Policyholder Behavior in the Tail
Variable Annuity Guaranteed Benefits Survey/C3 Phase II
2009 Results

Survey Highlights

- The relationship between account value and guaranteed value, often referred to as in-the-moneyness, is used by all responding insurers (7) when determining GMIB utilization rates, but only 20% of responding insurers use this when determining GMWB utilization rates.
- Company experience continues to be the most popular response (between 94% and 100% of insurers over the past three years) regarding the source of assumptions.
- The vast majority of insurers (90%) use dynamic lapses for living benefits; however, only 15% of those described their function as two-sided, where lapses decrease when benefits are in-the-money as well as increase when benefits are out-of-the-money.
- About 65% of insurers do not use dynamic lapses for death benefits. This is down slightly from 75% in last year's survey.
- Around 95% of insurers model dynamic utilization for income benefits, but only 62% indicated the use of dynamic utilization for withdrawal benefits.
- 1,000 scenarios and a 30 year projection horizon remain the most popular C3 Phase II calculation parameters by a large margin.
- There are large differences in lapse rates provided by insurers for both base lapse assumptions and lapse assumptions in the tail across all types of benefits.
- Among all companies that perform experience studies, most insurers (67%) perform them annually.
- About half of responding insurers (16 out of 29) indicated that some assumptions covered by the survey were changed from last year, with the vast majority of these changes coming from updated company experience.
- There is a very wide variation in the description of the tail scenario across insurers.
- The median cumulative return, measured across the tail scenarios provided by respondents, resembles the 10th percentile of the AAA pre-packaged scenarios over the first 13 projection years and is higher in later years.

Acknowledgements

The Society of Actuaries' Policyholder Behavior in the Tail (PBITT) working group gratefully acknowledges Stephen Hodges and Michael Altier for all of their efforts in analyzing the survey data and drafting the results 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 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.
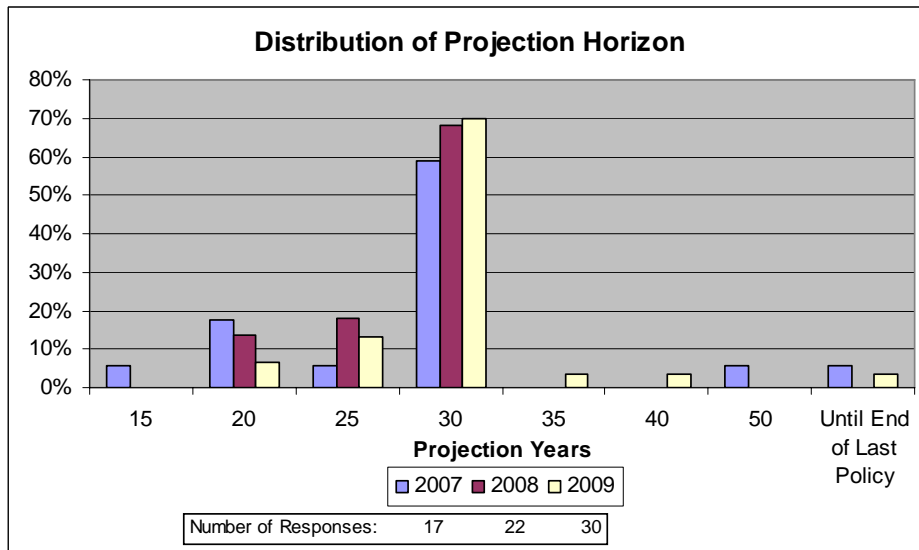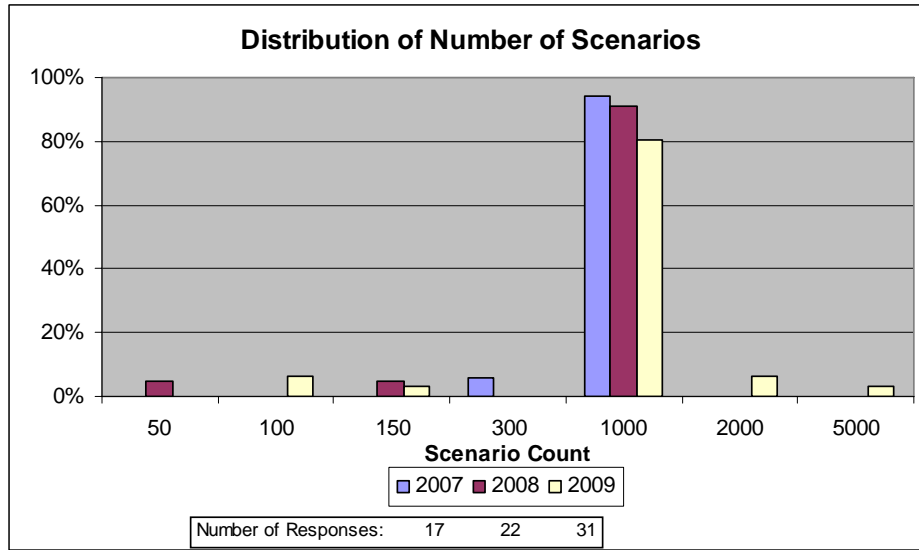
Background

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. This survey was also offered in 2007, 2008, and again in 2009. Each survey received around 20-30 responses, however not every company answered every question. The following sections highlight responses from 2009 and, where applicable, show how answers compare to previous years' surveys.

As a way to judge the credibility of results, most charts indicate how many companies responded to the question for each survey year.

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. Answers were similar to 2008 and 2007 in that most insurers project 1000 scenarios for 30 years. However, 2009 answers regarding the scenario count were more dispersed than previous years.

Distribution of Number of Scenarios

| Number of Responses: | 17 | 22 | 31 |

Scenario Count

2007 2008 2009

Distribution of Projection Horizon

| Number of Responses: | 17 | 22 | 30 |

Projection Years

2007 2008 2009

*2005 answers were not available for comparison.

Tail Scenario

Insurers were asked to describe the tail scenario that gives the first positive Additional Asset Requirement (AAR). For example, if the sorted AARs for each scenario in the tail were 100, 90, 50, 30, 15, -5, -20, …, the scenario the insurer would provide would be the one that produced an additional asset requirement of 15.

Responses varied widely across insurer regarding the description of the tail scenario. The chart below shows each insurer's description of the equity performance in their tail scenario.

2009 Equity Tail Scenarios
Individual Insurers' Responses
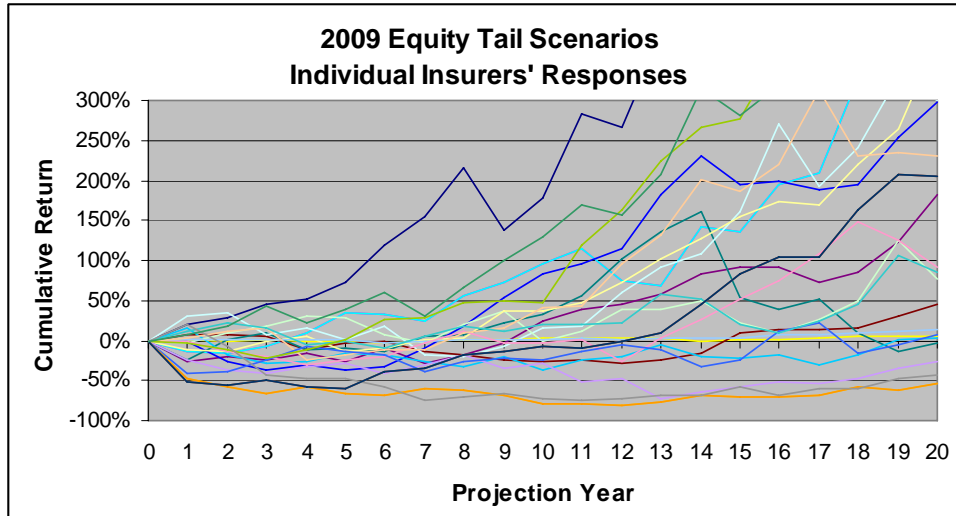
One explanation of the variation could be the wide variety of guarantees sold. Companies with substantial ratcheting guarantees may be most hurt by a rapidly rising scenario followed by a crash, but this scenario may not be in the tail for companies with return of premium guarantees.

In the chart below, the median of the lines above is plotted against the 10th percentile of the equity returns from the American Academy of Actuaries pre-packaged scenario set (http://www.actuary.org/life/phase2_2.asp). For reference, the median of insurers' responses from the previous years' surveys are also plotted on the graph below. Note that the lines below reference the median (of each survey year) and 10th percentile (of the AAA scenarios) of the cumulative gains, rather than representing a particular scenario.

Median of Tail Scenario Responses vs. AAA 10th %-ile
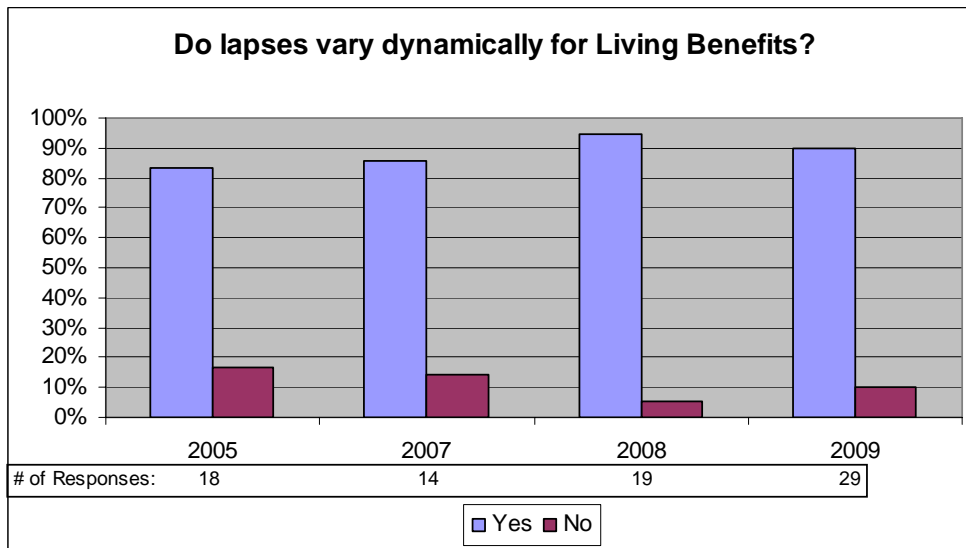**Equity Index**
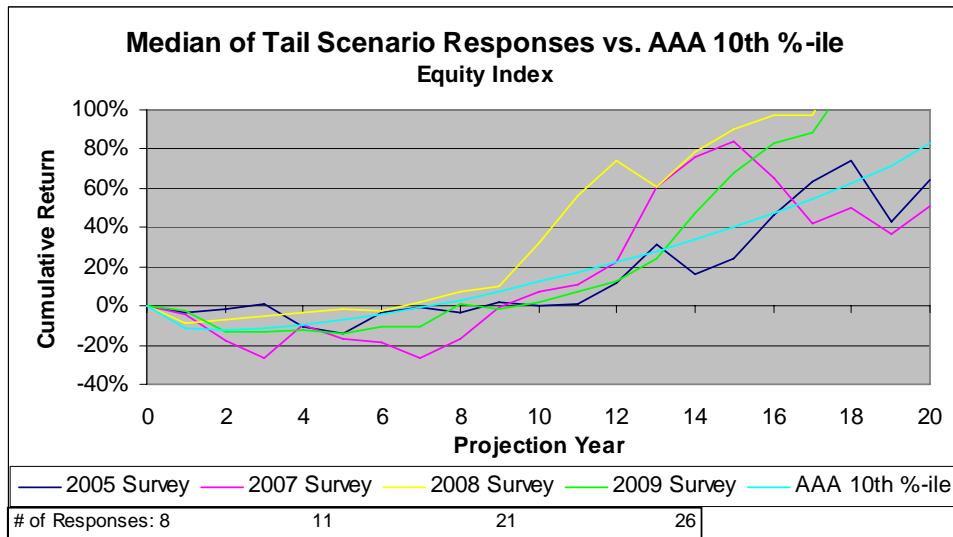
Over the first 13 years, the 2009 survey results are fairly close to the 10th percentile of the AAA set, however starting in year 14 the returns diverge.

Dynamic Lapses and Dynamic Utilization
The charts below show the percentage of insurers that use dynamic lapses for variable annuities with death benefits and variable annuities with living benefits.

Do lapses vary dynamically for Death Benefits?

| # of Responses:	2005	2007	2008	2009
	22	17	20	33

☐ Yes ■ No
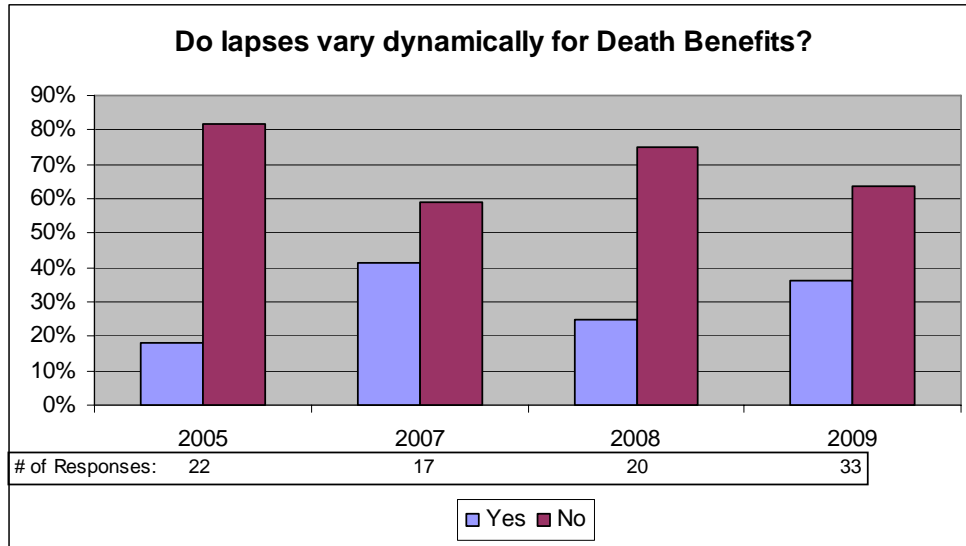
Although only 36% of insurers in 2009 use dynamic lapses for death benefits, this is double the rate of the 2005 survey. Of those that do use dynamic lapses for death benefits, most insurers described their function. In all four survey years, all dynamic lapse functions for death benefits have been 1-sided (lapses slow when benefits are in-the-money, but do not speed up when benefits are out-of-the-money).

Do lapses vary dynamically for Living Benefits?

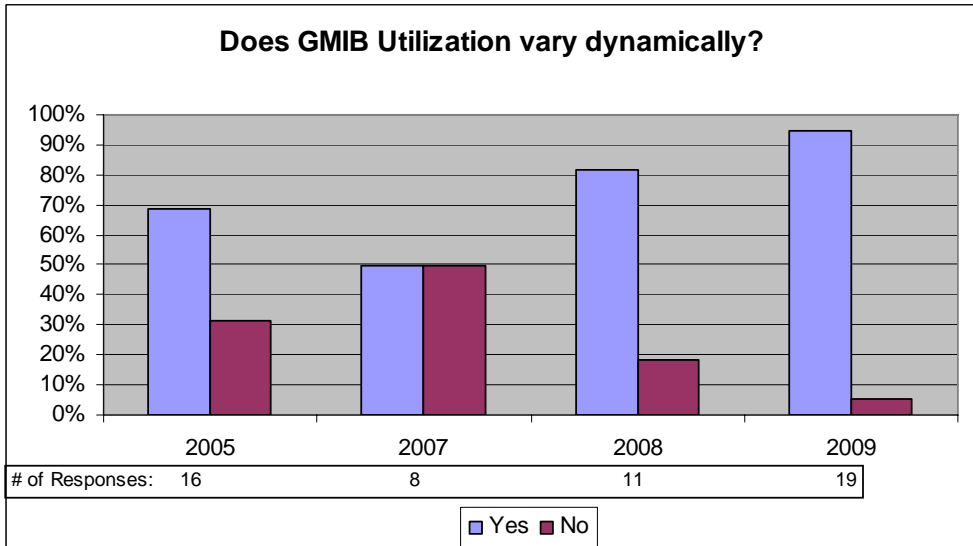| # of Responses:	2005	2007	2008	2009
	18	14	19	29

☐ Yes ■ No

An overwhelming majority of insurers use dynamic lapses for living benefits. The percentage of insurers using dynamic lapses has risen from 83% in 2005 to 90% in 2009, with a peak of 95% in 2008.

Insurers were also asked to describe their living benefit dynamic lapse function. This question yielded a wide variety of responses; however, most insurers described a 1-sided dynamic function that only slows lapses when the guarantee becomes in-the-money. A very small number of insurers described a two sided dynamic function, where lapses also speed up when guarantees are out-of-the-money.

Percentage of Insurers Using a 2-sided Dynamic Lapse Function for Living Benefits

	2005	2007	2008	2009
# of Responses:	14	12	18	26
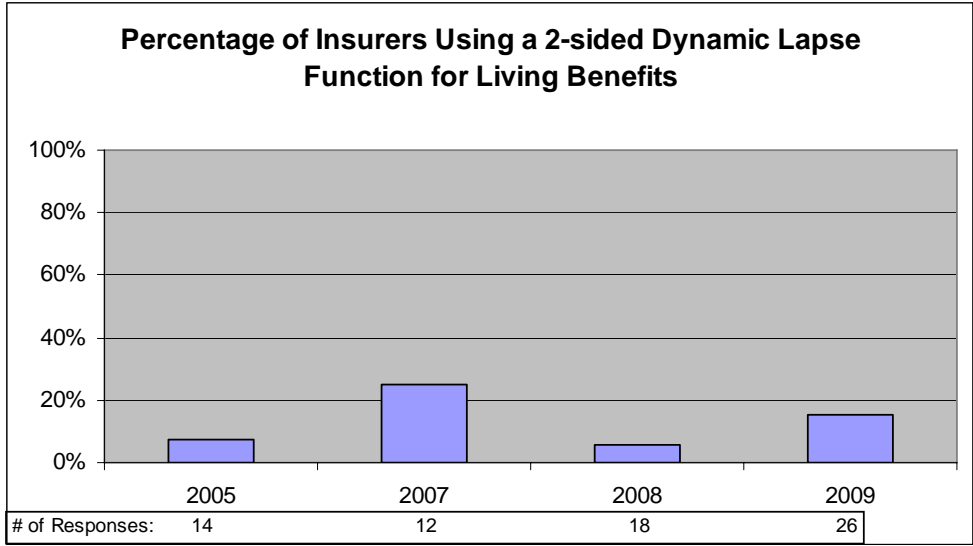
The charts below show the percentage of insurers who use dynamic utilization functions for Income Benefits and for Withdrawal Benefits.

Does GMIB Utilization vary dynamically?

	2005	2007	2008	2009
# of Responses:	16	8	11	19

Yes No

Does GMWB Utilization vary dynamically?

| # of Responses:	16	9	15	26

Legend: Yes, No
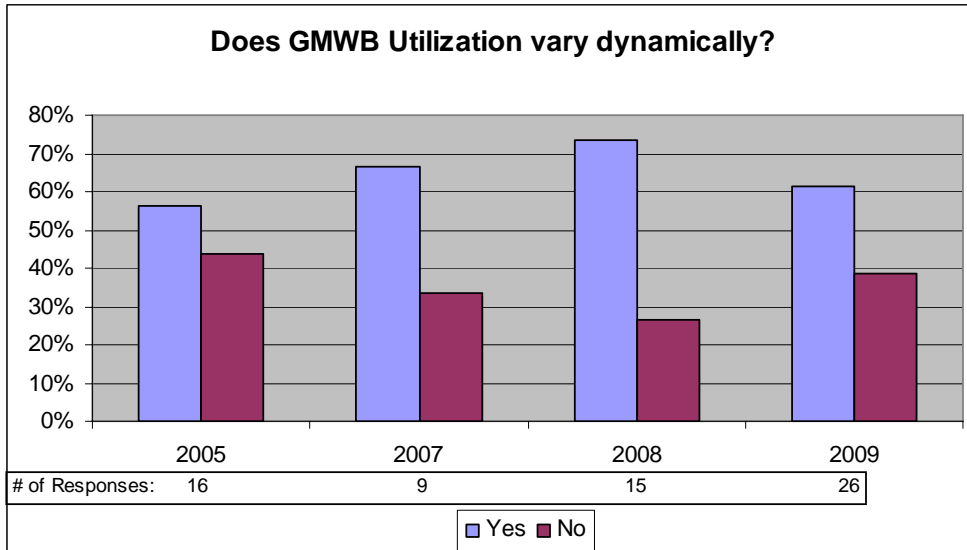
Dynamic utilization for GMIBs has risen substantially over the past few years from 50% in 2007 to more than 95% in 2009. While the majority of respondents (62%) use dynamic GMWB utilization, results were lower in 2009 than in 2008 and 2007.
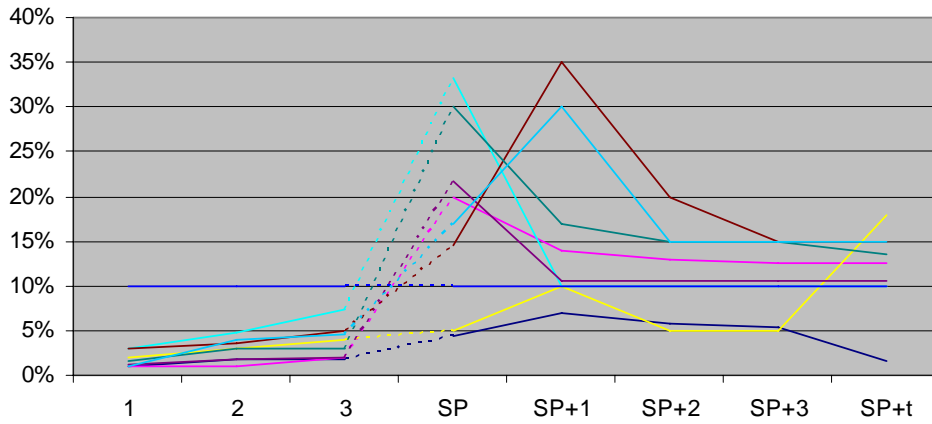
Base Lapse Assumptions

Added as a new question for 2009, 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. Responses were broken down by benefit type into Death Benefits (GMDB), Accumulation Benefits (GMAB), Income Benefits (GMIB), Withdrawal Benefits (GMWB), and Combination Benefits.

The charts below list each insurer's response for base lapses for each benefit type. Note that the y-axis scale may differ among the graphs below.

2009 Individual Insurers' Death Benefit Lapses-Base Assumption (18 Responses)
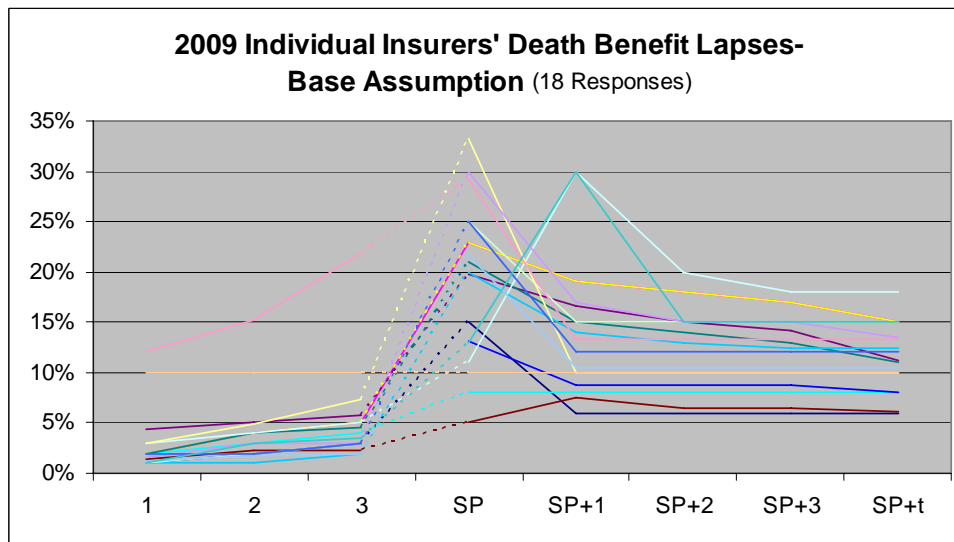
**2009 Individual Insurers' GMAB Lapses-
Base Assumption** (9 Responses)

**2009 Individual Insurers' GMIB Lapses-
Base Assumption** (7 Responses)
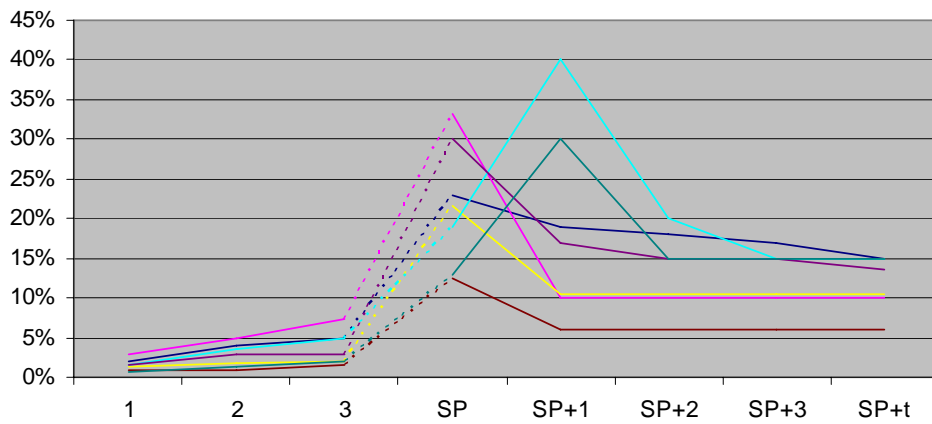
**2009 Individual Insurers' GMWB Lapses-
Base Assumption** (13 Responses)

**2009 Individual Insurers' Combo Benefit Lapses-
Base Assumption** (5 Responses)
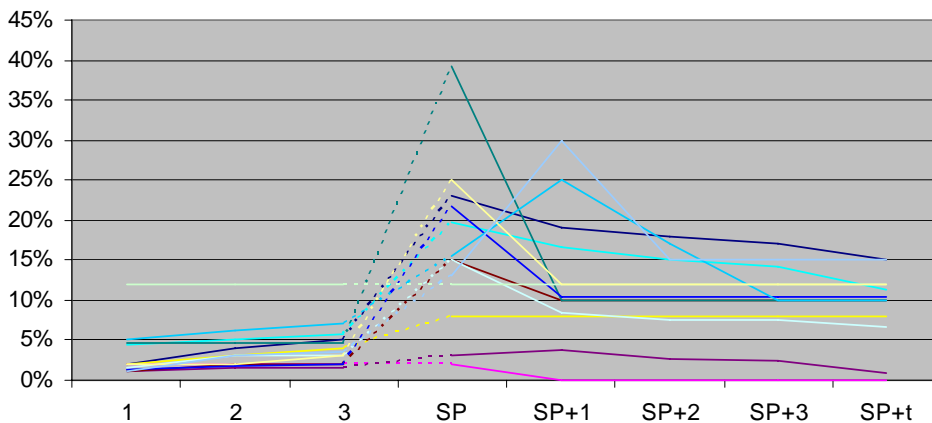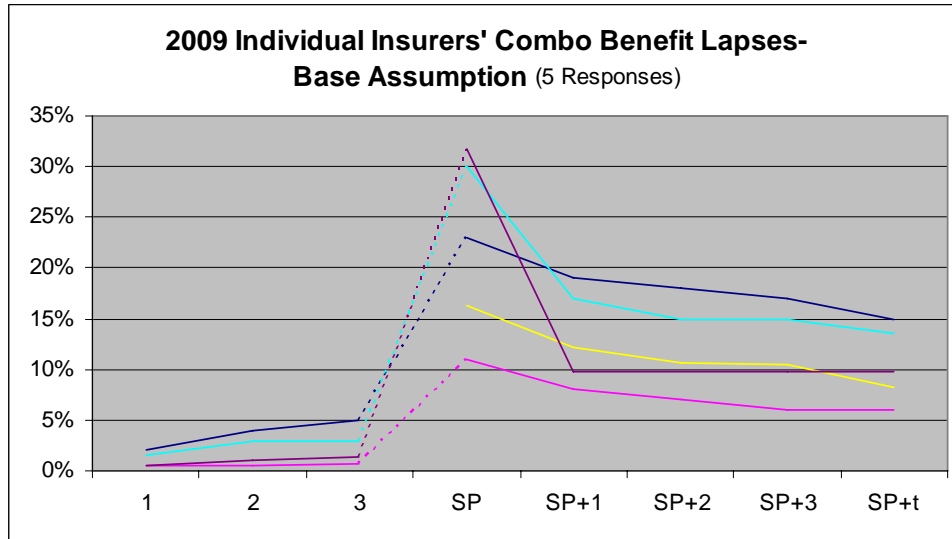
The following graphs show the lowest, median, and highest lapses by benefit type across all insurers' responses.

**2009 Lowest Lapses by Benefit-
Base Assumption**

GMDB — GMAB — GMIB — GMWB — Combo

**2009 Median Lapses by Benefit-
Base Assumption**

GMDB — GMAB — GMIB — GMWB — Combo

2009 Highest Lapses by Benefit-Base Assumption

GMWB Lapses are directly under Combo Lapses

Legend: GMDB — GMAB — GMIB — GMWB — Combo
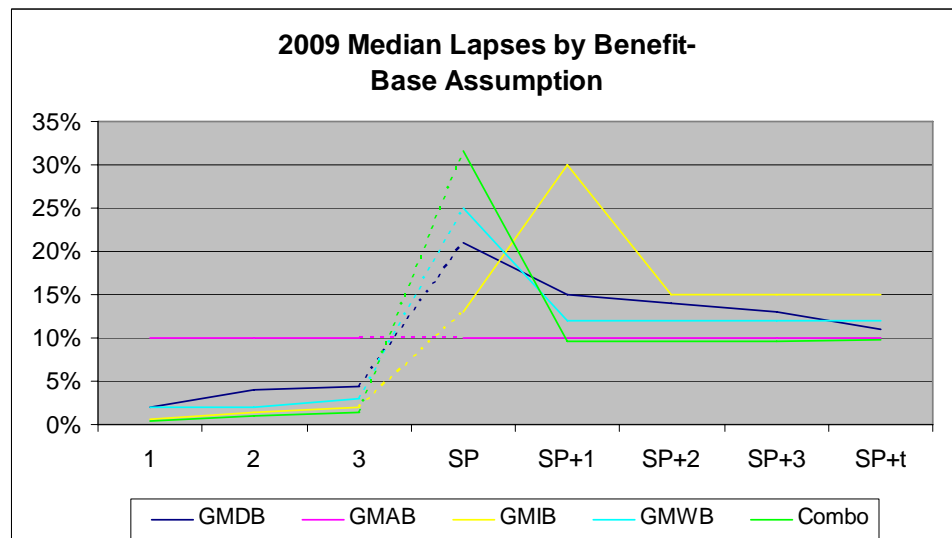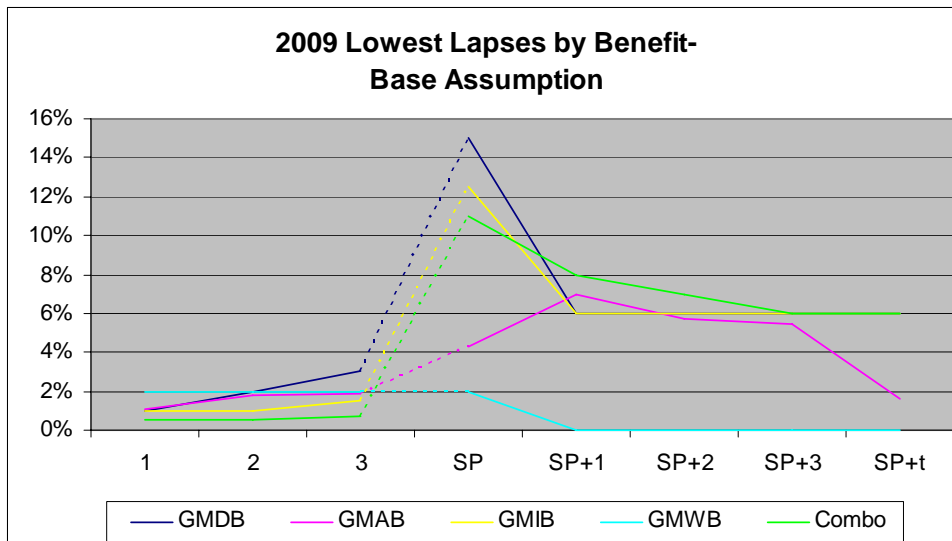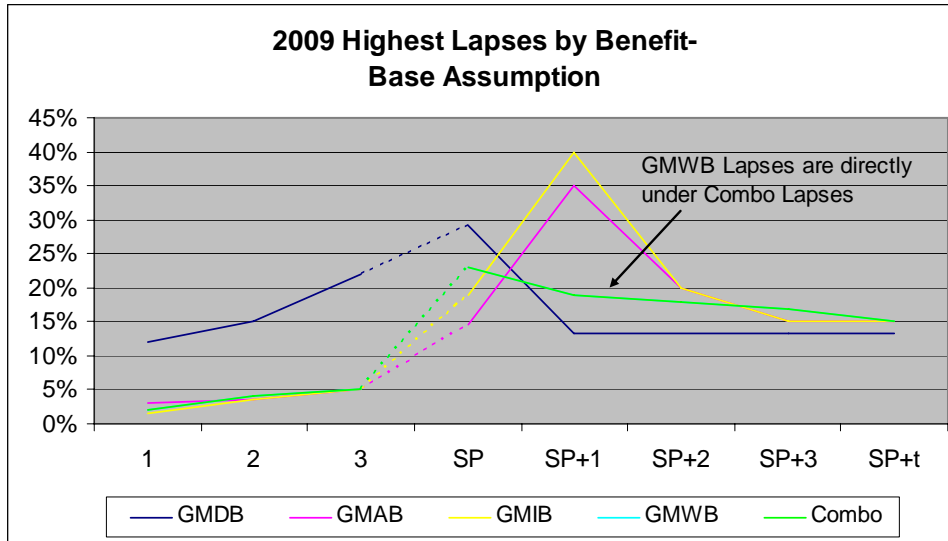
Lapses in the Tail

Insurers were asked to list the actual lapse rate experienced in the tail for Death, Maturity, Income, and Withdrawal benefits. In 2009, the format of this question changed making comparisons to past years difficult. The charts below show tail lapse rates by benefit type for years 1 through 20.

2009 Individual Insurers' Death Benefit Lapses-In the Tail
(11 Responses)

Year

2009 Individual Insurers' GMAB Lapses-In the Tail
(6 Responses)

2009 Individual Insurers' GMIB Lapses-In the Tail
(5 Responses)

2009 Individual Insurers' GMWB Lapses-In the Tail
(9 Responses)

2009 Individual Insurers' Combo Benefit Lapses-In the Tail (7 Responses)
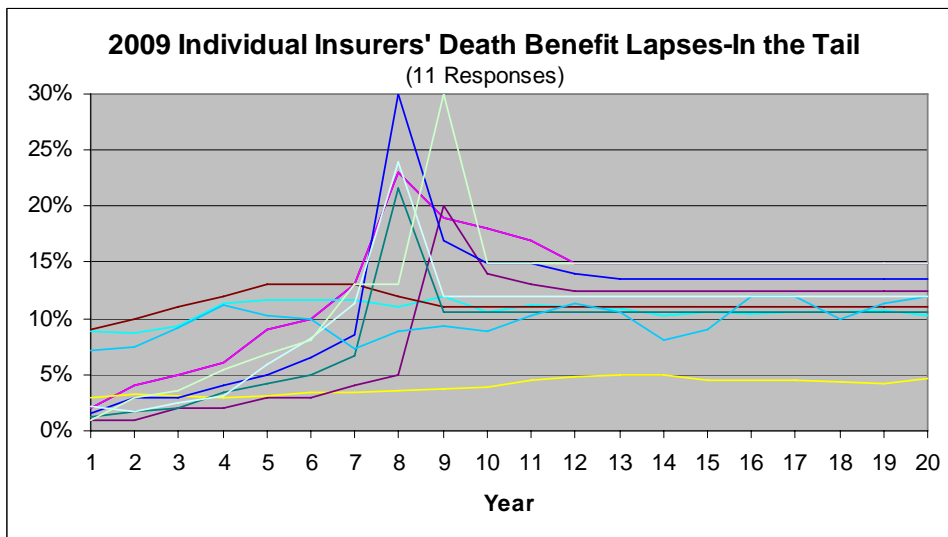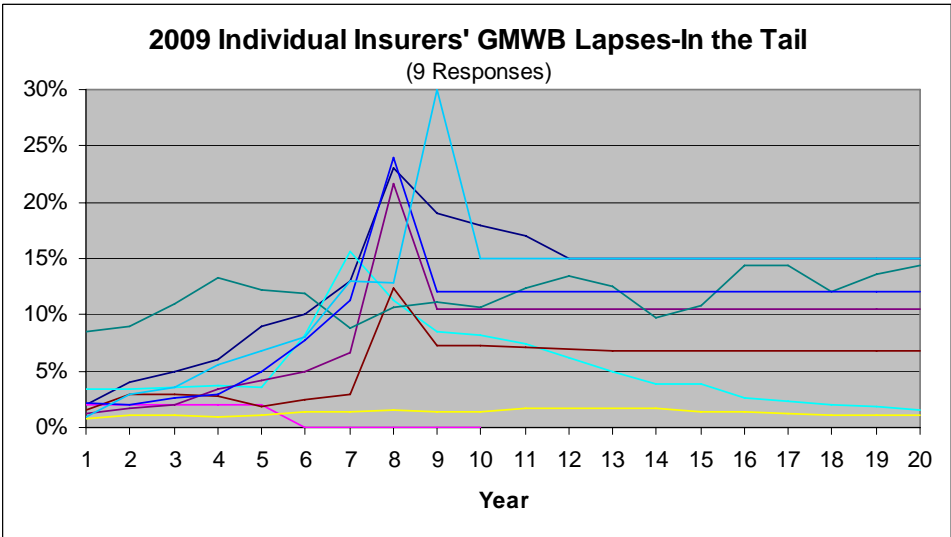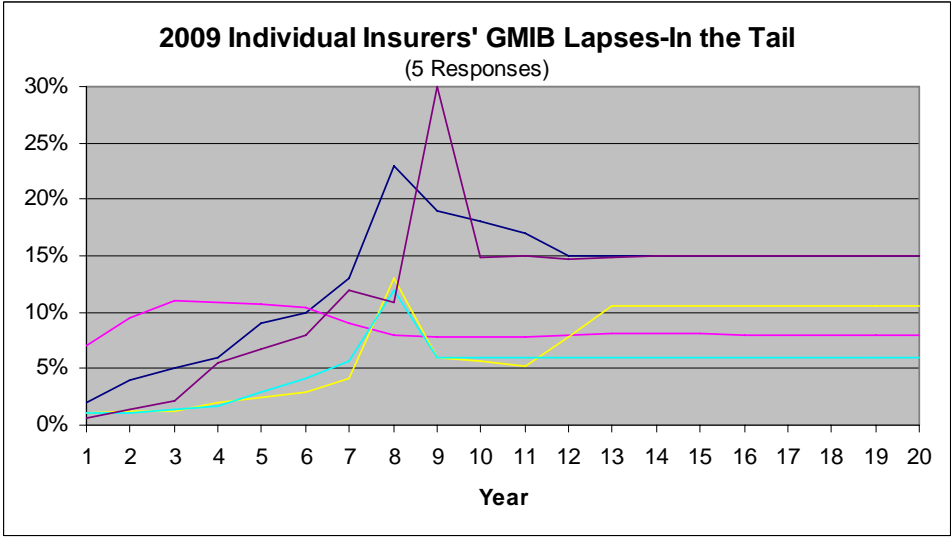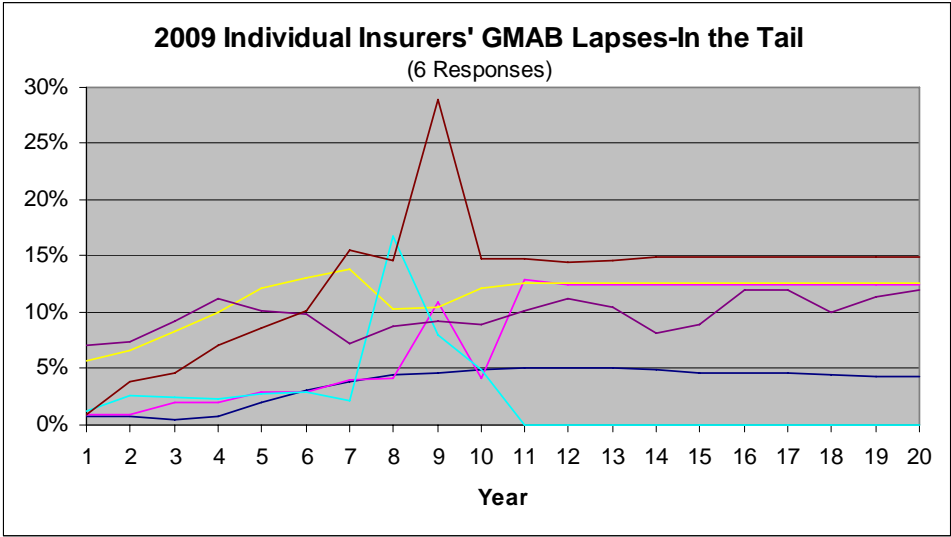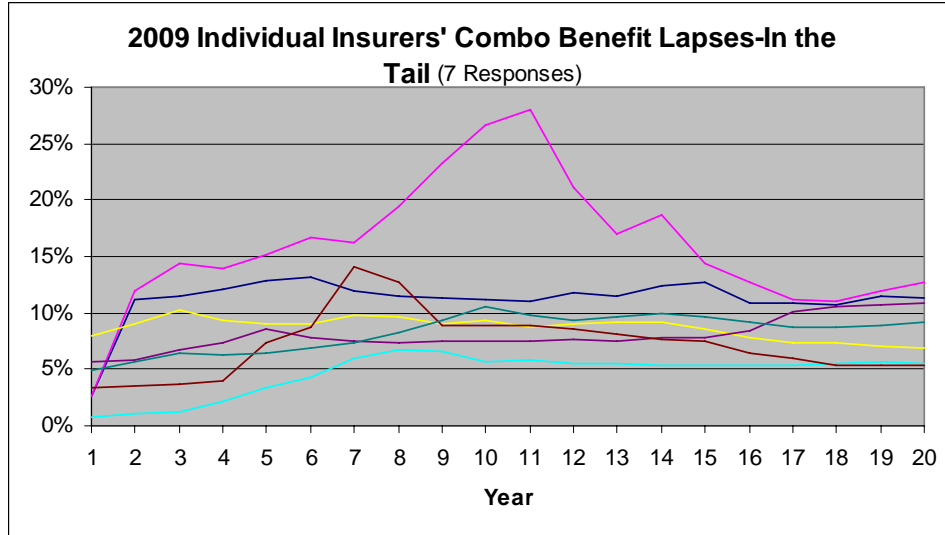
Income and Withdrawal Utilization

Insurers were also asked to describe their Income and Withdrawal utilization assumptions. The response rate was considerably larger in 2009 than in previous years. In-the-moneyness, or the relationship of the account value to the guaranteed value, continues to be included in all insurers' GMIB utilization functions. Insurers were able to list more than one factor so the percentages will not sum to 100%.

Factors that Impact GMIB Utilization
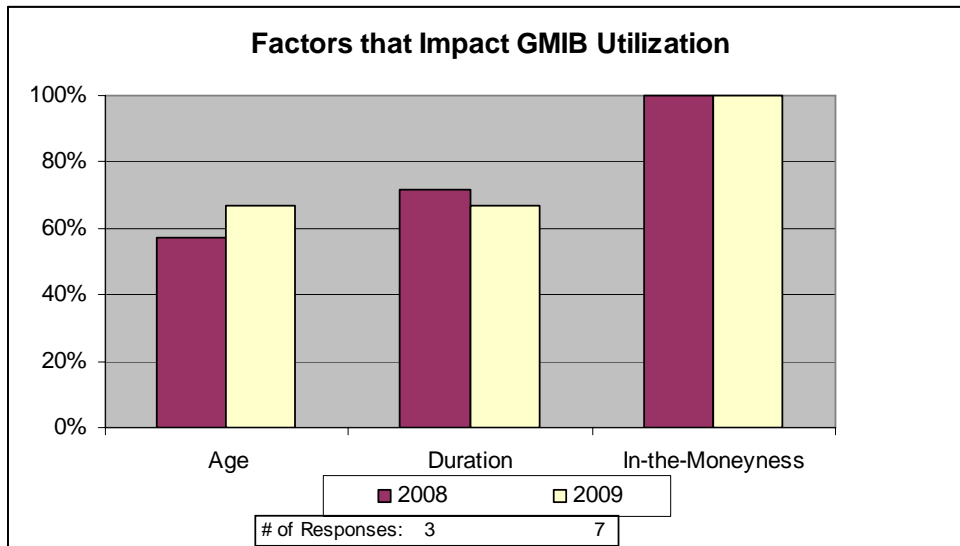
# of Responses: 3   7

Factors that impact GMWB utilization have been relatively constant over the past year despite the large increase in responses. In-the-moneyness continues to be used much less frequently than other factors.

Factors that Impact GMWB Utilization
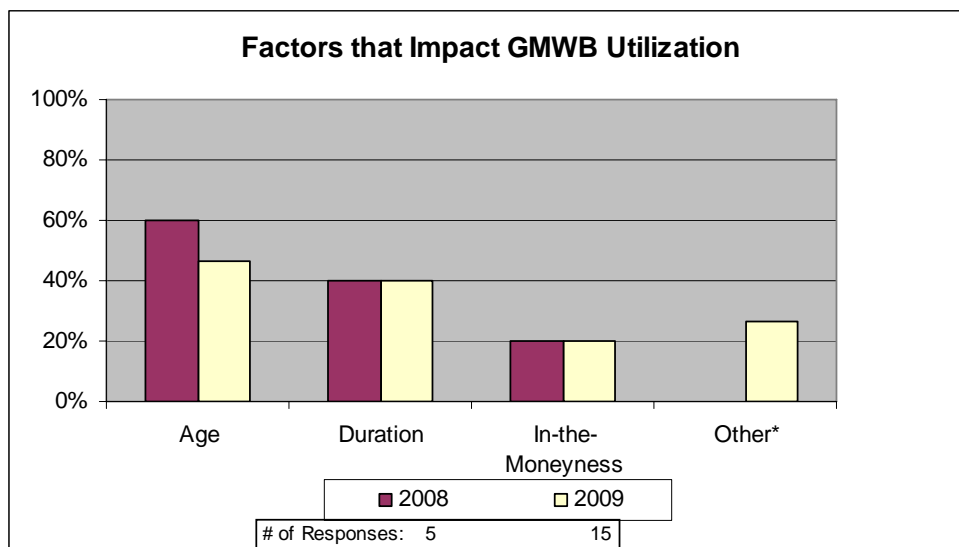
*Other factors listed in 2009 included:
- Withdrawals set to 0% until GMWB is maximized, then fully utilized.
- Cohort approach assigning different wait times to different policies.
- Utilization varying by GMWB rider type.
- Utilization dependent upon whether or not withdrawals have already begun.

Lapses by Distribution and Market

Insurers were asked if their lapses varied by distribution channel. Only 14% (4 out of 29) indicated a difference. All of those indicating a difference distinguished between internal distribution (captive agency) and external distribution (brokers, banks, independent agents), with the latter having higher lapses.

Insurers were also asked if their lapses varied by market. Again, only 14% (4 out of 29, but not necessarily the same 4 as above) indicated their lapses vary by market. One insurer described that their differences relate to Employer vs. Individual markets.

Source of Assumptions

Insurers were asked to provide the source they used for their lapse assumptions, as well as the frequency of lapse studies performed in the company. Clearly company experience studies continue to be the most popular source of assumptions, and companies that perform experience studies most often perform them annually. Note that over the past few years, only a small percentage of companies indicated that they used industry experience. It is our hope that with the publication of these and future survey results, we will increase the availability of industry experience for all companies to consider when setting assumptions or when extrapolating to the tail.

Source of Assumptions
(Many companies responded with more than one answer)

Number of Responses: 17 21 28

How Frequently are Experience Studies Performed?

Number of Responses: 16 20 27
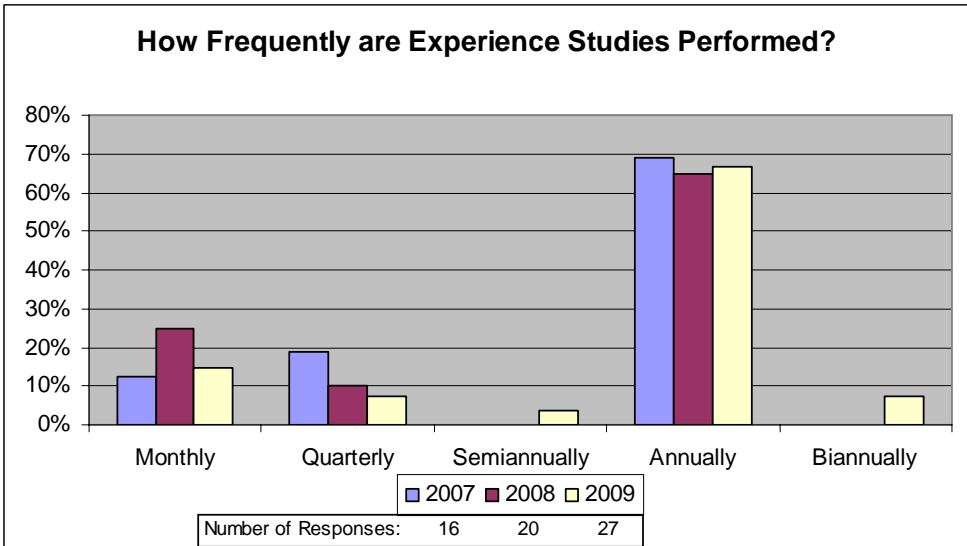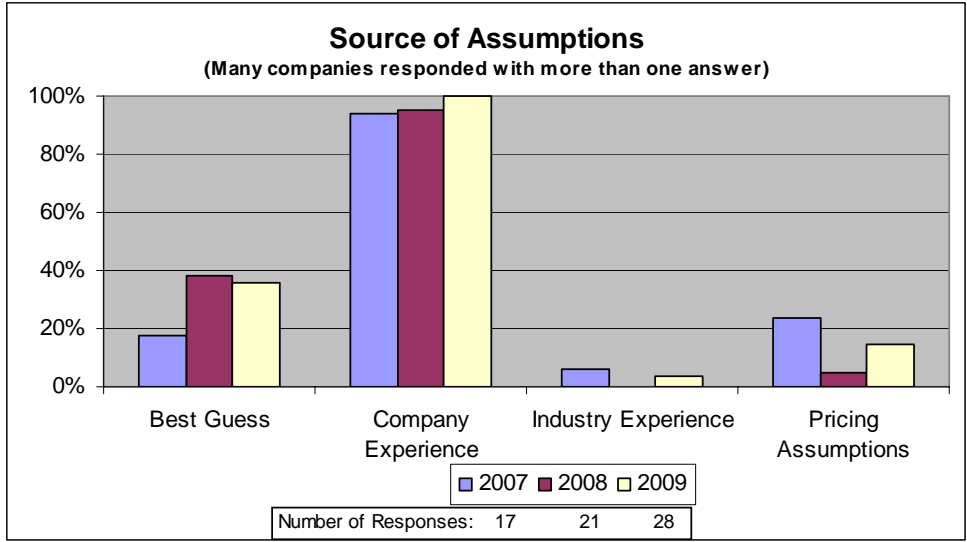
*2005 answers were not available for comparison.

Changes in Assumptions

A new question regarding assumption changes was asked in 2009. Insurers were asked if any of the assumptions previously discussed in the survey were changed from the previous year's analysis. 55% (16 out of 29) indicated that some assumptions were changed.

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 charts below show the responses.

What Changes Were Made for Death Benefit Lapses?
(11 Responses)

Category	Percentage
Updated for Experience	~72%
Added Dynamic Function	~9%
Removed Dynamic Function	~9%
Changed Dynamic Function	~9%
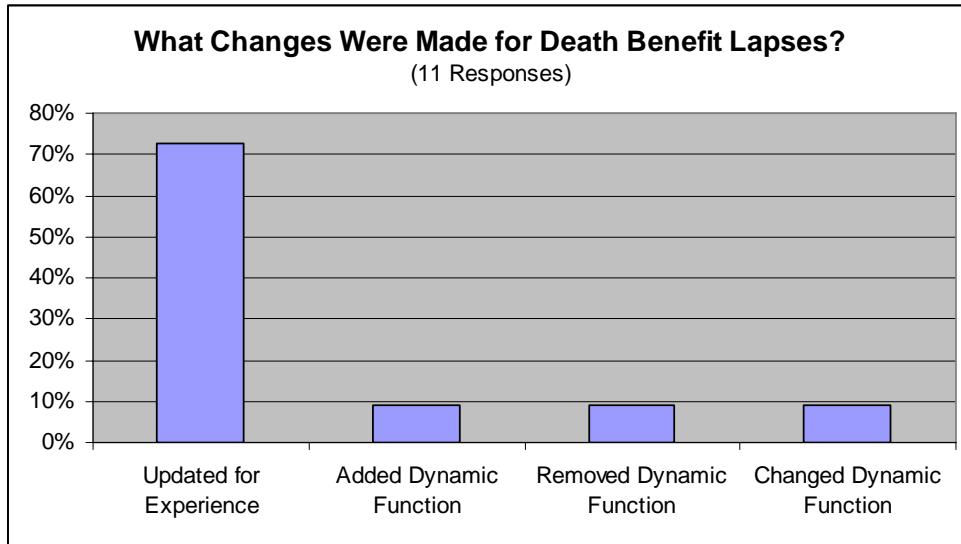
Among those indicating that assumptions were updated for experience, three insurers explicitly stated that lapses were decreased while two insurers stated that lapses were increased.

What Changes Were Made for Living Benefit Lapses?
(11 Responses)

Category	Percentage
Updated for Experience	~64%
Added Dynamic Function	~27%
Changed Dynamic Function	~9%

What Changes Were Made for Living Benefit Utilization?
(8 Responses)

[Bar chart showing percentages:
- Updated for Experience: ~75%
- Changed Dynamic Function: ~12.5%
- Added New Benefit: ~12.5%]
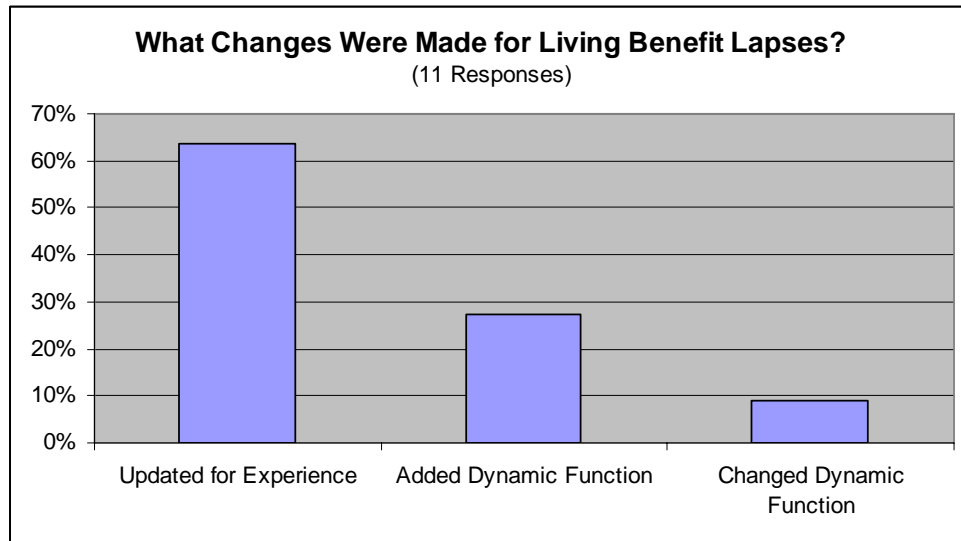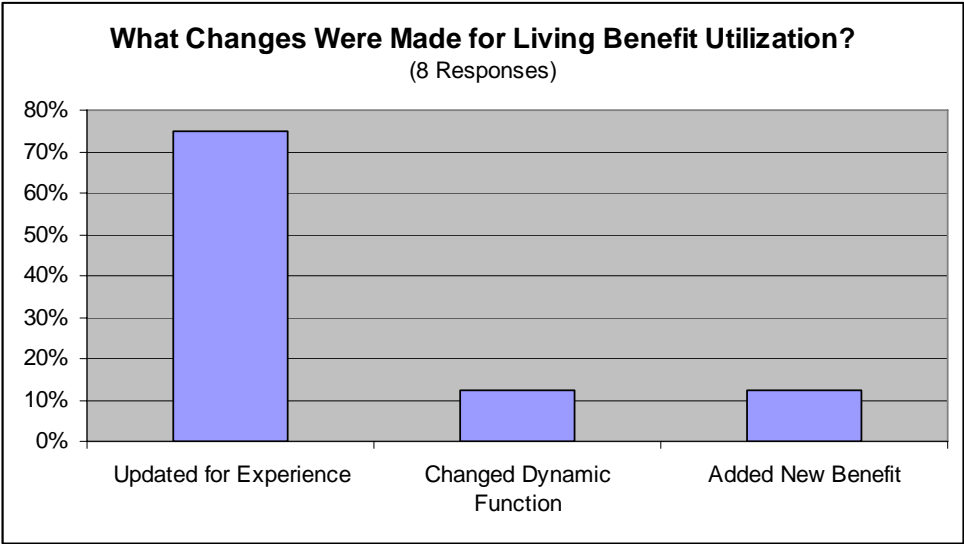
Respondents Profile

The following section shows the relative size of companies responding to the survey as measured by Total Account Value.

Distribution of Respondents by Total Account Value
(25 Responses)

[Bar chart showing percentages by Total Account Value:
- Less than $1b: 0%
- $1b-$2b: 12%
- $2b-$5b: 12%
- $5b-$10b: 16%
- $10b-$20b: 24%
- $20b-$40b: 20%
- $40b+: 16%]

Total Account Value
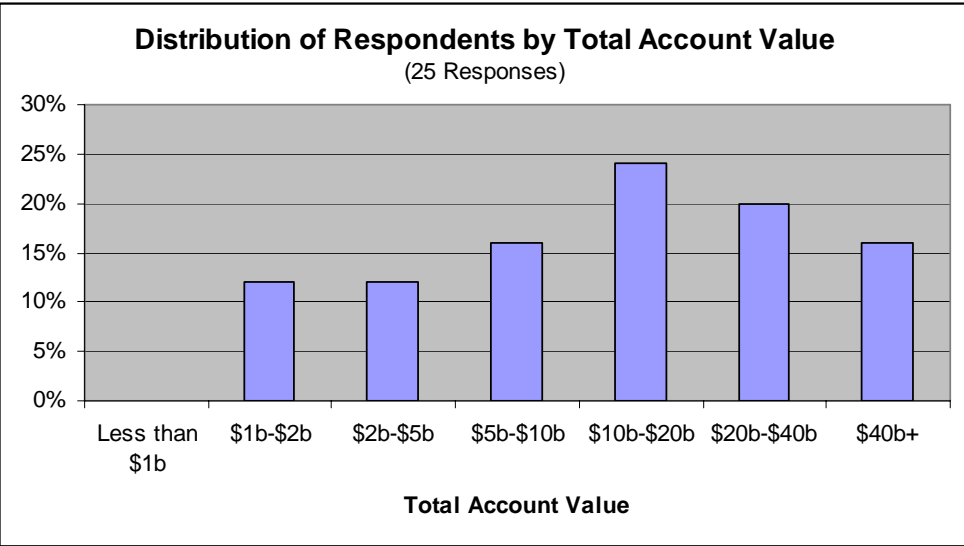
APPENDIX – COMPLETE SURVEY QUESTIONS

<u>2009 VA Survey – Society Of Actuaries</u>
The Society of Actuaries' Risk Management Task Force is trying to develop better estimates of policyholder behavior in the tail (PBITT). Our mission is to examine and ultimately give guidance to actuaries on how to set policyholder assumptions in extreme scenarios. We are most interested in the assumptions for the scenarios in the 90 CTE calculations if stochastically modeled, or the assumptions for events that occur above two standard deviations of expected experience.

This brief questionnaire, the fourth of its kind, is designed to confidentially gather the range of assumptions actuaries use in pricing, reserving, and risk management of secondary guarantees on Variable Annuity products, such as death benefits, income benefits, withdrawal benefits and accumulation benefits. The definitions of these benefits are as follows:

Guaranteed Minimum Death Benefit (GMDB)
guarantees minimum account value at death

Guaranteed Minimum Income Benefit (GMIB)
guarantees minimum monthly income at annuitization

 Guaranteed Minimum Withdrawal Benefit (GMWB)
guarantees a minimum stream of income, provided it is withdrawn within specified limits over time

Guaranteed Minimum Accumulation Benefit (GMAB)
guarantees a minimum account value at a specified time

If data are not available, please report your best estimate assumptions for behavior in the tail. Please respond even if you are unable to answer all questions. Partial responses are both acceptable and helpful. Kindly disregard any questions that are not relevant to your business.

Assumption based capital adequacy (or RBC) requirements for these benefits were introduced as of 12/31/05, and we hope all companies in this market are comfortable enough with this exercise to participate in this fourth survey. Obviously, a greater number of survey participants will enhance the value and usefulness of the survey results. As an added incentive for participants, the results will be provided to them in advance of their availability on the SOA website.

We greatly appreciate your time and efforts in helping us to attain our goal. It is our hope that the results of this survey will enhance the actuary's ability to set assumptions for these products in extreme scenarios and also enable better peer review.

We respect the proprietary nature of each company's models, and we can assure you the results will be reported anonymously and that your specific results will be held under the strictest confidence.

Please submit responses to the survey by July 3, 2009.

If there is any additional information that you would like to add, please feel free to email it to: bscott@soa.org.

Question 1: BACKGROUND Variable Annuity Guaranteed Benefits Information

List the approximate size of your company's current total VA book by line (understanding there may be some benefits with more than one guaranteed benefit). Please enter amounts in millions. For example, 20,000,000 should be entered as 20.

	Yr Began writing	Annual Net Premiums	Account Value	Guaranteed Value
GMDB				
GMIB				
GMWB				
GMAB				

Question 2: TAIL SCENARIO for Variable Annuity Guaranteed Benefits

Before examining policyholder behavior in the tail, the "tail scenario" needs to be defined. Information on your particular tail scenario will provide a frame of reference for each set of results.

2a. Do you currently use stochastic modeling to set capital levels? (e.g. for the RBC C-3 phase 2 calculation)
Yes
No

2b. If so, how many scenarios do you typically model?

2c. How many years in the future do you typically project?

2d. If you are performing stochastic modeling for required capital/RBC calculation purposes, please list the scenario that triggered the loss at the first non-zero result of your modified 90 CTE calculation (i.e. the first negative present value in these calculations). If you are not currently using stochastic modeling, please list the tail scenario. Please provide your scenario in the format of annual non-cumulative returns. Please ensure you are reporting the first non-zero result from the modified 90 CTE calculation, as opposed to your first non-zero result.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Equity										
Bond										
Int Rates										

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Equity										
Bond										
Int Rates										

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
Equity										
Bond										
Int Rates										

	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40
Equity										
Bond										
Int Rates										

Question 3: DYNAMIC ASSUMPTIONS for Variable Annuity Guaranteed Benefits

3a. Does your lapse assumption vary dynamically for death benefits?
Yes
No

3b. If so, please describe the dynamic lapse functions you are using for death benefits:

3c. Does your lapse assumption vary dynamically for living benefits?
Yes
No

3d. Please describe the dynamic lapse functions you are using for living benefits:

3e. For Income Benefits, does your utilization assumption vary dynamically?
Yes
No

3f. If so, please describe the dynamic utilization function that you are using:

3g. For Withdrawal Benefits, does your withdrawal assumption vary dynamically?
Yes
No

3h. If so, please describe the withdrawal dynamic function you are using:

Question 4: BASE LAPSE RATES for Variable Annuity Guaranteed Benefits

Please enter base (non-dynamic) lapse rates assumed:

	Death Benefits	Accumulation/Maturity Benefits	Income Benefits	W/D Benefits	Combo of Benefits*
Year 1					
Year 2					
Year 3					
End of Surr Period					
SP+1					
SP+2					
SP+3					
SP+t (ultimate)					

*For Question 4, please describe the combined benefits:

Question 5: LAPSE RATES IN THE TAIL for Variable Annuity Guaranteed Benefits

Please enter the lapse rates assumed in the tail scenario listed in Question 2:

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year10
Death Benefits										
Accum/Maturity Benefits										
Income Benfits										
W/D Benefits										
Combo of Benefits*										

	Year11	Year12	Year13	Year14	Year15	Year16	Year17	Year18	Year19	Year20
Death Benefits										
Accum/Maturity Benefits										
Income Benfits										
W/D Benefits										
Combo of Benefits*										

	Year21	Year22	Year23	Year24	Year25	Year26	Year27	Year28	Year29	Year30
Death Benefits										
Accum/Maturity Benefits										
Income Benfits										
W/D Benefits										
Combo of Benefits*										

	Year31	Year32	Year33	Year34	Year35	Year36	Year37	Year38	Year39	Year40
Death Benefits										
Accum/Maturity Benefits										
Income Benfits										
W/D Benefits										
Combo of Benefits*										

*For Question 5, please describe the combined benefits:

Question 6: GMIB ANNUITIZATION UTILIZATION RATES IN THE TAIL

For Income Benefits, please enter the utilization rate or range of rates assumed in the tail scenario in Question 2. If rates vary by age, duration, or any other factor, please specify:
Age
Duration
Other (please specify)

	Factor	Utilization
Factor 1		
Factor 2		
Factor 3		
Factor 4		
Factor 5		

NOTE: If this does not accommodate your assumptions, please e-mail a table or other information specifying the rates to bscott@soa.org.

Question 7: GMWB WITHDRAWAL RATES IN THE TAIL

For Withdrawal benefits, please enter the % using full withdrawal rates assumed in the tail scenario in Question 2. If rates vary by age, duration, or any other factor, please specify:
Age
Duration
Other (please specify)

	Factor	Utilization
Factor 1		
Factor 2		
Factor 3		
Factor 4		
Factor 5		

 NOTE: If this does not accommodate your assumptions, please e-mail a table or other information specifying the rates to bscott@soa.org.

Question 8: LAPSE RATES BY DISTRIBUTION SYSTEM for VA Guaranteed Benefits

8a. Do your lapse assumptions differ by Distribution System?
Yes
No

8b. If so, please describe the Distribution Systems and differences in lapse assumptions.

Question 9: LAPSE RATES BY MARKET for VA Guaranteed Benefits

9a. Do your lapse assumptions differ by Market?
Yes
No

9b. If so, please describe the Markets and differences in lapse assumptions.

Question 10: SOURCES of Variable Annuity Lapse Rate Assumptions

10a. What is the source of your assumptions? (e.g. company study, best guess)

10b. Does your company perform lapse studies?
Yes
No

10c. If so, how often?

10d. How many years of experience data were used in your latest study?

Question 11: CHANGES in ASSUMPTIONS from Previous Year

11a. Were any of the previously described assumptions changed from the Year-End 2007
capital calculation?
Yes
No

11b. If so, please describe the change.

Death Benefit Lapses
Living Benefit Lapses
Living Benefit Utilization

Question 12: COMMENTS

Please add any additional explanatory comments or clarifications:

Question 13:
Please provide us with a primary and secondary contact in case we need to follow-up
with you on your submission.

	Name	Telephone	Email
Primary			
Secondary			