Risks of Life Insurers: Recent Trends and Transmission Mechanisms

Ralph S.J. Koijen\textsuperscript{a} Motohiro Yogo\textsuperscript{b}

\textsuperscript{a}NYU Stern and CEPR

\textsuperscript{b}Princeton University and NBER
Overview

- Traditional risks:
  1. Interest rates
  2. Aggregate longevity or mortality
  3. Policyholder behavior

- Modern risks:
  1. Minimum-return guarantees (variable annuities)
  2. Shadow insurance
  3. Securities lending
  4. Derivatives
Overview

- **Traditional risks:**
  1. Interest rates
  2. Aggregate longevity or mortality
  3. Policyholder behavior

- **Modern risks:**
  1. Minimum-return guarantees (variable annuities)
  2. Shadow insurance
  3. Securities lending
  4. Derivatives

- **Objectives:**
  2. Discuss potential amplification and transmission mechanisms.
  3. Suggest improvements in financial disclosure.
Themes

1. Risk concentration: Aggregate activity for industry mostly due to top 10 financial groups.

2. Individual risk exposure easier to quantify, but overall risk mismatch is much harder.

3. Poorly designed accounting standards and capital regulation can have unintended consequences. Life insurers increase risk to improve RBC.

   - Investment: Ellul et al. (2011), Ellul et al. (2012), and Merrill et al. (2012).
   - Derivatives: Credit Suisse (2012).
Life insurers during the 2008 financial crisis

- AIG lost $21 billion from securities lending, compared with $34 billion from CDS (McDonald and Paulson 2014).
- Hartford also received TARP because of VA losses.
- Others involved in VA or securities lending applied for TARP: Allstate, Genworth Financial, and Prudential Financial.
Operating gain in 2008 for top 10 financial groups by variable annuity account value

<table>
<thead>
<tr>
<th>Financial group</th>
<th>Account value (billion $)</th>
<th>Operating gain (share of capital and surplus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MetLife</td>
<td>143</td>
<td>-0.05</td>
</tr>
<tr>
<td>AXA Financial</td>
<td>139</td>
<td>-0.18</td>
</tr>
<tr>
<td>Hartford Life</td>
<td>119</td>
<td>-0.52</td>
</tr>
<tr>
<td>AIG Life</td>
<td>105</td>
<td>0.00</td>
</tr>
<tr>
<td>ING USA Life</td>
<td>98</td>
<td>-0.14</td>
</tr>
<tr>
<td>Lincoln Financial</td>
<td>97</td>
<td>-0.01</td>
</tr>
<tr>
<td>Manulife Financial</td>
<td>94</td>
<td>-0.46</td>
</tr>
<tr>
<td>Prudential of America</td>
<td>79</td>
<td>-0.28</td>
</tr>
<tr>
<td>Aegon USA</td>
<td>61</td>
<td>-0.26</td>
</tr>
<tr>
<td>Ameriprise Financial</td>
<td>57</td>
<td>-0.44</td>
</tr>
<tr>
<td>Total for life insurers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with VA guarantees</td>
<td>1,460</td>
<td>-0.09</td>
</tr>
<tr>
<td>without VA guarantees</td>
<td>0</td>
<td>0.01</td>
</tr>
</tbody>
</table>
Operating gain from annuities for life insurers with variable annuity guarantees
Capital gain in 2008 for top 10 financial groups by securities lending agreements

<table>
<thead>
<tr>
<th>Financial group</th>
<th>Amount of assets (billion $)</th>
<th>Capital gain (share of capital and surplus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIG Life</td>
<td>54</td>
<td>-1.69</td>
</tr>
<tr>
<td>MetLife</td>
<td>38</td>
<td>-0.07</td>
</tr>
<tr>
<td>New York Life</td>
<td>6</td>
<td>-0.34</td>
</tr>
<tr>
<td>Prudential of America</td>
<td>5</td>
<td>-0.28</td>
</tr>
<tr>
<td>Northwestern Mutual</td>
<td>4</td>
<td>-0.52</td>
</tr>
<tr>
<td>Hartford Life</td>
<td>2</td>
<td>-0.07</td>
</tr>
<tr>
<td>Genworth Financial</td>
<td>2</td>
<td>0.12</td>
</tr>
<tr>
<td>Allstate Financial</td>
<td>2</td>
<td>-0.48</td>
</tr>
<tr>
<td>Manulife Financial</td>
<td>2</td>
<td>-0.07</td>
</tr>
<tr>
<td>Woodmen Life</td>
<td>1</td>
<td>-0.26</td>
</tr>
<tr>
<td>Total for life insurers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with securities lending</td>
<td>128</td>
<td>-0.39</td>
</tr>
<tr>
<td>without securities lending</td>
<td>0</td>
<td>-0.18</td>
</tr>
</tbody>
</table>
Capital gain for life insurers with securities lending agreements

![Diagram showing the capital gain (billion $) and as share of capital & surplus from 2002 to 2014. The capital gain fluctuates over time, with significant increases and decreases. The as share of capital & surplus also varies, indicating the impact of these gains on the insurer's financial health.]
Shadow insurance

- **Shadow insurance**: Affiliated reinsurance with an unauthorized and unrated reinsurer.
- Some captives are actually authorized.
Shadow insurance

- **Shadow insurance**: Affiliated reinsurance with an unauthorized and unrated reinsurer.

- Some captives are actually authorized.

1. Liquidity risk from mismatch between LOC and insurance liabilities.

2. More investment risk?

3. Less equity and higher leverage?


- Iowa released financial statements for 8 captives in 2014. Under statutory accounting, surplus would be $-2.663 billion (instead of $1.497 billion).
Top 10 financial groups by shadow insurance

<table>
<thead>
<tr>
<th>Financial group</th>
<th>Reinsurance ceded (billion $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Hancock Life Insurance</td>
<td>118</td>
</tr>
<tr>
<td>MetLife</td>
<td>45</td>
</tr>
<tr>
<td>Athene USA</td>
<td>40</td>
</tr>
<tr>
<td>Hartford Life</td>
<td>40</td>
</tr>
<tr>
<td>Aegon USA</td>
<td>30</td>
</tr>
<tr>
<td>Great-West Life</td>
<td>14</td>
</tr>
<tr>
<td>Voya Financial</td>
<td>13</td>
</tr>
<tr>
<td>AIG Life and Retirement</td>
<td>12</td>
</tr>
<tr>
<td>Global Atlantic</td>
<td>11</td>
</tr>
<tr>
<td>Lincoln Financial</td>
<td>7</td>
</tr>
</tbody>
</table>
Reinsurance ceded to affiliated, shadow, and unaffiliated reinsurers
Life versus annuity reinsurance ceded to shadow reinsurers
Do derivatives hedge volatility?

- Total notional amount of OTC derivatives held by U.S. life insurers was $1.1 trillion in 2014 (Berends and King 2015).

  **Question**: Hedge or amplify volatility? Derivatives amplify volatility for banks (Begenau et al. 2015).

1. **Basis risk**
   - Long duration of VA guarantees.
   - Hedge statutory, GAAP, or economic capital?

2. **Counterparty risk**
Growth rate of capital and surplus with and without derivatives
Potential transmission mechanisms

1. Banks:
   - Captive reinsurance funded by LOC.
   - Counterparties in securities lending and derivatives.
   - Funding through corporate bonds.

2. Corporate bond market:
   - Fire-sale dynamics (Ellul et al. 2012).
   - Higher borrowing costs for firms.

3. Households:
   - Solvency worries could lead to debt overhang and collapse in demand.
   - Increase in precautionary saving and welfare loss.
Improvements in financial disclosure

1. Variable annuities: Type and quantity of guaranteed benefits by product.

2. Interest-rate risk: Market value and duration of liabilities (analogous to reporting on the asset side).


4. Derivatives: More detail on which derivatives hedge which risks.

5. International activity: Detailed financial statements not available for Europe (depends on Solvency II disclosure).
More on systemic risk in the insurance sector


- Available as of November 4, 2016 (Amazon and OUP).
## Surplus of Iowa captives based on Iowa versus statutory accounting

<table>
<thead>
<tr>
<th>Captive</th>
<th>Iowa</th>
<th>Statutory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Verity I</td>
<td>27</td>
<td>-432</td>
</tr>
<tr>
<td>Cape Verity II</td>
<td>140</td>
<td>-548</td>
</tr>
<tr>
<td>Cape Verity III</td>
<td>54</td>
<td>-169</td>
</tr>
<tr>
<td>MNL Reinsurance</td>
<td>118</td>
<td>118</td>
</tr>
<tr>
<td>Solberg Reinsurance</td>
<td>207</td>
<td>207</td>
</tr>
<tr>
<td>Symetra Reinsurance</td>
<td>20</td>
<td>-51</td>
</tr>
<tr>
<td>TLIC Riverwood Reinsurance</td>
<td>817</td>
<td>-1,113</td>
</tr>
<tr>
<td>TLIC Oakbrook Reinsurance</td>
<td>114</td>
<td>-675</td>
</tr>
<tr>
<td>Total</td>
<td>1,497</td>
<td>-2,663</td>
</tr>
</tbody>
</table>