

Update on Development of New Mortality Tables

Society of Actuaries & American Academy of Actuaries Joint
Project Oversight Group

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2012 Payout Annuity Mortality Table

Basic Table
Projection Scale
Margin

Progress To-Date

- Proposed 2012 basic table
- Proposed projection scale
- Proposed margins - valuation table

- Underlying experience is 2000-2004 payout annuity mortality experience

2012 Proposed Basic Table

- Created using confidence intervals at each age, through application of P-Splines for ages 65-94
- Graduated qxs from the data for males and females with confidence intervals
 - Method used provided a 95% confidence interval of graduation
 - For ages 65-95, qxs generally range between 99-101% of the best estimate
- Younger ages
 - For ages 1-50, used 1994 GAM projected with Scale AA to 2002
 - For age 0, used 4 times age 1 rate

2012 Proposed Basic Table

- Ages 51 through 64, graded from 1994 GAM q_x to experience q_x at age 65
- Older ages
 - For ages 96+, use Kinnisto extension
 - Cap mortality at 400 per 1,000
 - Cap comes in at 106 for males, 107 for females after improvement / projection from mid-point (2002) to 2012

Improvement and Future Projection

- Analyzed various sources of mortality improvement
 - Historical versus future projection
 - Social Security Administration 2010 Trustee's Report (preliminary)
 - Canadian Institute of Actuaries September 2010 Report
 - Human Mortality Data Base
 - Center for Disease Control (CDC)
 - Towers Watson research on mortality improvement
- Improvement and dis-improvement from year to year
 - 2004 and 2006 showed high improvement for most ages whereas 2003 showed dis-improvement
- SSA actual reported through 2006

Improvement and Future Projection

- Projections from 2002-2006 (4 years)
 - Based on actual average population improvement (based on SSA data)
 - Distinct male and female improvement factors
 - Not floored at 0%, resulting in slight dis-improvement at select ages
- Projections for 2007 to 2012 (6 years)
 - Starting point is average SSA projected improvement for 2012 to 2022, male and female distinct
 - Based upon clarification of approach from discussions with SSA actuaries and supported by various research and emerging experience, SSA improvement for ages 65+ thought to be too conservative (low)
 - Therefore, added additional improvement level of 0.4% for ages 65 to 82 and 0.2% for ages 87+. Graded from 0.4% to 0.2% between ages 82 and 87
 - Add-on is the same for males and females

Improvement and Future Projection

- Graded improvement to zero at age 105
- Ultimate projections (2002 to 2012) then smoothed

2002 to 2012 Improvement Rates		
Age	Male	Female
0	1.0%	1.0%
50	1.0%	1.0%
60	1.5%	1.3%
80	1.5%	1.3%
90	0.7%	0.6%
100	0.2%	0.2%
105	0.0%	0.0%

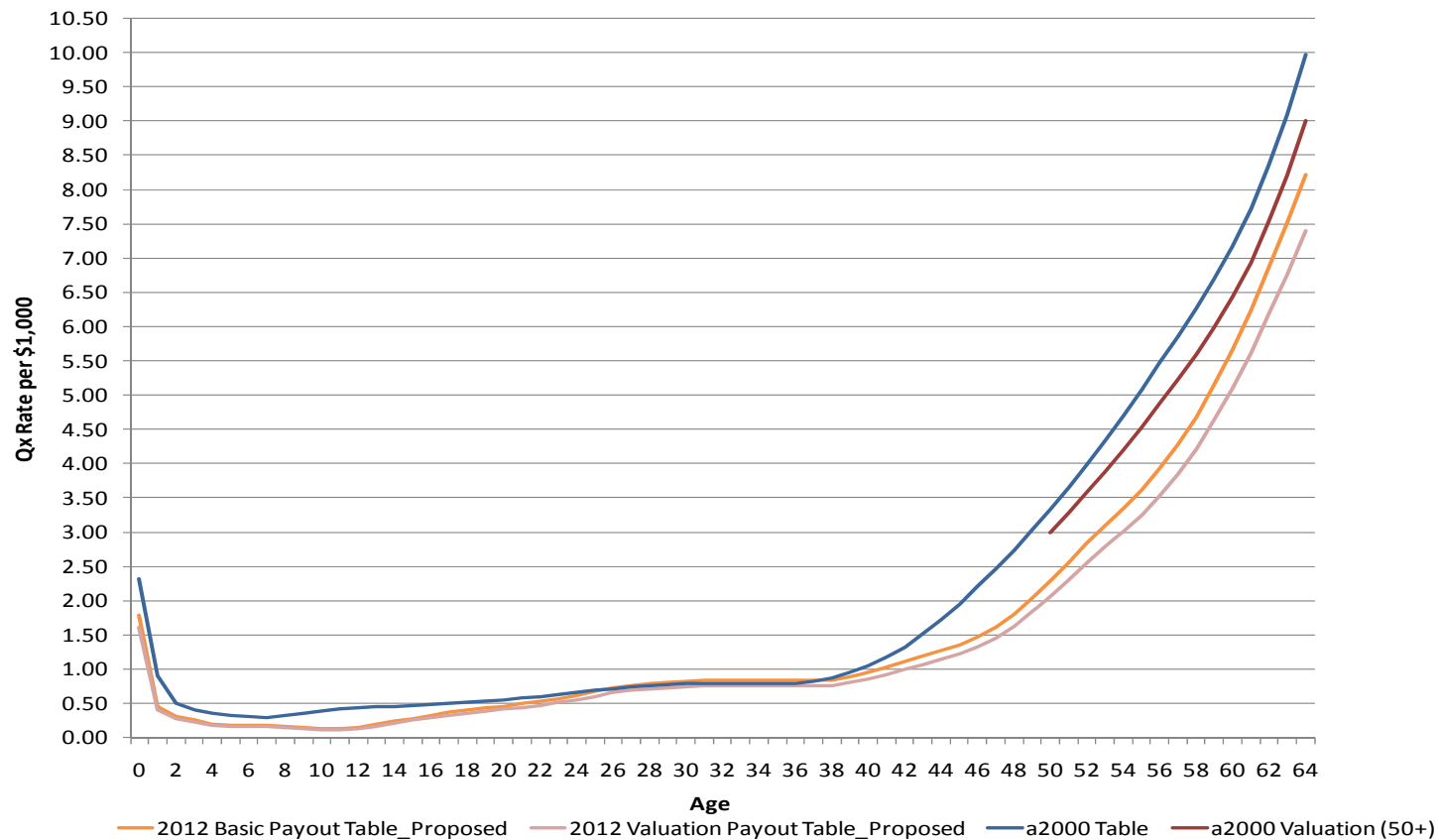
Improvement and Future Projection

- Projection scale for 2012 and beyond
 - For each age, project using same improvement factor for all years in the projection
 - No limit in terms of number of years projection applies
 - Naming of projection scale still under discussion
 - Scale G2 suggested since replacing Scale G

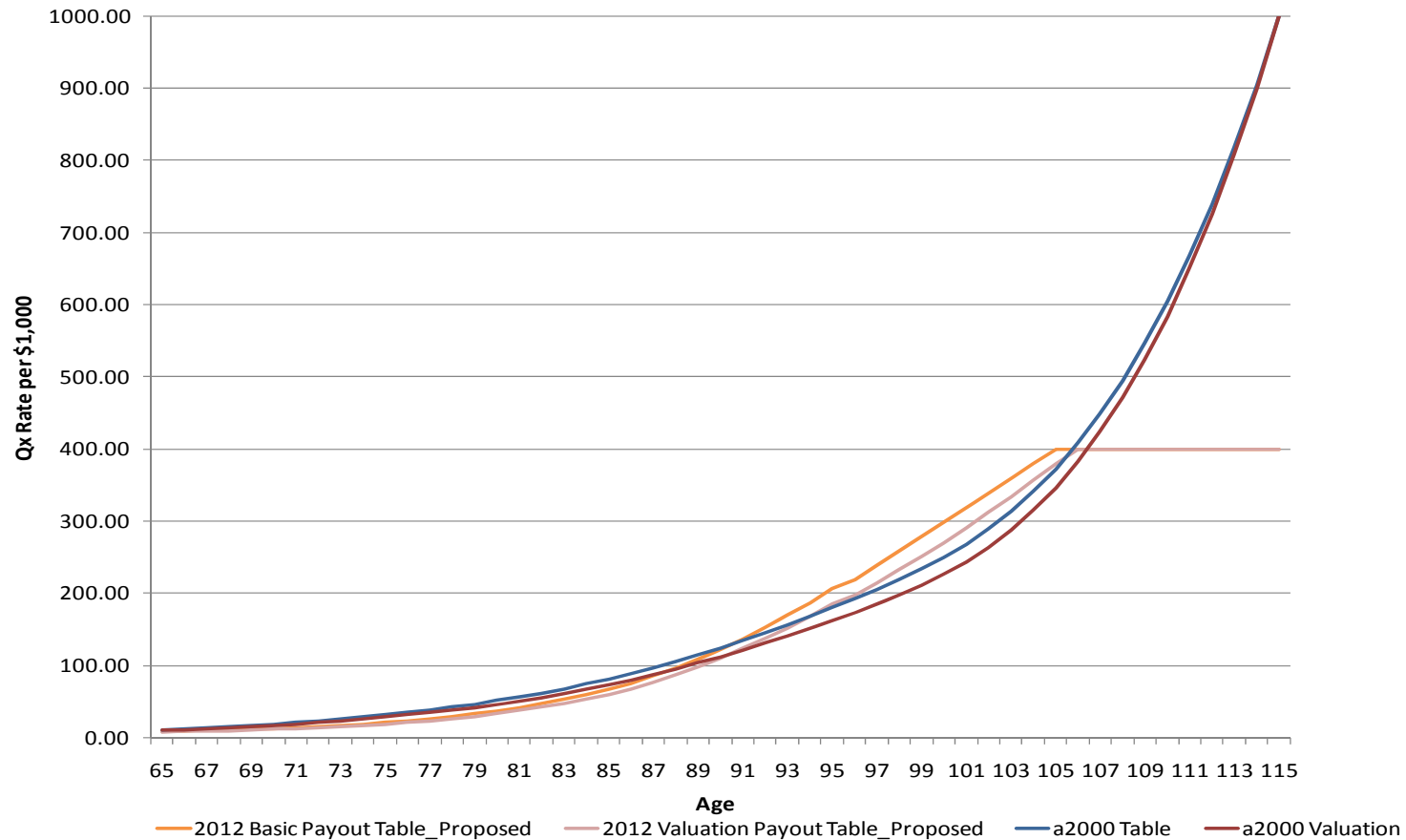
Margins – Valuation Table

- Proposing to use similar margins to those in a2000 table
- Have maintained cap mortality rate at 0.400 rather than grading to 1.000 at age 120
- Margin =
 - 10% to age 100
 - Grades down 1% per year at ages beyond 100 until ultimate mortality cap of 0.400 is invoked
 - Results in zero margin beginning at age 106 for males and 108 for females
- Table ends at age 120 with $q_x = 0.400$

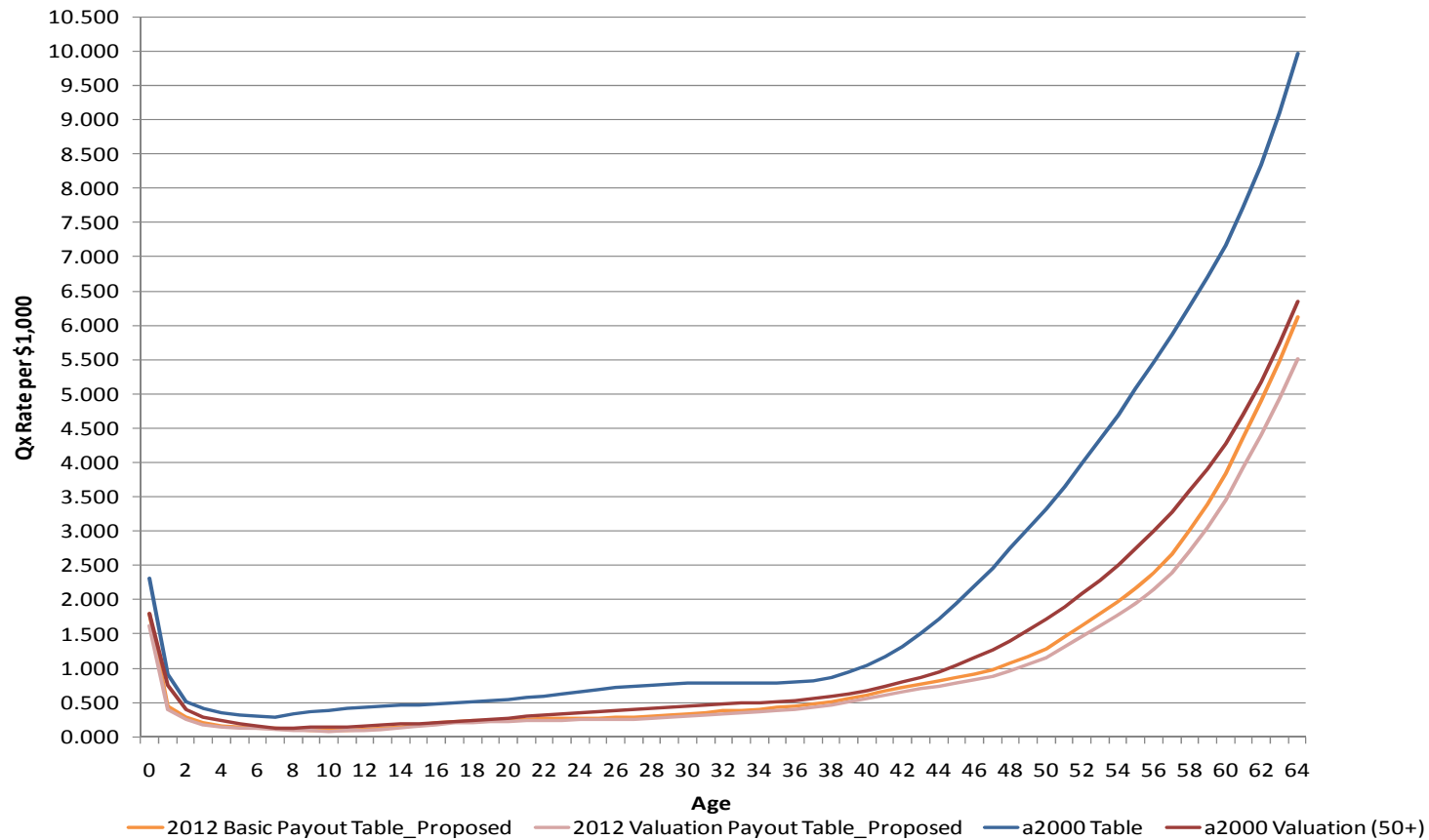
Mortality rate per 1,000 Comparison Proposed 2012 Table to a2000 Table Male risks, ages 0-64



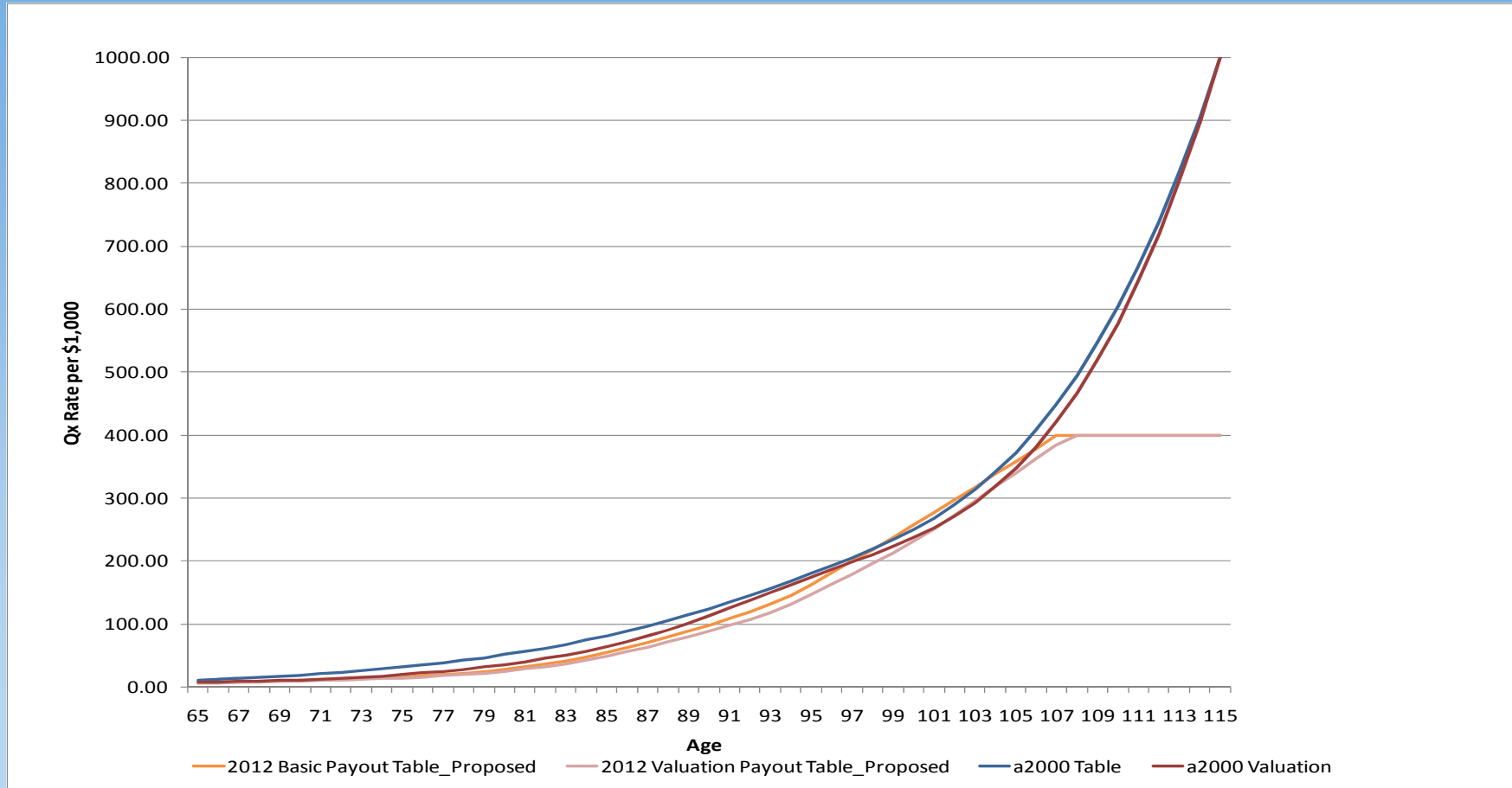
Mortality rate per 1,000 Comparison Proposed 2012 Table to a2000 Table Male risks, ages 65-115



Mortality rate per 1,000 Comparison Proposed 2012 Table to a2000 Table Female risks, ages 0-64



Mortality rate per 1,000 Comparison Proposed 2012 Table to a2000 Table Female risks, ages 65-115



Sample Reserve Calculations Using Proposed Table

- Prepared sample reserve calculations using 5% interest and proposed mortality and compared to reserves using a2000 table

– Compared initial reserves and reserves 10 years after issue for select ages

		Initial Reserves per \$1,000 @ 5% Interest			Percentage Increase		
		a2000	2012 w/o Improvement	2012 with Improvement	2012 w/o Improvement	Adding Improvement	Total 2012
Life Annuity at Age 65	Male	11.60	12.37	12.76	6.6%	3.1%	9.9%
	Female	12.62	13.00	13.32	3.0%	2.4%	5.5%
Life Annuity at Age 75	Male	8.50	9.20	9.45	8.3%	2.7%	11.2%
	Female	9.41	9.95	10.16	5.7%	2.1%	8.0%
Life Annuity at Age 85	Male	5.50	5.63	5.72	2.3%	1.6%	3.9%
	Female	5.91	6.29	6.37	6.4%	1.3%	7.7%
Age 50 deferred to 80	Male	1.05	1.27	1.57	21.3%	23.4%	49.6%
	Female	1.36	1.51	1.75	11.0%	16.5%	29.3%
Age 60 deferred to 80	Male	1.78	2.14	2.46	19.8%	15.4%	38.2%
	Female	2.26	2.50	2.78	10.5%	11.1%	22.7%

		Reserves per \$1,000 10 Years After Issue @ 5%			Percentage Increase		
		a2000	2012 w/o Improvement	2012 with Improvement	2012 w/o Improvement	Adding Improvement	Total 2012
Life Annuity at Age 65	Male	8.50	9.20	9.79	8.3%	6.4%	15.2%
	Female	9.41	9.95	10.43	5.7%	4.8%	10.8%
Life Annuity at Age 75	Male	5.50	5.63	5.95	2.3%	5.7%	8.1%
	Female	5.91	6.29	6.57	6.4%	4.4%	11.1%
Life Annuity at Age 85	Male	3.21	2.82	2.92	-12.1%	3.5%	- 9.0%
	Female	3.32	3.30	3.39	- 0.6%	2.8%	2.2%
Age 50 deferred to 80	Male	1.78	2.14	2.63	19.8%	23.1%	47.5%
	Female	2.26	2.50	2.91	10.5%	16.4%	28.6%
Age 60 deferred to 80	Male	3.21	3.76	4.31	17.0%	14.7%	34.3%
	Female	3.92	4.32	4.78	10.1%	10.6%	21.8%

Validation of Proposed Table

- Back-tested proposed basic table to underlying 2000-2004 experience
- Overall fit was quite good at core ages (65 to 95) and somewhat less at other ages, where we used different data

Comparison of Recommended Basic Table (Adjusted to 2002) To the 2000-04 Experience

Attained Age Group	Male A/E Ratio	Female A/E Ratio
60-64	111%	112%
65-69	100%	103%
70-74	100%	102%
75-79	100%	99%
80-84	100%	100%
85-89	100%	102%
90-94	101%	100%
95-99	107%	105%

Age Groups 60-64 & 95-99 Not Used in Table Development

Validation of Proposed Table

- Tested proposed basic table to preliminary 2005-2008 experience
- Overall fit was fairly good at core ages (65 to 95)
- Committee felt preliminary 2005-2008 experience data does not suggest need to withhold introduction of proposed 2012 table

Comparison of Recommended Basic Table (Adjusted to January 1, 2007) To the 2005-2008 Experience

Attained Age Group	Male A/E Ratio	Female A/E Ratio
60-64	110%	129%
65-69	94%	99%
70-74	105%	99%
75-79	102%	103%
80-84	104%	98%
85-89	102%	96%
90-94	107%	105%
95-99	99%	107%

Age Groups 60-64 & 95-99 Not Used in Table Development

Next Steps

- LATF discussion and approval to expose proposed 2012 basic table, projection scale G2 (name?) and margin
- Finalize corresponding written report

Guaranteed Issue/Simplified Issue Mortality Update



Status of Industry Studies

- Data call developed
- Data call out week of March 21
- Data submissions requested by end of July
- Approximately 4 months behind originally targeted schedule
 - Data cleansing/analysis late 2011/2012
 - First draft of tables late 2012
- Desire to coordinate with VBT limited underwriting data



2014 VBT / CSO

Current Status

- Limited progress since last meeting
- Committee re-grouped this week, with several subgroups formed
- Will continue to be based on 2002-2007 experience data
 - Validation against 2008-2009 experience, once ready
- Initial focus will be on base / aggregate table
- Analysis on UCT / preferred criteria not expected to be completed until late 2011