Mortality Cat Bonds: What the Financial Markets Think of Pandemic Risk

Presented by Dale Hagstrom Consulting Actuary, Milliman

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Mortality Cat Bonds and Pandemic Risk

- Background: Mortality Cat Bonds
- Actuarial Approach to Measuring Risk
- Actuarial Cost vs Interest Spread on Bond
- Variation in Spreads on Corporate Bonds
  - High to Low Investment Grade
  - Investment Grade to Non-investment Grade
  - Mortality Cat Bonds to LIBOR
- Epidemic Event Timing
- Conclusion
Mortality Cat Bonds and Pandemic Risk

Background: Mortality Cat Bonds

- Need for Cat Bonds
- Market for Cat Bonds
- Operation of Mortality Cat Bonds
  - Remote Attachment Point
  - Short Maturity (3 to 5 years)
  - Investment Return Floats with LIBOR
  - Investment Grade BBB- to BB+
- Recent History of Mortality Cat Bonds
Mortality Cat Bonds and Pandemic Risk
Actuarial Approach to Measuring Risk

- Historical Experience To Parameterize Probability Distributions
- Three Components to Model
  - Normal Variation over Several Decades
  - Extra Variation from Disease
  - Extra Variation from Terrorism
- Transparent Model Allowing Easy Sensitivity Tests
- Quantification of Remote Events Depends on Tail of Distribution
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Actuarial Cost vs Interest Spread on Bond

- Actuarial Cost Appears Well Less Than Spread on Bonds
- Possible Reasons for High Spread on Cat Bonds
  - Low Investment Grade to Non-investment Grade
  - Liquidity Risk
  - Mortality Cat Risk Not Well Understood
  - Small Market with Buyers Demanding Minimum Return
  - Other Risks (Collateral, Issuer, etc.)
Mortality Cat Bonds and Pandemic Risk
Variation in Spreads on Corporate Bonds

Spread between Low and High Investment Grade

- BAA
- AAA
- BAA-AAA Spread
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Variation in Spreads on Corporate Bonds
Spread between Low and High Investment Grade
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Variation in Spreads on Corporate Bonds
Spread between Low and High Investment Grade
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Variation in Spreads on Corporate Bonds

Spread between Non-Investment Grade and Investment Grade
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Variation in Spreads on Corporate Bonds
Spread between Non-Investment Grade and Investment Grade
Timeline
Changes in Cat Bond Market Spreads over LIBOR

2005: Roughly Level

2006: Rise from 3/06 to 9/06, then fall to 11/06

2007: Level until starting slow rise in 8/07

2008: Slow rise to 9/08 (to high of 06), then double by 1/09

2009: Slow rise to 3/09, then sharp rise to 5/09 - 7/09, then sharp drop to EOY

2010: Sharp drop continues to 2/10 (returning to 11/08 level), then show fall to 8/10, then fast fall to 11/10 (5/08 level)

2011-12: Roughly Level
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Variation in Spreads on Mortality Cat Bonds over LIBOR Compared to Epidemic Event Timing

- Variation in 2006 may relate to H5N1
- Rises in mid-2007 to 3/2009 may relate to credit markets
- Rise in mid 2009 may relate to H1N1
- Fall in late 2009 tracks falling spreads elsewhere in spite of continuing H1N1 worry
- Cautious fall in 2010 until H1N1 epidemic clearly ends, then fast fall
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Conclusion

- Epidemic Event Timing Has Some Effect on Spreads
- But Some Major Spread Movements Are Unrelated to Pandemic
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