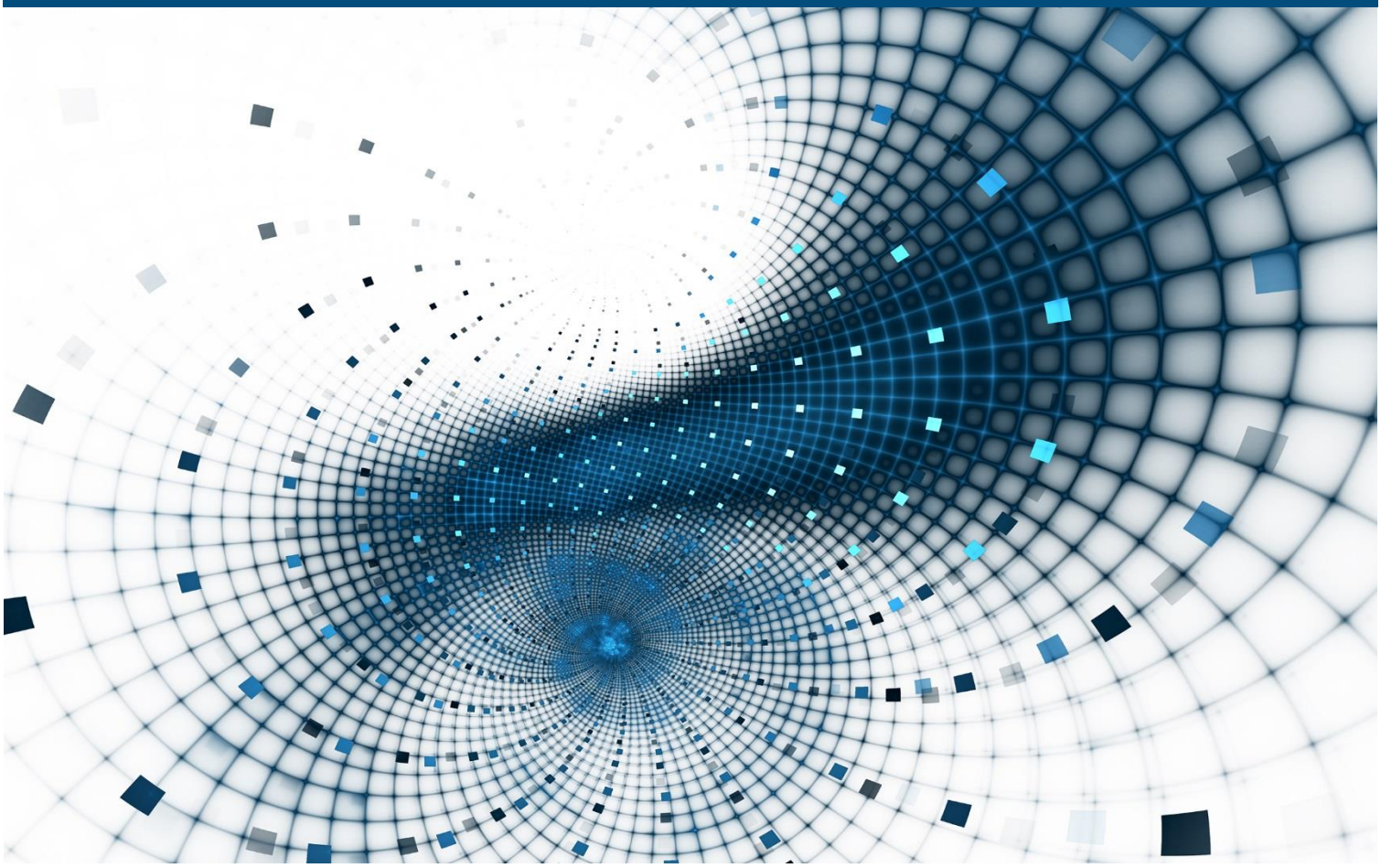
SOCIETY OF ACTUARIES

2015 Variable Annuity Guaranteed Benefits Survey

Survey of Assumptions for Policyholder Behavior in the Tail



September 2015

2015 Variable Annuity Guaranteed Benefits Survey

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Caveat and Disclaimer

The opinions expressed and conclusions reached by the authors are their own and do not represent any official position or opinion of the Society of Actuaries or its members. The Society of Actuaries makes no representation or warranty to the accuracy of the information.

Survey Highlights

Overview

- Twenty-six companies provided responses to the survey, up from 18 last year. The PBITT committee appreciates the participation of these companies.
- The percentage of companies using a projection horizon greater than 30 years has been steadily increasing with several companies citing projections of 50 or more years (Figure 2).

Tail Scenario

- The median tail scenario continues to track the 10th percentile return of the AAA equity index (Figure 6).
- However, the cumulative equity return in the tail scenario for individual companies varies widely (Figure 3).

Base Lapse Assumptions

- The median base lapse rate assumption is similar across benefit types (Figure 13).
- The median base lapse rate assumption for GMDB and GMWB are similar to past years, with continued fluctuation in the excess lapse assumption that occurs at the expiration of the surrender charge (Chart on Page 21; Row “SP (End)”).

Assumptions Regarding Lapses in the Tail

- Lapses in the tail varied significantly by company and by benefit type (Figures 14-18).

Dynamic Lapse Assumptions

- In-the-moneyness was a key input item for dynamic lapse functions for all benefit types (Figures 19-26).
- Policy duration and length of surrender charge were also important.

- Annuitant age was important for guaranteed minimum withdrawal benefits but less important for other benefit types.

Income and Withdrawal Utilization Assumptions

- Guaranteed minimum income benefit (GMIB) dynamic utilization assumptions are heavily influenced by In-the-Moneyness. Age and duration are also significant factors in the calculation (Figure 27).
- Age and duration are the most critical factors in guaranteed minimum withdrawal benefit (GMWB) dynamic utilization assumptions. In contrast to GMIB, in-the-moneyness is not significant for setting utilization assumptions for GMWB.

Source of Assumptions

- Company experience is relied on much more heavily for base assumptions than for tail assumptions (Figure 35).
- The most common frequency for updating assumptions is annual, although the 2015 survey showed more variation in the responses to this question than past surveys (Figure 32).

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Acknowledgements

The Society of Actuaries' Policyholder Behavior in the Tail (PBITT) working group gratefully acknowledges Stephen Hodges, Jeff Hartman, and Chuck Bremer for all of their efforts in analyzing the survey data and drafting this report.

Special thanks to all of the companies that responded to the survey and provided helpful information. Without their efforts, this survey would not be possible. The identities of survey participants are kept confidential and known only to Society of Actuaries' staff.

The Policyholder Behavior in the Tail group is interested in comments on the survey and results. Please e-mail comments to either Jim Reiskytl, Chair of the Policyholder Behavior in the Tail group, at jimreiskytl@wi.rr.com or Steve Siegel, Society of Actuaries Research Actuary at ssiegel@soa.org.

Background

In late 2005, the Society of Actuaries' Policyholder Behavior in the Tail (PBITT) committee distributed a survey to insurers. The goal of the survey was to gain insight into companies' assumptions of variable annuity policyholder behavior in the tail of the C3 Phase II calculation. Each edition of the survey has had approximately 18-30 responses; however, not every company answered every question. The following sections highlight responses from the 2015 survey and, where applicable, illustrate how answers compare to previous years' results. As a way to judge the credibility of results, most charts indicate how many companies responded to the question for the five most recent survey years.

It is our hope that this study's report on assumptions will enable actuaries to improve and compare their 'tail' expectations with those assumed by others. Actuaries may use this study to both (a) aid in setting their assumptions and (b) in setting up experience studies

to parameterize such dynamic functions, especially from experience gained in "tail" historical periods.

The latest survey reflects a different response group from that in the prior survey. As a result, some of the changes described below reflect different respondents, not necessarily a change by any given company. While the exact relationships of new versus prior respondents vary by individual question, the Society of Actuaries' staff was able to verify that 14 respondents also participated in the 2014 survey and 12 did not.

Please note that when percentages of responding companies are shown, the percentages are based on the number of respondents and not their size.

Specifics of C3 Phase II Calculation

Insurers were asked to provide details on their C3 Phase II calculation such as the number of scenarios used, and the length of projection horizon. In 2015, as in past years, 1,000 scenarios was the predominant response (Figure 1).

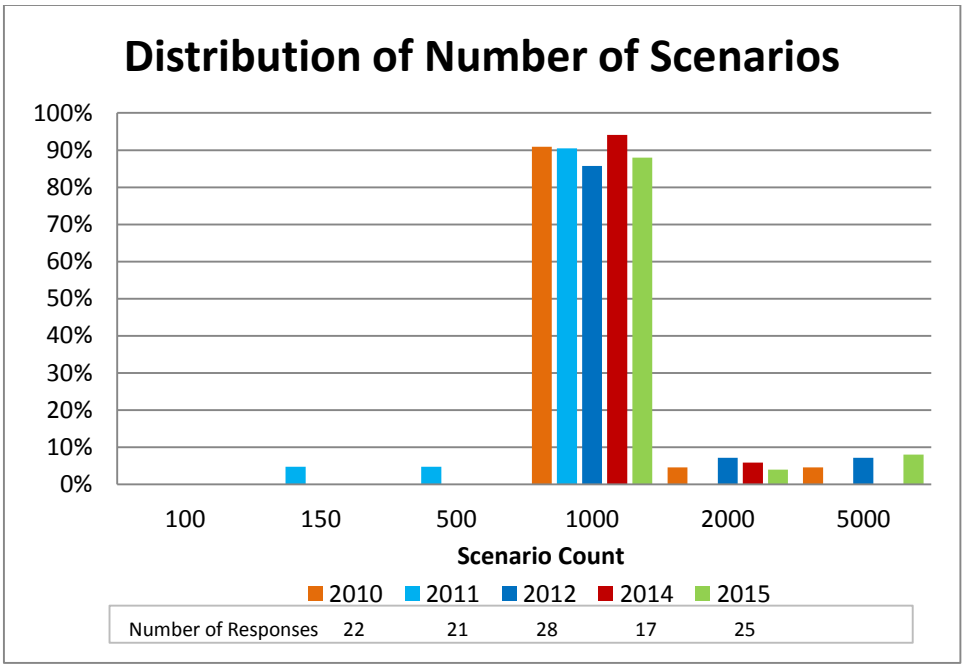

Figure 1

All of the 2015 respondents indicated they projected results over at least 20 years, with 92% (23 of 25) of respondents projecting results 30 years or more. There has been a trend in the last few years toward longer projections and in particular 48% (12 of 25) of respondents in 2015 reported using 50 years or more (Figure 2).

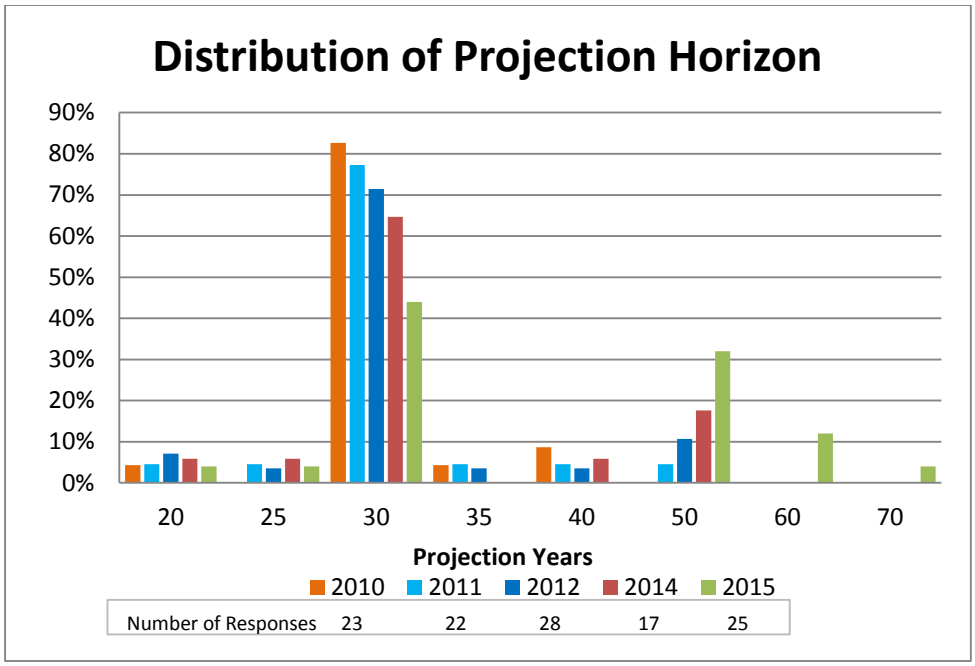

Figure 2

Tail Scenario

Insurers were asked to describe the tail scenario that determines the first negative result of their modified 90 CTE calculation (that is, the least negative result of all scenarios with a negative present value). If no scenario produced a negative result, the scenario with the smallest positive was provided.

Responses varied widely among insurers regarding the description of the tail scenario. Figure 3 below shows each insurer's description of the equity performance in their tail scenario on a cumulative basis. Of the 21 responses, 16 had negative cumulative returns at the end of the fifth projection year. Of those 16 responses, 10 still had negative cumulative returns after fifteen years. Of the 21 total responses, 4 had cumulative returns greater than 25% at the end of the fifth projection year.

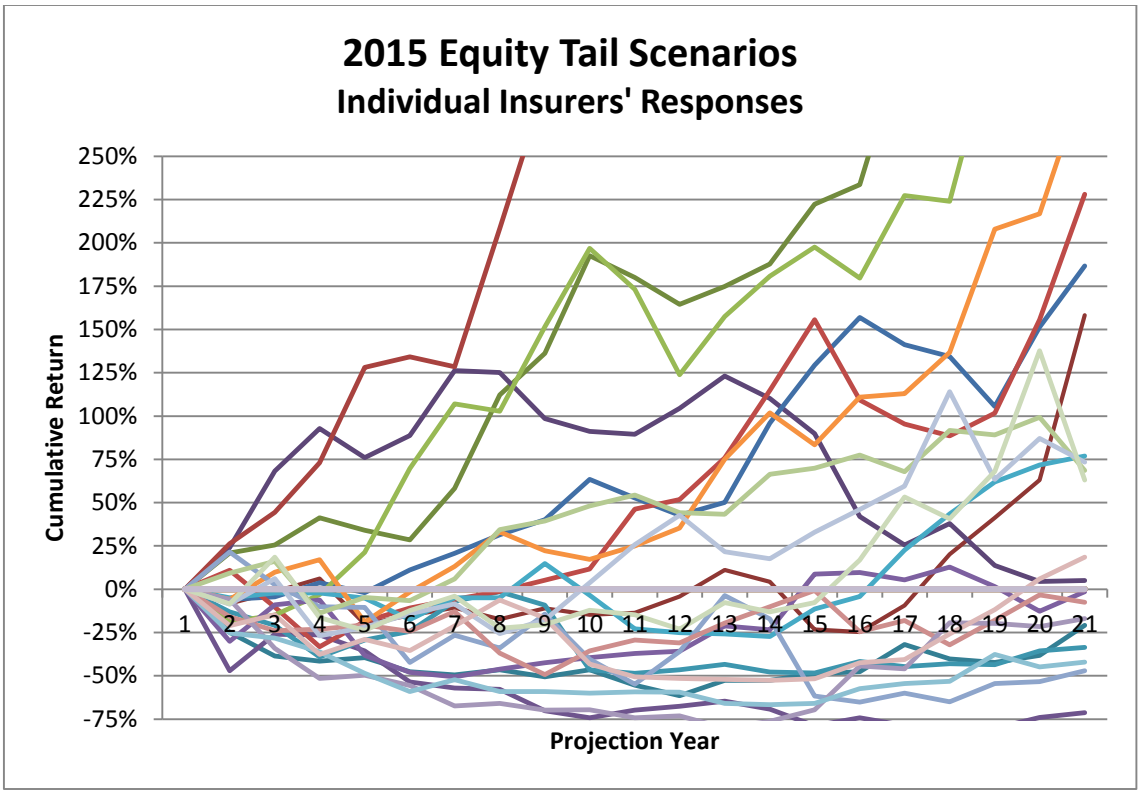

Figure 3

Figure 4 shows the cumulative returns of the bond funds in the tail scenario. There is much less variation in bond fund returns, especially in the early years. After year 10, all of the reported scenarios had positive cumulative returns.

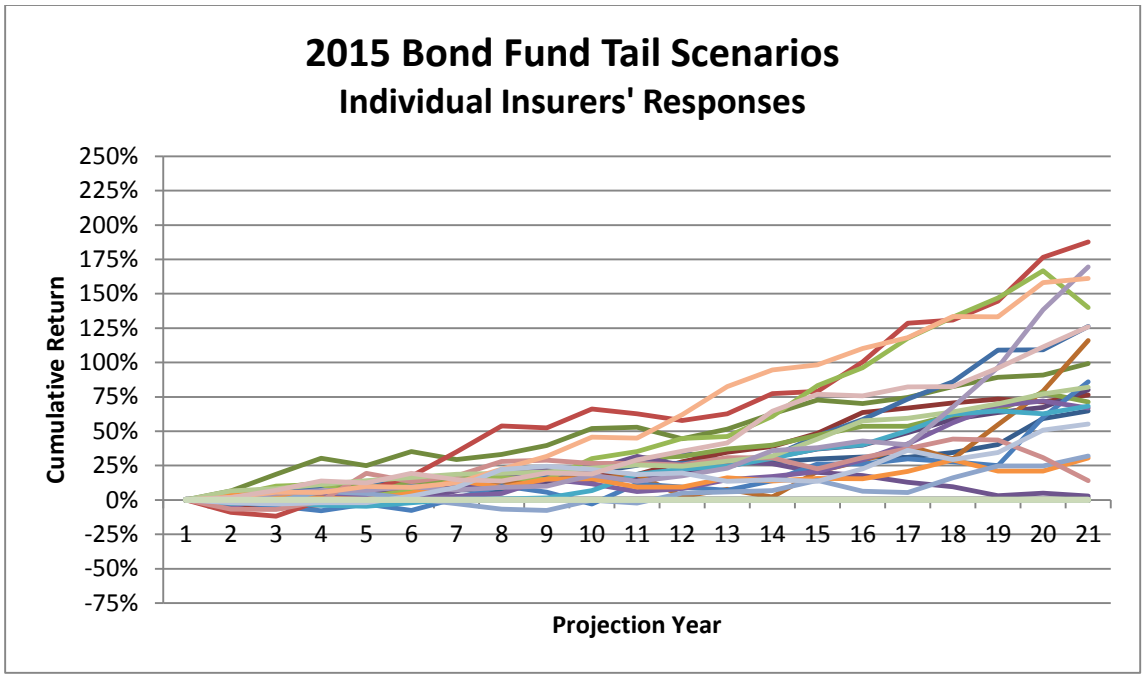

Figure 4

Figure 5 shows the 5-year Treasury interest rate in the tail scenario. The majority of responses fell in the range of 2% - 4% in all years.

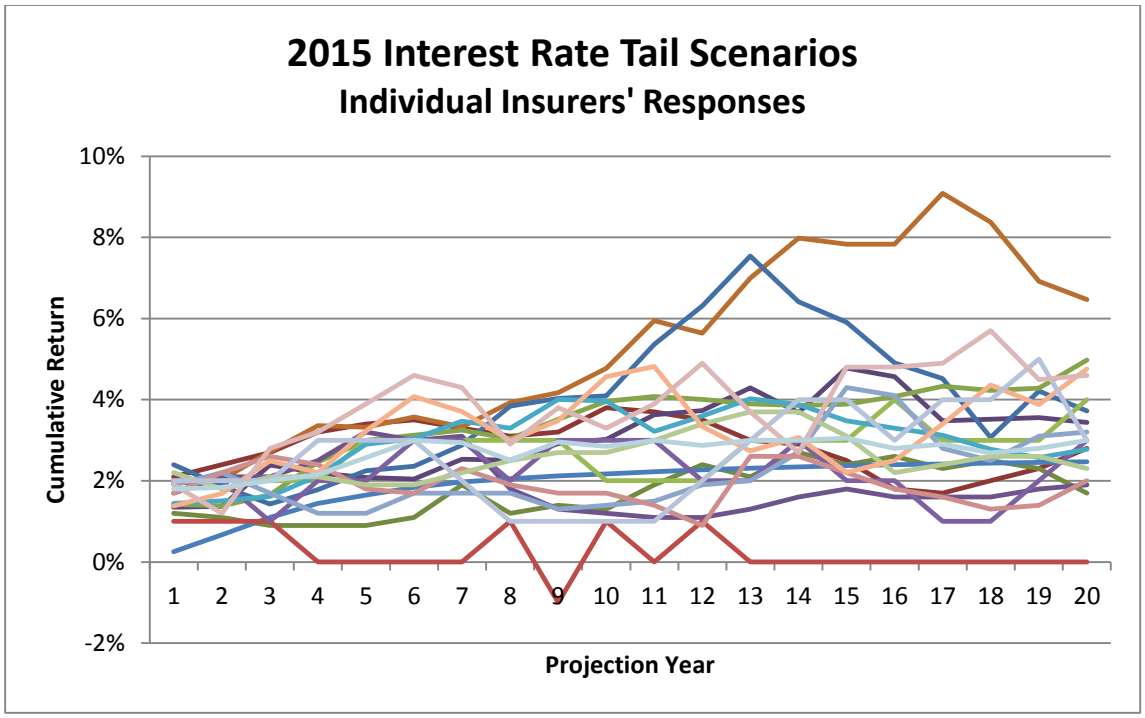

Figure 5

In Figure 6, the median of the 2015 Equity Tail Scenarios (from Figure 3) is plotted against the 10th percentile of the equity returns from the American Academy of Actuaries pre-packaged scenario set based on 2005 data (http://www.actuary.org/life/phase2_2.asp). The median of insurers' responses from 2015 had a cumulative return that is somewhat close to the 10th percentile of the American Academy of Actuaries pre-packaged scenarios through eighteen years.

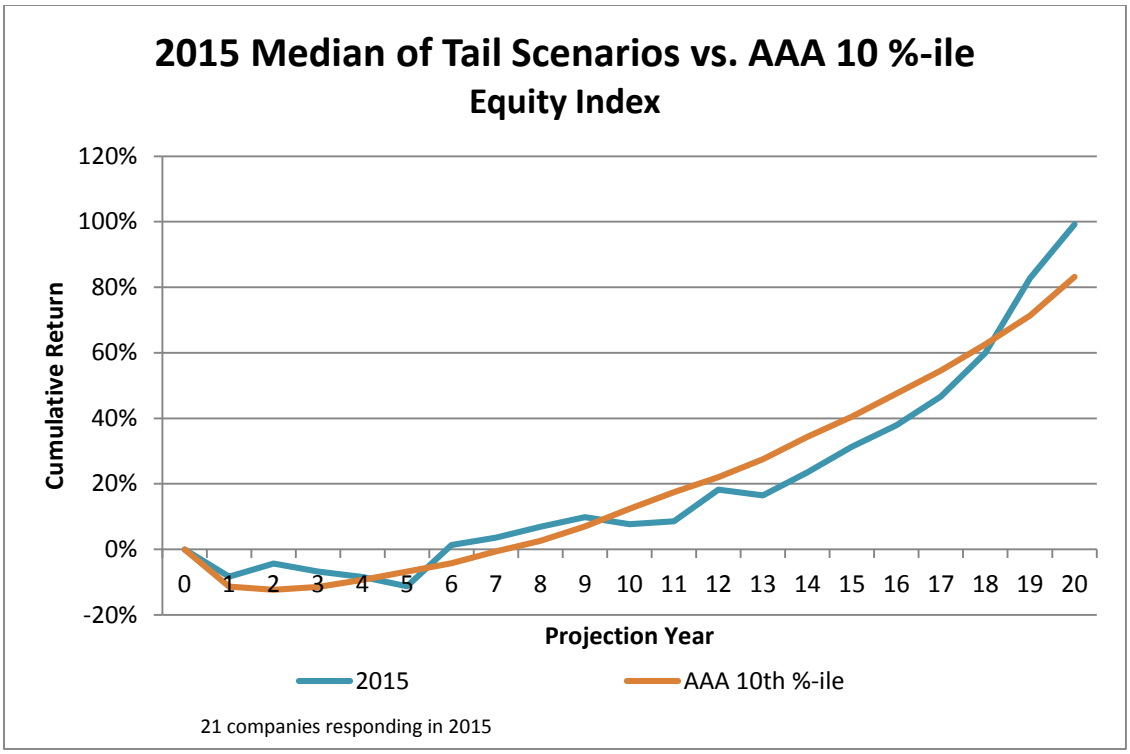

Figure 6

The median response has been fairly stable over the years, particularly in the first 8 projection years (Figure 7). There has not been a consistent trend over time, either to the median scenario having higher or lower returns.

Responses may vary from year to year due to changes in products, assumptions or the participating respondents. For example, the number of respondents to this question has varied from 15 to 23.

Note that the lines in Figure 6 and Figure 7 reference the median (of each survey year) and 10th percentile (of the AAA scenarios) with respect to the cumulative gains at a given duration, rather than representing a particular scenario over all durations.

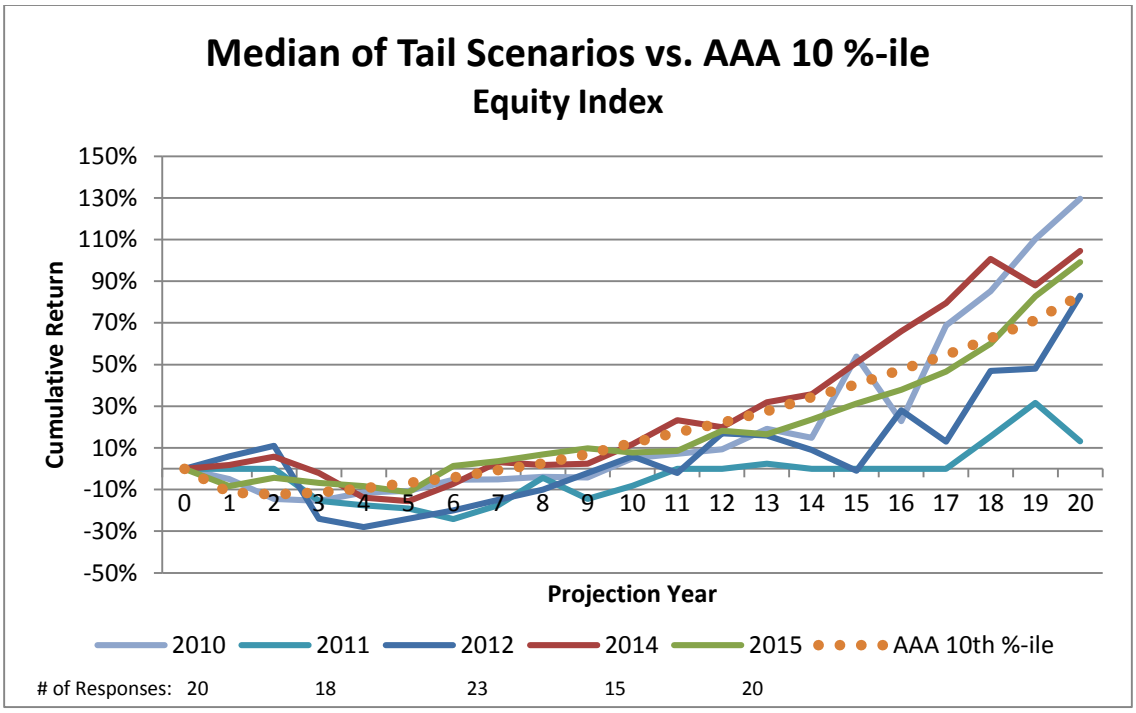

Figure 7

Base Lapse Assumptions

Insurers were asked to list their base lapse assumption (non-dynamic) at policy years 1, 2, 3, as well as several durations following the surrender charge period. The survey question was enhanced for 2012 in order to provide more clarity around the definition of the end of the surrender charge period. Responses were categorized by benefit type into Death Benefits (GMDB), Accumulation Benefits (GMAB), Income Benefits (GMIB), Withdrawal Benefits (GMWB), and Combination Benefits (Combo).

Figures 8-12 show each insurer's response for base lapses for each benefit type.

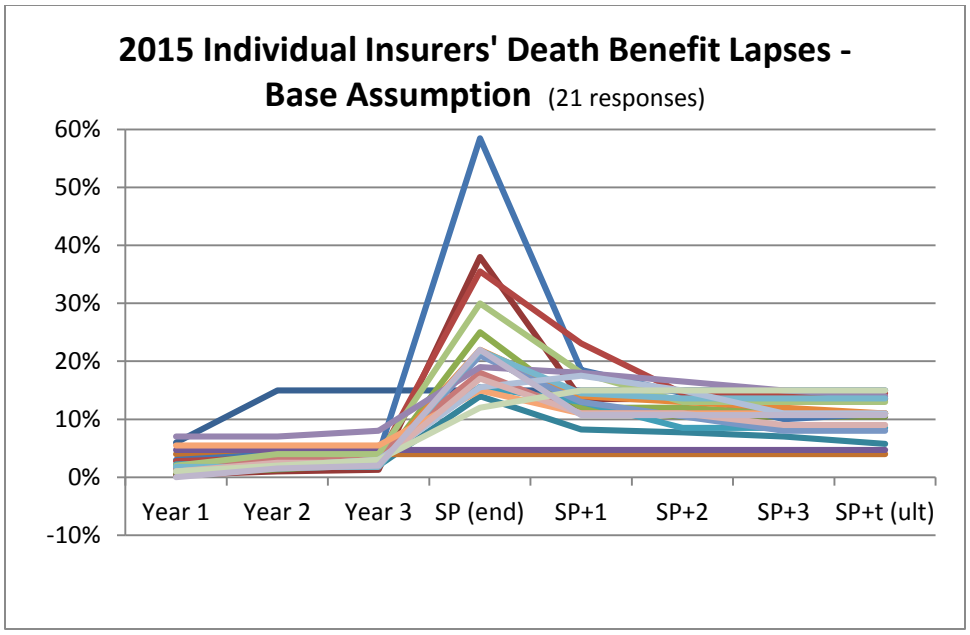

Figure 8

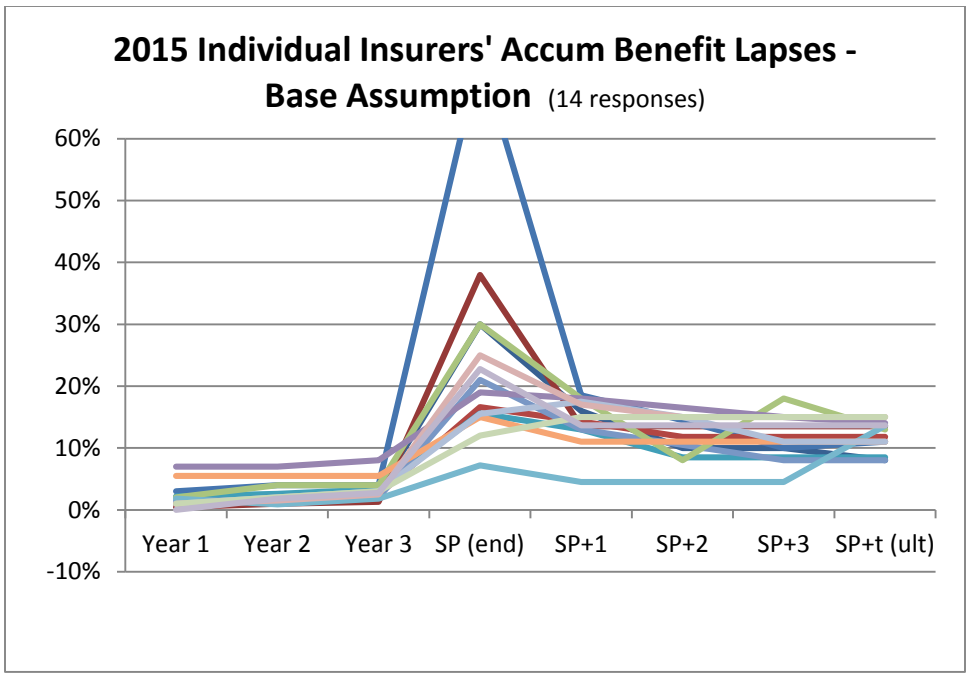

Figure 9

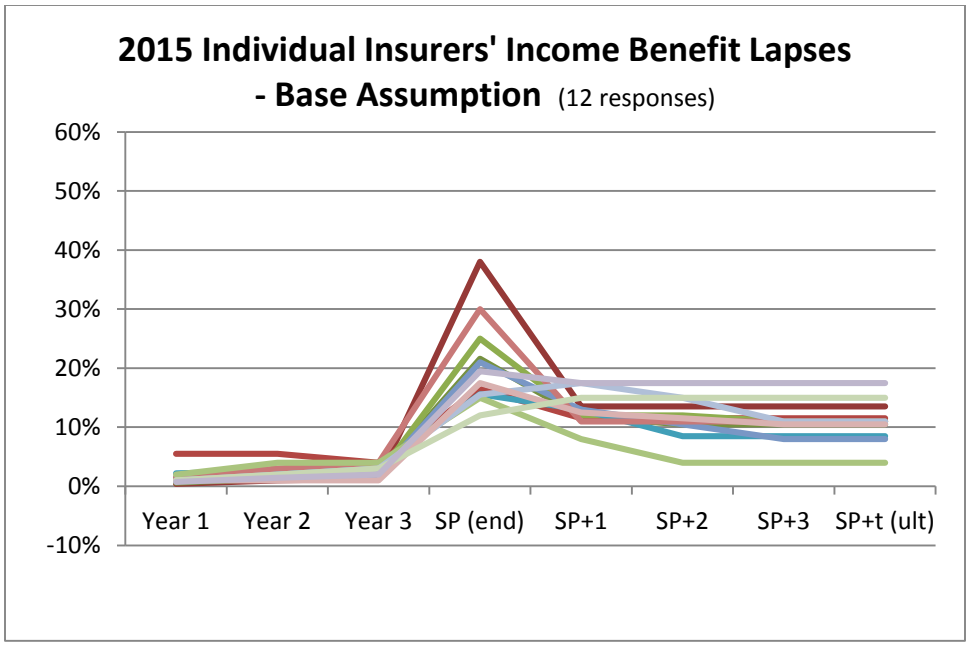

Figure 10

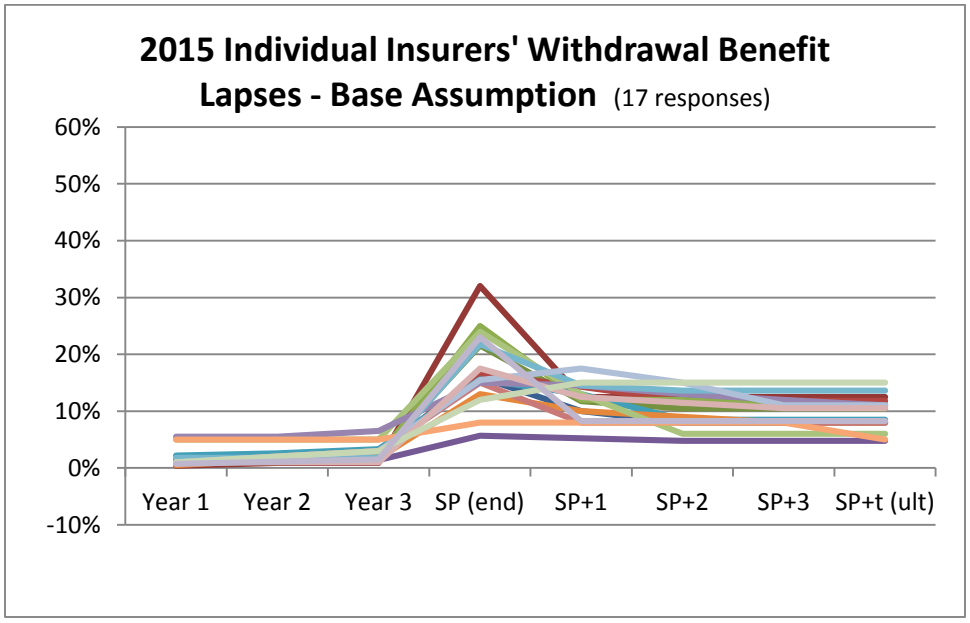

Figure 11

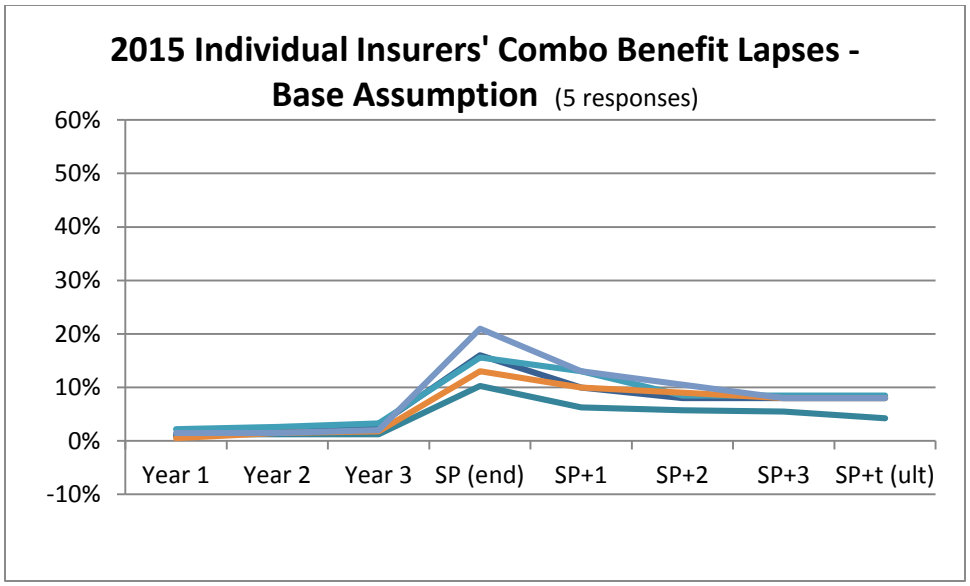

Figure 12

Figure 13 shows the median lapses by benefit type across all insurers' responses. The median base assumption lapse rates show little difference across benefit types, with Combo benefits having a slightly lower lapse rate after the surrender charge period.

Note that the median lapse rates do not reflect any one individual insurer's array (by duration) of lapse rates, but rather reflect the median across all insurers at the given duration. Thus, the median rate used for duration 2 may be from Insurer A while the rate used for duration 3 would be from Insurer B if that is the median data point given for duration 3.

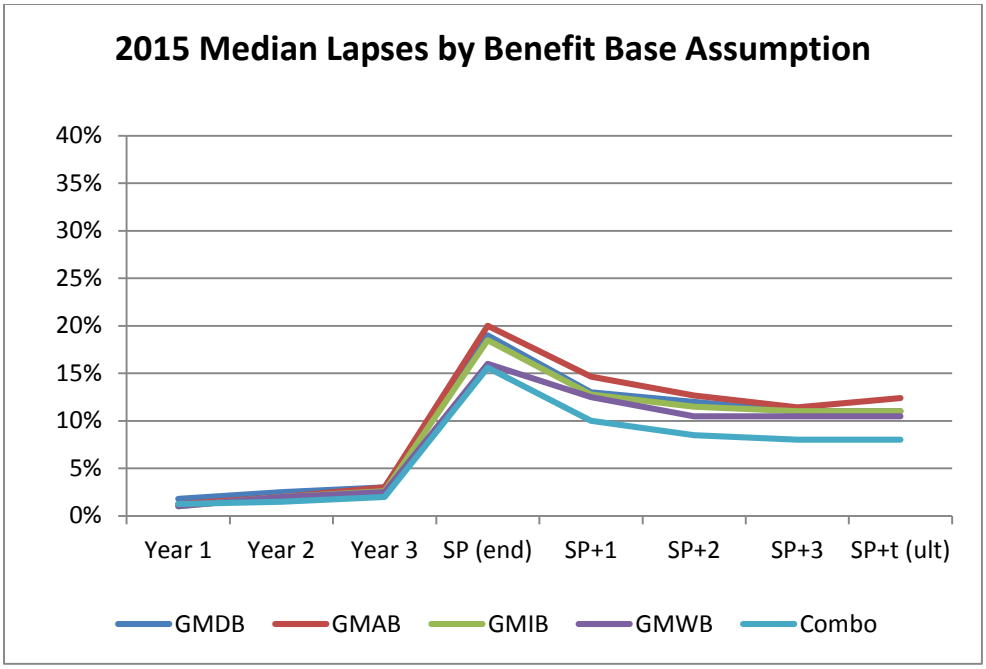

Figure 13

The following tables compare median lapse rates by benefit type for the last five surveys. Following that is a table that focuses on the two benefit types for which the most responses were received and makes it easier to review benefit specific assumptions across survey years. The variation across survey years of the median lapse rates at the end of the surrender charge period [SP (end)] continues to oscillate.

2010 Median Base Lapse Rates by Benefit Type

Duration	GMDB	GMAB	GMIB	GMWB	Combo
Year 1	1.2%	1.0%	1.3%	1.2%	1.5%
Year 2	2.2%	2.0%	1.8%	2.0%	2.1%
Year 3	3.1%	3.0%	2.5%	2.9%	2.3%
SP (end)	24.0%	23.0%	27.0%	24.0%	23.0%
SP+1	12.8%	13.5%	13.5%	13.0%	13.8%
SP+2	12.8%	11.5%	11.2%	12.0%	13.3%
SP+3	11.9%	11.7%	11.2%	11.3%	11.7%
SP+t (ult)	12.0%	11.5%	11.2%	11.8%	11.6%

Responses	14	9	7	10	8

2011 Median Base Lapse Rates by Benefit Type

Duration	GMDB	GMAB	GMIB	GMWB	Combo
Year 1	1.1%	1.0%	1.5%	1.0%	2.0%
Year 2	2.0%	2.0%	2.0%	2.0%	2.3%
Year 3	3.0%	2.5%	2.1%	2.5%	3.0%
SP (end)	16.4%	11.7%	15.0%	16.0%	22.6%
SP+1	13.5%	18.2%	17.9%	12.5%	20.0%
SP+2	12.5%	15.0%	15.0%	12.0%	15.5%
SP+3	12.5%	14.3%	14.5%	11.0%	14.5%
SP+t (ult)	12.0%	12.0%	12.0%	11.0%	12.0%

Responses	16	8	7	11	9

2012 Median Base Lapse Rates by Benefit Type

Duration	GMDB	GMAB	GMIB	GMWB	Combo
Year 1	1.3%	1.7%	2.5%	1.5%	1.2%
Year 2	2.3%	2.5%	3.0%	2.3%	2.5%
Year 3	3.0%	3.8%	3.7%	3.3%	3.4%
SP (end)	24.0%	22.9%	22.1%	24.0%	22.7%
SP+1	15.0%	13.3%	12.3%	12.5%	16.0%
SP+2	13.6%	12.8%	11.8%	12.0%	14.5%
SP+3	12.1%	12.5%	11.3%	11.3%	12.5%
SP+t (ult)	11.3%	11.1%	10.6%	10.9%	11.1%

Responses	18	10	10	12	10

2014 Median Base Lapse Rates by Benefit Type

Duration	GMDB	GMAB	GMIB	GMWB	Combo
Year 1	1.0%	1.0%	1.0%	0.9%	1.0%
Year 2	2.0%	2.0%	2.0%	1.7%	1.6%
Year 3	3.0%	2.9%	2.9%	1.8%	2.4%
SP (end)	22.5%	23.3%	23.3%	22.0%	21.6%
SP+1	15.0%	13.8%	14.5%	13.3%	13.5%
SP+2	13.0%	11.6%	12.5%	12.3%	11.3%
SP+3	12.0%	11.6%	12.0%	12.0%	11.1%
SP+t (ult)	11.0%	10.6%	10.6%	10.6%	11.0%

Responses	16	8	7	11	9

2015 Median Base Lapse Rates by Benefit Type

Duration	GMDB	GMAB	GMIB	GMWB	Combo
Year 1	1.8%	1.3%	1.0%	1.0%	1.3%
Year 2	2.5%	2.0%	2.0%	2.0%	1.5%
Year 3	3.0%	3.0%	2.6%	2.5%	2.0%
SP (end)	19.0%	20.0%	18.5%	16.0%	15.6%
SP+1	13.0%	14.7%	12.8%	12.5%	10.0%
SP+2	12.0%	12.7%	11.5%	10.5%	8.5%
SP+3	11.0%	11.4%	11.0%	10.5%	8.0%
SP+t (ult)	11.0%	12.4%	11.0%	10.5%	8.0%

Responses	21	14	12	17	5

2015 Median Base Lapse Rates by Year

	GMDB					GMWB				
Duration	2010	2011	2012	2014	2015	2010	2011	2012	2014	2015
Year 1	1.2%	1.1%	1.3%	1.0%	1.8%	1.2%	1.0%	1.5%	0.9%	1.0%
Year 2	2.2%	2.0%	2.3%	2.0%	2.5%	2.0%	2.0%	2.3%	1.7%	2.0%
Year 3	3.1%	3.0%	3.0%	3.0%	3.0%	2.9%	2.5%	3.3%	1.8%	2.5%
SP (end)	24.0%	16.4%	24.0%	22.5%	19.0%	24.0%	16.0%	24.0%	22.0%	16.0%
SP+1	12.8%	13.5%	15.0%	15.0%	13.0%	13.0%	12.5%	12.5%	13.3%	12.5%
SP+2	12.8%	12.5%	13.6%	13.0%	12.0%	12.0%	12.0%	12.0%	12.3%	10.5%
SP+3	11.9%	12.5%	12.1%	12.0%	11.0%	11.3%	11.0%	11.3%	12.0%	10.5%
SP+t (ult)	12.0%	12.0%	11.3%	11.0%	11.0%	11.8%	11.0%	10.9%	10.6%	10.5%
Responses	14	16	18	16	21	10	11	12	11	17

Lapses in the Tail

Insurers were asked to list the lapse rate assumption as applied in the tail scenario for Death, Accumulation, Income, Withdrawal and Combination benefits. As described on Page 9 in the *Tail Scenario* section, the tail scenario is defined as the scenario that gives the first negative result of the insurer's modified 90 CTE calculation when rank ordered. The following charts show tail lapse rates by benefit type for policy years 1 through 20.

Individual company assumptions can be volatile if the underlying tail scenario is volatile and the company assumes a dynamic policyholder response.

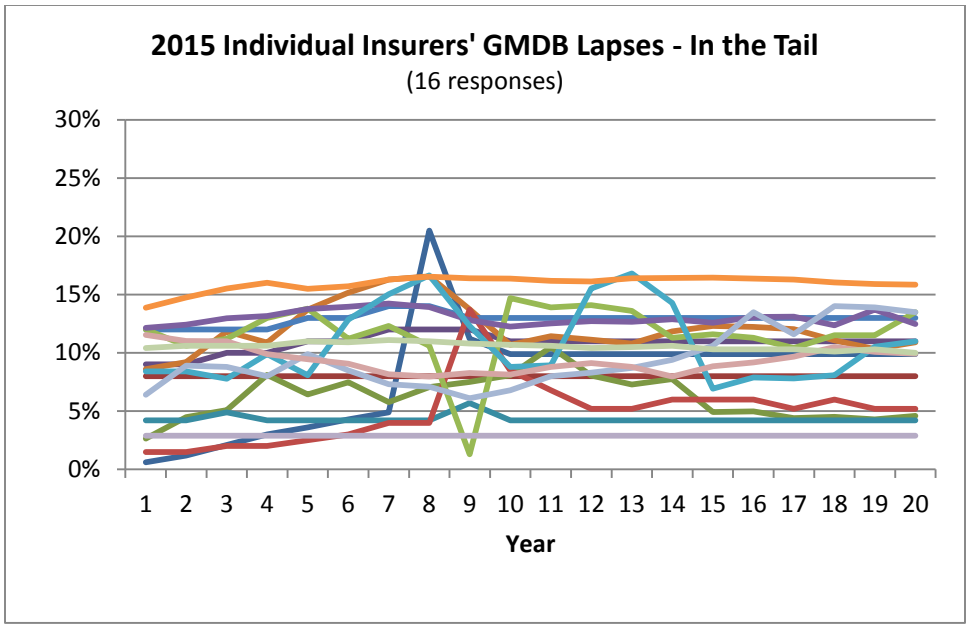

Figure 14

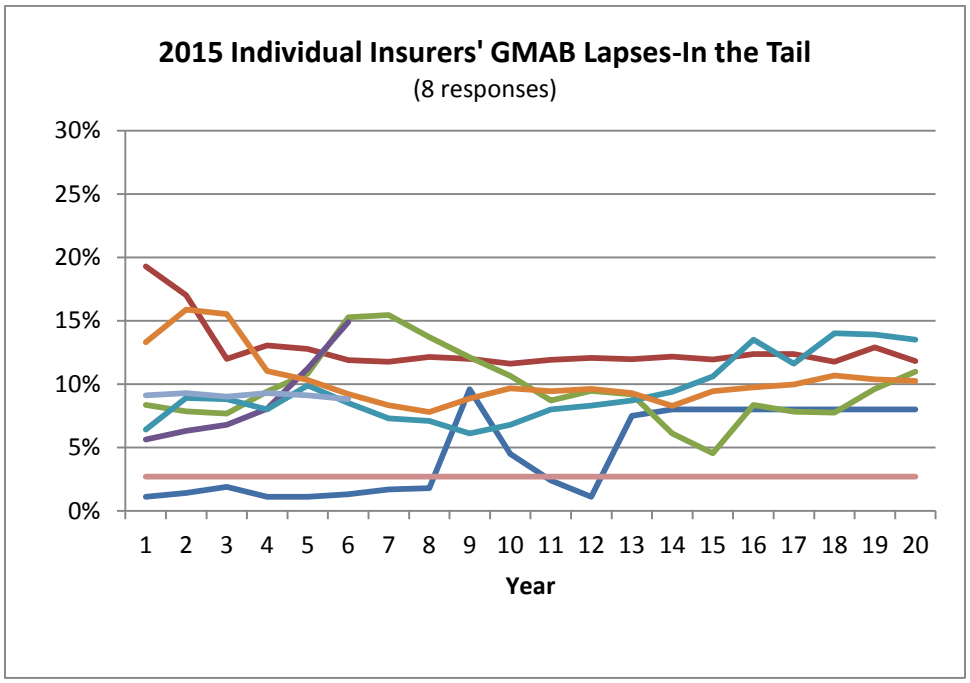

Figure 15

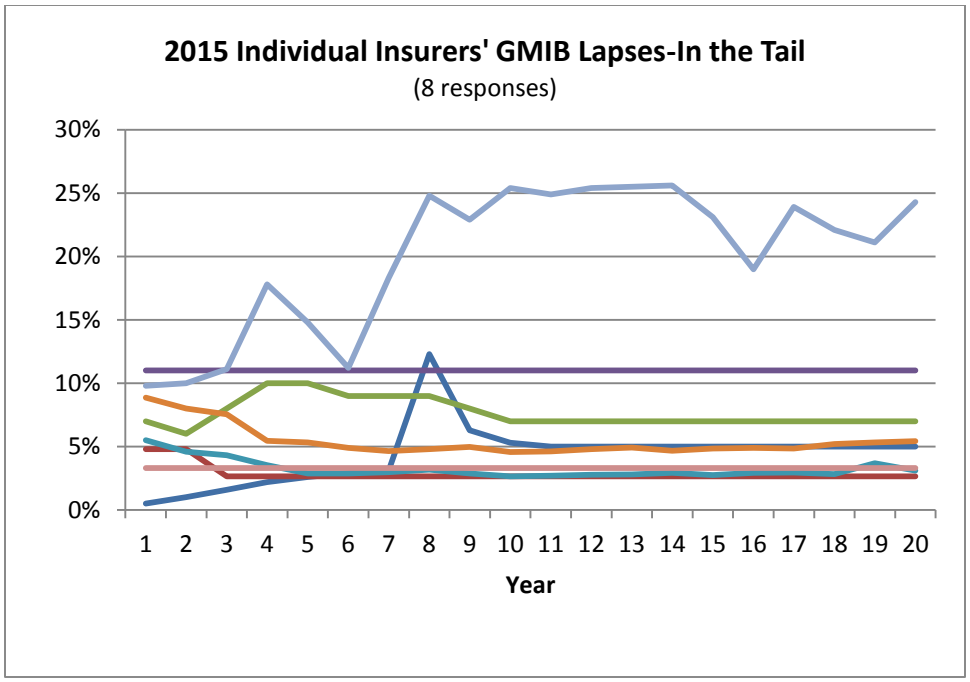

Figure 16

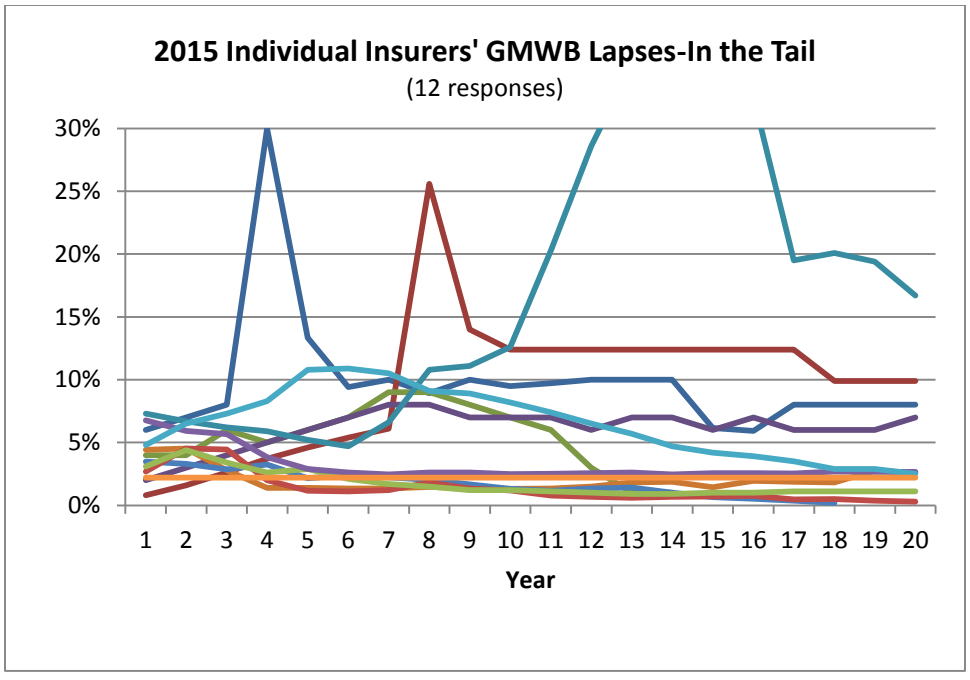

Figure 17

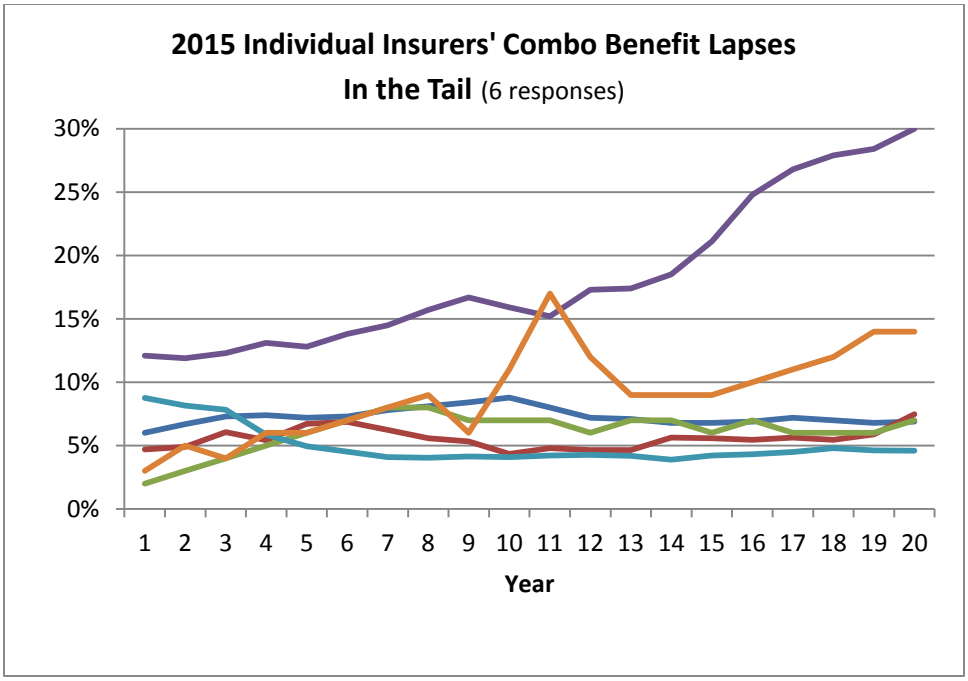

Figure 18

Dynamic Lapses

Companies were asked whether their dynamic lapse functions varied by each of the four benefit types (death, living, income, and withdrawal). For each benefit type, companies were asked specific follow-up questions for the first time in 2015. Prior to 2015, companies provided general descriptions of their dynamic functions which allowed broad descriptions and categorizations of formulas. The specific questions in 2015 were:

1. Is your formula one-sided or two-sided?
2. Is there a floor rate greater than zero? If so, please describe.
3. What factors influence the level of dynamic lapses for this benefit?

Minimum Death Benefits

For dynamic lapse functions related to death benefits, 77% of companies (10 of 13) use a one-sided dynamic formula.

Figure 19 shows the distribution of responses regarding the floor lapse rate with 23% (3 of 13) using a floor rate of zero.

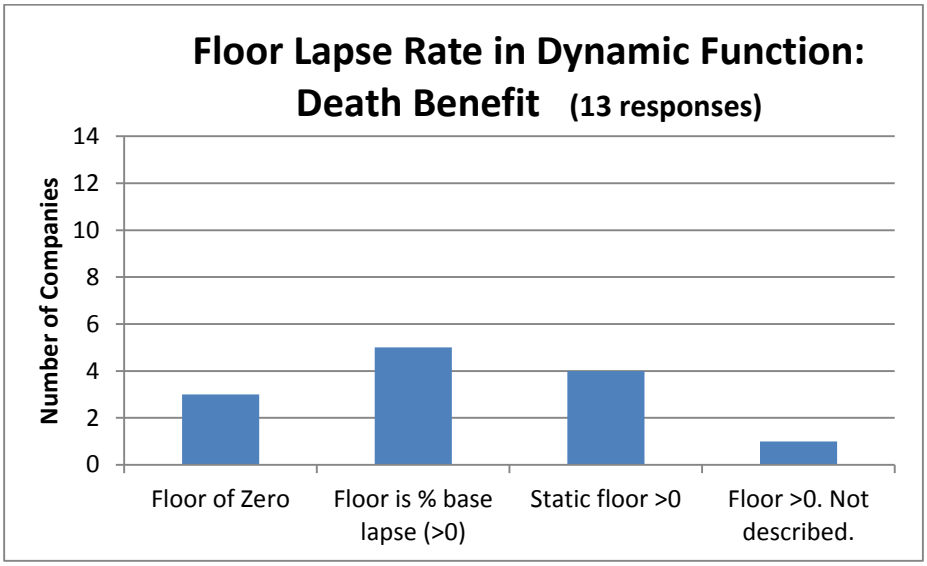

Figure 19

All 13 companies that described their dynamic lapse function for variable annuities with guaranteed minimum death benefits cited in-the-moneyness as a factor that influences the dynamic lapse assumption. Policy duration and length of surrender charge period were the next most common responses. These are shown in Figure 20. Other responses included the equity change in the prior period, death benefit type, and commission option.

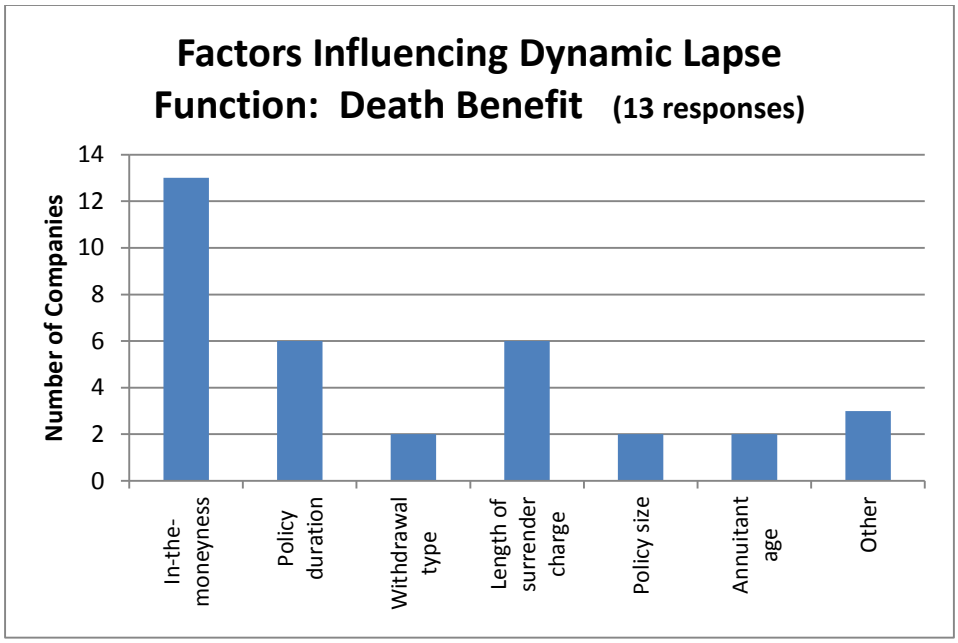

Figure 20

Minimum Accumulation Benefits

For dynamic lapse functions related to accumulation benefits, 82% of companies (14 of 17) use a one-sided dynamic formula.

Figure 21 shows the distribution of responses regarding the floor lapse rate with 53% (9 of 17) using a floor rate of zero.

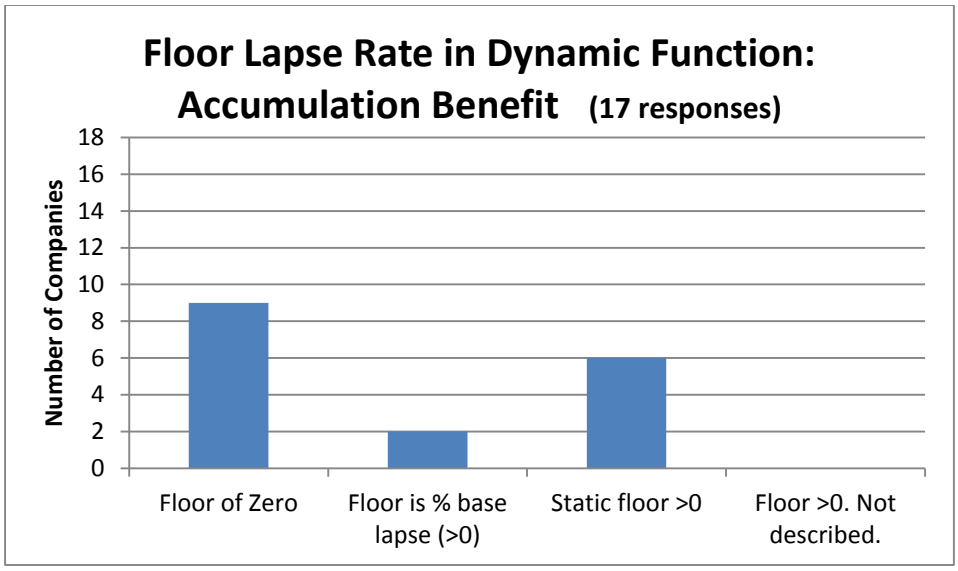

Figure 21

All 17 companies that described their dynamic lapse function for variable annuities with guaranteed minimum accumulation benefits cited in-the-moneyness as a factor that influences the dynamic lapse assumption. Policy duration and length of surrender charge period were the next most common responses. These are shown in Figure 22. Other responses included commission option, single/joint life, remaining term to guarantee maturity, and the base lapse rate.

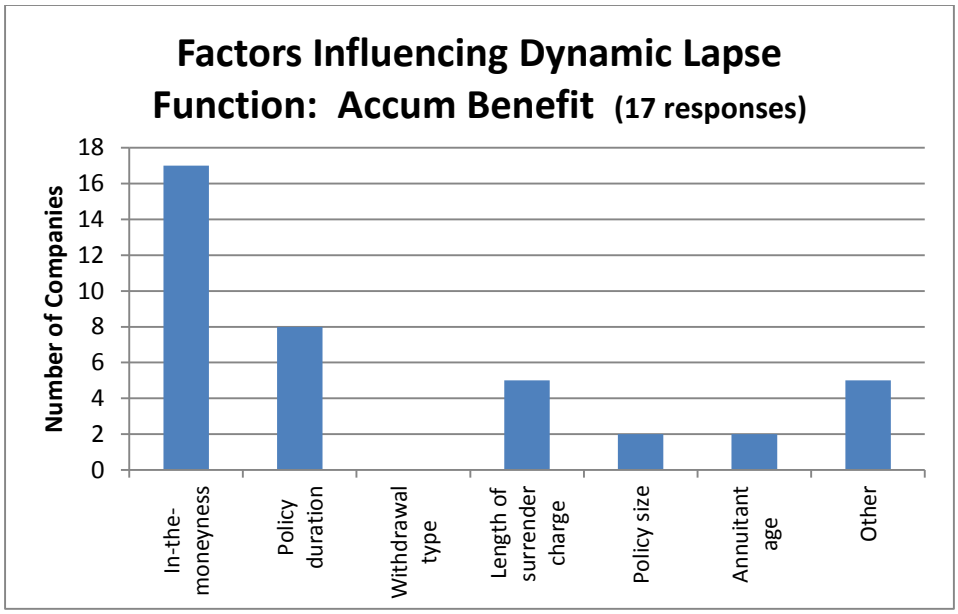

Figure 22

Minimum Income Benefits

For dynamic lapse functions related to income benefits, 75% of companies (9 of 12) use a one-sided dynamic formula.

Figure 23 shows the distribution of responses regarding the floor lapse rate with 33% (4 of 12) using a floor rate of zero.

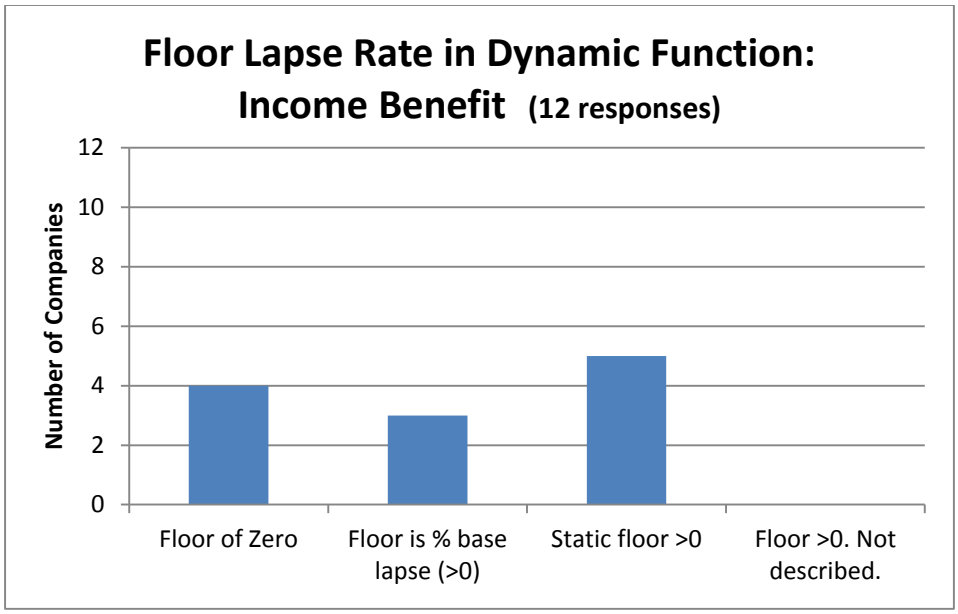

Figure 23

All 12 companies that described their dynamic lapse function for variable annuities with guaranteed minimum income benefits cited in-the-moneyness as a factor that influences the dynamic lapse assumption. Policy duration was the next most common response. These are shown in Figure 24. Other responses included commission option, the base lapse rate, and the waiting period.

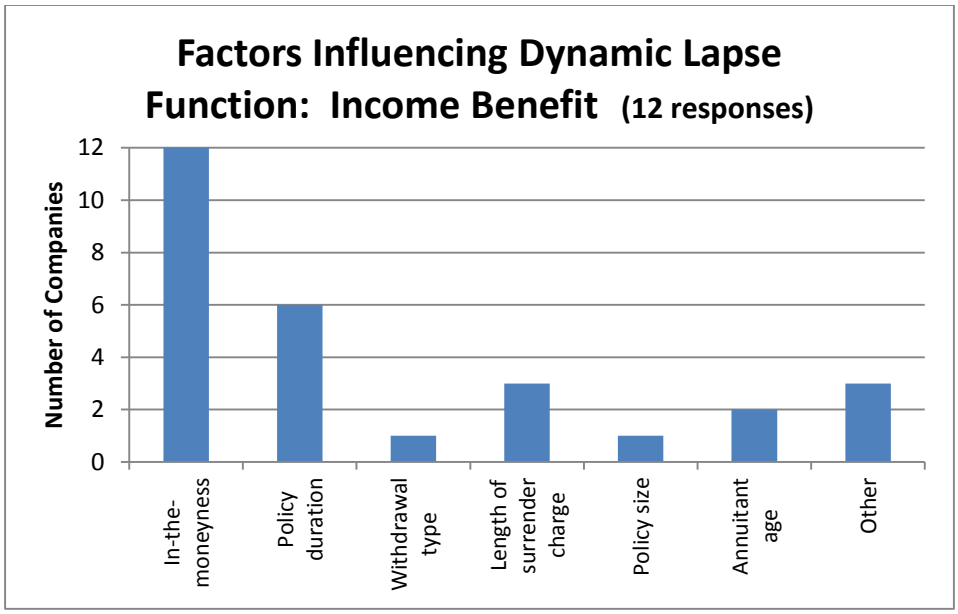

Figure 24

Minimum Withdrawal Benefits

For dynamic lapse functions related to withdrawal benefits, 79% of companies (15 of 19) use a one-sided dynamic formula.

Figure 25 shows the distribution of responses regarding the floor lapse rate with 47% (9 of 19) using a floor rate of zero.

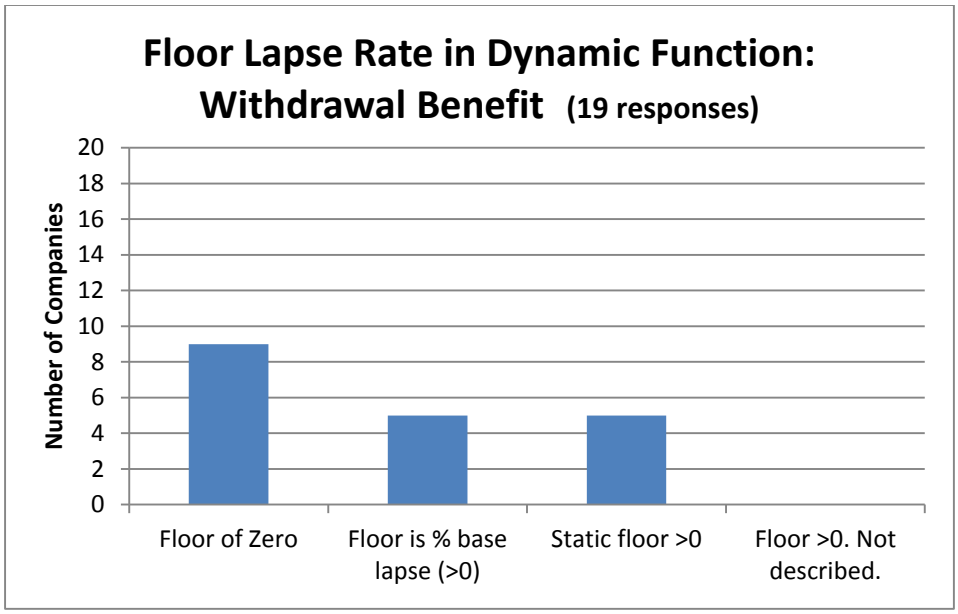

Figure 25

All 19 companies that described their dynamic lapse function for variable annuities with guaranteed minimum withdrawal benefits cited in-the-moneyness as a factor that influences the dynamic lapse assumption. Policy duration and annuitant age were the next most common responses. These are shown in Figure 26. Other responses included owner age, commission option, the base lapse rate, and the waiting period.

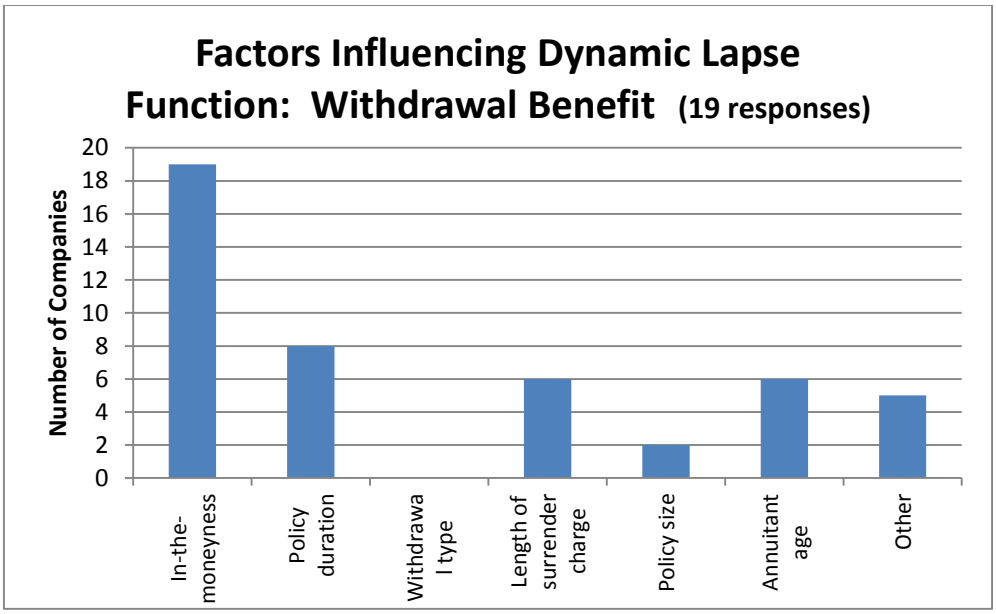

Figure 26

Income and Withdrawal Utilization

Beyond whether their utilization assumptions were dynamic, insurers were also asked to describe their Income and Withdrawal utilization assumptions.

All but one respondent mentioned that in-the-moneyness ("ITM"), or the relationship of the account value to the guaranteed value, was used as a parameter of GMIB utilization. ITM was more likely to be mentioned than either age or duration. Insurers were able to list more than one factor, so the percentages in Figure 27 will not sum to 100%.

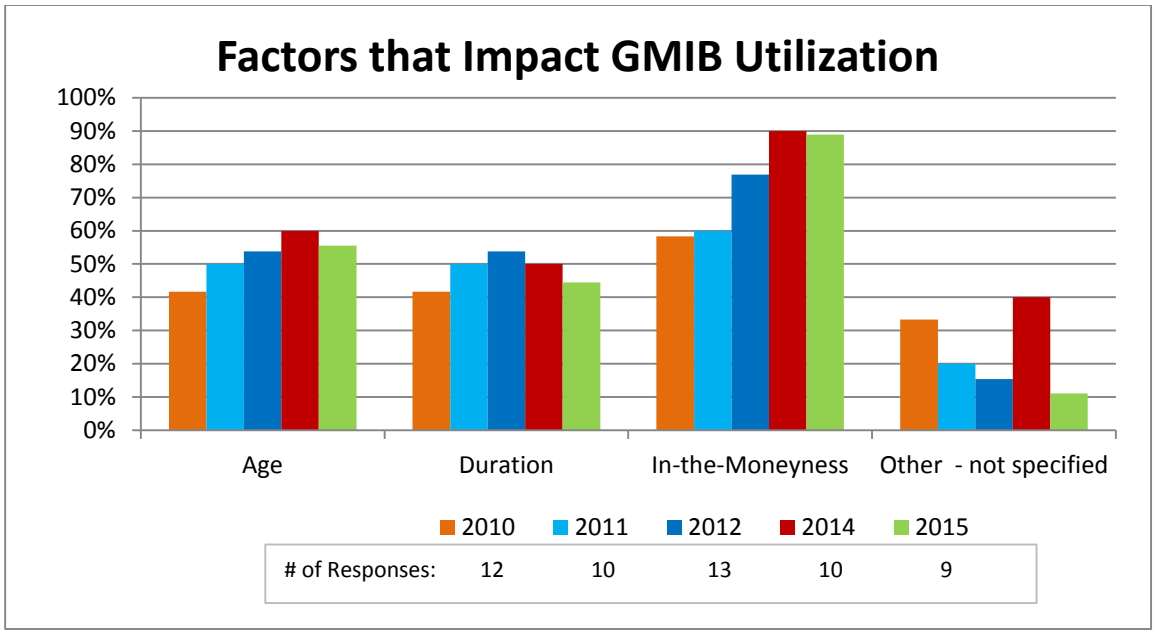

Figure 27

Age and duration continued to be the most common factors used to vary GMWB utilization assumptions (Figure 28). Factors mentioned in the Other column included distribution channel, benefit provisions, payout status, and wait time. The ITM parameter for GMWB, unlike for GMIB, remained at an extremely low level compared to the other factors. Insurers were able to list more than one factor, so the percentages will not sum to 100%.

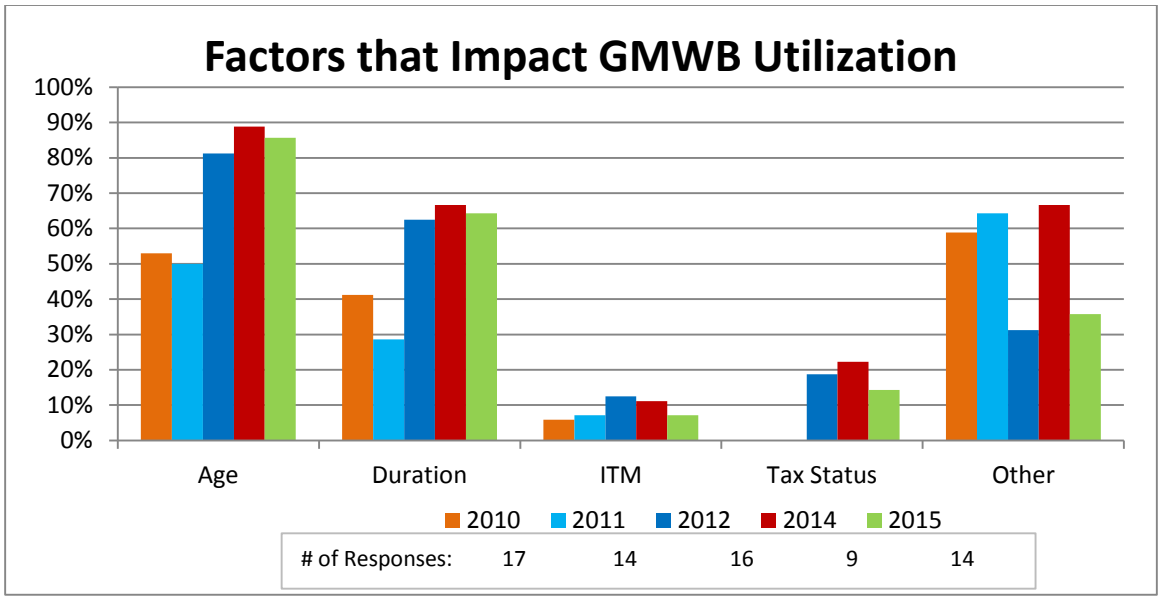

Figure 28

Lapses by Distribution Channel

Insurers were asked several questions about their distribution channels. 64% of responses (16 of 25) said that their products were sold through multiple distribution channels (Figure 29). Of those 16 respondents, 57% (9 of 16) use three or four distribution channels.

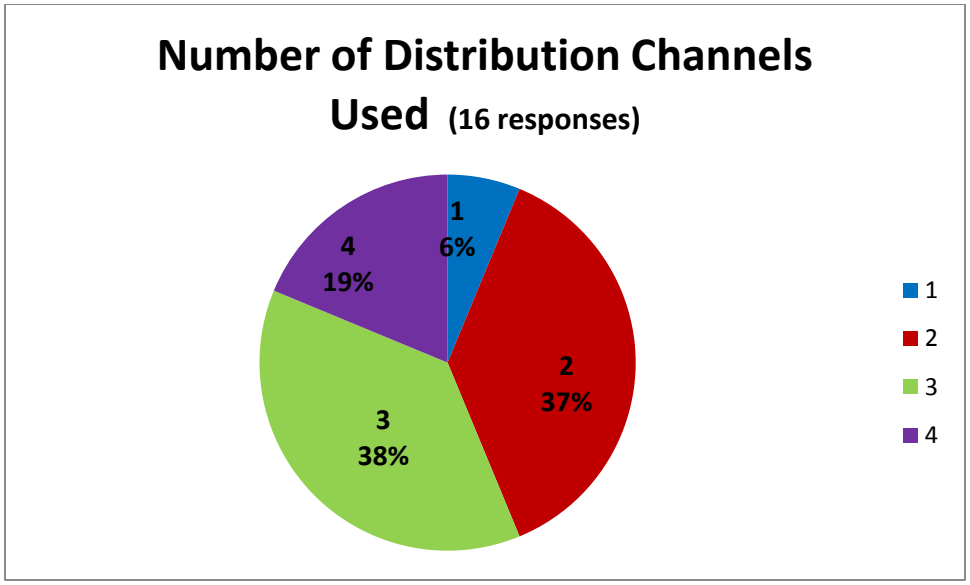

Figure 29

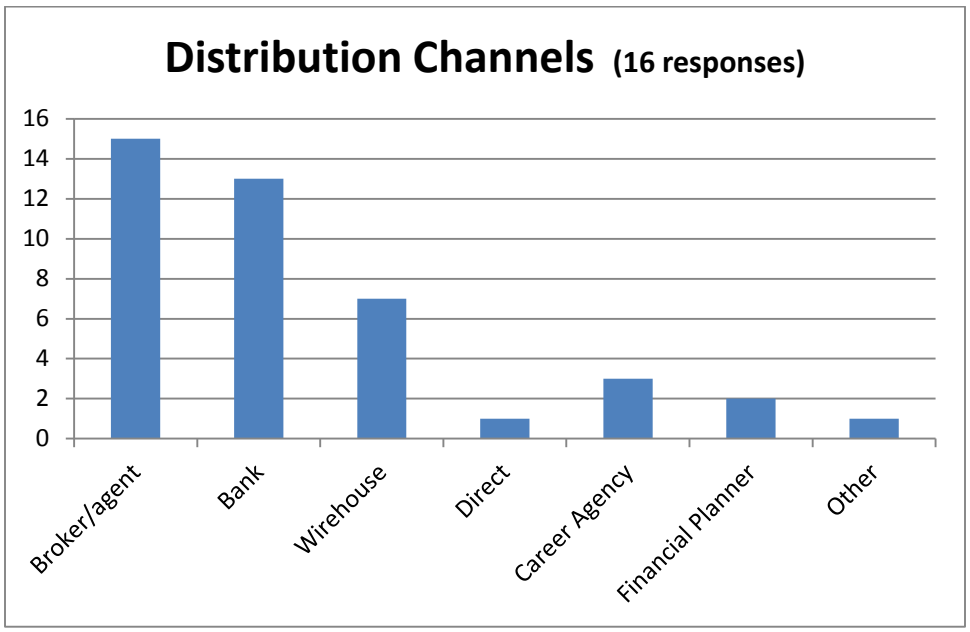

Figure 30

About half of respondents (7 of 16) measure lapse experience by distribution channel. Thirty-one percent (5 of 16) indicated that their assumptions vary by distribution channel which is a higher percentage than in past surveys. Differences included different products sold through different distribution channels. Others cited different lapse assumptions for business distributed through direct channels or captive agents.

Source of Assumptions

Insurers were asked to provide the sources they used for their expected lapse assumptions and the frequency of lapse studies performed in the company. However, given investment market volatility since 2008, some companies have had the opportunity to observe and analyze policyholder behavior "in the tail". Therefore, a follow up question was asked specifically about "in the tail" assumptions.

The survey responses showed that "company experience studies" continue to be the most popular source of base case assumptions (see Figure 31). In 2015 there was a significant increase in the number of companies who indicated the use of industry experience, pricing assumptions, and external consultants in setting assumptions.

Collection, analysis, and publication of industry experience would be valuable as a supplement to any company's specific experience. Companies of various sizes can be challenged by the statistical credibility available from only their own data, especially in the rare occurrence of a "tail" situation. Aggregation of data makes it easier to see trends otherwise obscured by statistical fluctuations. As with any aggregate industry study, each company needs to be aware of any inherent reasons why its own results may legitimately vary from that of the aggregate industry.

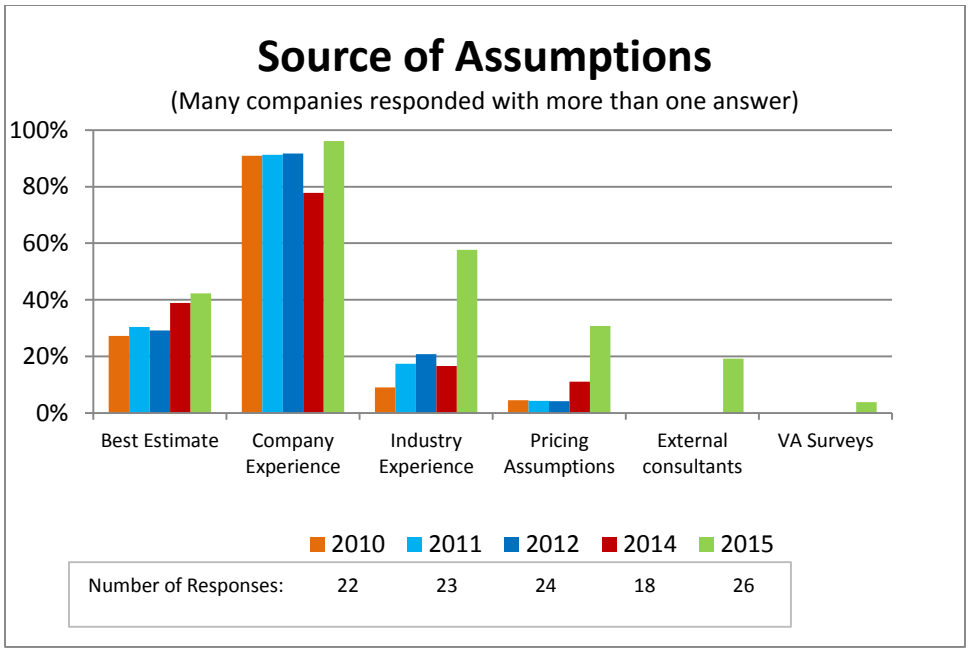

Figure 31

The most common frequency to perform experience studies is annual (see Figure 32), although there is more variation in responses in 2015 than in past years. In 2015, 46% (12 of 26) of respondents reported performing annual experience studies and 81% (21 of 26) perform experience studies on an annual or more frequent basis. At least five companies mentioned that they monitor lapse experience much more frequently (usually monthly) than they perform an official lapse experience study.

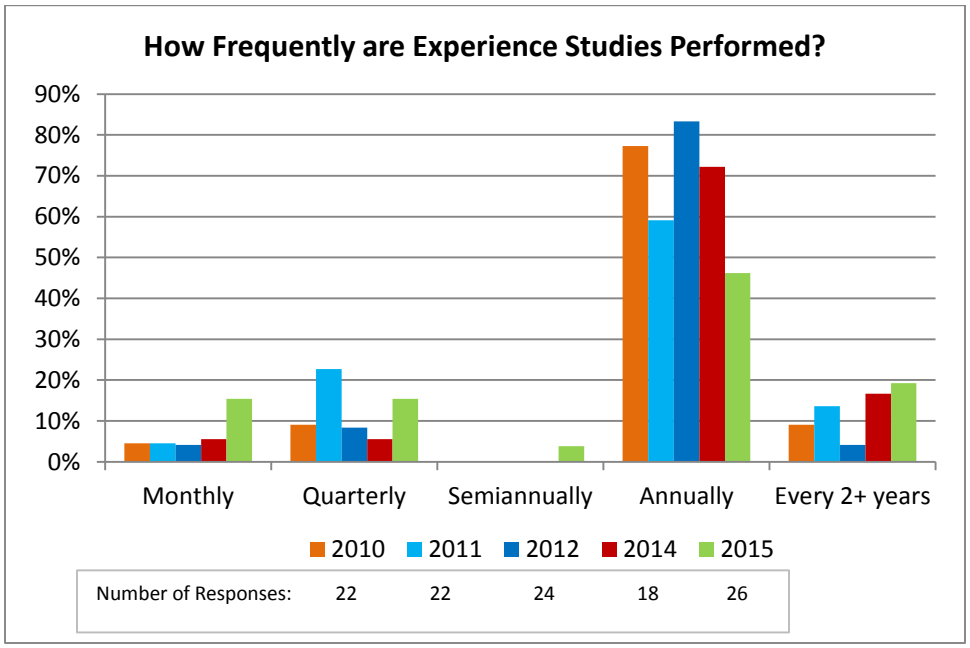

Figure 32

Insurers were asked how many years of data were used in their latest lapse study (Figure 33). Several respondents gave time frames or made comments about using post-2008 data for their lapse study which would have excluded the financial crisis of 2008.

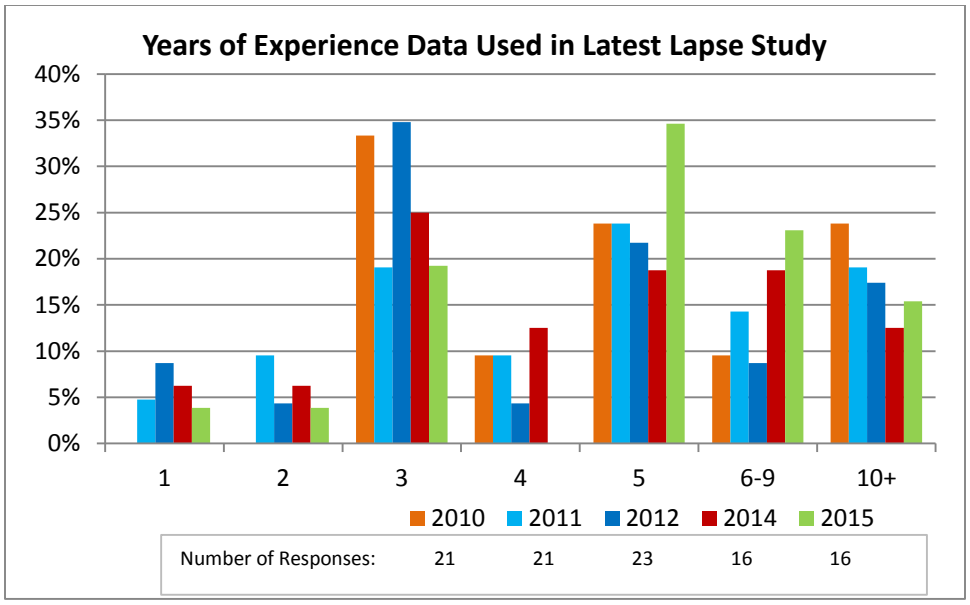

Figure 33

Companies were also asked about the sources of assumptions for "in the tail" lapsation with responses summarized in Figure 34. Companies were able to include more than one category in their responses. In 2015, "best estimate" was a less common response than in prior years. Instead more respondents favored company experience, industry experience, pricing assumptions, and external consultants.

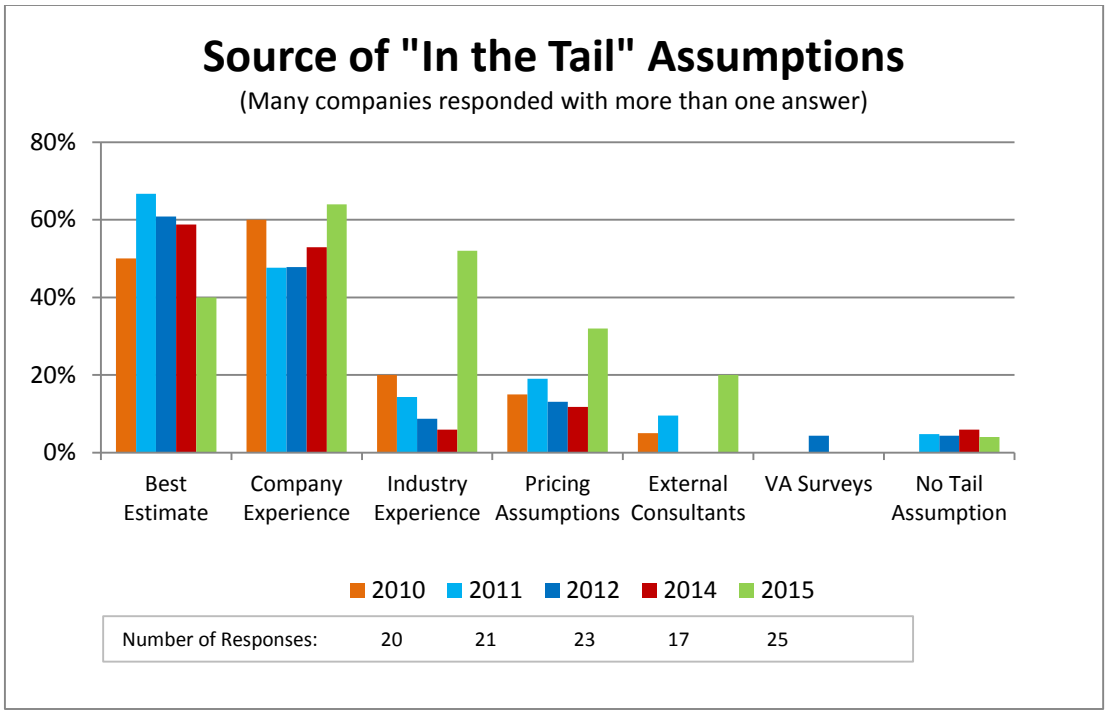

Figure 34

Figure 35 compares the source of base assumptions with the source of "In the Tail" assumptions for 2015, comparing the 2015 data from Figures 31 and 34. This shows that more reliance is placed on company experience for base assumptions than for assumptions "in the tail." This is not unexpected since most actual experience is not in a tail scenario. Lapse assumptions in the tail require more judgement from the actuary.

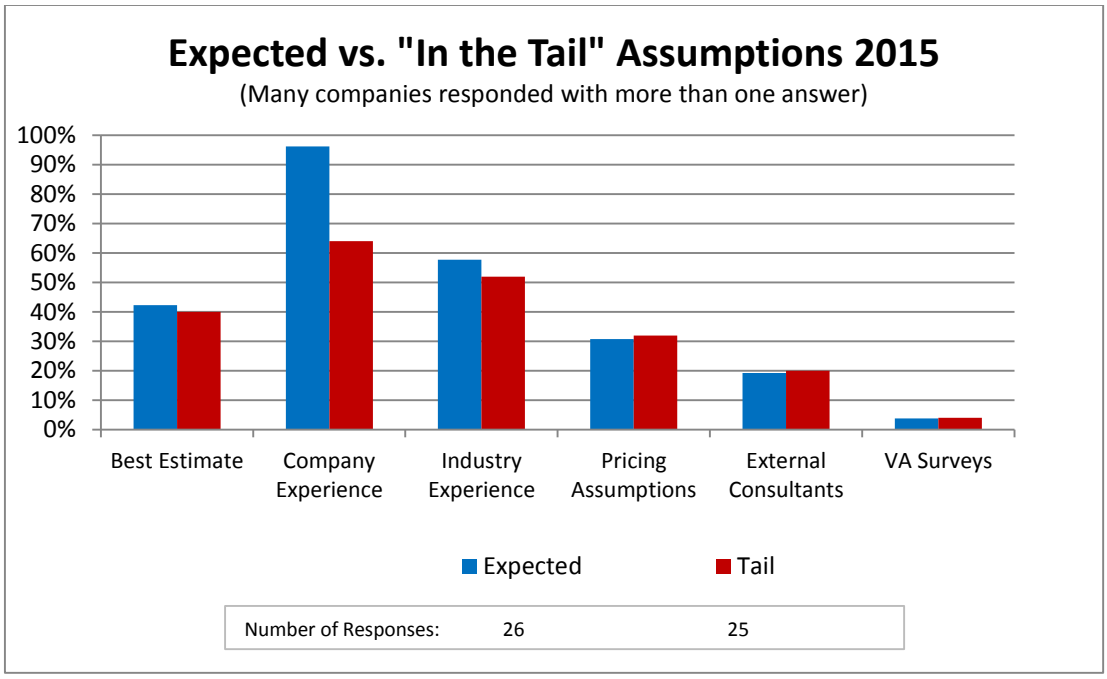

Figure 35

The survey also requested that companies provide the years of experience used if they were using company experience as a source for "in the tail" lapse rate assumptions. Sixteen insurers responded. Five, ten, and "all available" years of experience were the most common responses.

Changes in Assumptions

Insurers were asked if any of the assumptions previously discussed in the survey were changed from the previous year's analysis. The percentage of respondents indicating that some assumptions were changed in 2015 was 73% (19 of 26) which is similar to prior surveys (Figure 36).

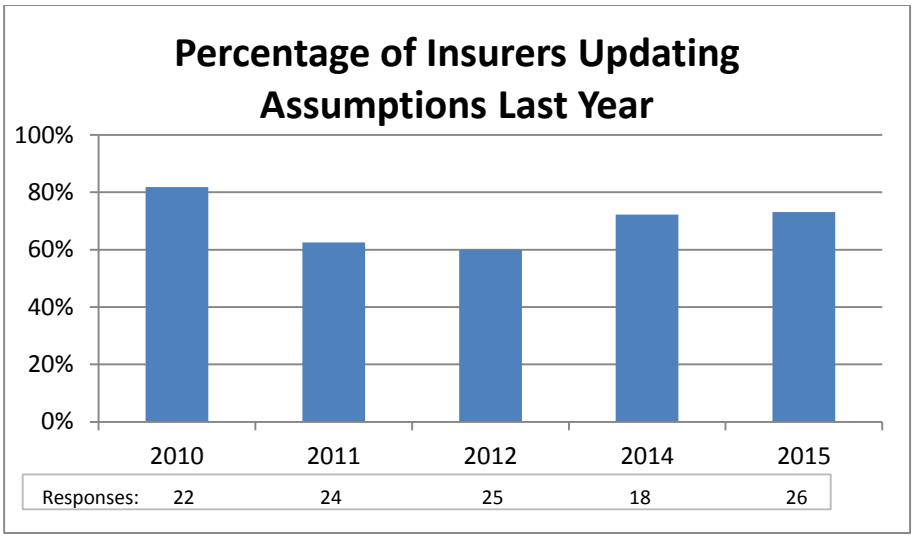

Figure 36

The question went further to ask insurers to describe what was changed in each of three categories: death benefit lapses, living benefit lapses, and living benefit utilization. The following charts (see Figures 37-39) show the percentages of those changing, as allocated among the types of responses. A strong majority of companies made updates for experience in the prior year. Many companies also updated their dynamic functions, especially for living benefit lapses.

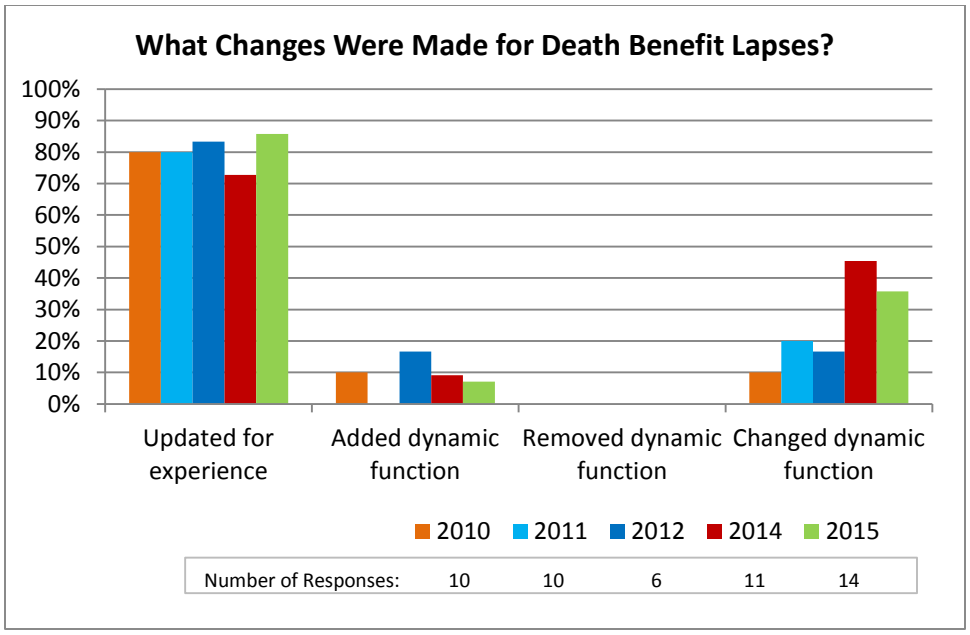

Figure 37

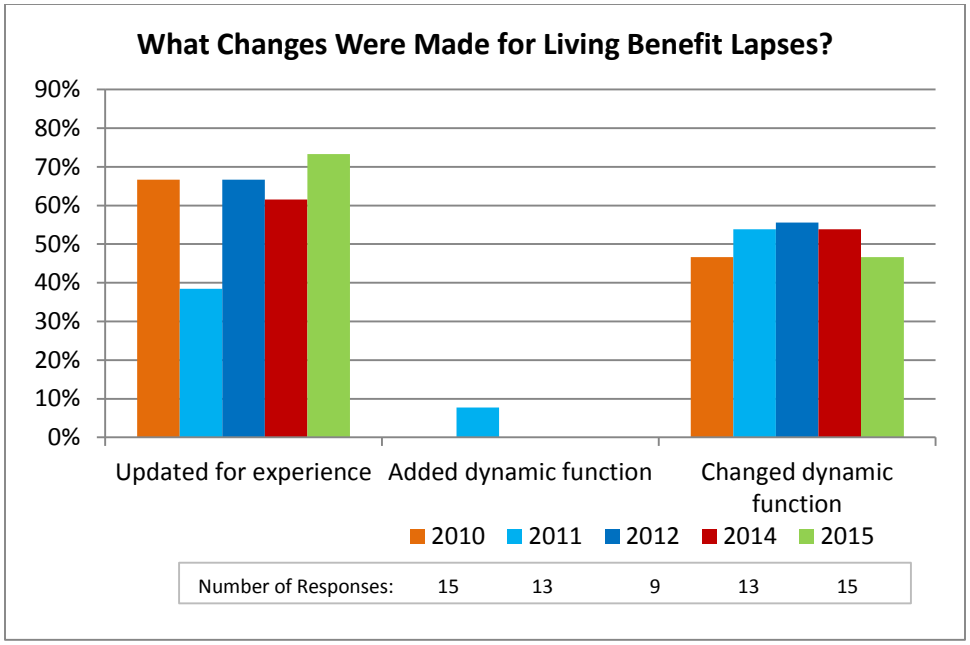

Figure 38

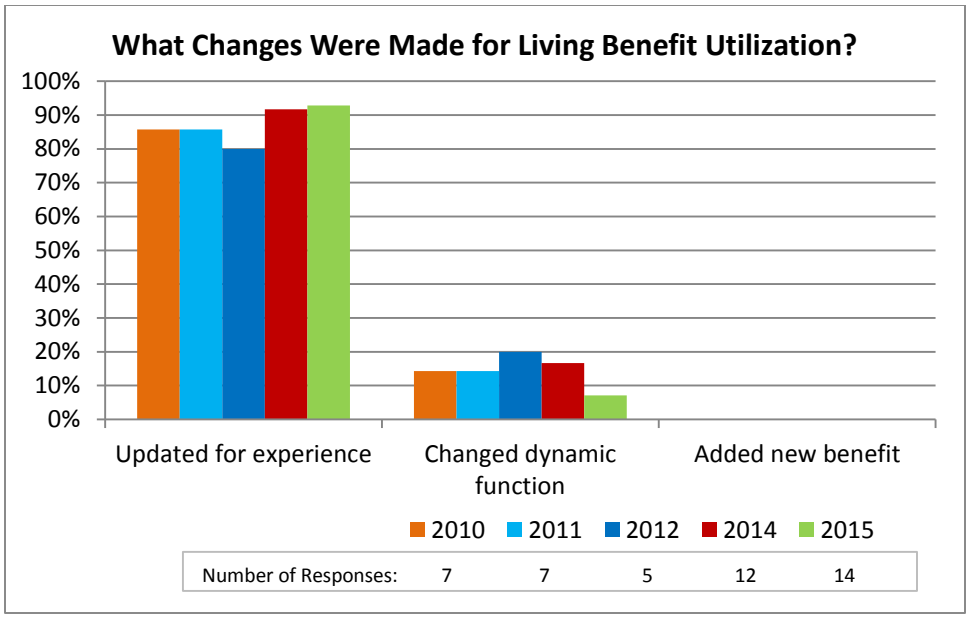

Figure 39

The survey asked companies if emerging policyholder behavior experience since 2008 (for many, a "tail" environment) caused a revision in policyholder behavior assumptions in the tail. Figure 40 shows that about half (48%; 12 of 25) made changes following the crisis with the vast majority of those (92%; 11 of 12) revising assumptions further since then.

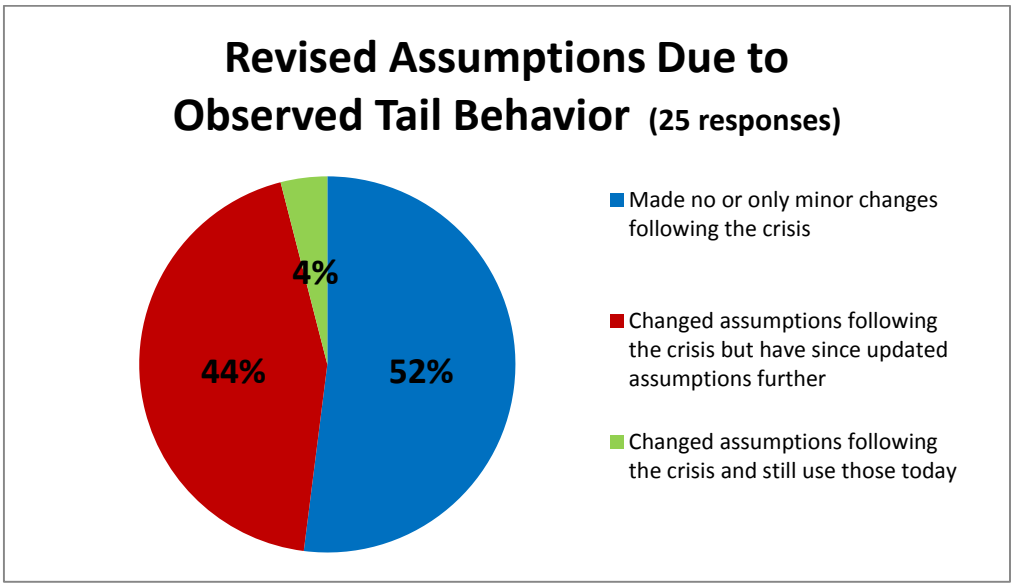

Figure 40

Respondents Profile

Figure 41 indicates the relative size of companies responding to the survey as measured by Total Account Value.

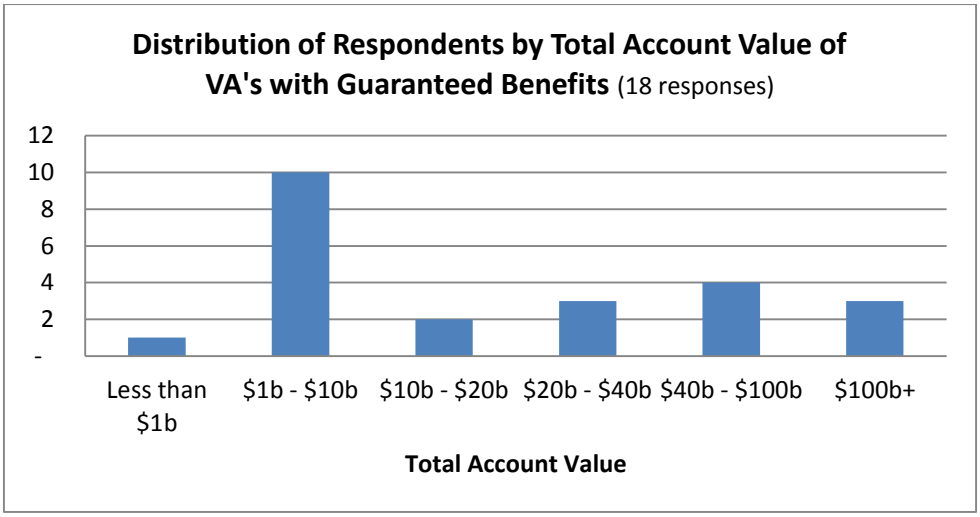

Figure 41