



SOA Post-Level Term Experience Results

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Actuaries' Club of the Southwest

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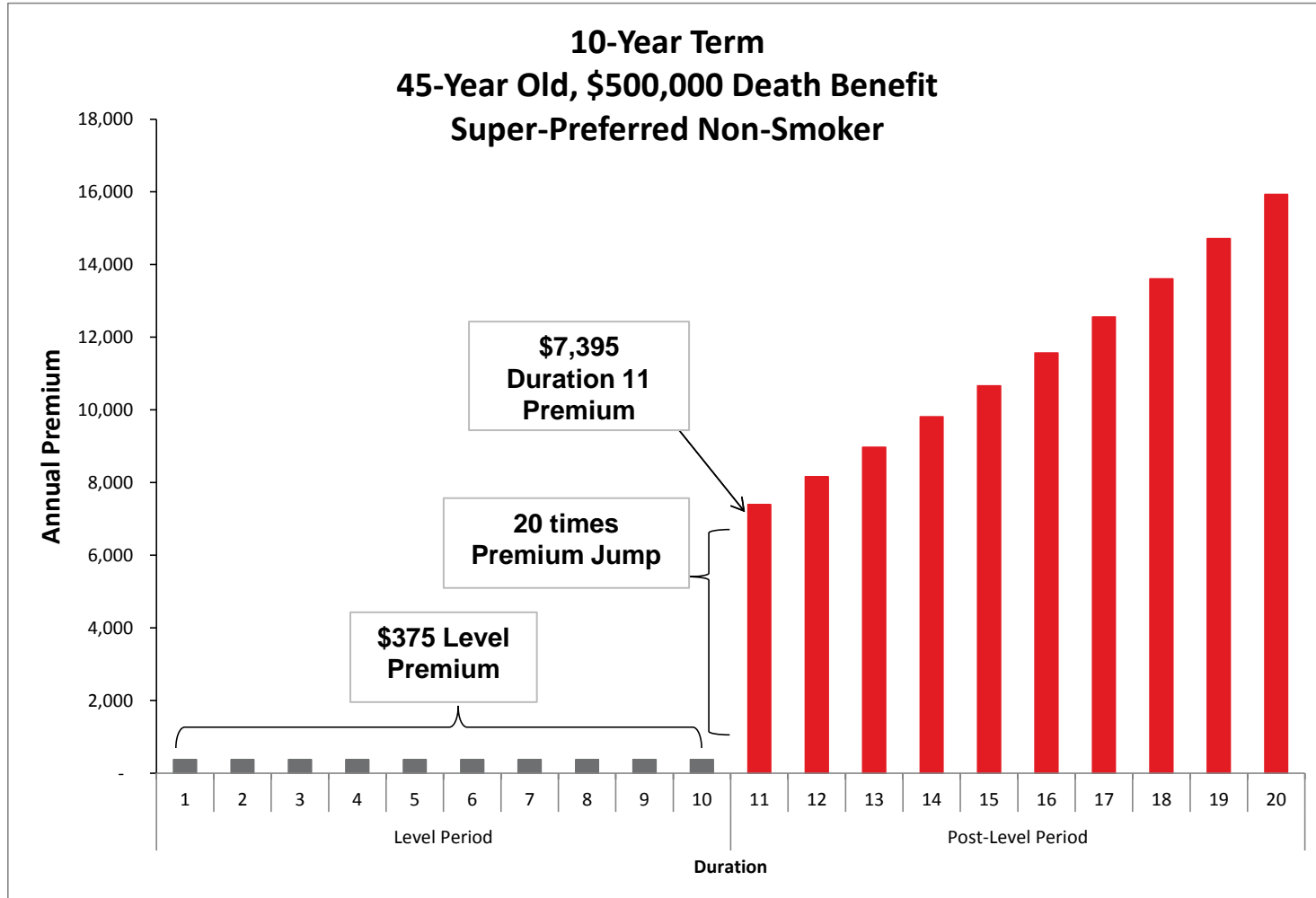
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Introduction to Post-Level Term

Introduction to Post-Level Term

10-Year Term: Premium Structure with Jump to ART



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Background

Background

- SOA Sponsored Post-Level Term Reports
 - 2007 – Report on the Survey of Post-Level Premium Period Lapse and Mortality Assumptions and Experience For Level Premium Term Plans
 - 2009 – Report on the Survey of Post-Level Premium Period Lapse and Mortality Assumptions for Level Premium Term Plans
 - 2010 – Report on the Lapse and Mortality Experience of Post-Level Premium Period Term Plans
 - 2013 – Report on the Survey of Post-Level Premium Period Lapse and Mortality Assumptions for Level Premium Term Plans
 - 2014 – Report on the Lapse and Mortality Experience of Post-Level Premium Period Term Plans

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Assumption Survey Results

Assumption Survey Results

Overview

- Sent to top 100 term providers based on 2012 term insurance sales
 - Responses from 41 companies
 - Responses represented 62% of 2012 term sales

Assumption Survey Results

Product Distribution

Level Premium Term Product Mix by Level Period				
Product Level Period	Aggregate Distribution for Respondents	Number of companies where product represents at least x% of individual company's term sales		
		x=5%	x=15%	x=30%
5 Year Term	1.20%	3	1	0
10 Year Term	22.70%	42	36	8
15 Year Term	8.60%	32	6	1
20 Year Term	52.00%	44	44	42
25-30 Year Term	15.10%	33	23	9
Other	0.40%	5	2	1

Assumption Survey Results

Post-Level Premium Structure

- Dominant Structure is Jump to an ART Scale

Post-Level Product Design	
Product Structure	Responses
Premium jump to ART	40
Premium grade to ART	4
Jump to new level period	3
Face amount decrease	1
Product terminates	2
Flexible Premiums (Term UL)	1

Assumption Survey Results

Expected Changes to Post-Level Premium Structure

- No change expected for most term new business
- Minimal changes reported to inforce term business

Changes to Post-Level Premium Structure for Term New Business	
No change	23
Grade premiums into an ART scale over 'x' years	3
Other	3

Changes to Post-Level Premium Structure for Term In Force		
Description	Implemented in last 5 years	Considering
Lower post-level premiums	1	5
Grade into an ART scale	3	3
Other	0	2

Assumption Survey Results

Structure of Current & Guaranteed Ultimate Rates

- Trend towards increasing level of guaranteed ultimate rates
- Relationship between current and guaranteed continues to vary

Structure of Guaranteed Ultimate Rates		
Description	2013	2009
% of 1980 CSO		
Between 150-300%	2	8
% of 2001 CSO		
Less than 200%	5	1
Exactly 200%	7	12
Between 200-300%	11	7
Exactly 300%	11	12
More than 300%	7	1
Other	3	5

Relationship between Current Ultimate and Guaranteed Ultimate Premiums		
Description	2013	2009
Product has Guaranteed Rates only	14	15
Current Rates = Guaranteed Rates	15	12
Current Rates < Guaranteed Rates	14	16
Current Rates grade to Guaranteed Rates	1	2

Assumption Survey Results

Post-Level Lapse Rate Structure

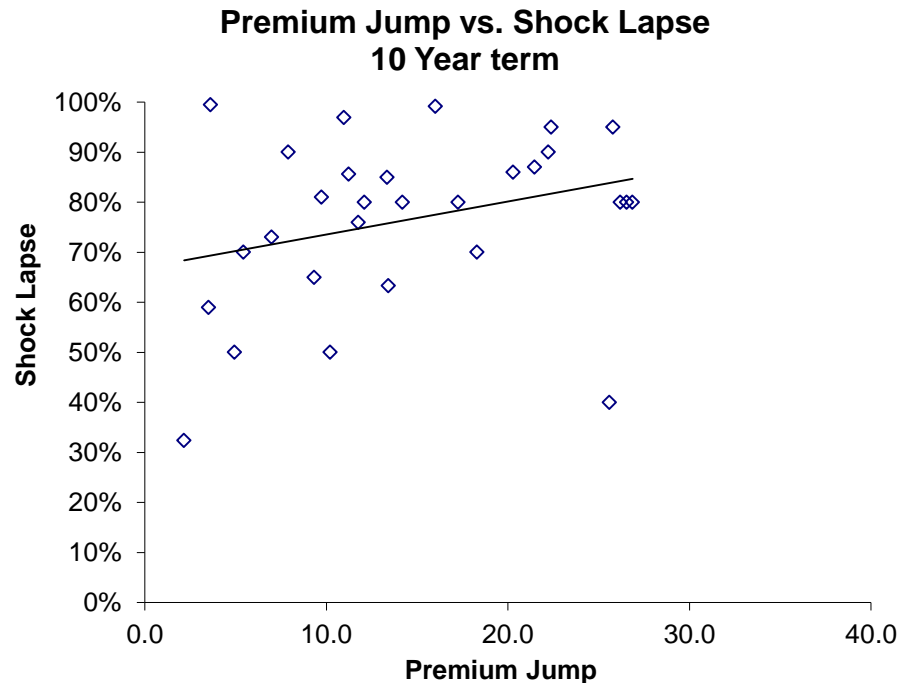
- Most companies assume only one shock lapse, generally grading down thereafter

Lapse Rate Trend By Duration		
Description	Responses	
	10-Year Term	20-Year Term
Duration L Shock, then level	8	7
Duration L Shock, then grade down	12	10
2 Shocks, Duration $L \geq L+1$	6	5
2 Shocks, Duration $L+1 > L$	3	2

Assumption Survey Results

Post-Level Lapse Rate Assumption by Premium Jump

- Broad range of assumptions by premium jump
- Trend is somewhat inconsistent with experience



Assumption Survey Results

Post-Level Lapse rate Assumptions

- Today's skewness assumptions do not always follow past experience

Monthly Lapse Skewness During Level Premium Period	
Response	Respondents
Lapses are uniformly distributed	18
Lapses occur on premium payment modes	10
Lapses occur at the end of the year	7
Other	4
No response	5

Monthly Lapse Skewness During Year of Shock Lapse	
Response	Respondents
Lapses are uniformly distributed	5
Lapses occur on premium payment modes	3
Lapses occur at the end of the year	17
Lapses graded toward end of the year with shock in month 12	12
No response	7

Monthly Lapse Skewness During Post-Level Period	
Response	Respondents
Lapses are uniformly distributed	6
Lapses occur on premium payment modes	7
Lapses occur at the end of the year	9
Lapses skewed to the beginning of L+1, Uniform thereafter	8
No response	14

Assumption Survey Results

Post-Level Mortality Methodology

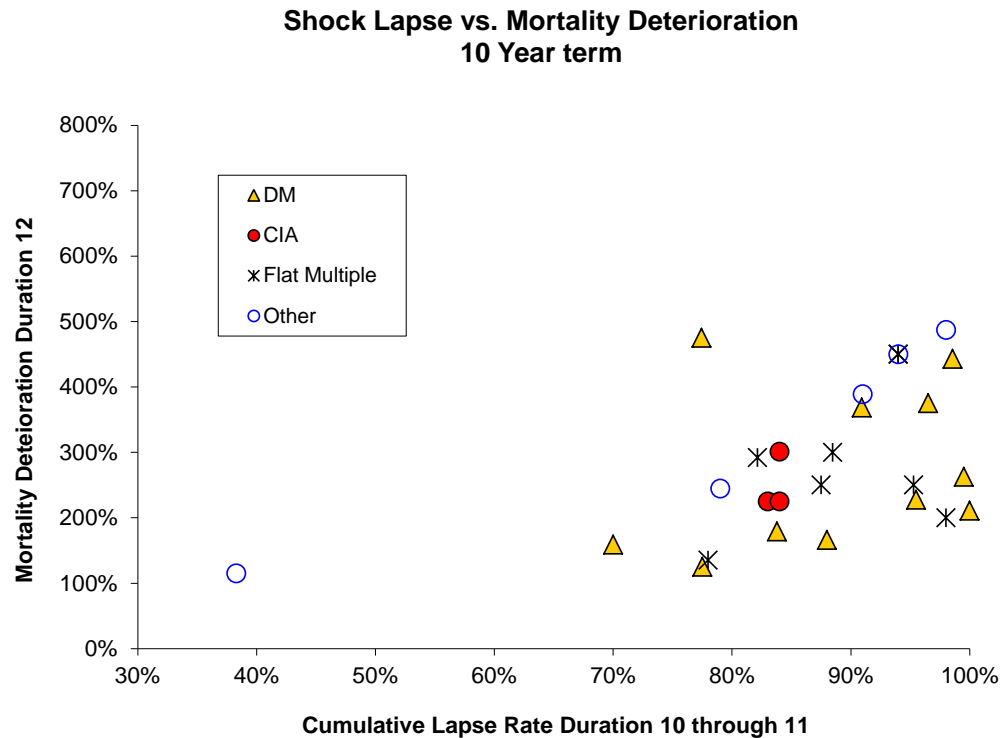
- Dukes-MacDonald (or derivatives) and Flat Multiple are the primary assumptions used in developing mortality after the shock lapse

Method of Developing Mortality Assumption	
Method	Responses
N/A - 100% shock lapse	9
Dukes-MacDonald or derivatives of Dukes-MacDonald	14
Canadian Institute of Actuaries Valuation Technique Paper #2	4
Flat Multiple	13
Other: Set by reinsurer/external consultant	3
Other: Internally developed method	3

Assumption Survey Results

Post-Level Mortality Assumptions vs. Cumulative Lapse Rate

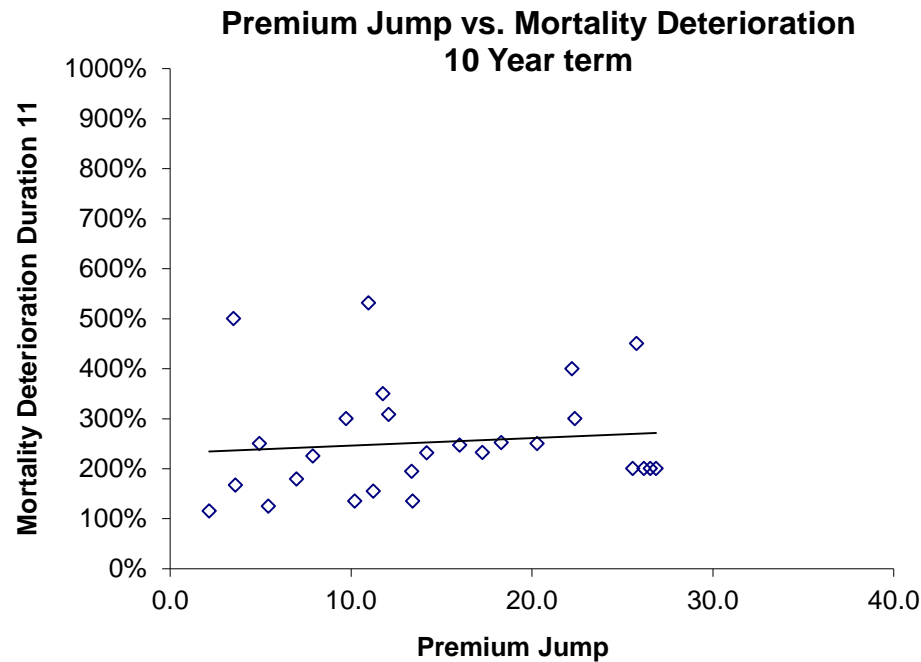
- Mortality deterioration increases gradually with increasing lapse rates



Assumption Survey Results

Post-Level Mortality Assumptions vs. Premium Jump

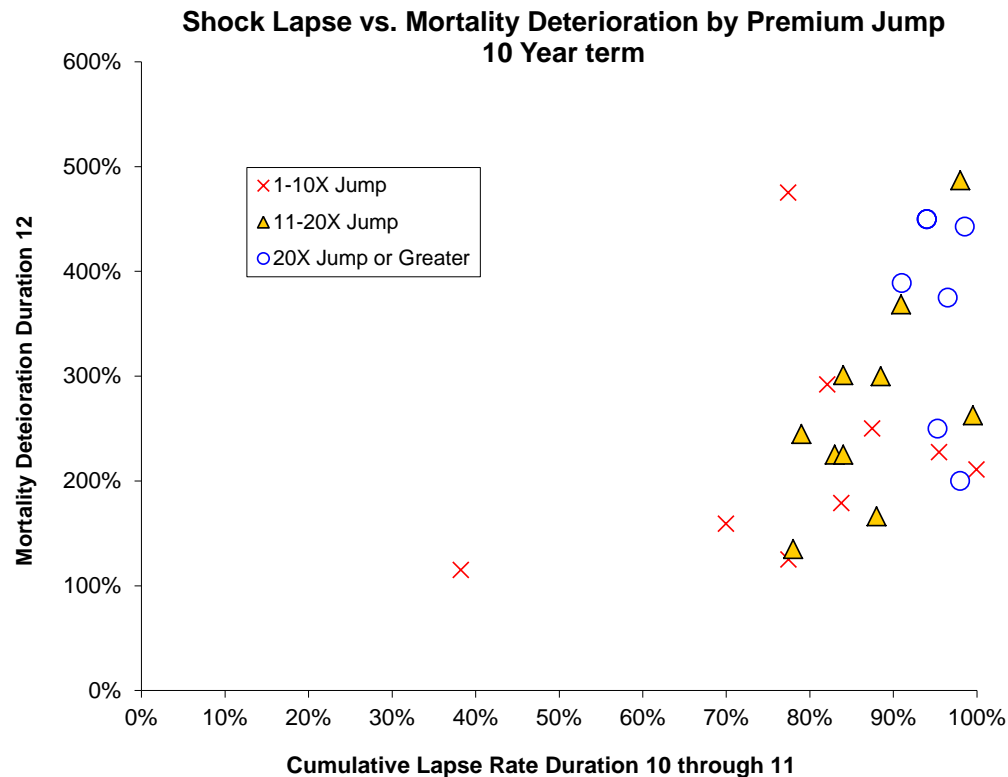
- Mortality deterioration assumptions do not differ dramatically by premium jump, inconsistent with experience



Assumption Survey Results

Post-Level Mortality Assumptions vs. Prem Jump and Lapse Rate

- When split by lapse rate, it does appear assumptions vary by premium jump



Assumption Survey Results

Post-Level Mortality Deterioration Structure

- Assumptions vary broadly by structure of mortality deterioration

Mortality Deterioration Assumption Trend By Duration		
Description	Responses	
	10-Year Term	20-Year Term
Level all durations	7	6
Decreasing or grade to ultimate level	13	11
Increasing then decreasing	6	1
Generally increasing	1	3

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Experience Study Results

Lapse Study Experience Results

Overview

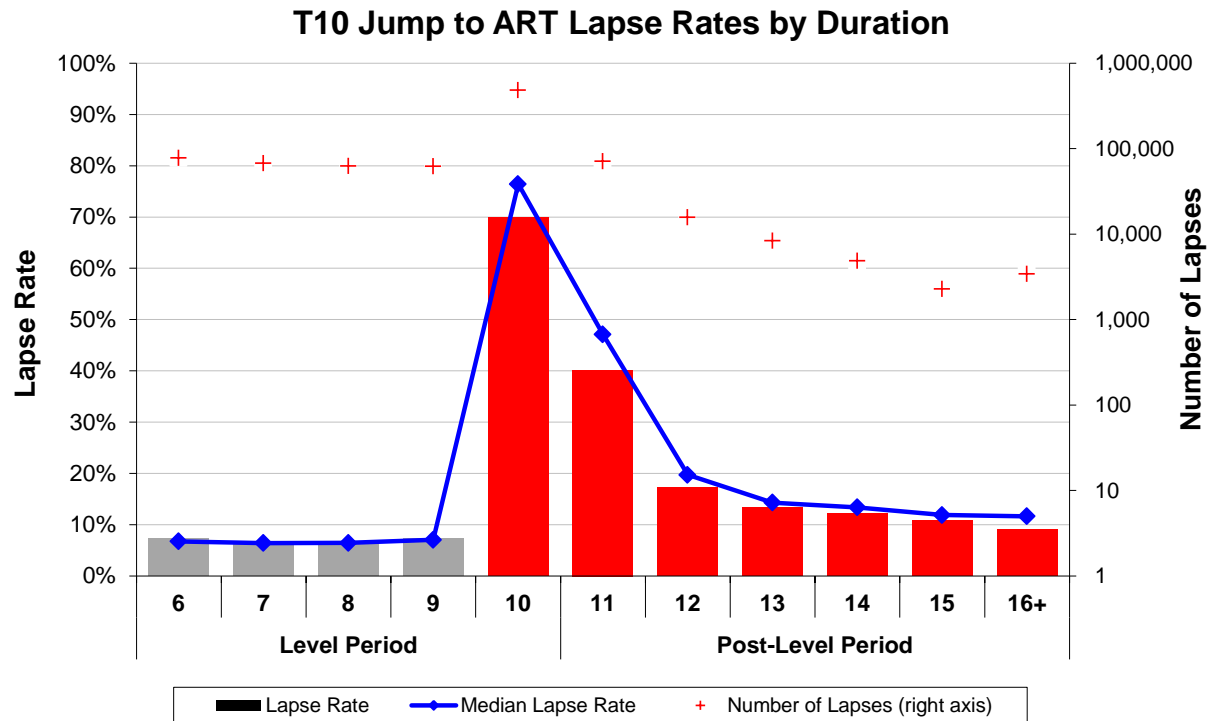
2000-2012 Policy-Year Study

		2014 Study	2010 Study	Change
10-Year Term	Number of Companies w/ Post Level Experience	36	25	144%
	Post-Level Lapses with Premiums	436,307	87,544	498%
	Post-Level Lapses without Premiums	258,030	170,171	152%
15-Year Term	Number of Companies w/ Post Level Experience	15	7	214%
	Post-Level Lapses with Premiums	37,673	12,191	309%
	Post-Level Lapses without Premiums	1,364	1,359	100%

Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results – Jump to ART

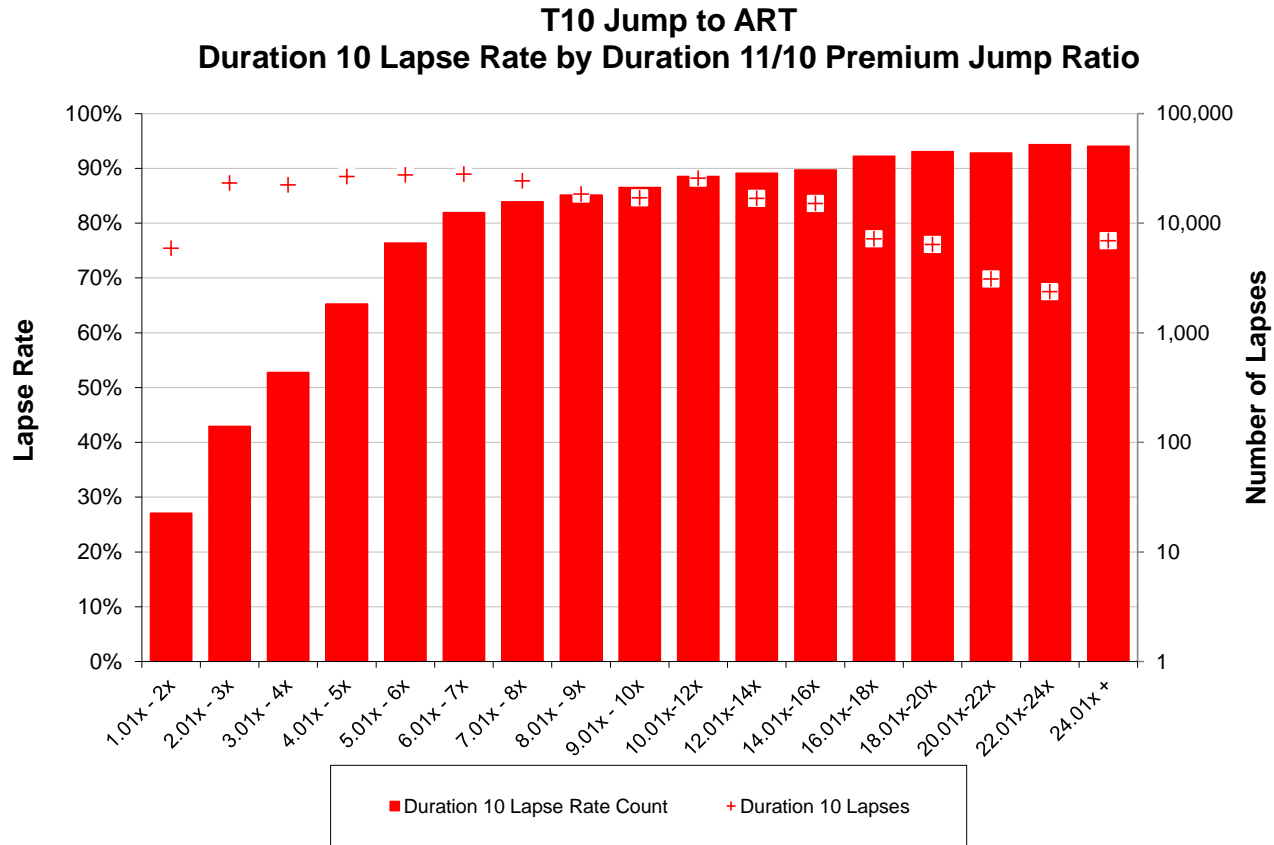
Lapse Rates by Duration



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results – Jump to ART

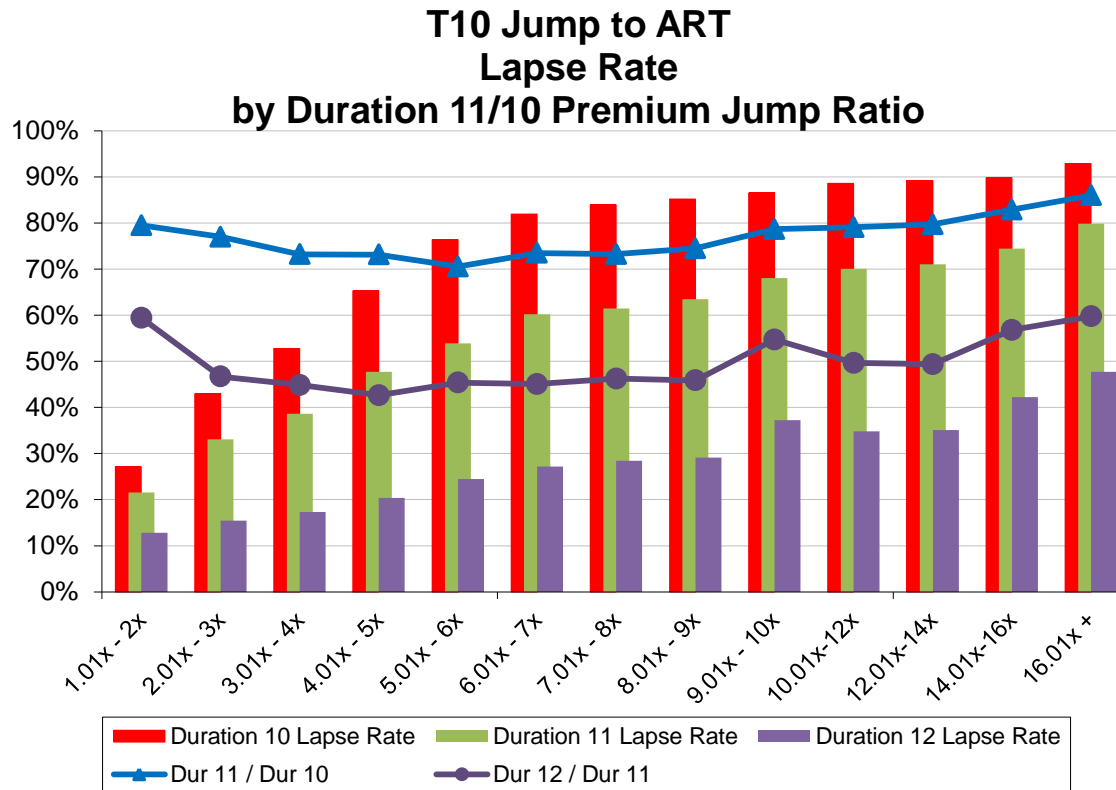
Lapse Rates by Premium Jump



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results – Jump to ART

Lapse Rates by Duration & Premium Jump

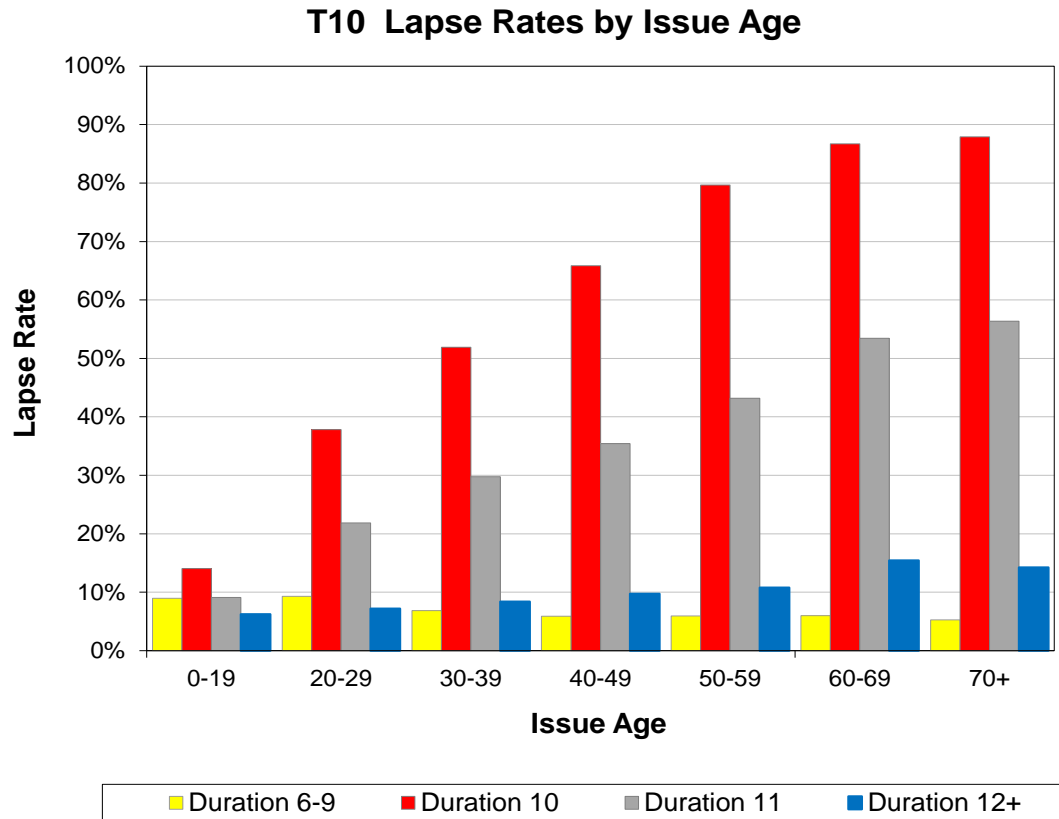


Duration 11/10 Premium Jump Ratio Band	Dur 11 / Dur 10	Dur 12 / Dur 11
1.01x - 2x	79.5%	59.5%
2.01x - 3x	77.0%	46.7%
3.01x - 4x	73.2%	44.9%
4.01x - 5x	73.1%	42.7%
5.01x - 6x	70.5%	45.4%
6.01x - 7x	73.5%	45.1%
7.01x - 8x	73.2%	46.3%
8.01x - 9x	74.5%	45.9%
9.01x - 10x	78.7%	54.7%
10.01x - 12x	79.1%	49.7%
12.01x - 14x	79.7%	49.4%
14.01x - 16x	82.9%	56.8%
16.01x +	86.0%	59.8%
Subtotal Prem Data Available	59.4%	42.9%
No Prem Data Available	55.0%	43.1%
Grand Total	57.4%	42.9%

Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results

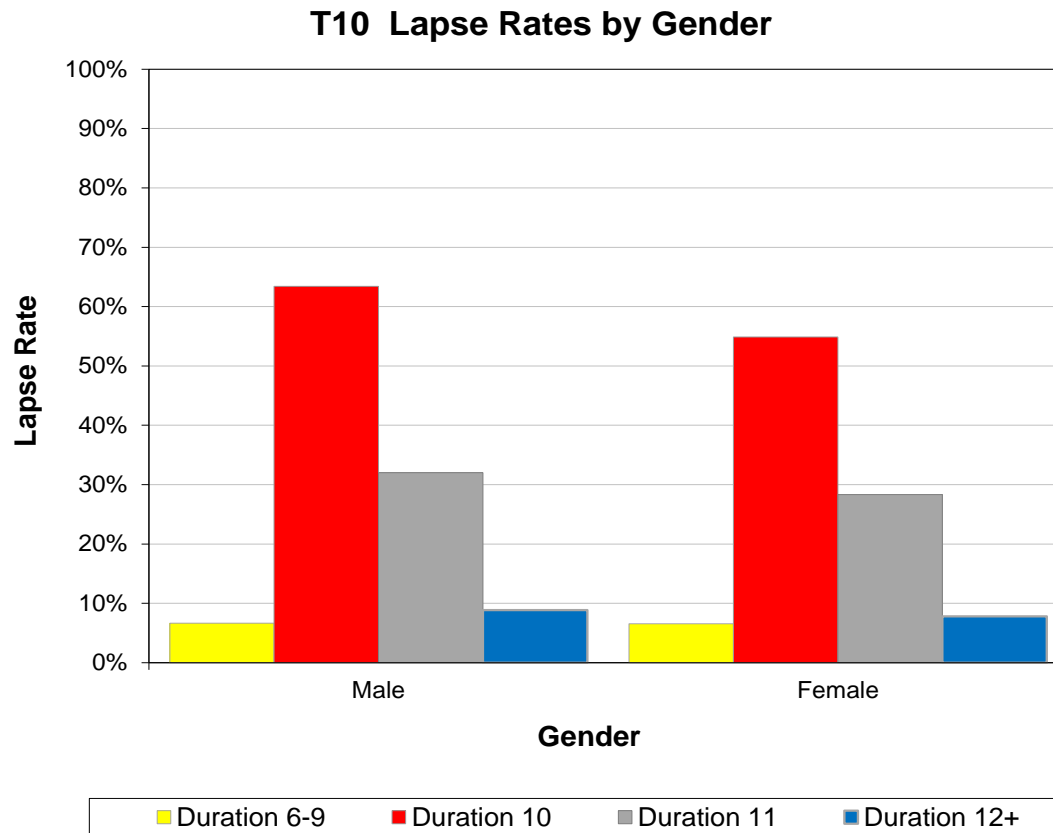
Lapse Rates by Duration and Issue Age



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results

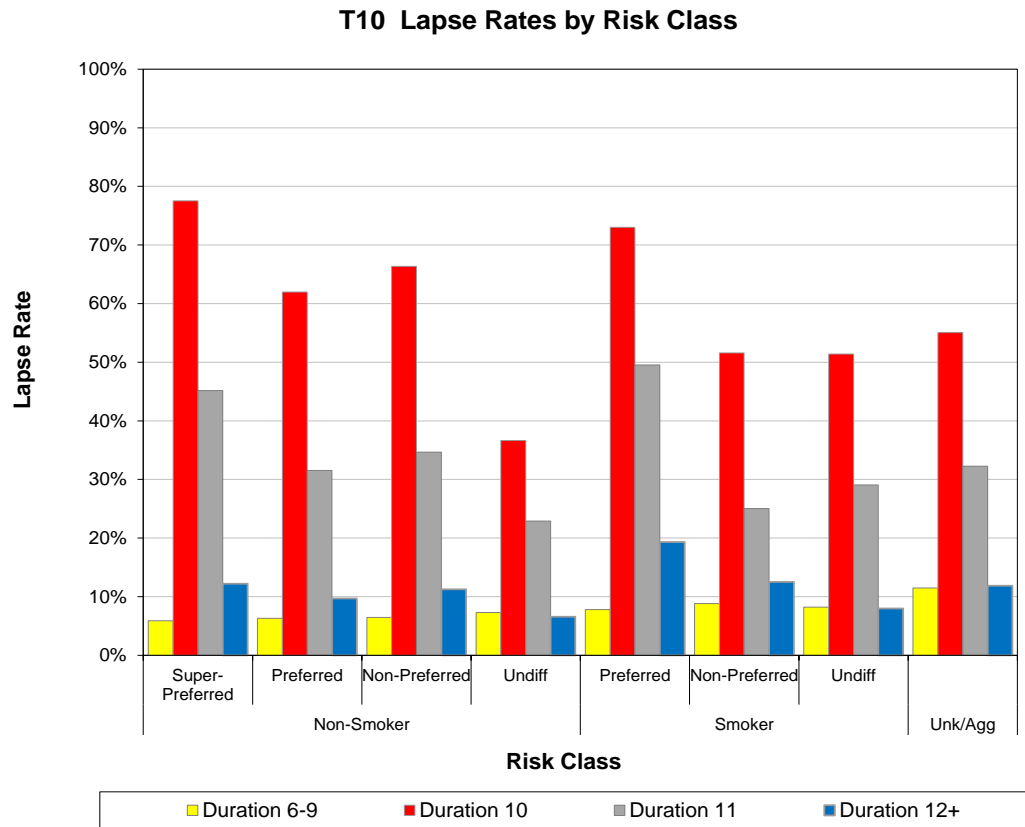
Lapse Rates by Duration & Gender



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results

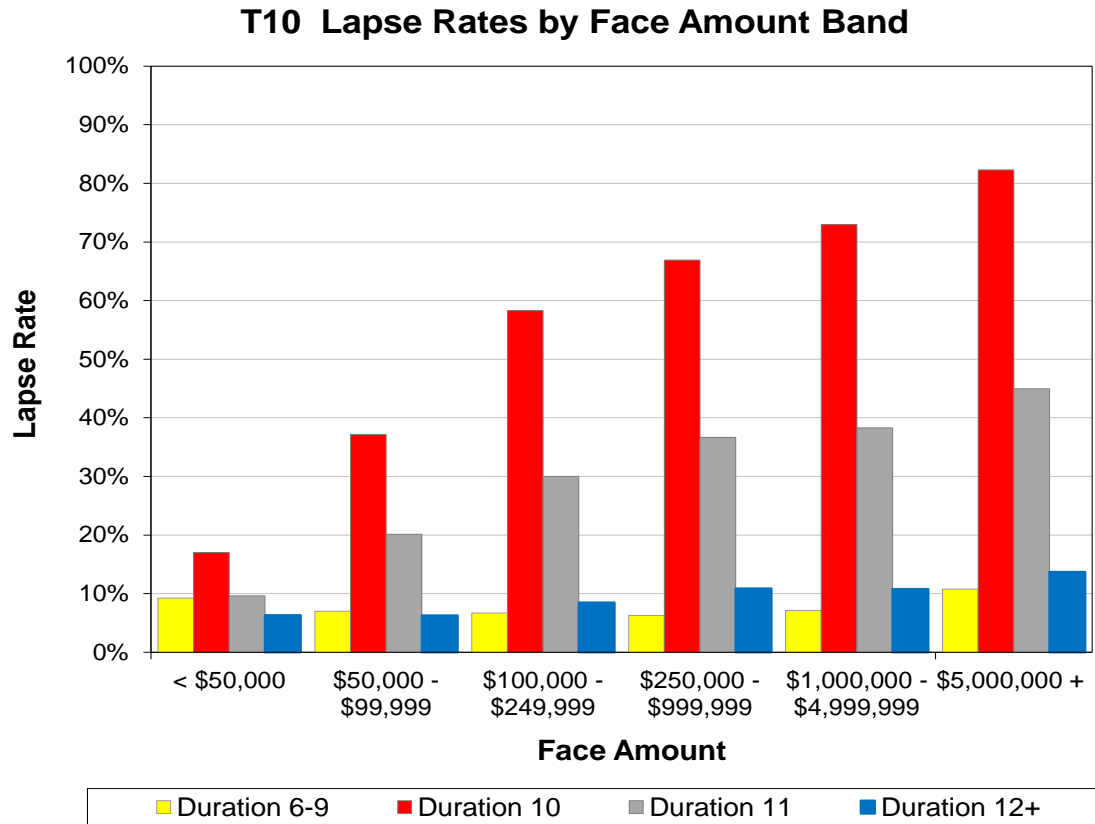
Lapse Rates by Duration & Risk Class



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results

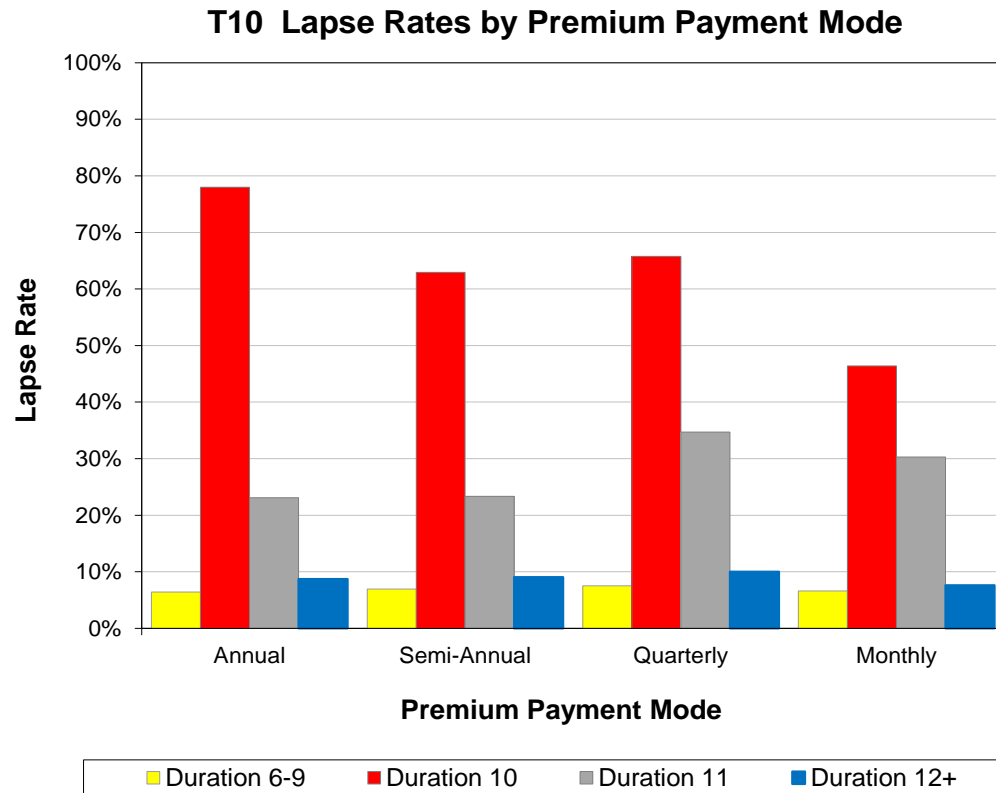
Lapse Rates by Duration & Face Amount Band



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistence/research-2014-post-level-shock.aspx>

Lapse Study Experience Results

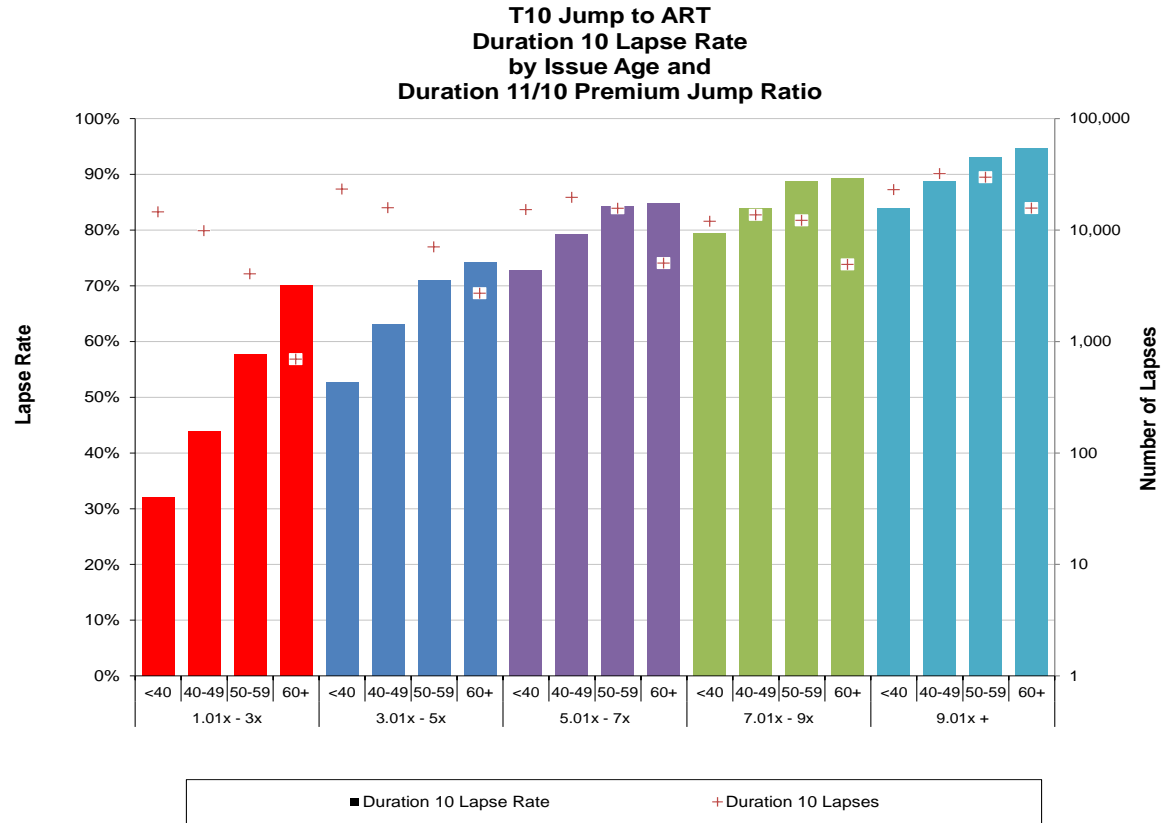
Lapse Rates by Duration & Premium Payment Mode



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results – Jump to ART

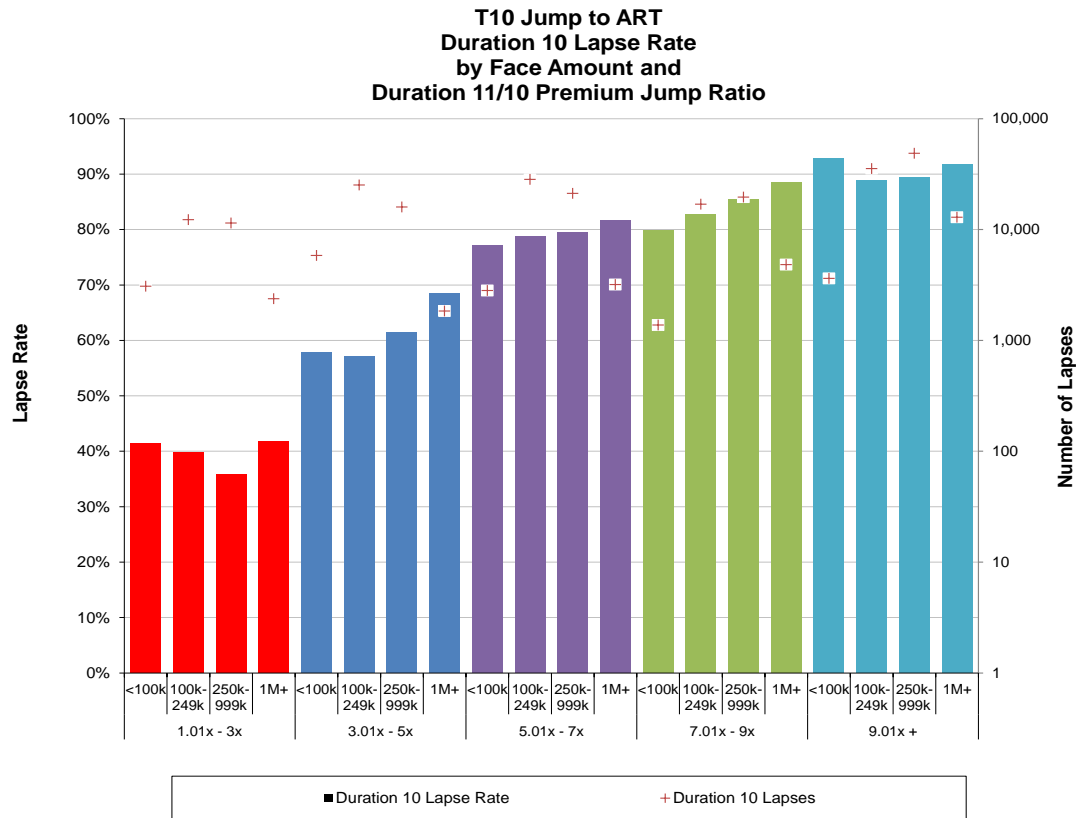
Lapse Rates (duration 10) Premium Jump and Issue age



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results – Jump to ART

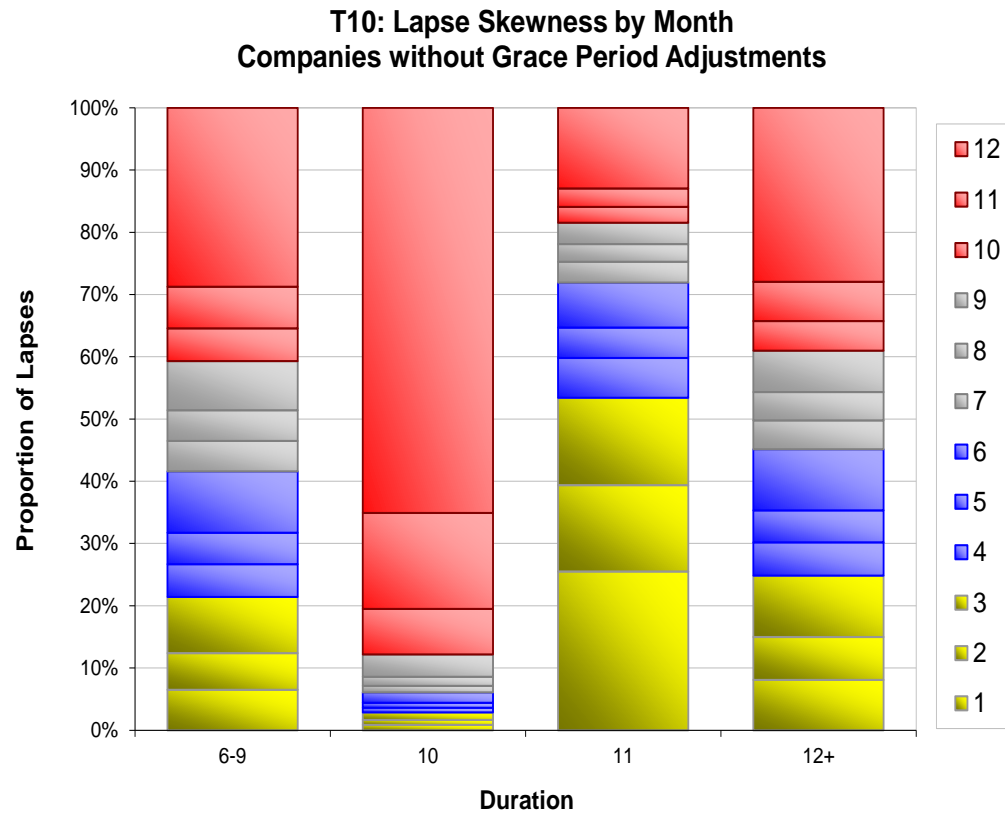
Lapse Rates (duration 10) Premium Jump and Face Amount Band



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results

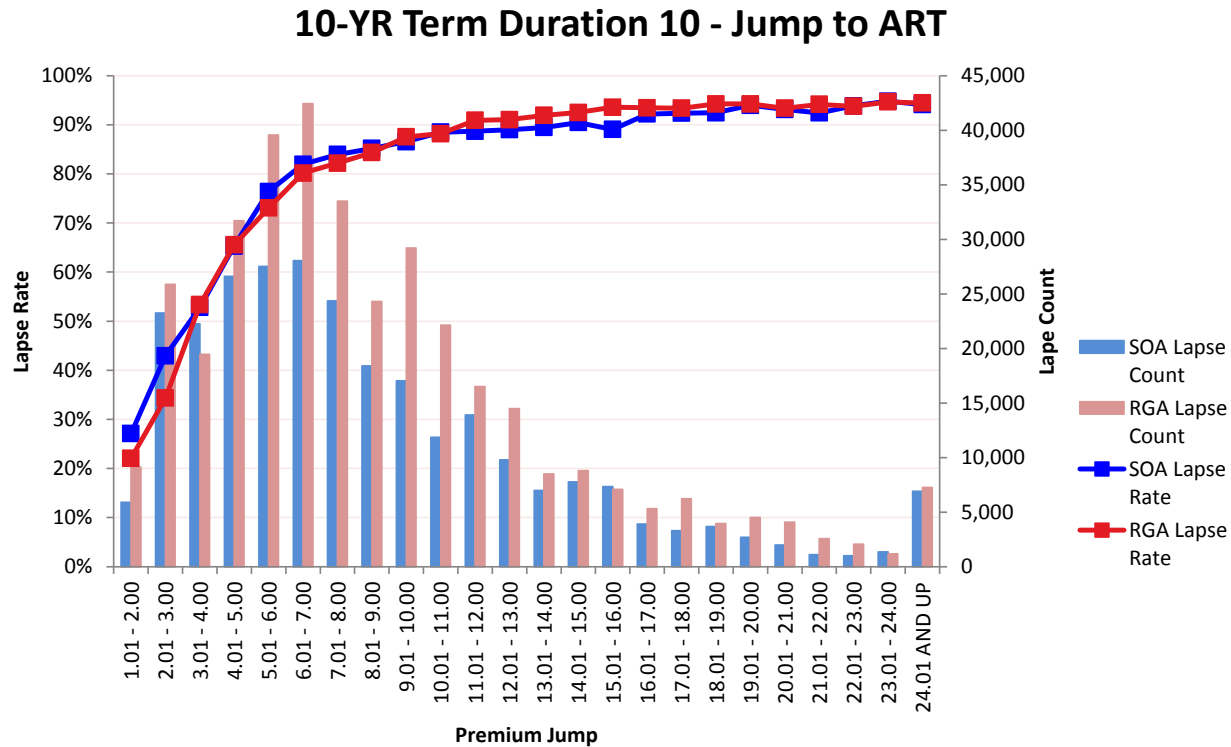
Skewness of Lapses



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Lapse Study Experience Results

Comparison of RGA to SOA



Mortality Study Experience Results

Overview

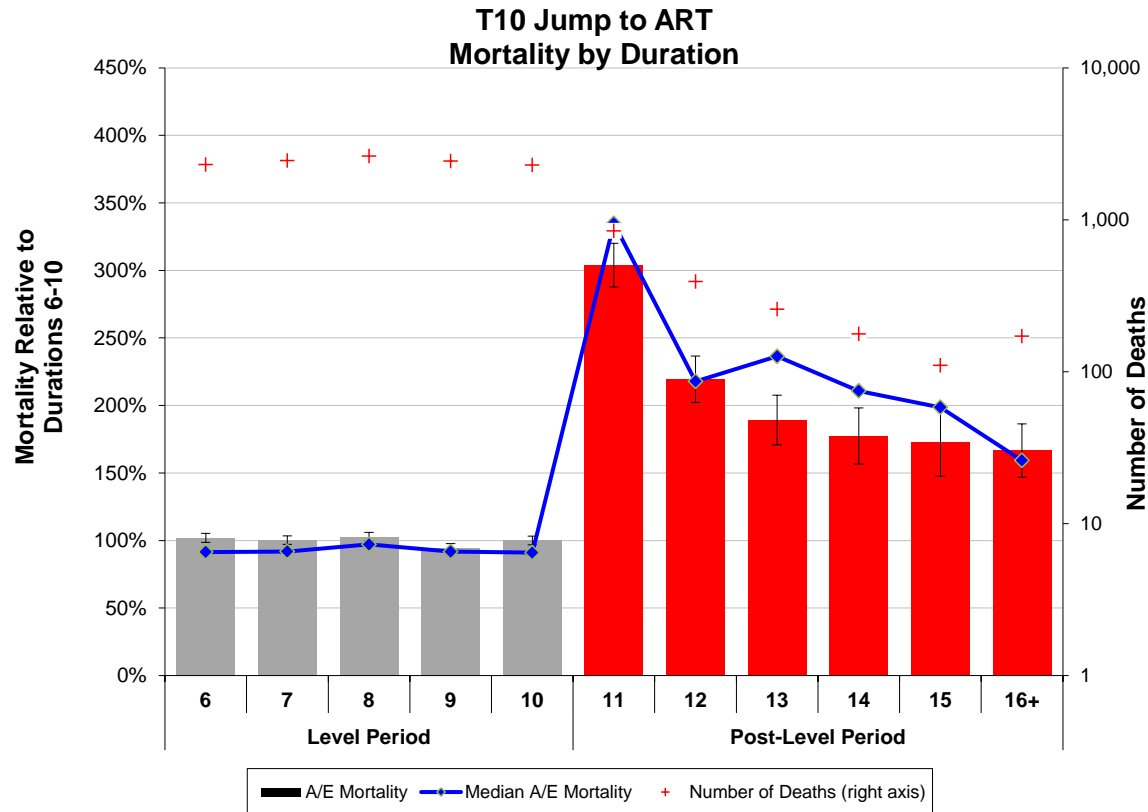
2000-2012 Calendar Year Study

		2014 Study	2010 Study	Change
10-Year Term	Number of Companies w/ Post Level Experience	36	24	150%
	Post-Level Claims with Premiums	2,651	382	694%
	Post-Level Claims without Premiums	729	381	191%
15-Year Term	Number of Companies w/ Post Level Experience	6	5	120%
	Post-Level Claims with Premiums	432	145	298%
	Post-Level Claims without Premiums	12	13	92%

Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Mortality Study Experience Results – Jump to ART

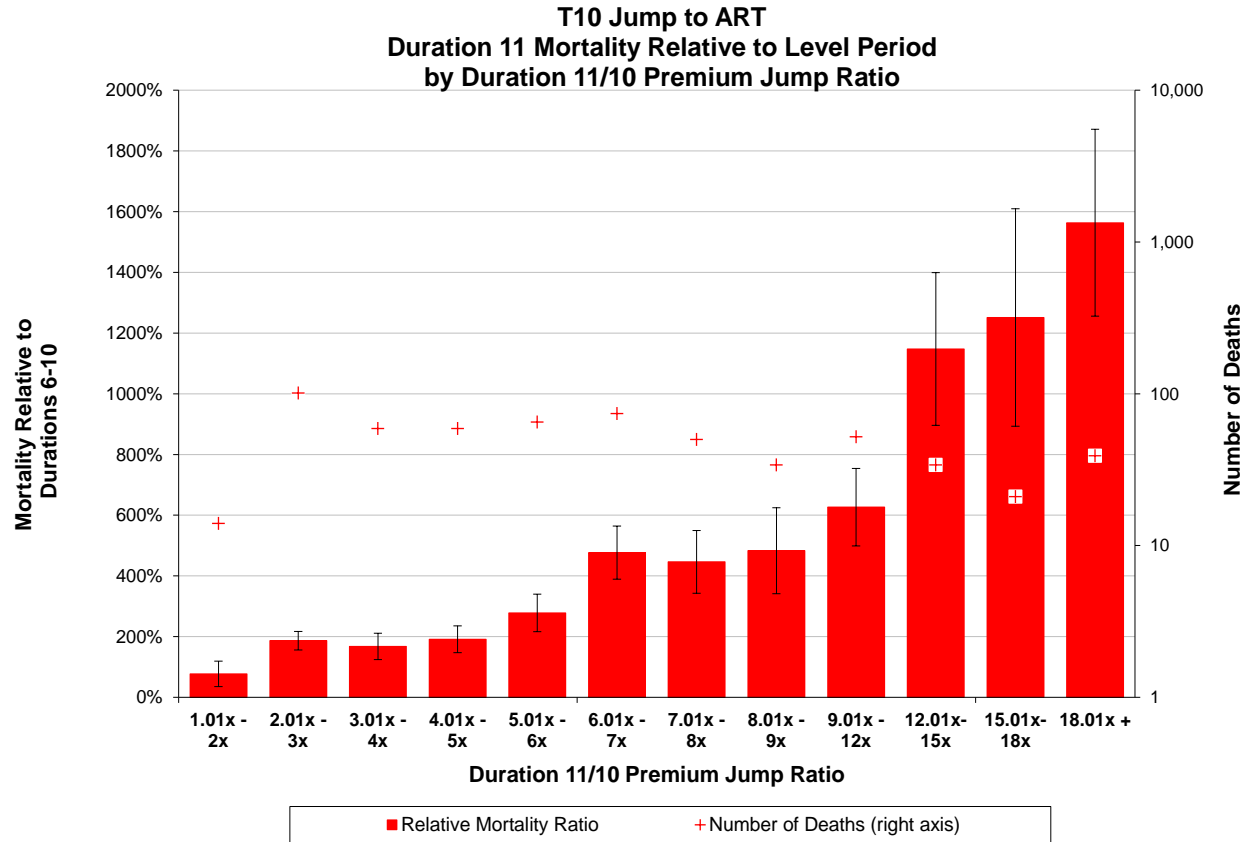
Mortality by Duration



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Mortality Study Experience Results – Jump to ART

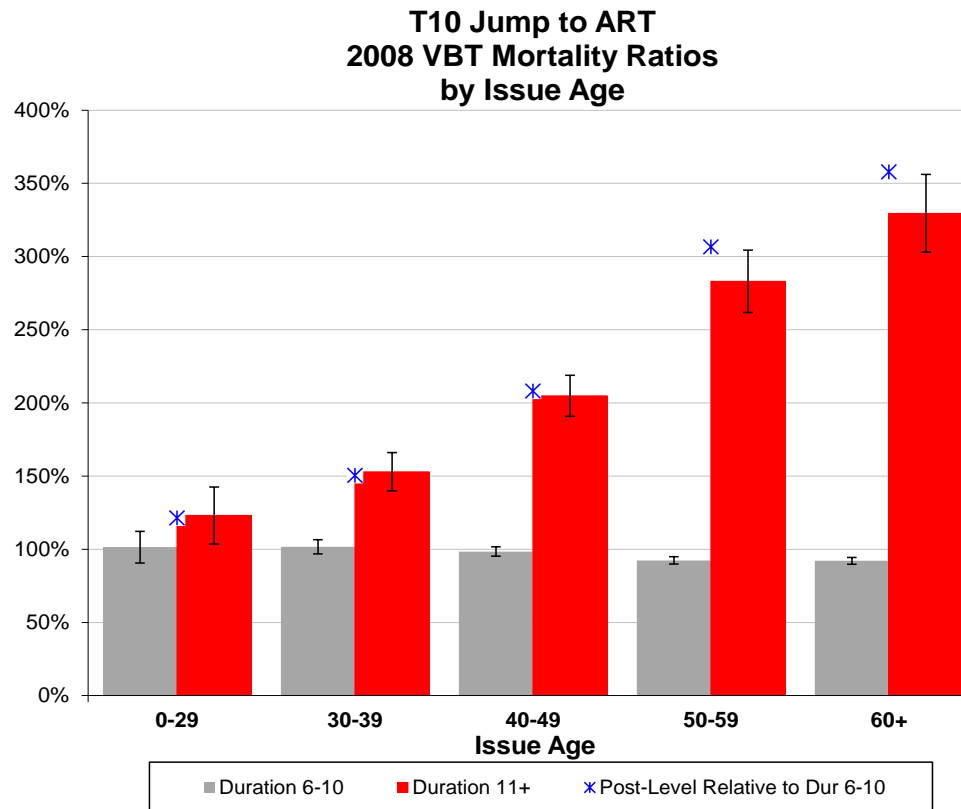
Mortality by Duration & Premium Jump



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Mortality Study Experience Results – Jump to ART

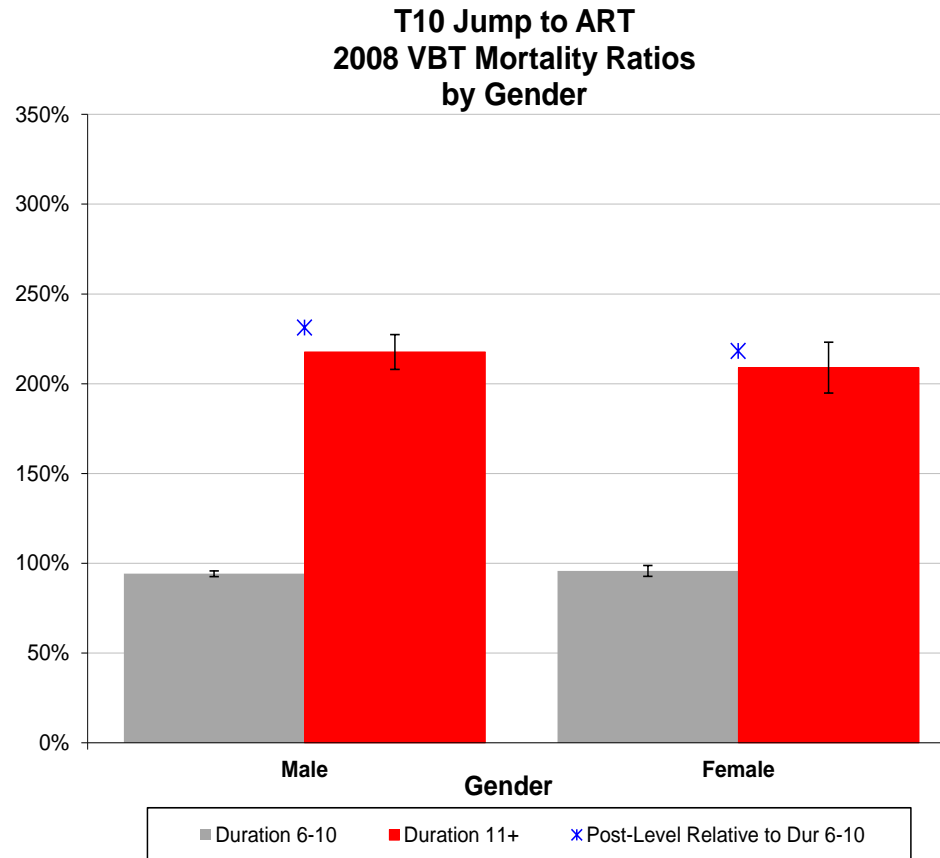
Mortality by Duration & Issue Age



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Mortality Study Experience Results – Jump to ART

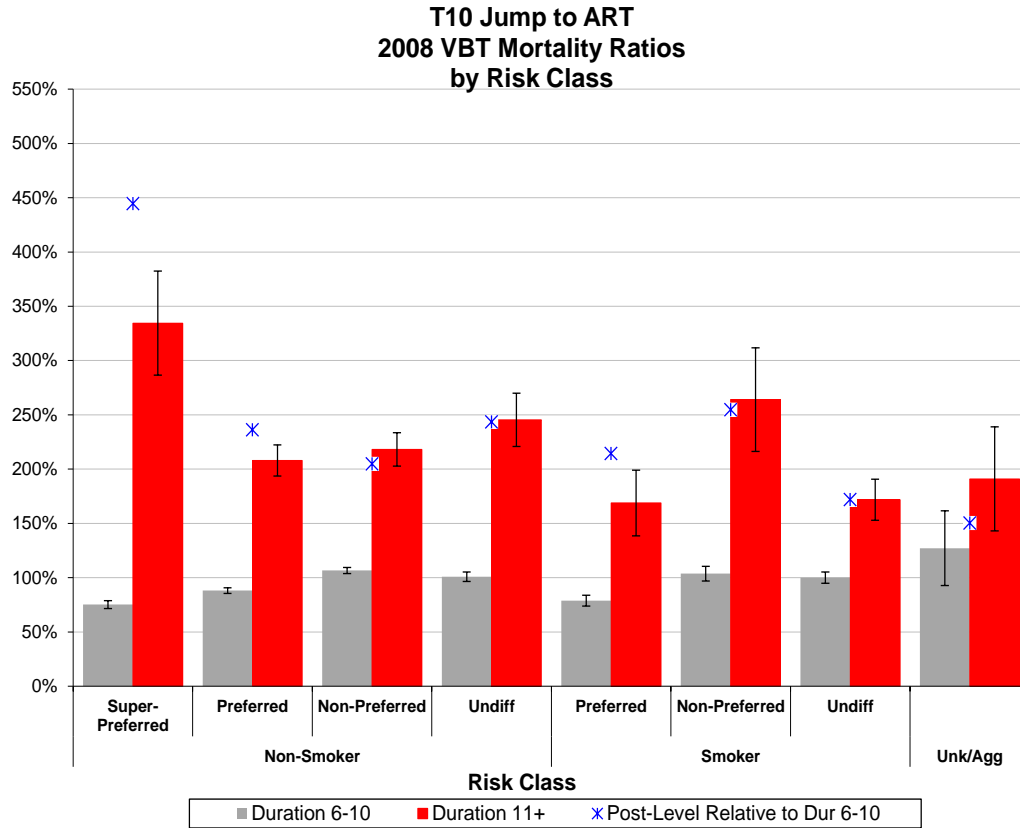
Mortality by Duration & Gender



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Mortality Study Experience Results – Jump to ART

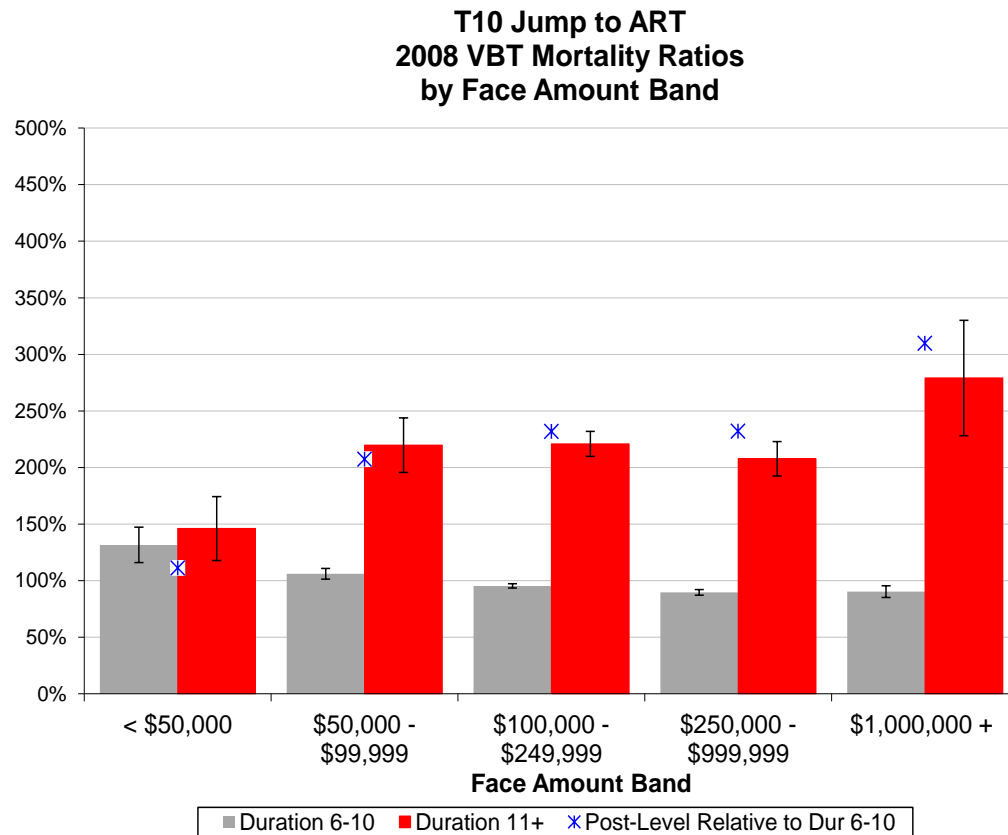
Mortality by Duration & Risk Class



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Mortality Study Experience Results – Jump to ART

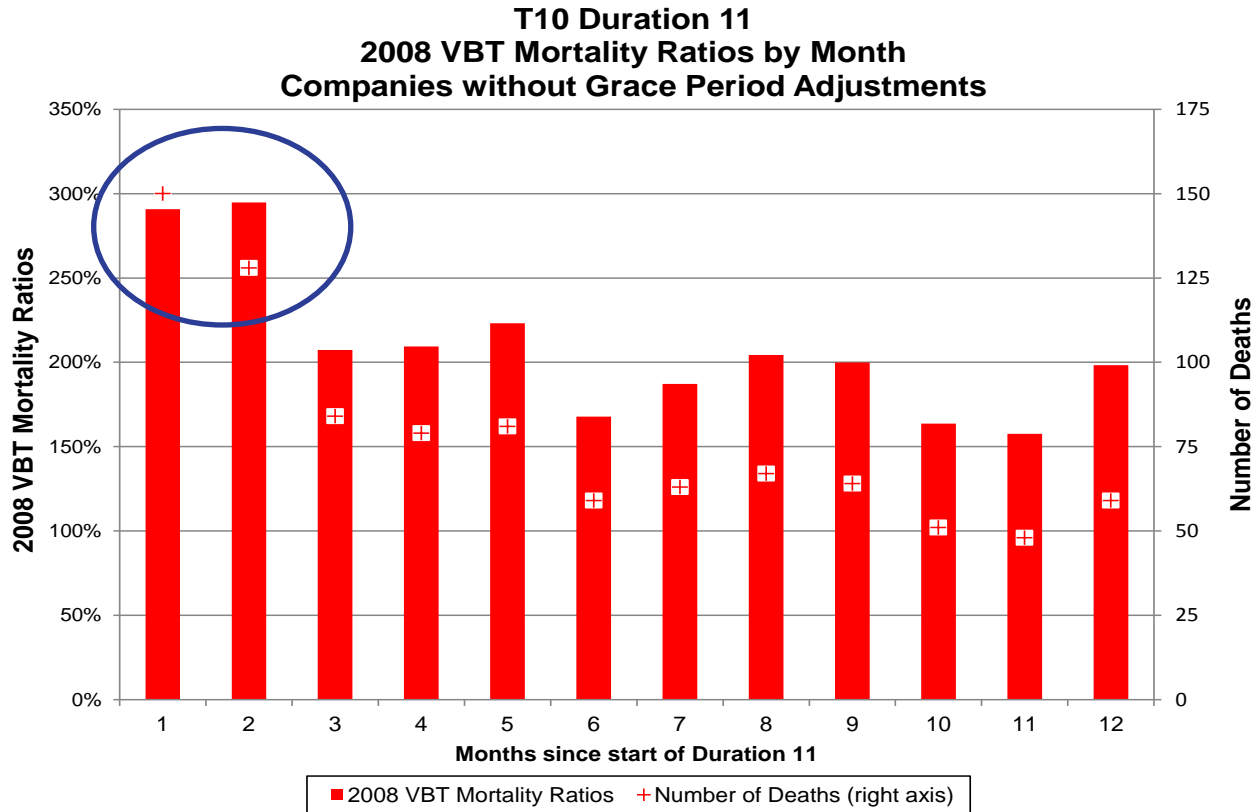
Mortality by Duration & Face Amount Band



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Mortality Study Experience Results

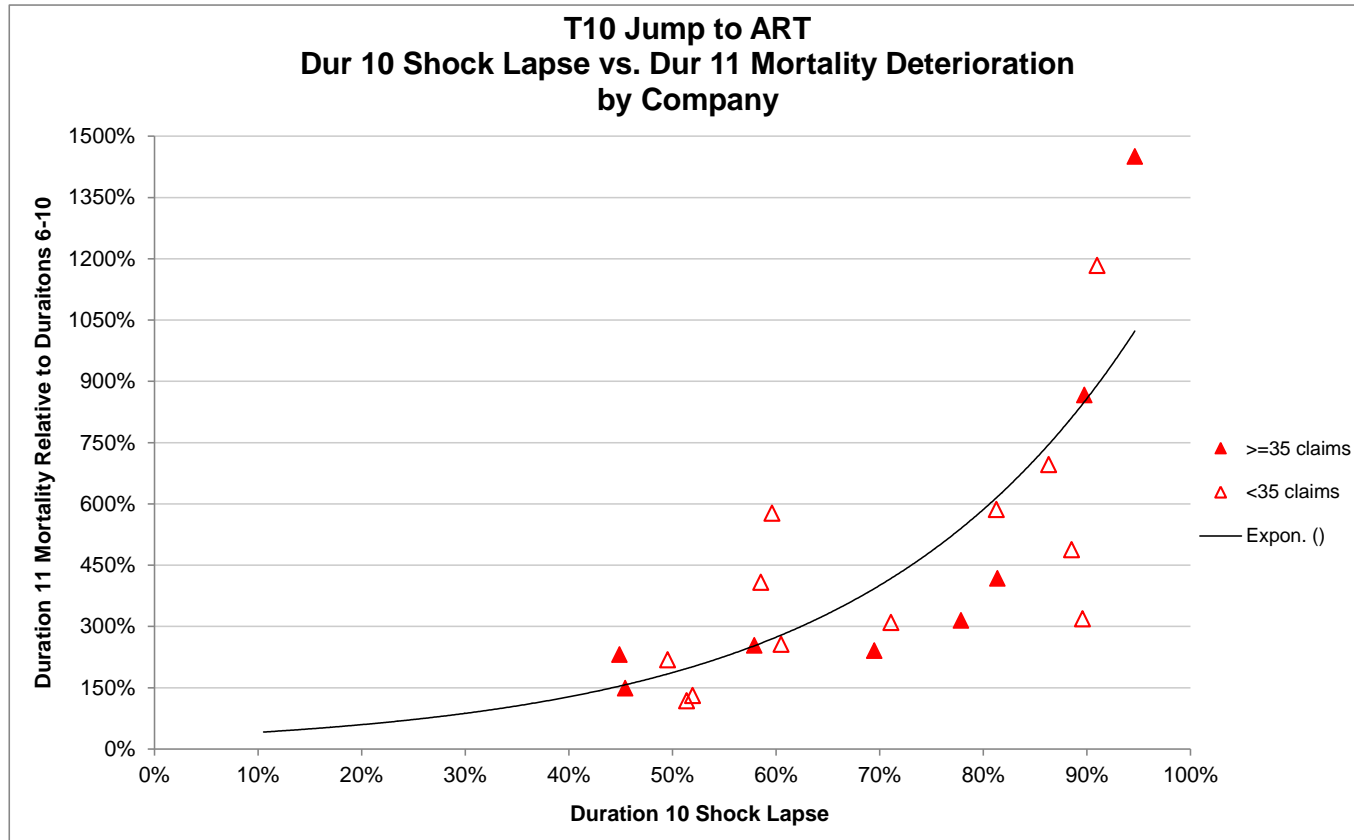
Mortality by Monthly Duration



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Mortality Study Experience Results – Jump to ART

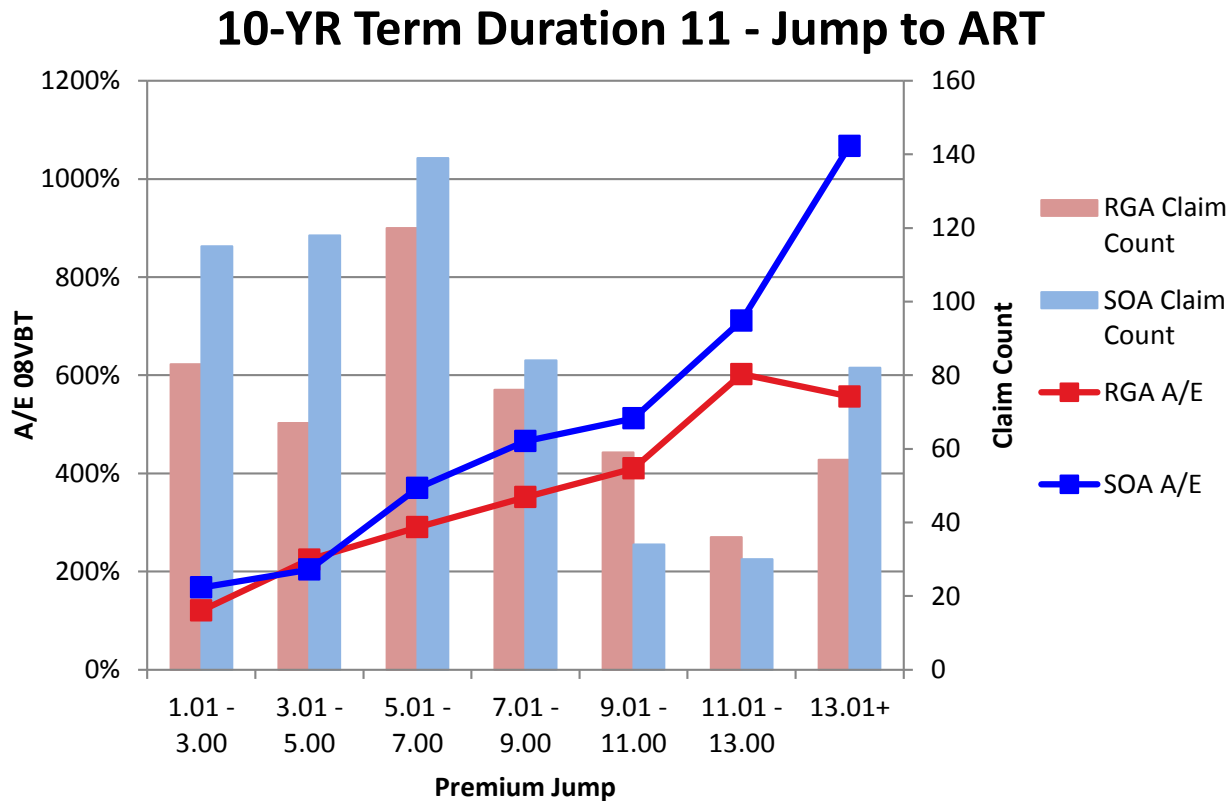
Mortality Deterioration by Shock Lapse



Source: <http://www.soa.org/Research/Experience-Study/Ind-Life/Persistency/research-2014-post-level-shock.aspx>

Mortality Study Experience Results – Jump to ART

Mortality Deterioration by Shock Lapse



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Predictive Model

Predictive Model

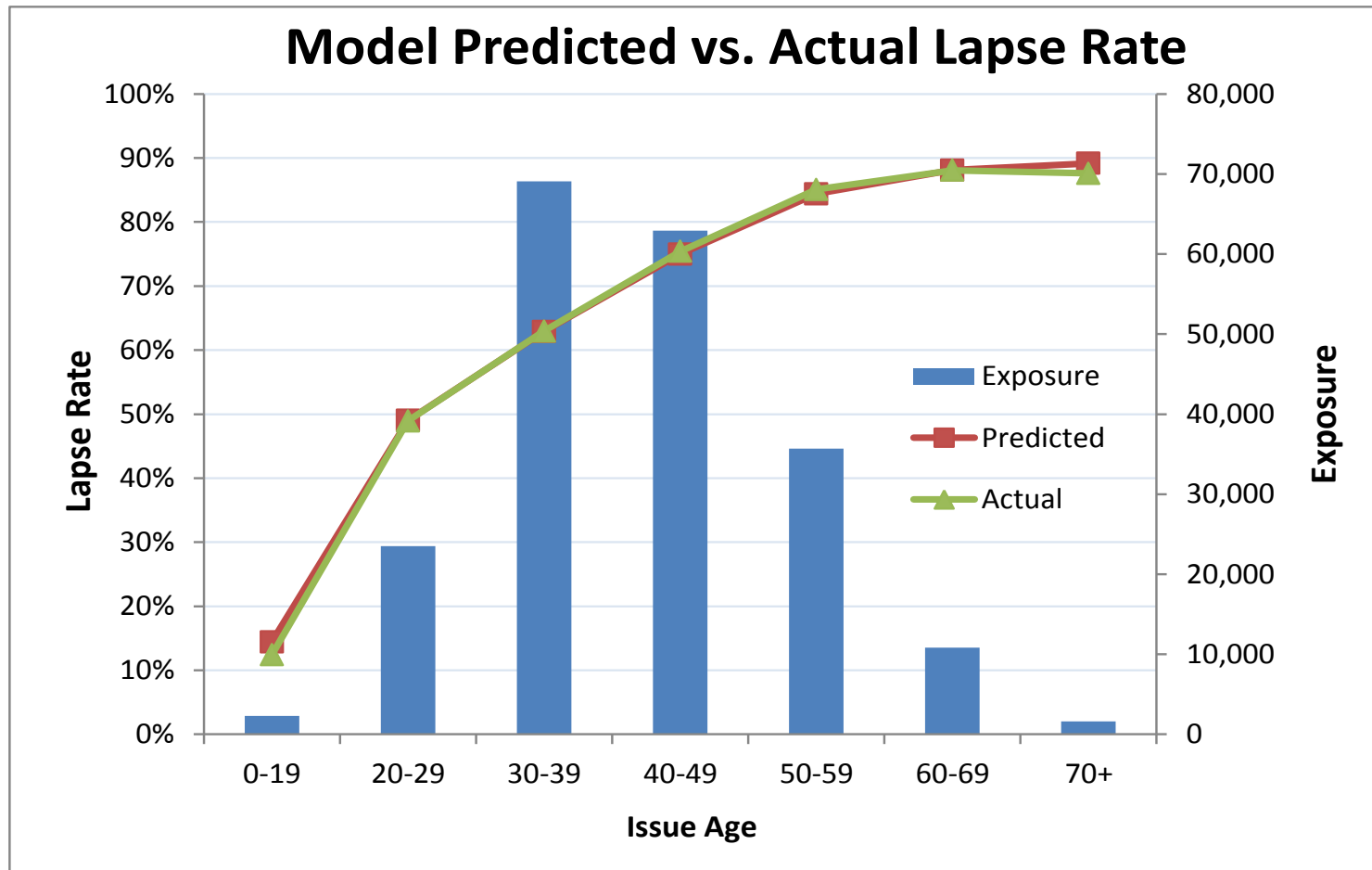
- Multivariate Lapse Rate Model – T10 Duration 10 Shock Lapse
 - Model:
 - Generalized Linear Model (GLM)
 - Target variable follows distribution in the exponential family
 - Response variable = observed lapse count
 - Follows a Poisson distribution
 - Benefits:
 - Elimination of possible bias from a uni-variate approach
 - Systematic way of controlling lapse assumption complexity
 - Transparent insight into true drivers of lapse rates
 - Distribution of target variables

Predictive Model – Model 1

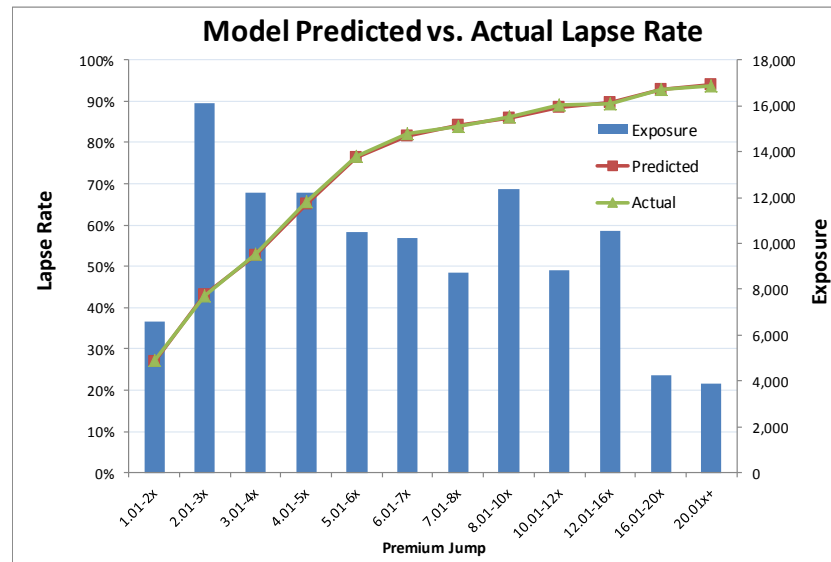
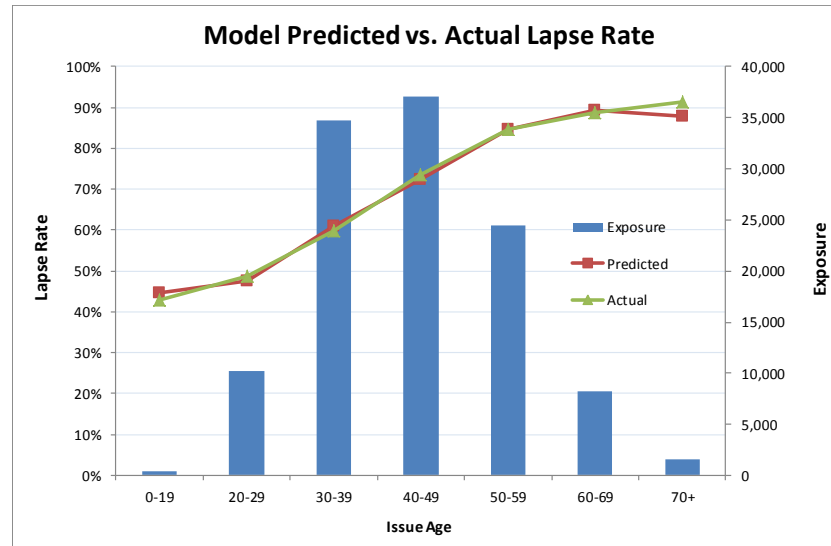
Model Parameter				
Variable	Type	Coefficient	Factor	P-Value
Intercept	-	-2.676		<2.0E-16
Issue Age	Numerical	0.0552		<2.0E-16
(Issue Age)^2	Numerical	-0.000316		<2.0E-16
Risk Class	Categorical			
Super-Pref NS		0	1.00	0
NS		-0.06736	0.93	<2e-16
SM		-0.01296	0.99	0.0339
Face Amount	Categorical			
<50K		0	1.00	0
50-100K		0.600	1.82	<2.0E-16
100K-250K		1.262	3.53	<2.0E-16
250K-1M		1.559	4.75	<2.0E-16
>1M		1.585	4.88	<2.0E-16
Premium Mode	Categorical			
Annual		0	1.00	0
Semi/Quarter		-0.1365	0.87	<2.0E-16
Monthly/BiWeekly		-0.3506	0.70	<2.0E-16
Other/Unknown		-0.08481	0.92	<2.0E-16
Cross Term	Mixed			
Issue Age:Face Amt <50		0		0
Issue Age:Face Amt 50-100K		-0.001288		0.3162
Issue Age:Face Amt 100-250K		-0.01074		<2e-16
Issue Age:Face Amt 250K-1M		-0.01653		<2e-16
Issue Age:Face Amt >1M		-0.0172		<2e-16

Validation of Results			
Data Proportion	Actual Lapse Rate	Predicted Lapse Rate	Actual / Predicted
11.3%	82.6%	82.6%	100.1%
76.9%	69.1%	68.8%	100.4%
11.8%	63.5%	63.5%	100.0%
1.2%	14.9%	17.9%	83.2%
3.9%	61.8%	62.7%	98.5%
51.9%	67.5%	67.4%	100.1%
36.9%	74.4%	73.8%	100.8%
6.1%	80.7%	80.4%	100.4%
22.9%	85.8%	85.3%	100.5%
24.5%	74.9%	75.1%	99.7%
45.4%	56.9%	56.6%	100.5%
7.2%	85.3%	84.8%	100.7%

Predictive Model – Model 1



Predictive Model – Model 2



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