Risks in Insurance Markets: Recent Trends and Transmission Mechanisms

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1Based on joint work with Motohiro Yogo (Princeton University and NBER).
Overview

► Traditional risks:

1. Interest rates.
2. Aggregate longevity or mortality.
3. Policyholder behavior.

► Changes in risks and risk management practices of modern life insurers:

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

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- Changes in risks and risk management practices of modern life insurers:
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  2. Shadow insurance.
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- Objectives:
  2. Discuss potential amplification and transmission mechanisms.
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).
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.
Composition of life insurance liabilities

<table>
<thead>
<tr>
<th>Liability</th>
<th>Trillion $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable annuities (separate accounts)</td>
<td>1.8</td>
</tr>
<tr>
<td>Life insurance</td>
<td>1.5</td>
</tr>
<tr>
<td>Traditional annuities</td>
<td>1.0</td>
</tr>
<tr>
<td>Pension fund liabilities</td>
<td>0.7</td>
</tr>
<tr>
<td>Other reserves (accident &amp; health)</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Risk-sharing functions of life insurers:

1. Diversify idiosyncratic risk.
   - Traditional life/health products.

   - Variable annuities = Mutual fund + Long-dated put option.

   - The long-term nature of the guarantees can lead to duration mismatch (ESRB, 2015).
Variable annuity sales

![Graph showing variable annuity sales and mutual fund sales over time. The graph plots sales in billion dollars against year and quarter. The x-axis represents the year and quarter, while the y-axis shows sales in billion dollars. The data shows fluctuations in sales over time, with notable peaks and troughs.](image-url)
Number of insurers and contracts offering VA guarantees

![Graph showing the number of insurers and contracts offering VA guarantees over time](image-url)
Fees on variable annuity guarantees
Sales growth versus change in reserve valuation

- **Sales growth (%)**
- **Change in reserve valuation**

**Offered GLWB in 2007:**
- **Yes**
- **No**

Companies included:
- John Hancock
- Genworth
- Jackson National
- Ameriprise
- Aegon
- Pacific Life
- Sun Life
- Security Benefit
- Voya
- Allianz
- Prudential
- Metropolitan Life
- Nationwide
- New York Life
- Fidelity Investments
- Allianz
- MassMutual
- AIG
- Lincoln
- Hartland
- Nationwide
- Northwestern
- Thrivent Financial for Lutherans
- AXA
- AIG
- Ohio National Life
- Fidelity Investments
- MassMutual
- New York Life
Shadow insurance

- **Shadow insurance**: Affiliated reinsurance with an unauthorized and unrated reinsurer.
- Some captives are actually authorized.
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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 $-2.7 billion (instead of $1.5 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

[Graph showing the reinsurance ceded to affiliated, shadow, and unaffiliated reinsurers from 2002 to 2014. The graph indicates a significant increase in reinsurance ceded over the years, with affiliated reinsurers leading in reinsurance ceded.]
Life versus annuity reinsurance ceded to shadow reinsurers

![Graph showing the trend of life and annuity reinsurance ceded to shadow reinsurers from 2002 to 2014. The graph indicates an increase in reinsurance ceded for both life and annuity sectors, with life reinsurance showing a more significant increase in recent years.](image-url)
Variable annuity reinsurance

![Graph showing change in percentage of reserves reinsured vs. change in reserve valuation for various companies. The graph includes points for companies such as AIG, Aegon, Voya, Genworth, AXA, Aegon, MetLife, Lincoln, Pacific Life, Sun Life, Hartford, Jackson National, and others. The graph indicates a positive correlation between the change in percentage of reserves reinsured and the change in reserve valuation.]
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

![Graph showing growth rate with and without derivatives from 2002 to 2014.](graph.png)
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.
Property and casualty insurance

- P&C reinsurance markets are subject to “reinsurance cycles.”
  - Following disasters, prices rise, which is primarily driven by a contraction in supply.

- Following the financial crisis, there has been a large inflow of non-traditional capital (SWF, PF, HF, . . . ), which lowered spreads.

- Question is whether the non-traditional capital is more “flighty” than traditional reinsurance capital, thereby amplifying reinsurance cycles.
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>
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</table>