Is Solvency II Optimisation Dangerous?

Daniel Banks, P-Solve Investments
Shadrack Kwasa, P-Solve Investments
Unintended Regulatory Consequences - Pensions

Impact of Pension Scheme Funding Legislation 2005

As legislation takes hold Schemes pile into bonds

Source: P-Solve, Bloomberg
Unintended Regulatory Consequences – Life Insurance

Impact of Solvency II Legislation – Life Insurance

Spreads fall prior to Solvency II implementation

Source: P-Solve, Bloomberg
Is unseen investment risk accumulating in the market?

New Legislation

Solvency II
- Pillar I
- Pillar II
- Pillar III

General Insurers

SII motivated decisions lead to unintended consequences.

General Insurance Market

Accumulation of investment risk in the market

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Hypothesis

SII investment portfolio optimisation may expose the GI market to unintended consequences.

- TRUE
  - Regulations drive positioning – positioning is sub-optimal

- FALSE
  - SII portfolios exhibit consistent SII and Economic risks

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Testing our hypothesis: Background

1. Most General Insurers invest predominantly in bonds

2. Analysis performed over a range of economic scenarios

3. Bonds categorised by industry sector

4. Analysis restricted to standard formula

- Bonds
- Other

- Retail
- Utilities
- Finance
- Technology

- Downturn
- Recession
- Recovery

- Standard Formula
- Internal Model
Lenses through which you can view risk

Solvency II is part of a wider investment risk universe

What other lenses can we use to understand our investment portfolio and compare against Solvency II?
3 lenses to test our hypothesis

<table>
<thead>
<tr>
<th>Risk Lens</th>
<th>Risk Measure</th>
<th>Optimisation Objective</th>
<th>Lens in common use?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lens 1 = Volatility</td>
<td>Standard deviation of returns</td>
<td>Return</td>
<td></td>
</tr>
</tbody>
</table>
First Test of the hypothesis: Correlations

- Asset movements relative to each other are important.

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Asset Movements</th>
<th>Investment Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ve</td>
<td>▶️▶️▶️</td>
<td>▼▼▼▼ Amplified</td>
</tr>
</tbody>
</table>
Default lens view on correlations

- Default correlation matrix covering the period from 2000 to 2017.

Source: P-Solve, Moody’s
Volatility lens view on correlations

- Volatility correlation matrix covering the period from 2000 to 2017.

Colour Key

<table>
<thead>
<tr>
<th>Correlation &lt; 0</th>
<th>0 &lt; Correlation &lt; 1</th>
<th>Correlation = 1</th>
</tr>
</thead>
</table>

- Automotive
- Banking
- Capital Equipment
- Consumer Goods
- Finance
- Real Estate
- Healthcare & Pharmaceuticals
- High Tech Industries
- Media
- Retail
- Services Business
- Telecommunications
- Transportation
- Utilities

Source: P-Solve, Bloomberg

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Solvency II View on Correlation – Bond spreads

- Taking spread data over the period assumed when calibrating the standard formula for spread SCR.
- “EMU Corporates for different maturity buckets and rating classes between 1999 and February 2010.”

Source: P-Solve, Moody’s, EIOPA-14-322

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What does the correlation picture tell us?

<table>
<thead>
<tr>
<th>Lens</th>
<th>Bond universe correlations</th>
<th>Does diversifying across sectors reduce risk?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>Both +ve and –ve correlations appear</td>
<td>✓</td>
</tr>
<tr>
<td>Volatility</td>
<td>Mid to high +ve correlation between sectors</td>
<td></td>
</tr>
<tr>
<td>Solvency II</td>
<td>High +ve correlation across sectors</td>
<td>✗</td>
</tr>
</tbody>
</table>

- In a Solvency II world investing across sectors does not reduce correlation risk.
- Consistent with spread SCR that assigns the same SCR to similar bonds regardless of sector.
Second Test of the Hypothesis: Portfolio Optimisation

- Long term portfolios optimised across economic cycles

- The Solvency II lens picks bonds across sectors due to the relationship between spread SCR and return.

- In most cases the lower the spread SCR the lower the return and vice-versa.

Source: P-Solve, Moody’s, Bloomberg

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How do the portfolios compare?

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Source: P-Solve, Moody’s, Bloomberg
Volatility vs Average Spread

Volatility vs Spread

Source: Moody's

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Comparing volatility to expected loss

Plotting expected losses against volatility shows no correlation between the two.

Source: Moody's
## Are the results what we would expect?

<table>
<thead>
<tr>
<th>Lens</th>
<th>Any unexpected results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>• Relatively high spread SCR</td>
</tr>
<tr>
<td>Volatility</td>
<td>• Relatively high defaults</td>
</tr>
<tr>
<td></td>
<td>• No correlation between expected loss and volatility</td>
</tr>
<tr>
<td>Solvency II</td>
<td>None – nil benefit for sector diversification is in line with standard formula</td>
</tr>
</tbody>
</table>
What might influence the choice of lens?
What does this mean for insurers

Challenge

- Why do we use this lens?
- What is the impact of our choice?

Apply different lenses

- Do we understand all the risks we are exposed to?

Act

- Use lens to adapt portfolio to match the type of risks we want.

• Why do we use this lens?
• What is the impact of our choice?

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Finally…is Solvency II Optimisation Dangerous?

• The Solvency II lens, in this case, is not dangerous; although it may result in less sector diversification in a bond portfolio.

• The volatility lens produces more surprising results; this is more of a concern considering it is a widely used alternative to Solvency II.

• The choice of lens materially impacts the result.
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