How Might Pandemic Flu Affect U.S. Life Insurers?

Tom Edwalds, FSA
AVP – Mortality Research
Munich American Reassurance Company
What is Pandemic Flu?

- Epidemic: outbreak of infectious disease throughout geographic region
- Pandemic: global epidemic
- Flu: disease caused by influenza virus
- 3 Influenza pandemics in 20th century
  - 1918 Spanish Flu
  - 1957 Hong Kong Flu
  - 1968 Asian Flu
Risk for Life Insurers

- Weisbart (III) & Moody’s published estimated loss costs for life insurers
- Issue is fundamentally actuarial
- SoA Committee on Life Insurance
  Research commissioned study
  - POG chair: Tom Edwalds
  - Researcher: Jim Toole
Society of Actuaries Research
Currently in Progress

- Scope includes life & health insurance
- Focus today is on mortality surge model
  - Describe & apply to industry aggregates
  - Show preliminary results
  - Highlight internal controversies
Focus on Mortality Surge Model

- Model assumptions
- Model inputs
  - Insurance
  - Pandemic scenario
- Methodology
- Estimating aggregate inputs for US Life Insurers
- Pandemic scenario inputs selection
- Results
Model Assumptions

- Mortality surge measured as excess deaths/1000
  - NOT excess % of expected
- Marginal tax rate 35%
  - Can adjust
  - Assume tax savings useful regardless of net income & surplus
    - E.g. net operating loss carry forward
Model Inputs

Insurance
- Inforce by quin age
- Average reserve/1000 by quin age
- Reinsurance ceded by quin age

Pandemic Scenario
- Deterministic
- Excess deaths/1000
- Excess mortality curve shape
Methodology: Net Claims

Gross claims
- Calculate excess mortality by quin age
  = Excess deaths/1000 * shape % by quin age
- Calculate gross claims by quin age
  = insurance inforce * excess mortality

Net claims = Gross claims - reductions:
- reserves released
- reinsurance credit
- tax savings
Methodology: Reductions

- **Reserves released by quin age**
  \[ = \text{gross claims} \times \frac{\text{avg reserve}}{1000} \]

- **Reinsurance credit by quin age**
  \[ = \text{reins ceded} \times \text{excess mortality} \times \text{reins credit \%} \]
  - Will explain reinsurance credit \% later
  - Very controversial

- **Tax savings by quin age**
  \[ = 35\% \times (\text{gross claims} - \text{reserves released} - \text{reinsurance credit}) \]
Estimating Aggregate Inputs for US Life Insurers

- Inforce by Quin Age
  - LIMRA Study
  - US Census Bureau

- Reinsurance Ceded by Quin Age
  - MARC Survey

- Average Reserve/1000 by Quin Age
  - Estimated from data provided by POG
US Life Insurance Inforce

Data Sources

- LIMRA Study, 2004
  - % owning individual life insurance
  - % covered by group life insurance
  - Average face amount, individual and group

- US Census Bureau
  - 7/1/04 US population estimate by quin age
    - Projection from 2000 census
US Life Insurance Inforce Estimate by Quin Age

- Break LIMRA age bands down to quin age
- Separately for individual and group, by quin age:
  - Inforce = population * % covered * avg face
- Sum tied to NAIC aggregate and LIMRA totals
US Life Reinsurance Ceded
Estimate by Quin Age

- MARC survey
  - Total direct reinsurance ceded
    - individual & group
  - Tied to AM Best
- Data supplied by POG
  - Reinsurance distribution by quin age
Pandemic Scenario Inputs

- Excess deaths/1000
  - Excess pneumonia and influenza
  - Seasonal flu kills 36,000 per year in US

- Excess mortality curve shape
  - Distribution of excess deaths by quin age
  - Expressed as % of scenario excess deaths/1000
  - 3 options built in to model: Flat, “U”, and “W”
  - Can create custom shape
Pandemic Scenario Inputs: Excess Mortality Curve Shape

- **Flat**
  - Same excess deaths/1000 used for all ages
- **“U”** (Similar to 1957 or 1968)
  - Most deaths at ages 0-4 and 65+
  - Few deaths at working ages
- **“W”** (Similar to 1918)
  - Most deaths at ages 0-4, 20-40, and 65+
  - Not identical to 1918 shape
Two scenarios explored:

- Moderate (similar to 1957)
  - Excess mortality = 0.7 deaths/1000
  - “U” shape

- Severe (similar to 1918)
  - Excess mortality = 6.5 deaths/1000
  - “W” shape

Stress test, not prediction

- No probabilities assigned
Reinsurance Credit %

- Still working on this factor
- Ratio of
  - Identifiable reinsurer capital available
    - Statutory surplus
    - Mortality bond securitizations
    - Reserve redundancy
    - Offshore reinsurance (not yet included)
    - Other
  - Scenario reinsurance death claims surge
    = reinsurance ceded * excess mortality
- Maximum value is 100%
Results
Moderate Pandemic Scenario

- $7.8 B - Individual Life gross claims surge
- $2.0 B - Individual life net claims effect
- $3.9 B - Group Life gross claims surge
- $2.4 B - Group life net claims effect
- $3.6 B - Reinsurance claims surge
- Reinsurance credit %: 100%
Results
Severe Pandemic Scenario

- $94 B - Individual Life gross claims surge
- $43 B - Individual life net claims effect
- $46 B - Group Life gross claims surge
- $29 B - Group life net claims effect
- $35 B - Reinsurance claims surge

Reinsurance credit %: 64%

- Not final, will be higher
Summary

- Moderate pandemic scenario almost non-event for life insurers financially
- Severe pandemic scenario unpleasant and uncomfortable
  - But life insurance industry capable of paying all claims!
Open Issues

- Insured vs population mortality
  - Model will have inputs for population mortality surge & relative mortality surge of portfolio

- Reinsurance Credit
  - Offshore retrocession
  - Other available capital

- Asset losses
  - May introduce input factor into model
Questions?

Thank you!