SOCIETY OF ACTUARIES

2009-2013 Structured Settlement Mortality Experience Report

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Caveat and Disclaimer

This study is published by the Society of Actuaries (SOA) and contains information from a variety of sources. It may or may not reflect the experience of any individual company. The study is for informational purposes only and should not be construed as professional or financial advice. The SOA does not recommend or endorse any particular use of the information provided in this study. The SOA makes no warranty, express or implied, or representation whatsoever and assumes no liability in connection with the use or misuse of this study.

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Preface: Revisions Made to this Report Subsequent to December 2016

February 2019 Updates

A reserve indicator key is included in the pivot table fields. Because not all records submitted by the contributing companies contained a reserve amount, this field may be used to consider only the records containing such a reserve amount. By setting this field to "1," only the records containing a reserve amount will be considered. This is useful when the analysis is to be done "By Amount."

It is important to note that the "By Amount" results are understated on an overall basis because death rates were much higher on contracts not reporting reserve amounts.

A few sentences were modified in the report to consider the fact that not all records submitted contained a reserve amount. The "By Contract" data in this report reflects the total number of records submitted, while the "By Amount" data reflects only the total number of records **with a reserve amount** submitted.

August 2018 Updates

The last sentence of Paragraph 7 of Section 3 was modified to say that the 2009-2013 SSA Table used in this study is the 2011 SSA Table, which represents the midpoint of the experience period. Similarly, Paragraph 3 of Section 5.5 was modified to say that the SSA Table used in this study is the 2011 SSA Table, which represents the midpoint of the experience period being studied. This Table is being used for each study year.

Section 1: Acknowledgements and Resources

The Society of Actuaries would like to thank the following seventeen companies who contributed data to this study:

- **Allstate**
- **Athene**
- **Genworth**
- **Hartford**
- Integrity Life
- **Liberty Mutual**
- **Lincoln National**
- **MetLife**
- **MetLife of Connecticut**
- National Integrity Life
- **New York Life**
- **Pacific Life**
- **Prudential**
- **Symetra**
- **Transamerica**
- **Union Fidelity Life**
- USAA Life

The fourteen companies that contributed to both standard and substandard lives studies are indicated in bold.

The SOA also extends its gratitude to the Structured Settlement Subgroup of the Individual Annuity Experience Committee (IAEC). The Subgroup designed the project, oversaw the analyses and peer reviewed the report. The members of the Subgroup are:

- Joel Sklar, ASA, MAAA (Chair)
- Sean Souders, FSA, MAAA
- Zachary Granovetter, FSA
- Craig Likkel, FSA, MAAA
- Mike Straus, FSA, MAAA
- Jacqueline Wetcher, FSA, MAAA
- Christopher Whitney, FSA, MAAA

The SOA contracted with MIB's Actuarial and Statistical Research Group to collect, validate and compile the data for this report. The SOA also contracted with an independent consultant, Michel Desmarais, FSA, FCIA, to complete the required analyses and draft the report. The SOA also thanks Jerry Holman, FSA, MAAA, for his guidance and support of this work. Finally, Korrel Rosenberg, SOA Senior Research Administrator, supplied project management support.

Section 2: Purpose of the Study

The primary purposes of the study are to:

1. Compare emerging structured settlement experience to that assumed in currently-used statutory valuation bases, both standard and substandard.

2. For substandard business, analyze the experience using the rated-age basis and the "true age plus constant extra death" (CED) basis.

3. Help to provide a basis for actuaries to assess mortality in this unique line of business where mortality tables based on traditional payout annuities may not be representative of this distinct population.

No assessment has been made concerning the applicability of this experience for other purposes. In developing this report, the SOA relied upon data and information supplied by the participating company contributors. For each contributor this information includes, but is not limited to, the data submission for mortality experience and the responses to follow-up questions.

Section 3: Background

This report describes the results of the latest intercompany study of mortality experience under Structured Settlement annuities. Structured Settlement annuities consist primarily of workmen's compensation, individual long-term disability claims, and lawsuit settlements that provide a life-contingent income to the plaintiffs. Such periodic and deferred payments have been encouraged and even mandated in some states as a means of controlling costs under malpractice claims and ensuring the monies will be available in future years and not squandered as could happen with lump sum payments.

Because the settlement annuity market is considerably smaller than other insurance annuity markets, all contributors' data are very important. For example, the data contributed by some companies contained as little as one death. Only by combining the data of many companies could we hope to construct a database from which we could derive statistically reliable information.

MIB's Actuarial and Statistical Research Group collected, validated and summarized the data for this report. In lieu of printed tables, the two Microsoft Excel files (one for standard lives and one for substandard lives) published with this report provide Pivot Tables which access the database. These pivot tables can be modified to provide alternate breakdowns and information of interest to the individual user. Data for this report were collected in 2015 for study years 2009-2013.

An explanation of the exposure calculations with diagrams is available in Appendix A. This is provided to enable readers to draw comparisons of experience derived by different methods than used in this study to their own experience results.

All experience is available by amount and by contract. The data for standard and substandard lives are available with many breakdowns as described in Appendix B.

This study compared, separately for standard and substandard lives, actual to expected (A/E) mortality based on annuity valuation tables (1983 IAM, Annuity 2000 and 2012 IAM) and on the SSA tables during the study period.

The 2005-2008 Social Security Administration table used in this study is the unweighted average of the annual 2005 to 2008 SSA Tables. The 2009-2013 SSA Table used in this study is the 2011 SSA Table, which represents the midpoint of the experience period.

In addition, for substandard business a comparison of actual-to-expected mortality was made based on the "constant extra death (CED) method" which is the minimum valuation standard as prescribed in NAIC Actuarial Guideline IX-A.

This is the fifth such study sponsored by the Society of Actuaries and its Individual Annuity Experience Committee. This study is based on experience during study years 2009 through 2013.

The first study, published in the Transactions of the Society of Actuaries 1991-92 Reports, included experience through calendar year 1989. The second study, published in the Transactions of the Society of Actuaries 1995-96 Reports, included experience through calendar year 1993. The third study, available on the SOA website, looks at experience through calendar year 1997. The fourth study available on the SOA website, combined the experience of years 2000-2004 collected in 2005, and the experience of years 2005-2008 collected in 2009.

Structured settlements do not necessarily have annuity payments in all years. In addition, payments may vary substantially from year to year. Therefore, instead of using annual income, we used the statutory reserve for weighting the "By Amount" computations.

The study data only reflects contracts providing life contingent payments. We excluded certain-only business because there would likely be underreporting of deaths on such business, plus there is no real reason to study mortality on contracts for which mortality has no financial relevance.

Section 4: Format of the Data

This study was performed on a calendar year basis. Contributing companies received an analysis of their own experience; otherwise, individual company experience is not made public. Rather, all experience is combined and made available by contract years (count) and amount. The data are available with the following breakdowns:

Underwriting Group: Standard, Substandard

Gender: Male, Female

Experience Years: 2009, 2010, 2011, 2012, 2013

Issue Age Groups: 0-10, 11-20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80, 81+

Attained Age Groups: 0-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, 56-60, 61-65, 66-75, 76-85, 86-90, 91-95, 96-100, 101+

Rated Attained Age Groups: 0-10, 11-20, 21-30, 31-35, 36-40, 41-45, 46-50, 51-55, 56-60, 61-65, 66-75, 76-85, 86-90, 91-95, 96-100, 101+

Duration: 0-1 years, 2-5 years, 6-10 years, Ultimate (11+)

Underwriting Class: Standard mortality, Not underwritten

Section 5: Standard Lives

1. Deaths

This study includes 5,867 deaths among standard lives, out of which 5,434 were submitted with a death amount totaling more than $476M. The following table shows how this compares with the data of 2005-2008 included in the previous study. Although the current study has more comprehensive data than the previous one, the number of deaths is much lower than that in the most recent Individual Payout Annuity study that included 132,000 deaths. Therefore, some random fluctuation will be evident and credibility will be particularly impacted when results are subdivided into various categories. Accordingly, considerable care must be taken in the interpretation of the results.

General background information on mortality experience credibility is available in Appendix 2 of the Educational Note published by the Canadian Institute of Actuaries. "Expected Mortality: Fully Underwritten Canadian Individual Life Insurance Policies", Committee on Life Insurance Financial Reporting, Canadian Institute of Actuaries, July 2002.

Table 1

DEATHS		
Years	Number of deaths	Death amount
2005	414	25,956,870
2006	426	18,079,035
2007	496	30,228,401
2008	475	30,081,217
2005-2008	1,811	104,345,523
2009	1,047	73,860,269
2010	1,164	99,467,851
2011	1,245	113,493,532
2012	1,211	91,858,788
2013	1,200	97,690,725
2009-2013	5,867	476,371,165

2. Exposure

The study includes 503,888 contract years of experience for standard lives. Seventeen companies contributed data for this study. The previous 2005-2008 study included only 193,591 contract years of exposure. The current study also includes much more exposure by amount than the previous study.

The average exposure per study year is just over 100,000 contracts. This represents a major increase with respect to the just over 48,000 contracts averaged per study year in the previous study. The following table provides a comparison of the exposure for the previous and current studies.

Table 2

EXPOSURE		
Years	Number of policies	Amount exposed
2005	39,551	5,496,729,762
2006	48,126	6,119,378,601
2007	51,196	7,033,613,826
2008	54,717	7,887,800,260
2005-2008	193,591	26,537,522,449
2009	96,907	13,217,254,792
2010	100,165	15,197,523,000
2011	102,600	15,808,632,140
2012	101,400	15,550,699,873
2013	102,817	15,929,696,293
2009-2013	503,888	75,703,806,098

3. Issue Age

The age distribution for this business differs greatly from the retirement annuity business. As can be seen in the following table and graph, the peak issue age for standard issues by policy years exposed is at ages 41-50. The group shows a rapid decline in issues after age 60. By contrast, ages under 50 are usually sparsely represented in retirement annuity mortality studies.

Table 3

DATA BY ISSUE AGE GROUP				
2009-2013				
Issue age groups	Number of policy years	Amount exposed	Number of deaths	Death amount
0-10	70,205	16,049,373,711	97	19,335,016
11-20	75,594	13,512,052,442	212	36,544,865
21-30	72,100	12,177,913,317	421	53,966,340
31-40	87,862	13,705,037,493	738	89,578,015
41-50	95,559	11,900,972,772	1,291	115,619,954
51-60	69,518	6,263,052,077	1,535	95,198,388
61-70	27,113	1,806,449,871	1,081	48,191,687
71-80	5,075	245,948,145	379	11,370,140
81+	864	43,006,270	113	6,566,760
TOTAL	503,888	75,703,806,098	5,867	476,371,165

Graph 1
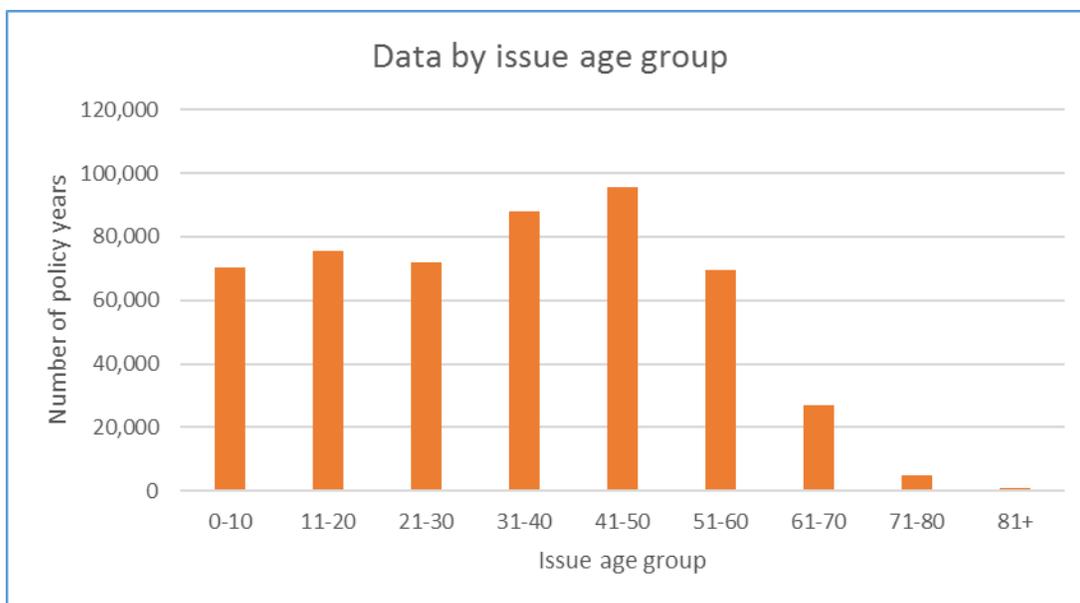
4. Gender

As shown in the following table, the exposure by gender is 50-50 by amount and 53% male and 47% female by number of policy years. However, the death data is 60% male by amount and 58% male by number. These results are similar to those of the 2005-2008 study. By amount, the average issue age for males is 27.6 years, while the average issue age for females is 28.4 years. By contract, the average issue age is identical for males and females at 33.6 years. Therefore, the average issue age by gender is not producing the higher proportion of male mortality. The higher proportion of male deaths relative to their exposure is caused by higher mortality rates for males as compared to females of similar ages.

As stated before, structured settlements do not necessarily have annuity payments in all years. In addition, payments may vary substantially from year to year. Therefore, instead of using annual income, we used the statutory reserve for weighting the "By Amount" computations. The "By Amount" data reflects only the total number of records with a reserve amount submitted. It is important to note that the "By Amount" results are understated on an overall basis because death rates were much higher on contracts not reporting reserve amounts.

Table 4

DATA BY GENDER					
2009-2013					
Years	Number of policy years			Amount exposed		
	Male	Female	Total	Male	Female	Total
2009	50,726	46,181	96,907	6,617,980,725	6,599,274,067	13,217,254,792
2010	52,590	47,575	100,165	7,593,640,494	7,603,882,506	15,197,523,000
2011	53,998	48,601	102,600	7,876,359,695	7,932,272,444	15,808,632,140
2012	53,431	47,969	101,400	7,743,087,581	7,807,612,292	15,550,699,873
2013	54,311	48,506	102,817	7,925,306,945	8,004,389,348	15,929,696,293
Total	265,056	238,833	503,888	37,756,375,440	37,947,430,658	75,703,806,098
%	53%	47%		50%	50%	
2005-2008	52%	48%		50%	50%	

DATA BY GENDER					
2009-2013					
Years	Number of deaths			Death amount		
	Male	Female	Total	Male	Female	Total
2009	605	442	1,047	40,258,950	33,601,319	73,860,269
2010	650	514	1,164	56,719,921	42,747,930	99,467,851
2011	789	456	1,245	72,976,679	40,516,853	113,493,532
2012	701	510	1,211	55,285,635	36,573,153	91,858,788
2013	664	536	1,200	58,276,472	39,414,253	97,690,725
Total	3,409	2,458	5,867	283,517,657	192,853,508	476,371,165
%	58%	42%		60%	40%	
2005-2008	57%	43%		62%	38%	

5. Expected Bases

As will be seen, mortality experience under structured settlement annuities does not fit well with assumed mortality under individual annuity valuation tables. For example, the 2012 IAM Basic Table was derived from experience for immediate annuities, annuitizations and life settlement options of individual life insurance and annuity death claims. The experience excluded substandard annuities, structured settlement annuities and variable payout annuities. To develop values for ages below 50, the 1994 GAM Table was used.

The NAIC's Standard Valuation Law requires a mortality improvement projection for mortality rates beyond 2012. Because some experience used in this study is after 2012, an adjustment has been made to project the mortality rates in the 2012 IAM Table, with projection scale G2, for comparison to this period experience. The projection scale G2 was applied to the 2012 IAM mortality rates, forward and backward, for each of the study years relative to the 2012 baseline.

The SSA Table used in this study is the 2011 SSA Table, which represents the midpoint of the experience period being studied. This Table is being used for each study year.

The table below shows the mortality bases available in the data. The term "Period" below implies that it's a valuation table.

Table 5

Mortality Table	Valuation margin	Projection
1983 IAM	Included	None
2000 Annuity	Included	None
2005-2008 SSA	None	None
2009-2013 SSA	None	None
2012 IAM Basic	None	None
2012 IAM Period	Included	None
2012 IAM Basic G2	None	G2
2012 IAM Period G2	Included	G2

6. A/E ratios

The following tables display deaths, expected deaths and A/E ratios for each expected basis described earlier, for the previous and current periods. These results are shown for both Contract counts and Amount.

Table 6

A/E RATIOS - Period 2005-2008				
	Number of deaths		**Death amount**	
	1,811		**104,345,523**	
Expected bases	**Expected deaths**	**A/E ratio**	**Expected death amount**	**A/E ratio**
1983 IAM	1,237	146.4%	102,020,961	102.3%
2000 Annuity	1,020	177.5%	83,527,363	124.9%
2005-2008 SSA	1,644	110.2%	140,294,644	74.4%
2012 IAM Basic	909	199.3%	73,837,652	141.3%
2012 IAM Period	818	221.3%	66,489,550	156.9%
2012 IAM Basic G2	968	187.2%	78,652,538	132.7%
2012 IAM Period G2	871	207.9%	70,824,932	147.3%

Table 7

A/E RATIOS - Period 2009-2013				
	Number of deaths		**Death amount**	
	5,867		**476,371,165**	
Expected bases	**Expected deaths**	**A/E ratio**	**Expected death amount**	**A/E ratio**
1983 IAM	3,796	154.6%	342,538,843	139.1%
2000 Annuity	3,123	187.8%	279,517,498	170.4%
2009-2013 SSA	4,719	124.3%	444,581,391	107.2%
2012 IAM Basic	2,771	211.7%	246,913,971	192.9%
2012 IAM Period	2,495	235.2%	222,328,569	214.3%
2012 IAM Basic G2	2,802	209.4%	249,651,996	190.8%
2012 IAM Period G2	2,522	232.6%	224,793,719	211.9%

The more recent valuation tables have lower mortality rates and thus higher A/E ratios. None of these tables fit the experience very well; the Social Security/Medicare experience table comes closest, but this may not be a usable table for projecting forward. An implication of this is that, in theory, Structured Settlement business should have its own mortality tables. However, even if the current study has more comprehensive data than the previous ones, it is not yet possible to develop a credible mortality table.

Comparing the results with those of the period 2005-2008, the A/E ratios have increased for each expected basis. However, A/E ratios for the period 2005-2008 were lower than those for the 2000-2004 period.

Seventeen companies contributed to the data for the current study period. It is possible to limit our analysis to the 13 companies that contributed data to both the current and the previous studies. The results appear in the following tables.

Table 8

DATA FOR COMMON COMPANIES (13 out of 17 companies)				
Years	Deaths		Exposure	
Years	Number of deaths	Death amount	Number of policies	Amount exposed
2005	226	15,643,148	20,984	2,557,576,706
2006	221	11,145,406	22,922	2,867,851,812
2007	262	17,273,890	24,959	3,170,866,662
2008	241	16,636,767	27,096	3,629,932,610
2005-2008	950	60,699,211	95,960	12,226,227,790
2009	291	11,002,608	32,331	3,014,732,269
2010	344	22,005,545	35,454	3,434,782,980
2011	356	19,410,975	38,002	3,890,858,017
2012	358	17,658,514	40,254	4,249,282,697
2013	398	25,261,365	42,467	4,623,346,848
2009-2013	1,747	95,339,007	188,509	19,213,002,812

There is an increase in the average number of deaths per year between the two periods, from 237 to 349. The average death amount per year also increased from $15M to $19M. The average number of policies exposed per year also increased from 23,990 to 37,702, while the average amount exposed per year increased from $3B to $3.8B.

As for the A/E ratios by count, shown in Table 9 below, no major changes are being noticed between the two periods with two exceptions

- The SSA expected basis has changed and is producing a higher A/E ratio in the current period.

- The 2012 IAM, with projection scale G2, is producing higher A/E ratios in the current period. The application of improvement rates forward and backward relative to 2012 causes the expected mortality rates in the current study to be lower than in the 2005-2008 period.

As stated before, structured settlements do not necessarily have annuity payments in all years. In addition, payments may vary substantially from year to year. Therefore, instead of using annual income, we used the statutory reserve for weighting the "By Amount" computations. The "By Amount" data reflects only the total number of records with a reserve amount submitted. By amount, the A/E ratios for the 2009-2013 period are generally higher for all expected bases. This is in line with the previous conclusion for all companies. The A/E data is shown in the following table.

Table 9

DATA FOR COMMON COMPANIES (13 out of 17 companies)				
A/E RATIOS - Period 2005-2008				
	Number of deaths		Death amount	
	950		60,699,211	
Expected bases	Expected deaths	A/E ratio	Expected death amount	A/E ratio
1983 IAM	635	149.7%	56,279,102	107.9%
2000 Annuity	525	181.1%	46,310,093	131.1%
2005-2008 SSA	846	112.3%	76,104,254	79.8%
2012 IAM Basic	472	201.3%	41,153,540	147.5%
2012 IAM Period	425	223.6%	37,054,543	163.8%
2012 IAM Basic G2	502	189.3%	43,742,883	138.8%
2012 IAM Period G2	452	210.2%	39,385,861	154.1%
A/E RATIOS - Period 2009-2013				
	Number of deaths		Death amount	
	1,747		95,339,007	
Expected bases	Expected deaths	A/E ratio	Expected death amount	A/E ratio
1983 IAM	1,173	149.0%	69,711,203	136.8%
2000 Annuity	965	181.0%	56,776,673	167.9%
2009-2013 SSA	1,477	118.3%	91,263,388	104.5%
2012 IAM Basic	865	202.0%	50,230,495	189.8%
2012 IAM Period	778	224.4%	45,231,014	210.8%
2012 IAM Basic G2	873	200.1%	50,716,300	188.0%
2012 IAM Period G2	786	222.3%	45,668,449	208.8%

Using data for all companies, the results can also be broken down by Study Year, which gives some idea of both the trend and the level of random fluctuation.
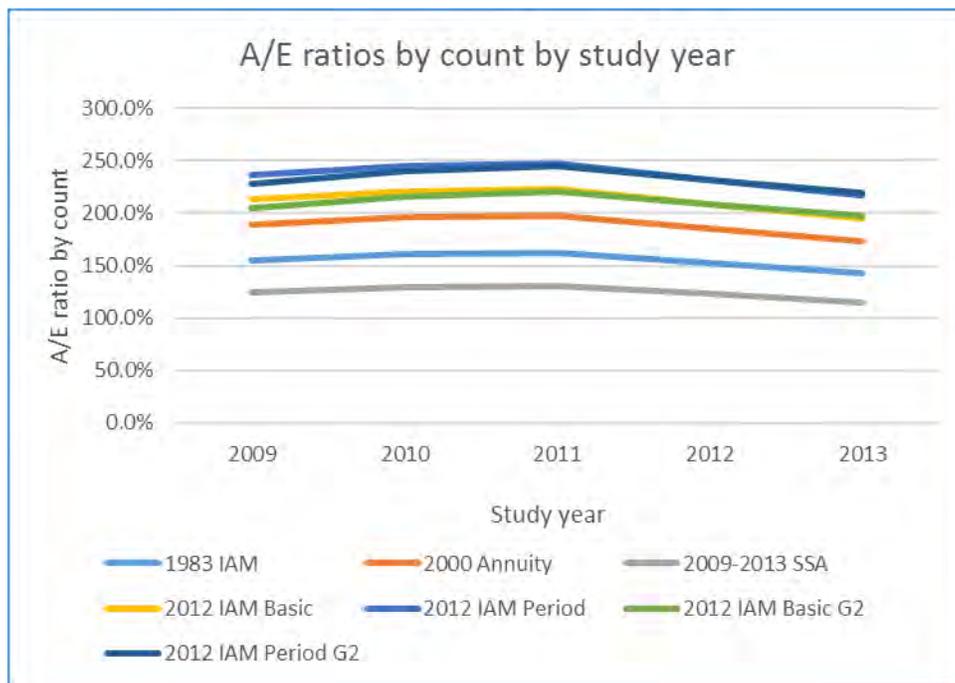
Table 10

A/E RATIOS BY COUNT					
	Number of deaths				
	1,047	**1,164**	**1,245**	**1,211**	**1,200**
Expected bases	**2009**	**2010**	**2011**	**2012**	**2013**
1983 IAM	155.3%	161.2%	162.7%	152.6%	142.8%
2000 Annuity	188.7%	195.9%	197.9%	185.4%	173.5%
2009-2013 SSA	124.4%	129.4%	130.8%	122.9%	115.3%
2012 IAM Basic	212.9%	220.9%	222.9%	208.8%	195.3%
2012 IAM Period	236.5%	245.4%	247.6%	232.0%	217.0%
2012 IAM Basic G2	205.3%	215.6%	220.3%	208.8%	197.7%
2012 IAM Period G2	228.1%	239.5%	244.7%	232.0%	219.6%

A/E RATIOS BY AMOUNT					
	Death amount				
	73,860,269	**99,467,851**	**113,493,532**	**91,858,788**	**97,690,725**
Expected bases	**2009**	**2010**	**2011**	**2012**	**2013**
1983 IAM	129.1%	152.2%	162.2%	126.9%	125.9%
2000 Annuity	158.4%	186.6%	198.8%	155.5%	154.1%
2009-2013 SSA	98.9%	116.7%	124.7%	98.1%	97.6%
2012 IAM Basic	179.3%	211.1%	225.0%	176.0%	174.5%
2012 IAM Period	199.1%	234.5%	249.9%	195.4%	193.8%
2012 IAM Basic G2	172.6%	205.9%	222.2%	176.0%	176.8%
2012 IAM Period G2	191.7%	228.6%	246.8%	195.4%	196.3%

The data seem to indicate an upward, then downward, trend in mortality rates. The results by amount have lower A/E's than those by contract and, as expected, have higher year-by-year volatilities.

Actual to expected ratios relative to the annuity valuation tables are well over 100%, indicating that reserves based on those tables may be excessive. As stated above, this is to be expected given those valuation tables are designed for individual annuity purchasers, a much more select population than this one.

Graph 2

A/E ratios by gender, shown next in Table 11, are lower for males under the 1983 IAM expected basis by both count and amount. However, under all four variations of the 2012 IAM expected bases, A/E ratios are lower for females by both count and amount. And, as stated before, the A/E ratios are lower by amount than by count and this is true by gender also.

Table 11

A/E RATIOS BY GENDER						
Expected bases	**By count**			**By amount**		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
1983 IAM	147.5%	165.5%	154.6%	134.8%	145.9%	139.1%
2000 Annuity	186.6%	189.6%	187.8%	171.7%	168.6%	170.4%
2009-2013 SSA	123.4%	125.7%	124.3%	108.9%	104.7%	107.2%
2012 IAM Basic	222.1%	198.8%	211.7%	205.5%	177.0%	192.9%
2012 IAM Period	246.7%	220.9%	235.2%	228.2%	196.6%	214.3%
2012 IAM Basic G2	219.5%	196.8%	209.4%	203.1%	175.2%	190.8%
2012 IAM Period G2	243.8%	218.7%	232.6%	225.5%	194.6%	211.9%

The reversal of A/E ratios being higher for males vs. females under the 2012 tables than the 1983 IAM Table is explained in Graphs 3 and 4 below. Where exposure is greatest in the study, the mortality rates decreased by more for males than females going from the 1983 IAM Table to, as an example of the 2012 tables, the 2012 IAM Period Table.

The greater decrease of the rates in percentage terms for males vs. females for the majority of ages (see Graph 4) results in relatively lower rates under the 2012 tables vs. the 1983 table for males than for females, which supports the measured reversal of the A/E gender relationship.

This is also consistent with the fact that the improvement scale G2 is greater for males than for females.
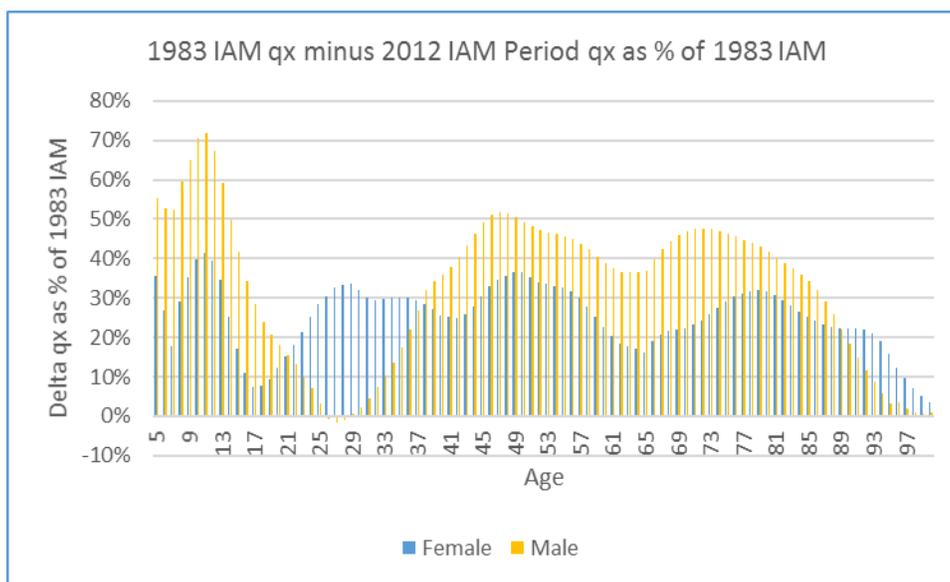
Graph 3

Graph 4

1983 IAM qx minus 2012 IAM Period qx as % of 1983 IAM
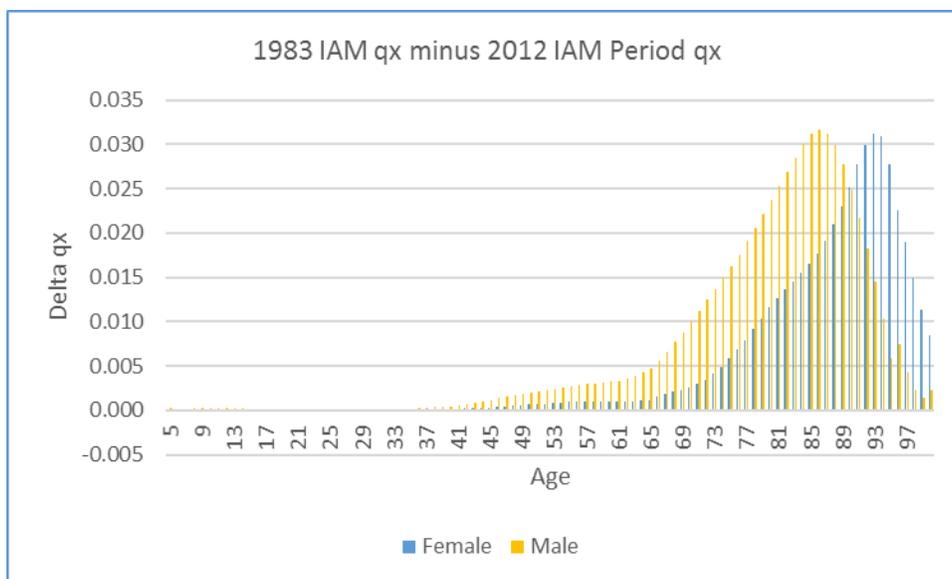
The A/E ratios by issue age in Table 12 show, for each expected basis, a steady decline after the issue age group 21-30. This holds true whether the A/E ratios are expressed by count or by amount. Again, the A/E ratios are mostly lower by amount than by count.

Table 12

A/E RATIOS BY ISSUE AGE										
Expected bases	By count									
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81+	TOTAL
1983 IAM	312.4%	375.1%	309.3%	212.0%	175.7%	132.0%	122.9%	112.8%	101.6%	154.6%
2000 Annuity	335.3%	451.8%	397.5%	269.1%	219.1%	160.6%	146.7%	131.5%	116.5%	187.8%
2009-2013 SSA	195.1%	223.7%	209.6%	152.8%	136.9%	110.6%	105.1%	96.0%	83.0%	124.3%
2012 IAM Basic	356.0%	461.1%	467.4%	306.2%	252.0%	187.9%	163.2%	138.6%	110.7%	211.7%
2012 IAM Period	394.5%	508.5%	518.4%	340.1%	280.0%	208.8%	181.4%	153.9%	123.0%	235.2%
2012 IAM Basic G2	352.6%	456.8%	463.2%	302.9%	249.0%	185.7%	161.5%	137.3%	110.0%	209.4%
2012 IAM Period G2	390.8%	503.8%	513.8%	336.4%	276.7%	206.3%	179.4%	152.6%	122.2%	232.6%

A/E RATIOS BY ISSUE AGE										
Expected bases	By amount									
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81+	TOTAL
1983 IAM	266.6%	352.2%	233.2%	165.6%	129.5%	103.6%	100.7%	83.2%	130.8%	139.1%
2000 Annuity	286.0%	427.3%	298.8%	208.7%	160.7%	126.1%	120.8%	98.5%	150.5%	170.4%
2009-2013 SSA	161.8%	210.7%	157.2%	118.4%	99.8%	85.5%	85.8%	72.1%	107.6%	107.2%
2012 IAM Basic	298.2%	433.9%	352.2%	235.9%	181.6%	146.7%	137.2%	108.6%	145.2%	192.9%
2012 IAM Period	330.5%	478.3%	390.8%	262.0%	201.8%	163.0%	152.4%	120.6%	161.3%	214.3%
2012 IAM Basic G2	295.7%	430.1%	349.2%	233.4%	179.5%	144.9%	135.6%	107.5%	144.0%	190.8%
2012 IAM Period G2	327.7%	474.2%	387.5%	259.2%	199.4%	161.0%	150.7%	119.4%	160.0%	211.9%

The following table contains the number of deaths, the death amount, the number of policies exposed and the exposure amount underlying the A/E ratios shown for each attained age group in Table 14.

Table 13

DATA BY ATTAINED AGE				
Attained age groups	Number of deaths	Death amount	Number of policies	Amount exposed
0-5	0	0	1,264	265,360,156
6-10	3	533,284	6,469	1,367,346,260
11-15	2	7,536	12,993	2,331,643,946
16-20	22	2,988,002	20,650	4,039,994,337
21-25	53	7,913,241	29,552	5,964,985,962
26-30	73	13,631,588	35,225	7,229,088,654
31-35	68	13,399,147	33,769	6,454,854,523
36-40	91	14,285,061	33,287	5,664,338,025
41-45	192	21,859,225	40,275	6,360,258,896
46-50	306	39,265,820	50,200	7,468,582,683
51-55	477	50,779,843	55,503	7,902,083,654
56-60	544	52,518,957	52,435	7,226,377,572
61-65	648	60,806,776	47,331	5,918,462,999
66-75	1,388	105,526,154	57,883	5,886,281,802
76-85	1,308	70,687,214	22,157	1,450,623,258
86-90	405	13,420,245	3,440	130,023,680
91-95	207	6,611,575	1,159	35,630,553
96-100	74	2,106,606	267	7,441,059
101+	6	30,891	29	428,079
TOTAL	5,867	476,371,165	503,888	75,703,806,098

Only attained age groups that have at least 400 deaths are considered credible. Therefore, results must be taken with great care. Results by Attained Age mirror those by Issue Age.

A/E ratios in Table 14 exceed 100% relative to the valuation tables. They consistently decrease by attained age group, but never decrease below 100% even at the higher ages, as was the case in the prior study.

Based on this study's overall distribution of business, each valuation table appears sufficient because its A/E ratio is greater than 100%, even at the highest ages.

Table 14

A/E Ratios by attained age group - By count														
Expected bases	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-75	76-85	86-90	91-95	96-100
1983 IAM	401%	370%	295%	299%	323%	242%	220%	183%	160%	139%	128%	120%	120%	134%
2000 Annuity	409%	392%	349%	397%	427%	316%	283%	230%	200%	171%	153%	140%	136%	151%
2009-2013 SSA	198%	206%	170%	179%	210%	169%	158%	132%	122%	116%	113%	103%	97%	103%
2012 IAM Basic	418%	375%	326%	390%	477%	406%	346%	263%	208%	204%	180%	144%	131%	130%
2012 IAM Period	465%	417%	357%	427%	530%	451%	384%	292%	231%	226%	200%	160%	145%	145%
2012 IAM Basic G2	414%	371%	323%	386%	472%	402%	342%	260%	205%	201%	178%	143%	130%	130%
2012 IAM Period	459%	413%	354%	423%	525%	447%	380%	289%	228%	224%	198%	159%	144%	144%

A/E Ratios by attained age group - By amount														
Expected bases	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-75	76-85	86-90	91-95	96-100
1983 IAM	297%	336%	306%	279%	236%	217%	170%	133%	124%	110%	113%	105%	126%	138%
2000 Annuity	304%	356%	362%	369%	312%	281%	218%	166%	154%	135%	134%	123%	143%	155%
2009-2013 SSA	147%	187%	177%	167%	153%	149%	121%	96%	94%	91%	99%	91%	102%	107%
2012 IAM Basic	310%	340%	338%	363%	347%	360%	266%	189%	159%	158%	160%	126%	138%	134%
2012 IAM Period	345%	378%	370%	398%	386%	400%	295%	210%	176%	176%	177%	140%	153%	149%
2012 IAM Basic G2	307%	337%	336%	360%	344%	356%	263%	187%	157%	156%	158%	125%	137%	134%
2012 IAM Period	341%	374%	367%	394%	382%	396%	292%	208%	174%	174%	175%	139%	153%	149%

The following table shows the data supporting the analysis by duration.

Table 15

DATA BY DURATION						
	Deaths		**Exposure**		**Mortality rate**	
Duration	**Number of deaths**	**Death amount**	**Number of policies**	**Amount exposed**	**By count**	**By amount**
1-2	81	6,943,760	23,044	4,370,153,695	0.003515	0.001589
3-5	104	12,664,108	31,666	5,667,029,505	0.003284	0.002235
6-10	300	17,196,124	32,966	5,362,987,741	0.009100	0.003206
11+	1,326	67,541,531	105,915	11,137,351,507	0.012520	0.006064
2005-2008	**1,811**	**104,345,523**	**193,591**	**26,537,522,449**	**0.009355**	**0.003932**
1-2	194	14,565,064	35,989	4,663,923,278	0.005391	0.003123
3-5	332	25,928,654	52,269	6,504,009,595	0.006352	0.003987
6-10	526	29,370,493	83,129	9,052,609,658	0.006328	0.003244
11+	4,815	406,506,954	332,502	55,483,263,566	0.014481	0.007327
2009-2013	**5,867**	**476,371,165**	**503,888**	**75,703,806,098**	**0.011643**	**0.006293**

The volume of data has increased substantially compared to the previous study. In the current study, the mortality rates by policy are higher than in the previous study at all durations except for 6-10. By amount, the mortality rates were higher at all durations.

By count, A/E ratios in Table 16 exceed 100% relative to the valuation tables. They generally increase by duration. A/E ratios are higher in the current study than in the previous study.

By amount, A/E ratios in Table 16 exceed 100% relative to the valuation tables. This is different than in the previous study. Again, the A/E ratios are higher in the current study.

As stated before, structured settlements do not necessarily have annuity payments in all years. In addition, payments may vary substantially from year to year. Therefore, instead of using annual income, we used the statutory reserve for weighting the "By Amount" computations. The "By Amount" data reflects only the total number of records with a reserve amount submitted. It is important to note that the "By Amount" results are understated on an overall basis because death rates were much higher on contracts not reporting reserve amounts.

In the 2005-2008 period, some companies were unable to provide reserve data so the "By Amount" results only reflected 88% of the contract years of experience and 79% of the deaths relative to the Standard "By Contract" experience. For the 2009-2013 report, while the reserve amount information was more complete than in the earlier study, there were some records that did not contain reserve data. The total claim amount of $476,371,165 is from 5,434 deaths (out of 496,353 contracts exposed) and not from the full 5,867 deaths (from 503,888 contracts exposed). There were 433 deaths for which no reserve data was submitted.

Table 16

2005-2008 A/E Ratios by duration - By count				
Expected bases	1-2	3-5	6-10	11+
1983 IAM	113%	100%	152%	153%
2000 Annuity	139%	123%	184%	186%
2005-2008 SSA	80%	71%	114%	117%
2012 IAM Basic	157%	138%	203%	209%
2012 IAM Period	174%	153%	226%	232%
2012 IAM Basic G2	147%	129%	191%	196%
2012 IAM Period G2	163%	144%	212%	218%

2009-2013 A/E Ratios by duration - By count				
Expected bases	1-2	3-5	6-10	11+
1983 IAM	125%	127%	125%	163%
2000 Annuity	157%	156%	153%	197%
2009-2013 SSA	96%	99%	98%	132%
2012 IAM Basic	180%	178%	173%	222%
2012 IAM Period	200%	198%	192%	246%
2012 IAM Basic G2	177%	176%	171%	219%
2012 IAM Period G2	197%	196%	190%	244%

2005-2008 A/E Ratios by duration - By amount				
Expected bases	1-2	3-5	6-10	11+
1983 IAM	51%	65%	101%	130%
2000 Annuity	62%	79%	124%	159%
2005-2008 SSA	37%	48%	73%	94%
2012 IAM Basic	69%	89%	140%	181%
2012 IAM Period	77%	99%	155%	201%
2012 IAM Basic G2	66%	84%	131%	169%
2012 IAM Period G2	73%	94%	146%	188%

2009-2013 A/E Ratios by duration - By amount				
Expected bases	1-2	3-5	6-10	11+
1983 IAM	117%	123%	82%	149%
2000 Annuity	146%	151%	101%	182%
2009-2013 SSA	87%	93%	64%	115%
2012 IAM Basic	167%	171%	115%	206%
2012 IAM Period	186%	190%	127%	229%
2012 IAM Basic G2	165%	169%	113%	204%
2012 IAM Period G2	183%	188%	126%	226%

Section 6: Substandard Lives

1. Deaths

This study includes 5,261 deaths among substandard lives, out of which 4,741 were submitted with a death amount totaling more than $1,738M. Table 17 shows how this compares with the data of 2005-2008 included in the previous study. Although the current study has more comprehensive data than the prior one, there is much less data when compared to the most recent Individual Payout Annuity study. Therefore, some random fluctuation will be evident and credibility will be particularly impacted when results are subdivided into various categories. Accordingly, considerable care must be taken in the interpretation of the results.

Table 17

DEATHS		
Years	**Number of deaths**	**Death amount**
2005	195	52,999,107
2006	293	85,242,159
2007	329	80,349,117
2008	399	99,218,164
2005-2008	**1,216**	**317,808,547**
2009	903	215,091,424
2010	1,026	285,308,242
2011	1,048	342,068,304
2012	1,152	356,896,063
2013	1,132	538,720,618
2009-2013	**5,261**	**1,738,084,651**

2. Exposure

The study includes 301,241 contract years of experience for substandard lives. The previous 2005-2008 study included only 104,960 contract years of exposure. The current study also includes much more exposure amount than the previous study.

The average exposure per study year is just over 60,000 contracts. This represents a major increase with respect to the just over 26,000 contracts averaged per study year in the prior study. Table 18 provides a comparison of the exposure for the previous and current studies.

Table 18

| EXPOSURE		
Years	Number of policies	Amount exposed
2005	18,480	8,618,883,157
2006	23,851	9,311,523,916
2007	28,921	11,309,135,415
2008	33,708	13,159,046,960
2005-2008	104,960	42,398,589,449
2009	54,254	15,512,480,526
2010	56,968	23,347,049,119
2011	59,088	24,534,312,499
2012	64,641	26,261,994,523
2013	66,291	26,190,641,541
2009-2013	301,241	115,846,478,208

3. Issue Age

The age distribution for this business differs greatly from the retirement annuity business. As can be seen in the following table and graph, the peak issue age for substandard issues by policy years exposed is at ages 41-50. The group shows a rapid decline in issues after age 60. By contrast, ages under 50 are usually sparsely represented in retirement annuity mortality studies.

Table 19

DATA BY ISSUE AGE GROUP				
2009-2013				
Issue age groups	**Number of policy years**	**Amount exposed**	**Number of deaths**	**Death amount**
0-10	48,242	40,339,591,025	503	342,226,964
11-20	31,740	17,869,886,543	321	354,699,492
21-30	36,147	18,119,127,731	386	181,631,500
31-40	43,464	14,137,217,381	659	231,036,189
41-50	62,501	13,713,902,910	1,137	288,964,276
51-60	54,079	8,813,903,371	1,282	220,062,007
61-70	22,442	2,552,385,838	767	92,653,071
71-80	2,484	272,896,816	185	23,422,406
81+	141	27,566,591	21	3,388,746
TOTAL	**301,241**	**115,846,478,208**	**5,261**	**1,738,084,651**

Graph 5
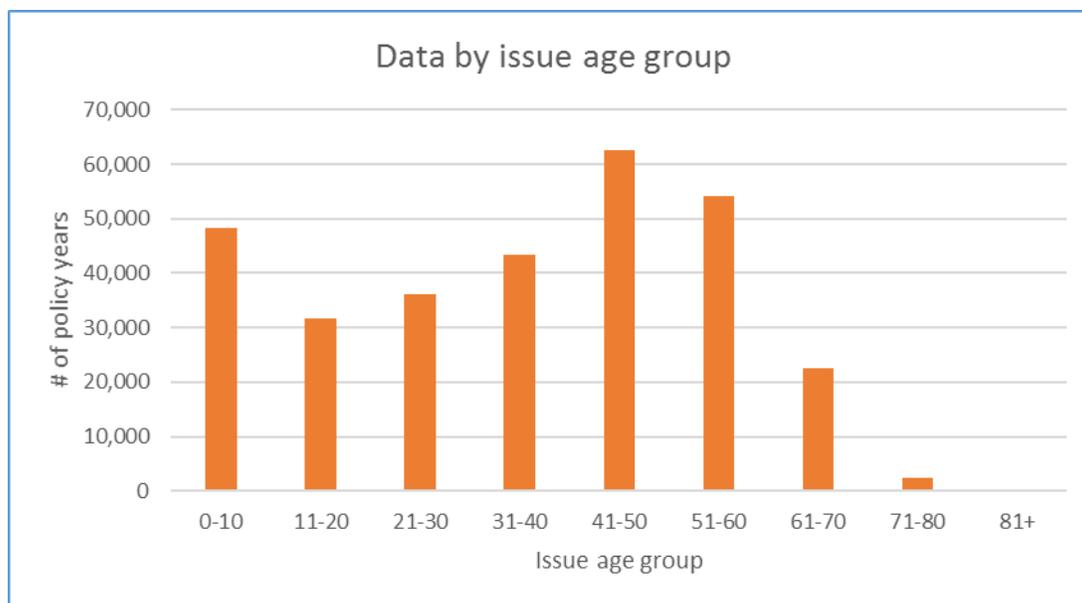
4. Rated Age

Experience was studied on a true age, rated age, and "true age plus constant extra deaths" (CED) basis.

All substandard contracts (also called "rated" contracts) are given a "rated age," which is higher than the true age. The rated age is deemed by the issuing company's underwriters and actuaries to produce an actuarial equivalency with respect to the cost of the guaranteed income stream.

The CED basis is specified as the statutory method for minimum substandard reserves in Actuarial Guideline IX-A of the NAIC's *Financial Examiners Handbook*. Substandard payout annuity reserves are allowed only for structured settlement contracts pursuant to tort actions and for contracts used to fund disabled lives and workers' compensation liabilities. Under the CED method, a constant "flat extra" increment to the valuation table rates is calculated to reproduce the life expectancy of the rated-up age.

Under the CED basis, the mortality is "front-loaded" because the extra deaths have a proportionally greater effect at the younger ages than at the advanced ages. Over time, the substandard mortality rates effectively approach standard rates as the underlying mortality rate increases and the increment becomes relatively less significant. Because of this grading towards standard mortality rates, reserves using the CED method approach standard reserves over time.

The incidence of extra mortality assumed under the two methods is not at all consistent. Both the rated-age method and the constant extra death method are a simplified approach to potentially more complex mortality patterns assumed by underwriters. While CED reserves are the statutory minimum, Actuarial Guideline IX-A also states that holding these reserves "shall in no way relieve the actuary from considering whether such reserves are adequate."

Since CED reserves are always based on the true age, they will go more years before reaching the end of the table and will grade toward the standard reserve. Therefore, the CED method should ultimately result in higher reserves for long-surviving structured settlement annuitants, as compared to reserves calculated using mortality rates based on rated age.

5. Expected Bases

Substandard structured settlement annuity mortality is particularly challenging to quantify because age categories are not homogeneous. True age groupings consist of slightly impaired lives with small age rate-ups and heavily impaired lives with substantially higher rated ages. While rated-age groupings tend to be more informative and useful, a given rated-age grouping will comprise young true-age policies with large rate-ups and older true-age policies with small rate-ups. Slicing the results into more homogeneous categories will give too little exposure and deaths per cell.

Minimum statutory reserve rates must be computed based on true age, although the True Age plus Constant Extra Death method is permitted to reflect impairments. An actuary may only base statutory reserves on a rated age if it can be demonstrated that such reserves are at least as high as the mandated true-age plus CED reserves at all durations. GAAP reserves, on the other hand, may be computed on a rated-age basis. Therefore, substandard results will be shown on both a true-age and rated-age basis. In addition, results will be shown on a true-age plus 1983 IAM CED basis.

The table below shows the mortality bases that will be used in this report.

Table 20

Mortality Table	Valuation margin	Projection
1983 IAM	Included	None
2000 Annuity	Included	None
2005-2008 SSA	None	None
2009-2013 SSA	None	None
2012 IAM Basic	None	None
2012 IAM Period	Included	None
2012 IAM Basic G2	None	G2
2012 IAM Period G2	Included	G2
1983 IAM plus 1983 IAM CED	Included	None

6. Gender

As shown in Table 21, the exposure by gender is 63% male by contract and 59% male by amount exposed. However, the number of deaths is 67% male and death amount is 61% male. By number of policy years, these results are similar to those of the 2005-2008 study. By amount, the proportion of females has increased, both in exposure and in death amounts.

As stated before, structured settlements do not necessarily have annuity payments in all years. In addition, payments may vary substantially from year to year. Annual income, therefore, cannot be the measure of exposure. Instead, we used the statutory reserve for weighting the "By Amount" computations and this may impact results. The "By Amount" data reflects only the total number of records with a reserve amount submitted. It is important to note that the "By Amount" results are understated on an overall basis because death rates were much higher on contracts not reporting reserve amounts.

Table 21

DATA BY GENDER					
2009-2013					
Years	Number of policy years			Amount exposed		
	Male	Female	Total	Male	Female	Total
2009	34,299	19,955	54,254	9,537,992,898	5,974,487,628	15,512,480,526
2010	36,075	20,893	56,968	13,714,025,924	9,633,023,196	23,347,049,119
2011	37,529	21,559	59,088	14,344,792,407	10,189,520,092	24,534,312,499
2012	40,712	23,929	64,641	15,289,586,886	10,972,407,637	26,261,994,523
2013	41,803	24,487	66,291	15,193,569,595	10,997,071,946	26,190,641,541
Total	190,418	110,822	301,241	68,079,967,710	47,766,510,498	115,846,478,208
%	63%	37%		59%	41%	
2005-2008	64%	36%		64%	36%	

DATA BY GENDER					
2009-2013					
Years	Number of deaths			Death amount		
	Male	Female	Total	Male	Female	Total
2009	614	289	903	144,477,090	70,614,334	215,091,424
2010	690	336	1,026	178,934,552	106,373,690	285,308,242
2011	716	332	1,048	188,547,058	153,521,246	342,068,304
2012	747	405	1,152	195,050,173	161,845,890	356,896,063
2013	782	350	1,132	355,643,130	183,077,488	538,720,618
Total	3,549	1,712	5,261	1,062,652,003	675,432,648	1,738,084,651
%	67%	33%		61%	39%	
2005-2008	68%	32%		68%	32%	

7. A/E Ratios

The following tables display deaths and A/E ratios for each expected basis described earlier, on a true and rated age basis for the previous and current periods. These results are shown for both Contract counts and Amount.

Table 22

A/E RATIOS - Period 2005-2008			
		Number of deaths	Death amount
		1,216	317,808,547
Expected bases		BY COUNT	BY AMOUNT
1983 IAM	True	304.0%	287.0%
1983 IAM	Rated	90.3%	62.1%
2000 Annuity	True	380.9%	358.1%
2000 Annuity	Rated	110.1%	75.6%
2005-2008 SSA	True	219.2%	205.8%
2005-2008 SSA	Rated	69.9%	47.9%
2012 IAM Basic	True	441.9%	414.0%
2012 IAM Basic	Rated	122.9%	83.9%
2012 IAM Period	True	490.7%	459.5%
2012 IAM Period	Rated	136.4%	93.2%
2012 IAM Basic G2	True	413.6%	389.3%
2012 IAM Basic G2	Rated	115.0%	78.9%
2012 IAM Period G2	True	459.3%	432.1%
2012 IAM Period G2	Rated	127.7%	87.7%

Table 23

A/E RATIOS - Period 2009-2013			
		Number of deaths	Death amount
		5,261	1,738,084,651
Expected bases		BY COUNT	BY AMOUNT
1983 IAM	True	328.9%	532.6%
1983 IAM	Rated	102.5%	79.4%
2000 Annuity	True	409.8%	663.3%
2000 Annuity	Rated	124.1%	95.1%
2009-2013 SSA	True	258.5%	384.9%
2009-2013 SSA	Rated	85.6%	64.3%
2012 IAM Basic	True	475.0%	762.9%
2012 IAM Basic	Rated	136.7%	101.3%
2012 IAM Period	True	527.6%	846.9%
2012 IAM Period	Rated	151.7%	112.4%
2012 IAM Basic G2	True	470.2%	755.6%
2012 IAM Basic G2	Rated	135.2%	100.5%
2012 IAM Period G2	True	522.2%	838.7%
2012 IAM Period G2	Rated	150.1%	111.5%

The more recent valuation tables have lower mortality rates and, thus, higher A/E ratios. A/E ratios are well over 100% when based on true age. None of these tables fit the experience very well; an implication of this is that Structured Settlement business should have its own mortality tables. Comparing the results with those of the period 2005-2008, the A/E ratios have increased for each expected basis. However, A/E ratios for the period 2005-2008 were lower than those for the 2000-2004 period.

Measured by Rated Age, the A/E ratios relative to 1983 IAM were a little over 100% by contract and lower than 100% by amount. Those A/E ratios had fallen below 100% in the previous study. The A/E ratios relative to the 2012 IAM that were all below 100% in the previous study are all higher than 100% in the current study.

The following tables display the same information by true age for the 1983 IAM Table plus 1983 IAM CED expected basis for the previous and current periods. These results are shown for both Contract counts and Amount.

Table 24

A/E RATIOS - Period 2005-2008		
	Number of deaths	Death amount
	1,216	317,808,547
Expected basis	BY COUNT	BY AMOUNT
1983 IAM plus 1983 IAM CED	52.5%	32.2%

Table 25

A/E RATIOS - Period 2009-2013		
	Number of deaths	Death amount
	5,261	1,738,084,651
Expected basis	BY COUNT	BY AMOUNT
1983 IAM plus 1983 IAM CED	78.5%	64.1%

Measured by True Age and relative to that expected basis, the A/E ratios remain below 100%. However, compared to the A/E ratios of the previous study, A/E ratios have increased significantly. Again, it is important to note that A/E ratios for the period 2005-2008 were lower than those for the 2000-2004 period. The current study produces results more in line with the results of the 2000-2004 study period. For the 2009-2013 report, the total claim amount of $1,738,084,651 is from 4,741 deaths (out of 294,749 contracts exposed) and not from the full 5,261 deaths (from 301,241 contracts exposed). There were 520 deaths for which no reserve data was submitted.

The A/E ratios by gender are shown in the two tables below. In general, female ratios are higher than male ratios, except under the 2012 IAM Table using the rated age method. When the A/E ratios are calculated using the 1983 IAM Table plus 1983 IAM CED expected basis, the A/E ratios for females are similar to those for males.

Table 26

A/E RATIOS - Period 2009-2013					
		MALE		FEMALE	
		Number of deaths	Death amount	Number of deaths	Death amount
		3,549	1,062,652,003	1,712	675,432,648
Expected bases		BY COUNT	BY AMOUNT	BY COUNT	BY AMOUNT
1983 IAM	True	299.7%	441.3%	412.2%	789.8%
1983 IAM	Rated	99.4%	79.0%	109.7%	80.1%
2000 Annuity	True	383.7%	565.0%	476.9%	913.6%
2000 Annuity	Rated	123.9%	98.2%	124.7%	90.5%
2009-2013 SSA	True	243.6%	328.0%	296.0%	529.0%
2009-2013 SSA	Rated	85.1%	65.3%	86.6%	62.7%
2012 IAM Basic	True	464.8%	674.3%	497.8%	961.9%
2012 IAM Basic	Rated	141.0%	109.3%	128.5%	90.8%
2012 IAM Period	True	516.1%	748.2%	553.1%	1068.7%
2012 IAM Period	Rated	156.5%	121.2%	142.6%	100.8%
2012 IAM Basic G2	True	459.9%	667.5%	493.2%	953.4%
2012 IAM Basic G2	Rated	139.5%	108.3%	127.2%	90.1%
2012 IAM Period G2	True	510.7%	740.7%	548.0%	1059.3%
2012 IAM Period G2	Rated	154.7%	120.2%	141.2%	100.1%

Table 27

A/E RATIOS - Period 2009-2013				
	MALE		FEMALE	
	Number of deaths	Death amount	Number of deaths	Death amount
	3,549	1,062,652,003	1,712	675,432,648
Expected basis	BY COUNT	BY AMOUNT	BY COUNT	BY AMOUNT
1983 IAM plus 1983 IAM CED	78.1%	64.8%	79.4%	62.9%

By count, the A/E ratios by duration are shown in Tables 28 and 29 below. In general, ratios increase with duration under the true age method and decrease by duration under the rated age method. When the A/E ratios are calculated using the 1983 IAM Table plus 1983 IAM CED expected basis, the A/E ratios increase with duration.

Table 28

A/E RATIOS BY DURATION - Period 2009-2013 - BY COUNT					
Number of deaths		**401**	**783**	**1,327**	**2,750**
Duration		**1-2**	**3-5**	**6-10**	**11+**
Expected bases		**A/E ratio**			
1983 IAM	True	255.1%	262.8%	314.2%	380.8%
1983 IAM	Rated	117.2%	109.3%	104.1%	98.3%
2000 Annuity	True	322.8%	330.8%	391.7%	470.8%
2000 Annuity	Rated	145.4%	134.7%	126.7%	117.9%
2009-2013 SSA	True	195.4%	203.1%	245.6%	304.0%
2009-2013 SSA	Rated	96.6%	91.0%	87.3%	82.0%
2012 IAM Basic	True	373.9%	384.2%	455.2%	544.7%
2012 IAM Basic	Rated	172.4%	158.5%	144.1%	124.9%
2012 IAM Period	True	415.2%	426.8%	505.5%	604.9%
2012 IAM Period	Rated	191.6%	176.1%	160.1%	138.5%
2012 IAM Basic G2	True	368.3%	379.8%	450.6%	539.9%
2012 IAM Basic G2	Rated	169.7%	156.5%	142.4%	123.7%
2012 IAM Period G2	True	409.1%	421.8%	500.5%	599.6%
2012 IAM Period G2	Rated	188.5%	173.8%	158.2%	137.2%

Table 29

A/E RATIOS BY DURATION - Period 2009-2013 - BY COUNT				
Number of deaths	**401**	**783**	**1,327**	**2,750**
Duration	**1-2**	**3-5**	**6-10**	**11+**
Expected basis	**A/E ratio**			
1983 IAM plus 1983 IAM CED	54.9%	58.0%	67.7%	103.5%

By amount, the A/E ratios by duration are shown in Tables 30 and 31 below. In general, ratios are much lower at higher durations under the rated-age method. When the A/E ratios are calculated using the 1983 IAM Table plus 1983 IAM CED expected basis, the A/E ratios are lowest at durations 6-10.

Table 30

A/E RATIOS BY DURATION - Period 2009-2013 - BY AMOUNT					
Death amount		94,638,437	181,349,574	269,709,736	1,192,386,904
Duration		1-2	3-5	6-10	11+
Expected bases		**A/E ratio**			
1983 IAM	True	434.7%	446.0%	407.0%	603.4%
1983 IAM	Rated	150.8%	120.5%	70.8%	74.7%
2000 Annuity	True	547.6%	560.7%	505.5%	749.7%
2000 Annuity	Rated	186.2%	147.6%	85.4%	89.0%
2009-2013 SSA	True	317.9%	314.5%	287.8%	440.9%
2009-2013 SSA	Rated	118.0%	93.5%	55.6%	61.3%
2012 IAM Basic	True	635.8%	650.1%	587.9%	856.9%
2012 IAM Basic	Rated	217.9%	172.0%	95.9%	92.7%
2012 IAM Period	True	705.8%	721.9%	652.8%	951.0%
2012 IAM Period	Rated	242.0%	191.1%	106.6%	102.9%
2012 IAM Basic G2	True	626.5%	642.6%	581.2%	849.9%
2012 IAM Basic G2	Rated	214.4%	169.7%	94.8%	92.1%
2012 IAM Period G2	True	695.6%	713.5%	645.3%	943.3%
2012 IAM Period G2	Rated	238.1%	188.6%	105.3%	102.2%

Table 31

A/E RATIOS BY DURATION - Period 2009-2013 - BY AMOUNT				
Death amount	94,638,437	181,349,574	269,709,736	1,192,386,904
Duration	1-2	3-5	6-10	11+
Expected basis	**A/E ratio**			
1983 IAM plus 1983 IAM CED	56.3%	53.7%	40.3%	77.5%

By count, the A/E ratios by rated issue age group are shown in Tables 32 and 33 below. In general, ratios decrease with higher rated issue age group. A/E ratios tend to be lower under the rated-age method. When the A/E ratios are calculated using the 1983 IAM Table plus 1983 IAM CED expected basis, the A/E ratios increase with rated issue age group up to age 60, and then remain relatively level. Credibility is particularly impacted when results are subdivided into various categories. Accordingly, considerable care must be taken in the interpretation of the results.

Table 32

A/E RATIOS BY RATED ISSUE AGE GROUP - Period 2009-2013 - BY COUNT											
Number of deaths		1	28	83	267	633	1,220	1,552	1,147	326	4
Rated issue age group		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Expected bases		A/E RATIO									
1983 IAM	True	77.4%	376.0%	424.2%	501.1%	436.6%	351.3%	286.2%	302.7%	318.3%	185.6%
1983 IAM	Rated	69.9%	260.1%	214.9%	200.5%	161.5%	129.2%	93.7%	79.4%	65.0%	42.9%
2000 Annuity	True	82.6%	411.9%	497.4%	633.1%	563.1%	446.8%	357.2%	370.9%	379.9%	209.6%
2000 Annuity	Rated	74.7%	305.3%	275.2%	259.3%	204.6%	160.1%	113.7%	94.5%	74.7%	46.6%
2009-2013 SSA	True	51.7%	240.3%	262.3%	334.1%	312.8%	265.6%	228.5%	255.9%	275.3%	147.2%
2009-2013 SSA	Rated	43.1%	151.1%	140.9%	145.1%	125.7%	106.2%	80.7%	67.9%	53.3%	39.8%
2012 IAM Basic	True	90.8%	444.4%	532.4%	704.1%	656.4%	527.0%	410.3%	437.5%	428.3%	189.7%
2012 IAM Basic	Rated	78.4%	305.5%	306.0%	301.6%	240.8%	186.9%	131.5%	99.6%	69.6%	51.2%
2012 IAM Period	True	100.8%	491.7%	589.2%	779.0%	728.3%	585.4%	455.9%	486.2%	475.8%	210.8%
2012 IAM Period	Rated	87.0%	336.9%	338.3%	334.7%	267.6%	207.7%	146.2%	110.6%	76.7%	55.4%
2012 IAM Basic G2	True	90.5%	441.2%	528.5%	698.7%	650.9%	521.9%	406.0%	432.7%	423.2%	188.6%
2012 IAM Basic G2	Rated	78.2%	303.1%	303.7%	299.2%	238.7%	185.1%	130.2%	98.5%	68.8%	50.6%
2012 IAM Period G2	True	100.5%	488.2%	584.8%	773.1%	722.1%	579.8%	451.1%	480.7%	470.3%	209.5%
2012 IAM Period G2	Rated	86.7%	334.3%	335.7%	332.1%	265.3%	205.7%	144.6%	109.4%	75.8%	54.8%

Table 33

A/E RATIOS BY RATED ISSUE AGE GROUP - Period 2009-2013 - BY COUNT										
Number of deaths	1	28	83	267	633	1,220	1,552	1,147	326	4
Rated issue age group	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Expected basis	A/E RATIO									
1983 IAM plus 1983 IAM CED	21.9%	50.9%	50.9%	73.7%	82.5%	83.5%	75.8%	79.9%	82.4%	67.5%

By amount, the A/E ratios by rated issue age group are shown in Tables 34 and 35 below. In general, ratios follow the same pattern as by count.

Table 34

A/E RATIOS BY RATED ISSUE AGE GROUP - Period 2009-2013 - BY AMOUNT											
Death amount		302,894	14,735,155	46,742,771	100,963,848	211,136,761	328,279,548	574,412,851	344,994,330	116,346,666	169,827
Rated issue age group		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Expected bases		A/E RATIO									
1983 IAM	True	53.6%	365.9%	547.9%	440.9%	455.1%	424.8%	632.0%	601.6%	638.3%	114.5%
1983 IAM	Rated	46.9%	233.7%	232.1%	135.1%	109.2%	82.5%	85.4%	57.0%	53.6%	8.1%
2000 Annuity	True	57.1%	394.1%	639.7%	552.0%	580.3%	538.9%	788.7%	739.3%	764.2%	130.2%
2000 Annuity	Rated	50.3%	276.7%	298.3%	173.7%	137.0%	101.3%	102.5%	66.6%	61.1%	9.4%
2009-2013 SSA	True	32.5%	225.5%	329.2%	283.4%	305.9%	301.5%	467.0%	482.0%	537.2%	91.4%
2009-2013 SSA	Rated	26.6%	131.2%	148.4%	95.4%	82.3%	67.2%	71.3%	46.9%	43.7%	6.6%
2012 IAM Basic	True	61.5%	427.0%	682.4%	615.1%	667.7%	629.8%	907.0%	862.2%	869.5%	123.2%
2012 IAM Basic	Rated	51.0%	272.2%	339.5%	202.9%	158.6%	120.2%	115.8%	64.7%	55.5%	7.9%
2012 IAM Period	True	68.2%	472.7%	755.1%	680.8%	740.4%	699.3%	1007.6%	957.9%	966.1%	136.7%
2012 IAM Period	Rated	56.5%	300.4%	376.1%	225.4%	176.2%	133.5%	128.7%	71.9%	61.2%	8.7%
2012 IAM Basic G2	True	61.3%	424.3%	677.8%	610.6%	662.3%	623.9%	897.6%	852.7%	859.0%	122.5%
2012 IAM Basic G2	Rated	50.8%	270.5%	337.2%	201.5%	157.4%	119.2%	114.9%	64.2%	55.0%	7.8%
2012 IAM Period G2	True	68.0%	469.7%	750.0%	675.9%	734.5%	692.7%	997.2%	947.3%	954.4%	135.9%
2012 IAM Period G2	Rated	56.3%	298.5%	373.6%	223.8%	174.9%	132.5%	127.7%	71.4%	60.6%	8.6%

Table 35

A/E RATIOS BY RATED ISSUE AGE GROUP - Period 2009-2013 - BY AMOUNT										
Death amount	302,894	14,735,155	46,742,771	100,963,848	211,136,761	328,279,548	574,412,851	344,994,330	116,346,666	169,827
Rated issue age group	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Expected basis	A/E RATIO									
1983 IAM plus 1983 IAM CEI	13.9%	44.0%	50.6%	48.0%	54.6%	55.9%	75.9%	69.8%	78.4%	12.4%

Appendix A—Exposure Calculations - Mortality

1. Overview

For the statistical agent data, the data is submitted by calendar year split into two policy durations. For mortality, the Balducci approach is used. Therefore, the exposure assigned to a death will differ depending upon whether mortality is the decrement under study. The duration that a termination is assigned to is based on the Actual Termination Date. See the diagram below

Each submitted record is split into two portions that correspond to the two policy durations:

- **B:** The policy duration before the anniversary date in the calendar year (Before Analytical Anniversary Portion = 'B'), and
- **A:** The policy duration after the anniversary date in the calendar year (After Analytical Anniversary Portion = 'A').

For example, a record submitted with the annuitant having a duration of 10 at the beginning of the observation year would have a Before Analytical Anniversary Portion of 'B' with a duration of 10, and the Analytical Anniversary Portion of 'A' would have a duration of 11.

Based on the two Analytical Anniversary Portions, we calculate Exposure Length for mortality. Then, we calculate the Policies Exposed, Annuity or Reserve Amount, and the Amount Exposed.

2. Mortality Exposure Length

The Exposure Length differs between the After Analytical Anniversary Portion 'A' and the Before Analytical Anniversary Portion 'B' for in force, death terminations and non-death terminations. The Exposure Length is used to determine the Policies Exposed and the Annuity or Reserve Amount Exposed.

2.1 For In Force Policies

The Exposure Length of the Before Analytical Anniversary Portion 'B' is the fraction of the year from the beginning of the calendar year to the Anniversary Date of the policy in the Observation Year. For After Analytical Anniversary Portion 'A,' the Exposure Length is the fraction of the year from the anniversary date of the policy during the calendar year to the end of the calendar year.

2.2 For Death Terminated Policies

The calculation of Exposure Length depends upon whether the death occurred before the anniversary date or after the anniversary date:

- If the death occurs before the anniversary date, due to the Balducci hypothesis, the exposure length for 'B' is the fraction of the year from the beginning of the calendar year

to the anniversary date in the Observation Year. The exposure length for the After Analytical Anniversary Portion 'A' would be zero.

- If the death occurs after the anniversary date, the exposure length for 'B' is the fraction of the year from the beginning of the calendar year to the anniversary date in the Observation Year. Due to the Balducci hypothesis, the exposure length for the After Analytical Anniversary Portion 'A' would be 1.

2.3 For Non-Death Terminated Policies

The calculation of Exposure Length depends upon whether the non-death termination occurred before the anniversary date or after the anniversary date:

- If the non-death termination occurs before the anniversary date, the exposure length for the Before Analytical Anniversary Portion 'B' is the fraction of the year from the beginning of the calendar year to the Actual Termination Date. The exposure length for the After Analytical Anniversary Portion 'A' would be zero.
- If the non-death termination occurs after the anniversary date, the exposure length for the Before Analytical Anniversary Portion 'B' is the fraction of the year from the beginning of the calendar year to the anniversary date in the Observation Year. The exposure length for the After Analytical Anniversary Portion 'A' would be the fraction of the year from the anniversary date to the Actual Termination Date.

3. Policies Exposed

Policies Exposed is calculated as the product of the Policy Exposure Indicator (PEI) and Exposure Length. For single life policies, the PEI is set to 1 for the base policy (Segment Number = 1) and PEI is set to 0 for the non-base policy (Segment Number > 1).

4. Annuity or Reserve Amount

Annuity or Reserve Amount is based upon the Amount at the Beginning of the Year or the Amount at the End of the Year.

For the Analytical Anniversary Portion 'B,' the Annuity or Reserve Amount is based upon the Amount at the Beginning of the Year. For the Analytical Anniversary Portion 'A,' the Annuity or Reserve Amount is based upon the Amount at the End of the Year.
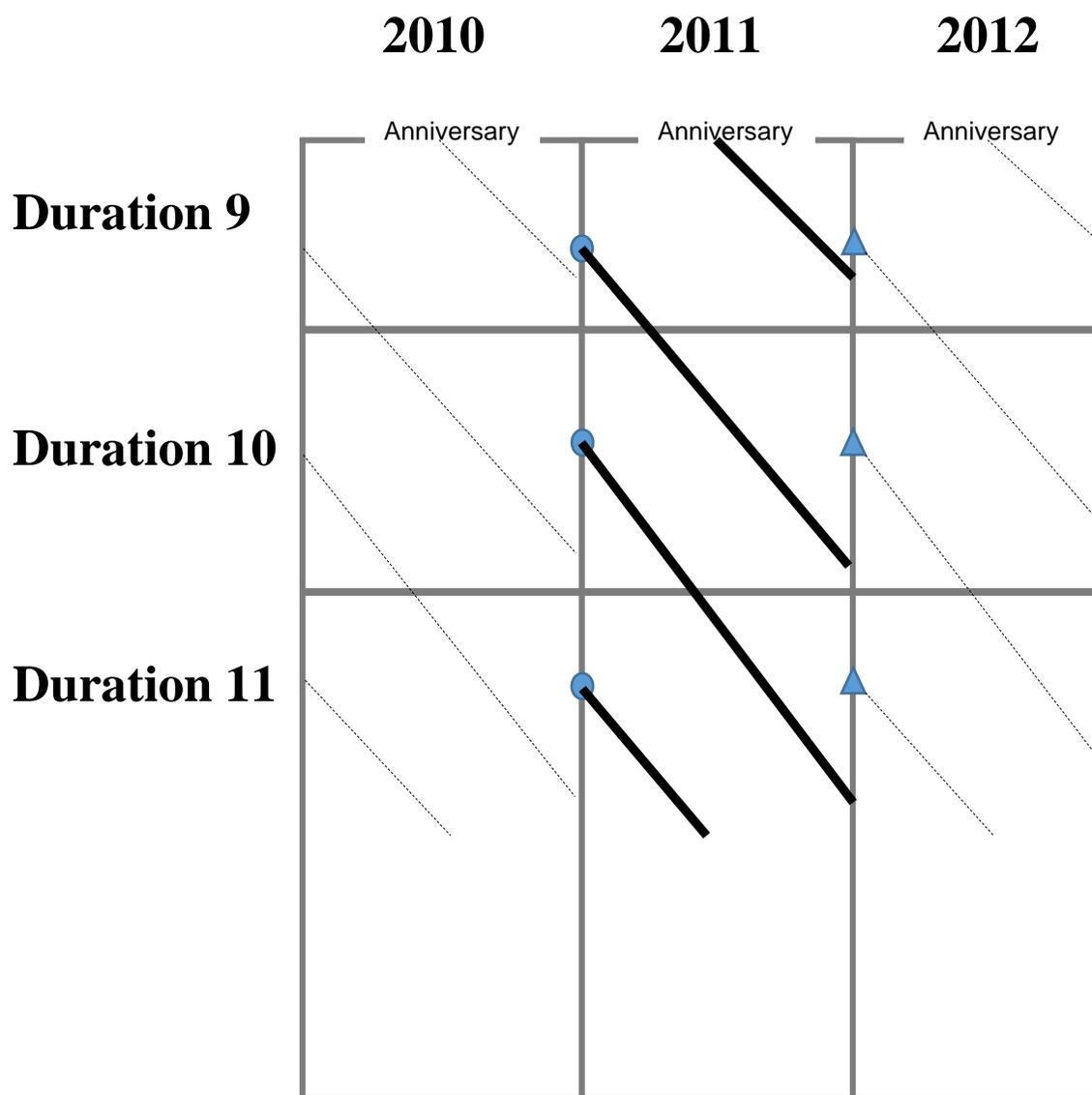
5. Amount Exposed

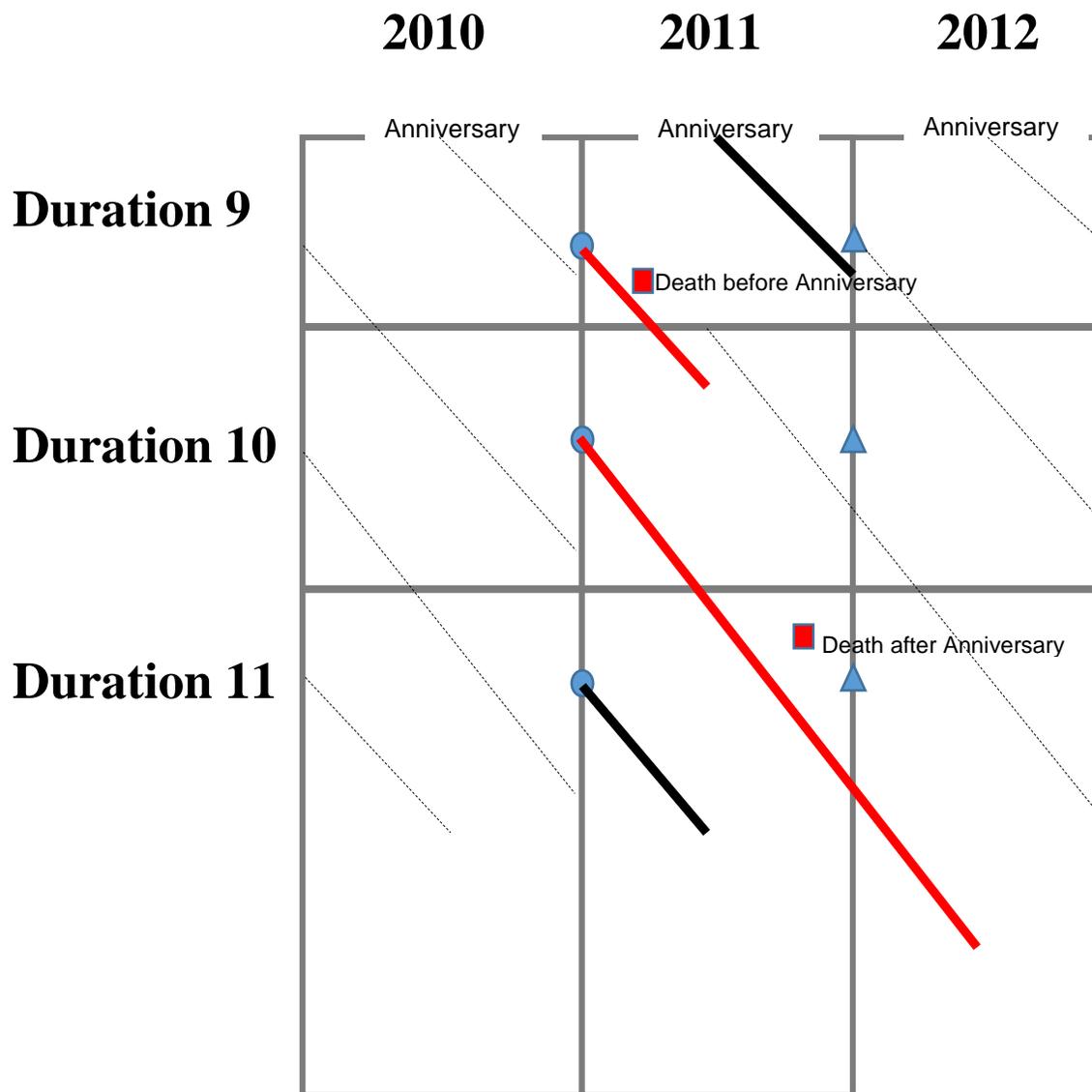The Amount Exposed is calculated as the product of the Exposure Length and Annuity or Reserve Amount.

Diagrams

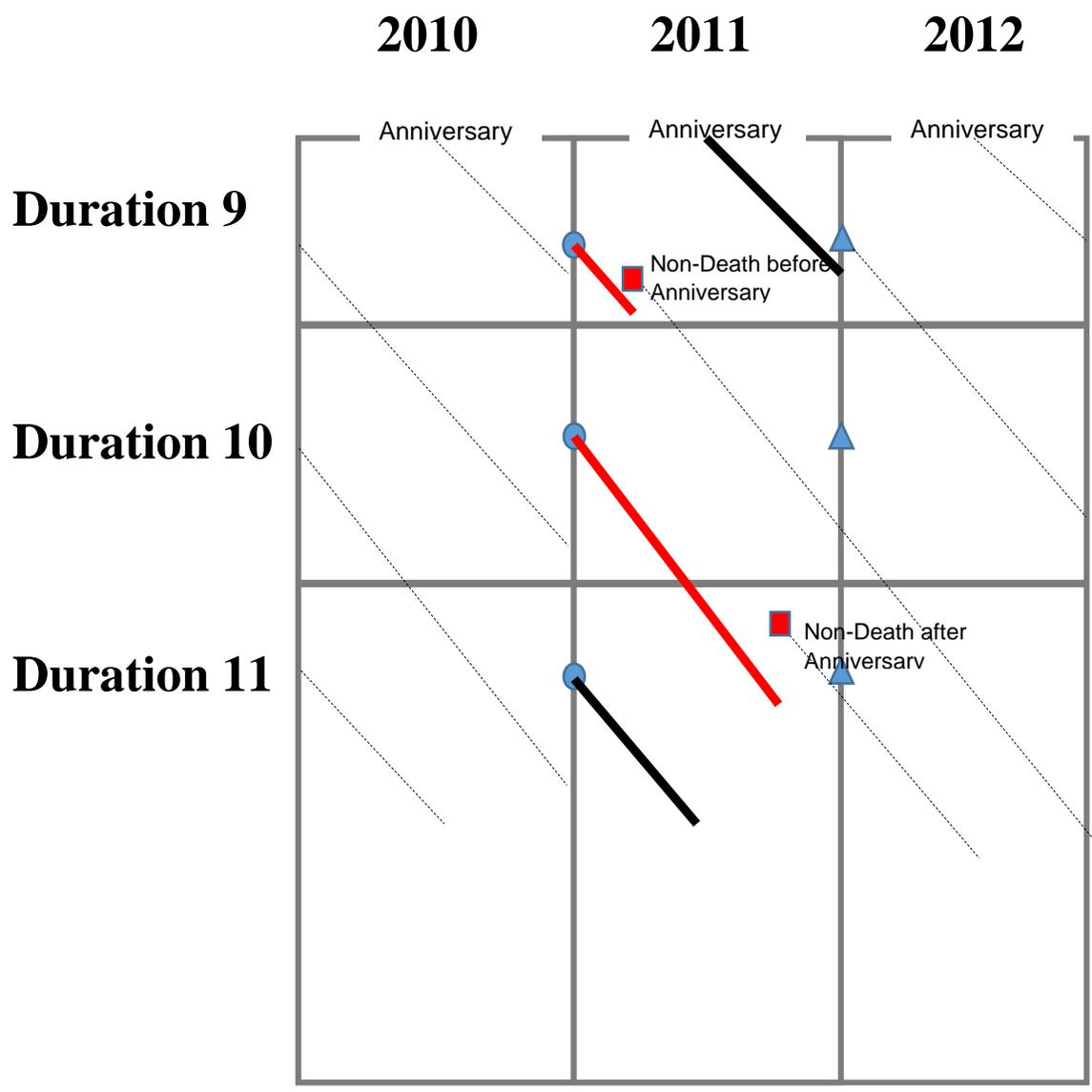# Exposure for Policy Duration

in Calendar Year 2011

For in force Policies

	2010	**2011**	**2012**
	Anniversary	Anniversary	Anniversary
Duration 9			
Duration 10			
Duration 11			

For Death Terminated Policies

For Non-Death Terminated Policies

Appendix B—Fixed Variables

STANDARD LIVES

<u>Study year</u>:	2009, 2010, 2011, 2012, 2013
<u>Gender</u>:	Female, Male
<u>Issue age group</u>:	0-10, 11-20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80, 81+
<u>Contract year</u>:	1-2, 3-5, 6-10, 11+
<u>Attained age group</u>:	0-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, 56-60, 61-65, 66-75, 76-85, 86-90, 91-95, 96-100, 101+

<u>Common company indicator</u>: 0 (not common) or 1 (common)

<u>Underwriting Class:</u>	Standard mortality, Not underwritten

SUBSTANDARD LIVES

<u>Study year</u>:	2009, 2010, 2011, 2012, 2013
<u>Gender</u>:	Female, Male
<u>Issue age group</u>:	0-10, 11-20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80, 81+
<u>Rated issue age group</u>:	0-10, 11-20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80, 81-90, 91-100
<u>Contract year</u>:	1-2, 3-5, 6-10, 11+
<u>Attained age group</u>:	0-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, 56-60, 61-65, 66-75, 76-85, 86-90, 91-95, 96-100, 101+

<u>Common company indicator</u>: 0 (not common) or 1 (common)

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