%	20.4%
55	$370,761	$310,079	$275,793	83.6%	74.4%	16.4%	25.6%
comp.**	$122,069	$101,753	$95,426	83.4%	78.2%	**16.6%**	**21.8%**

	Scenario 2: Present Value of Future Claims * (based on the mortality experience of the first three policy years)						
	1	2	3	4=2/1	5=3/1	6	7
	males	based on	based on	ratio	reduction	reduction	reduction
issue	based on	table C	table D	table C	table D	table C	table D
age	90-95 table	(2 yr-shift)	(4 yr-shift)	(2 yr-shift)	(4 yr-shift)	(2 yr-shift)	(4 yr-shift)
25	$40,456	$34,887	$33,862	86.2%	83.7%	13.8%	16.3%
35	$63,082	$49,418	$43,693	78.3%	69.3%	21.7%	30.7%
45	$158,473	$125,167	$111,268	79.0%	70.2%	21.0%	29.8%
55	$377,786	$303,289	$283,282	80.3%	75.0%	19.7%	25.0%
comp.**	$140,281	$111,831	$101,808	79.7%	72.6%	**20.3%**	**27.4%**

* Based on a **single year of issue of $10 million face** amount for each age assuming Linton B lapses at 6% discount rate over a 20-year period.

** Using the distribution of 15%, 35%, 35%, 15% for ages 25, 35, 45, 55 respectively.

note:

The mortality experience underlying this analysis was arbitrarily chosen to equal 80% of the 90-95 Table. All ratios shown, however, are independent of this assumption.

Table A was constructed by shifting each issue age of our model office back two years and then starting with third-year select mortality of the 75-80 select/ultimate table.

Table B was constructed by shifting each issue age of our model office back four years and then starting with fifth-year select mortality of the 75-80 select/ultimate table.

Table C was constructed by shifting each issue age of our model office back two years and then starting with third-year select mortality of the 90-95 select/ultimate table.

Table D was constructed by shifting each issue age of our model office back four years and then starting with fifth-year select mortality of the 90-95 select/ultimate table.

are 20.3 percent and 27.4 percent for Tables C and D respectively.

It should be noted that all six tables are based on the same actual mortality.

The ranking in order of highest to lowest present value of future claims as follows:

	PV of Future Claims	Reduction in PV in Relation to 9--95 Select/Ultimate
1. 1990-95 Select/Ultimate	140,281	--
2. 1975-80 Select/Ultimate	122,069	13.0%
3. Table C	111,831	20.3%
4. Table D	101,808	27.4%
5. Table A	101,753	27.5%
6. Table B	95,426	32.0%

The vast differences from table to table in projected claims as shown above is extraordinary. It is of utmost importance that the actuary recognize the significant financial impact in his selection of the appropriate mortality table.

* If actual to expected mortality ratios were based on the first five policy years of experience, then the corresponding reductions would be 9.5 percent and 13.2 percent respectively.

It is not uncommon for actuaries to observe significantly decreasing ratios of actual to expected mortality and then wonder where all the mortality improvement is coming from and how long it will last. In my opinion, while some portion of the mortality improvement may be "legitimate," the other portion (perhaps the greater part) results from using an inappropriate mortality table. Exhibit 2 was therefore developed to display the relationship between the mortality tables and the phenomenon of perceived mortality improvements.

In Exhibit 2 on page 15, we arbitrarily assumed decreasing mortality ratios (100 percent grading down to 70 percent over five years) under the 1975-80 Select/Ultimate table. This assumption is

> **It is not uncommon for actuaries to observe decreasing ratios of actual to expected mortality and then wonder where all the mortality improvement is coming from…**

reflective of what would appear to be an effective annual compounded mortality improvement rate of 8.5 percent as shown in this exhibit. Under Table A, we were able to show that over the same five-year period using the same mortality assumption, that the annual mortality improvement rate was essentially non-existent (.4 percent). Using Table B, the annual mortality improvement rate is –2 percent, reflective of the fact that relative to Table B, the mortality ratios actually increased over this five-year period. It should be noted that similar results would be obtained using the 1990-95 Select/Ultimate table.

Again this Exhibit demonstrates the fact that mortality improvements are related to the underlying mortality table being used. What appear to be significant mortality improvements may in fact be the result of using an inappropriate mortality table.

As we discussed earlier, the relationship of the ratio of the mortality rates in the early years to the mortality rates in the later years, is what gave rise to the great variation in the present value of future claims for each table. The phenomenon we observed, however, in Exhibit 2 relating to perceived mortality improvement is based on another relationship, which is the annual mortality rate increase of each table as shown in Exhibit 3.

Exhibit 3 on page 15 demonstrates this relationship between the mortality tables and perceived mortality improvements as shown in Exhibit 2.

In Exhibit 3, we show a comparison between the composite model office mortality rates using the 1975-80 select/ ultimate table, Table A and Table B. The major distinction of interest between these tables however, is not the magnitude of the rates themselves (since this is typically adjusted for by utilizing a scaling factor), but the annual increases from year to year. As can be observed, the 1975-80 Select/Ultimate Table has very high select mortality rate increases for the first two years (34% and 28% for years two and three respectively) and moderately high mortality rate increases of 19 percent and 15 percent% for the next two years

Exhibit 2: Ratio Of Actual To Expected Mortality Based On The Following Tables...

Exhibit 2 displays the phenomenon of the relationship between the mortality table and perceived mortality improvements.

DURATION	75-80 SELECT/ULTIMATE TABLE	TABLE A*	TABLE B*
1	100%	68%	58%
2	90%	70%	63%
3	81%	70%	65%
4	75%	70%	65%
5	70%	67%	63%

* Table A was constructed by shifting each issue age of our model office back two years and then starting with third year select mortality of the 75-80 select/ultimate table.

** Table B was constructed by shifting each issue age of our model office back four years and then starting with fifth year select mortality of the 75-80 select/ultimate table.

note: similar results would be obtained using the 90-95 sel/ult tables.

Annual Mortality Improvements

(relating to the above data)

FROM YEARS	75-80 SELECT/ULTIMATE TABLE	TABLE A	TABLE B
1-2	10%	-2.9%	-8.6%
2-3	10%	-2.9%	-8.6%
3-4	7.4%	0%	0%
4-5	6.7%	4.3%	3.1%
1-5	8.5%*	0.4%*	-2%*

* effective annual compounded mortality improvement rate

note: negative means mortality worsening

(years four and five respectively), before grading down into the 12%-10% range. Table A, however, has only moderately high mortality rate increases of 18 percent and 14 percent for years two and three respectively and then grades down into the 12-10% range, while Table B has relatively low level mortality rate increases generally between 10%-12 percent throughout. The tables show a mortality rate increase of 22 percent at durations 16, 14 and 12 for the 75-80 Table, Table A and Table B respectively, which reflects the grading discontinuity from select mortality to ultimate mortality.

In an earlier article entitled "The Relationship of Mortality Projections and the Underlying Mortality Tables Used," I have shown that the choice in the selection of a mortality table (1975-80 table vs. 1990-95 table)

can have a *major impact* on mortality projections and hence on product pricing and reinsurance premium determination. For example, the present value of future claims was shown to be 13 percent lower for males and 10 percent lower for females, using a projection based on the 1975-80 select and ultimate table (based on a composite model office) as opposed to using the 1990-95 select and ultimate table.

In light of the above discussion, it is my belief that actuaries must begin to ask whether there are other tables as demonstrated in this article, besides the 1975-80 and 1990-95 tables, which may be more appropriate to use and what is the effect of using these other tables?

From a direct writer's perspective, the product actuary should be asking whether the

Exhibit 3: Comparison Of Mortality Rate Increase By Duration *

Exhibit 3 demonstrates the underlying reason for the relationship between the mortality
tables and perceived mortality improvements as shown in exhibit 2.

Duration	QX 75-80	Percent Increase	Table A**	Percent Increase	Table B**	Percent Increase
1	1.1	-	1.61	-	1.88	-
2	1.47	34%	1.9	18%	2.09	11%
3	1.88	28%	2.17	14%	2.33	11%
4	2.23	19%	2.42	12%	2.57	10%
5	2.57	15%	2.7	12%	2.88	12%
6	2.89	12%	3	11%	3.23	12%
7	3.24	12%	3.38	13%	3.72	15%
8	3.62	12%	3.83	13%	4.26	15%
9	4.05	12%	4.47	17%	4.81	13%
10	4.58	13%	5.11	14%	5.37	12%
11	5.34	17%	5.73	12%	5.92	10%
12	6.01	13%	6.36	11%	7.22	10%
13	6.84	14%	7.14	12%	7.96	10%
14	7.76	13%	8.78	22%	8.78	10%
15	8.75	13%	9.69	10%	9.69	10%
16	10.69	22%	10.69	10%	10.69	10%
17	11.79	10%	11.79	10%	11.79	10%
18	12.98	10%	12.98	10%	12.98	10%
19	14.28	10%	14.28	10%	14.28	10%
20	15.69	10%	15.69	10%	15.69	10%

* composite model office mortality rates using the 1975-80 select/ultimate mortality table.

** Table A was constructed by shifting each issue age of our model office back two years and then starting with third-year select mortality of the 75-80 select/ultimate table.

** Table B was constructed by shifting each issue age of our model office back four years and then starting with fifth-year select mortality of the 75-80 select/ultimate table.

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mortality table currently being used is possibly overstating or understating future mortality. If it is overstating future mortality, then this could result in a higher premium and a less competitively priced product and possibly result in significantly reduced market share. If, on the other hand, it is understating future mortality, then this could result in lower premium (perhaps a loss leader) and greatly diminished profits, or losses.

From a ceding company's perspective, if the mortality table being used overstates future mortality, then the ceding company actuary may be more likely to negotiate a reinsurance premium that will prove to be too high (or a coinsurance allowance too low) and in effect pass on too much profit to the reinsurers. If the mortality table understates future mortality, then the reinsurance actuary may have problems obtaining reinsurance on what he believes would be favorable terms.

From a reinsurance company perspective, if the mortality table used overstates future mortality, then they would be more likely to develop a less competitive quote and could lose market share. On the other hand, if the mortality table used understates future mortality, the reinsurer runs the risk of underpricing, resulting in losses.

Each actuary must develop a tailor-made mortality table, which he believes is most appropriate for his company's business. Sensitivity tests should be done using two or more tables routinely as a matter of practice.

In conclusion, it is almost naïve to believe that different companies with vastly different underwriting rules, average policy sizes, distribution systems and market segments would use the same mortality table with only a difference in scaling factors. This "one-shoe-fits-all" philosophy currently being used in this industry should be re-evaluated. ✍