A5: Low Interest Environment and Year end Projections

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And
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Smaller Insurance Company Section

- Deals with unique concerns of smallcos
- Need for public experience information
- Saving costs
- Low Interest Team: year long focus on aspects of this
- Timely distribution of information (blast mails, webinars, etc.)
Low Interest Environment and Year End Projections

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The Actuarial Opinion and Memorandum Regulation

- First applied in 1992
- The standard was New York 7 scenarios including level, 3 up, 3 down
- 3 month Treasury was 3.29%
- 5 year Treasury was 6.08%
- 30 year Treasury was 7.44%
- Up and down 3% was reasonable
New York 7 scenarios including level, 3 up, 3 down are often used.

- 3 month Treasury was 0.01%.
- 5 year Treasury was 0.89%.
- 30 year Treasury was 2.98%.

Up and down 3% is not reasonable.
How Did We Get to This?

• From 1992 to 2011, interest rates have drifted down
• Since 2001, appointed actuaries have had more freedom to select scenarios
• The concepts of the NY 7 are still widely used and understood in spite of these changes
• Jim will say more about this later
History of Interest Rates

Data Used in Chart:
- Foreign loan made to U.S. government: 1790, 1792, 1794
- Average foreign loans made to U.S. government: 1791
- Federal government bonds: 1798-1820, 1860-1
- Federal government average new issue: 1841
- Federal government average market yield: 1842-8

Note: 1821 - U.S. debt insignificant, 1833 - no federal debt at all

- Highest grade corporates (RR): 1862 4, 1895-98.
- 30-year prime corporates: 1950-1978
- Interpolated: 1793, 1795-7, 1822, 1828, 1829, 1831.
Lessons from History

- Rates rise and fall in long periods that last about a generation
- History repeats but in not quite the same way
- Rates have fallen for so long that we might expect rising rates within a decade
- Rates will likely rise for a long time
What is the actuarial issue here?

• For the appointed actuary, ASOP 22 is the controlling guidance
• ASOP No. 22 discusses the need to test moderately adverse conditions, as "Conditions that include one or more unfavorable, but not extreme, events that have a reasonable probability of occurring during the testing period" (ASOP No. 22, section 2.15).
The Actuarial Conundrum

• Which scenarios are extreme and thus not moderately adverse?
• Which scenarios are adverse and have a reasonable probability of occurring in the testing period?
• How long is the testing period? This depends on the product mix. It might be short or up to 50 years.
When were rates last this low?

- Rate history from FRED2
  - [http://research.stlouisfed.org/fred2/](http://research.stlouisfed.org/fred2/)
- Go to Money Banking and Finance,
- Then Interest Rates, Treasury Bills,
- Series TB3MS from 1934
3 Month Treasuries from 1934
Three-month T Bills at market

0.15% in summer 1934
0.04% November 1938 = July 2011
Not 1.00% until February 1948
2.09% by December 1952
3.21% by December 1956
4.04% by September 1959
5.37% by September 1966
Conclusion from these rates

- In the Great Depression, 3-month rates took a full 10 years to recover to even 1.00%.
- That is 9 years from 1929 to the low point, and 10 years to rise back to 1%
- The last time rates were as low as 2011, that is what happened.
- History often repeats differently.
More Rate History from FRED2

• [http://research.stlouisfed.org/fred2/](http://research.stlouisfed.org/fred2/)
• Go to Money Banking and Finance,
• Then Interest Rates,
• Then Treasury Constant Maturity,
• Series GS3M, GS1, GS5, GS10, GS30 to see monthly average CMT rates
1 & 10 Year Treasuries: 1973 - 1992

[Graph showing the fluctuation of 1 & 10 Year Treasuries from 1972 to 1992]
1 & 10 Year Treasuries: 1993 - 2011
What are Normal Interest Rates?

• Normal depends on your time frame for projections.
• Here are two examples:
• For a 5-year projection, use the last 5 years as a baseline
• For a 40 year projection, consider the 40 year history from 1938.
What are moderately adverse scenarios, given the history?

- Jim will talk about our survey of valuation actuaries.
- Actuaries will want to decide what is extreme, and what is moderately adverse, given the history we saw.
"When forming an opinion, the actuary should consider whether the reserves and other liabilities being tested are adequate under moderately adverse conditions, in light of the assets supporting such reserves and other liabilities. To hold reserves or other liabilities so great as to withstand any conceivable circumstances, no matter how adverse, would usually imply an excessive level of reserves and liabilities."
Free Web Sources of Data
From SmallCo SOA Section

http://www.federalreserve.gov/econresdata/releases/statisticsdata.htm
http://online.wsj.com/mdc/public/page/marketsdata.html
Free Web Sources of Data
From SmallCo SOA Section

www.marketwatch.com
www.bloomberg.com

There are many others.
Thanks for your attention.

Jim Thompson will speak next.
Survey by Mark Rowley in Dec. 8 Webinar

- Is NY1 moderately adverse and thus must be passed?
  - All: Yes / No 67 / 12
  - Only appointed (45 / 28)
Survey (continued)

- Do you believe your regulator / auditor will consider NY1 moderately adverse?
  - All Yes / No (75 / 11)
  - Appointed only: (64 / 16)
Survey (continued)

- In your opinion, is an interest rate scenario with low interest for 10 years moderately adverse?
  - All Yes / No (81 / 9)
California Halloween Letter

- Give details of any mean reversion
- Discuss sensitivity testing on mean reversion, if done
- Discuss criteria for determining asset adequacy, including “moderately adverse conditions”
December 5 2011
- Pp 5-6: Sec. 4 – Clarification of Interest Rate Scenarios
- Baseline NY7 NOT normalized
- Can do additional scenarios
Sec. 6 Calls/Prepayments: justification should reflect comparison of actual prior to expected
Sec. 7 Defaults: include justification of future rating migration
Yield pick up now at 125 bp, formerly 100 bp
Sec. 9: special sensitivity test; 500 bp pop up
Sec. 1 – Assumptions: para. 4: Regardless of premium pay’t history, flex contracts must perform appropriate tests assuming additional premiums in decreasing scenarios to test guarantees.
Illinois Halloween Letter

- Page 3: concerns RAAIS: nothing specific mentioned
Surprise !!

- When I compared the 2011 letter with 2010 and earlier, I saw no change except
- NY Defaults: yield pick-up up to 125 bp and 500 bp pop up
  - States had already staked out their positions
- Did you pay extra attention to any of these provisions?
Constructing a Mean Reversion Scenario

- Flat how long? 10 years
- Gradation? 10 years?
- Ultimate Level: Over what interval?
<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>GS3M</th>
<th>GS6M</th>
<th>GS1</th>
<th>GS3</th>
<th>GS5</th>
<th>GS7</th>
<th>GS10</th>
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<td>Apr-53</td>
<td>Dec-61</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.79%</td>
<td>3.16%</td>
<td>3.30%</td>
<td>0.00%</td>
<td>3.41%</td>
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<tr>
<td>Jan-62</td>
<td>Dec-71</td>
<td>0.00%</td>
<td>0.00%</td>
<td>4.91%</td>
<td>5.13%</td>
<td>5.21%</td>
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<td>Jan-72</td>
<td>Dec-81</td>
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<td>0.00%</td>
<td>8.50%</td>
<td>8.54%</td>
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<tr>
<td>Jan-82</td>
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<td>7.83%</td>
<td>8.15%</td>
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<td>9.15%</td>
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<td>9.62%</td>
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<td>Jan-92</td>
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<td>5.82%</td>
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<tr>
<td>Jan-02</td>
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<td>1.86%</td>
<td>2.01%</td>
<td>2.13%</td>
<td>2.69%</td>
<td>3.23%</td>
<td>3.62%</td>
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**Twenty Year Averages**

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<td>GS6M</td>
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<td>GS3</td>
<td>GS5</td>
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<td>Jan-92</td>
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<td>4.84%</td>
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**NOTE:** first interval has 225 months, not 240 except for GS7 which has 30 months
# Thirty Year Averages

<table>
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<th>Period</th>
<th>Jan-82</th>
<th>Apr-53</th>
<th>Jan-62</th>
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<td>Dec-81</td>
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<td>4.31%</td>
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<td>GS6M</td>
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<td>4.31%</td>
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<td>7.28%</td>
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<td>GS3</td>
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<td>7.74%</td>
<td>7.61%</td>
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<td>GS5</td>
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<td>GS7</td>
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<td>GS10</td>
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<td>7.87%</td>
<td>8.17%</td>
<td>5.88%</td>
<td>8.17%</td>
<td>8.17%</td>
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</table>

**NOTE** GS3M and GS6M are only for 10 years Jan 82 - Dec 91

GS7 is only for 150 months July 69 - Dec 81
Conclusion

Research.stlouisfed.org/fred2
Lowest over 30 year average
3 and 6 months: Jan 72 – Dec 01
1-10 years: Jan 82 – Oct 11
# Graded Portion of the T Curve

<table>
<thead>
<tr>
<th>YR</th>
<th>GS3M</th>
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<th>GS1</th>
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<td>0.96%</td>
<td>1.48%</td>
<td>1.97%</td>
<td>2.40%</td>
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<tr>
<td>12</td>
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<td>0.90%</td>
<td>1.14%</td>
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<td>2.86%</td>
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<tr>
<td>13</td>
<td>1.26%</td>
<td>1.33%</td>
<td>1.65%</td>
<td>2.03%</td>
<td>2.52%</td>
<td>2.96%</td>
<td>3.33%</td>
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<tr>
<td>14</td>
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<td>1.75%</td>
<td>2.16%</td>
<td>2.57%</td>
<td>3.04%</td>
<td>3.46%</td>
<td>3.80%</td>
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<tr>
<td>15</td>
<td>2.09%</td>
<td>2.18%</td>
<td>2.67%</td>
<td>3.11%</td>
<td>3.56%</td>
<td>3.96%</td>
<td>4.27%</td>
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<td>2.60%</td>
<td>3.17%</td>
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<td>4.46%</td>
<td>4.73%</td>
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<td>4.59%</td>
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<td>18</td>
<td>3.32%</td>
<td>3.45%</td>
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<td>4.72%</td>
<td>5.11%</td>
<td>5.45%</td>
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<td>19</td>
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<td>4.69%</td>
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<td>5.80%</td>
<td>6.15%</td>
<td>6.45%</td>
<td>6.60%</td>
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Low Rates and Other Assumptions that Interact

- When the actuary does cash flow projections, the interest rates, default rates, investment spreads, and competitor rates should be internally consistent in each scenario.
- How can an actuary find that information without a lot of cost?
Sources of Information

• Investment managers might be a good source of data, or they might have access to sources such as a Bloomberg terminal or a Moody’s subscription.
• Some of these sources have web sites where information is available.
• Public web sites have less information than investment managers would.
Default Rates

- Rating Agencies such as Moody’s or S&P publish historical default rates.
- Actuaries can use a 20 year average or recent several year average from such studies as a basis for modeling defaults across different quality ratings. These vary over time as interest rates change.
Investment Spreads

• Many brokers, banks, or Bloomberg publish a series of corporate yields based on credit quality.
• From the Treasury yield curve, the actuary can derive average spreads for each quality type.
• I regress the spreads by month over 5 to 10 years to compute future spreads.
## Investment Spread Example

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Treasury</th>
<th>AA Bond</th>
<th>AA spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>0.10%</td>
<td>0.63%</td>
<td>0.53%</td>
</tr>
<tr>
<td>5 year</td>
<td>0.88%</td>
<td>1.64%</td>
<td>0.76%</td>
</tr>
<tr>
<td>10 year</td>
<td>2.00%</td>
<td>2.96%</td>
<td>0.96%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Treasury</th>
<th>BBB Bond</th>
<th>BBB spread</th>
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</thead>
<tbody>
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<td>1 year</td>
<td>0.10%</td>
<td>1.20%</td>
<td>1.10%</td>
</tr>
<tr>
<td>5 year</td>
<td>0.88%</td>
<td>2.53%</td>
<td>1.65%</td>
</tr>
<tr>
<td>10 year</td>
<td>2.00%</td>
<td>3.78%</td>
<td>1.78%</td>
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</table>
Bond Spread Ideas

- 10 years ago, bond spreads contracted as Treasury rates fell.
- In the past few years, bond spreads have not contracted as Treasury rates fell further. Financial turmoil was a better predictor of spread expansion or contraction.
- The future will be something else.
Do you have questions that you wish to discuss?