Theory and practice of insurance liability valuation

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Calibration of the insurance cost of capital rate

Impact of taking investment risk
Huber P. (2020). Assessing the profitability of insurance contracts subject to Swiss Solvency Test capital requirements.


Hedgeable component

Replicate

Non-hedgeable component

Hold capital buffer that incurs costs
Idiosyncratic risk => not risk premium
Frictional cost that applies to trapped capital not risk
1. The insurance company is equity funded and holds no debt
2. It is subject to an economic capital requirement
3. It pays-out all excess capital
4. It is not subject to tax
5. It takes no investment risk and has no non-insurance activity
6. Liabilities are collateralised and not subject to market risk
7. It does not write, or no value is placed on, new business
Deduct allowance for investment risk borne by shareholder (indifference return)

\[ \text{Deduct allowance for future new business profit} \]

\[ \text{Compute weighted average cost of capital} \]

\[ \text{Gross-up for tax (divide by } 1 - \text{tax)} \]

\[ \text{Add double tax allowance} \]
Higher liability spread → Lower new business profitability or Higher risk margin

Lower risk margin → Lower new business profitability or Lower liability spread
Capital cost rate and capital requirement

Determine projected investments to meet capital requirement

Produce cash-flow statement with capital cashflows being the residual

Decompose capital cash-flows into: debt, equity principal, indifference return, profit
<table>
<thead>
<tr>
<th><strong>Swiss Solvency Test</strong></th>
<th><strong>Solvency II</strong></th>
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</thead>
<tbody>
<tr>
<td>No tax liabilities</td>
<td>Deferred tax but no double tax</td>
</tr>
<tr>
<td>Current year capital costs excluded</td>
<td>Covers current year capital costs</td>
</tr>
<tr>
<td>Applied to minimum capital requirements (99% expected shortfall)</td>
<td>Applied to minimum capital requirements (99.5% VaR)</td>
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<tr>
<td>No allowance for diversification with new business or across entities (solo) in run-off capital requirements</td>
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</table>
Additional investment risk

- Additional capital requirements, increases double tax
- Benefit from investment leverage (corresponding to default option)
- Funding costs ≠ illiquidity premium depend on collateral or seniority of liabilities
Capital cashflows

Investment capital cashflows

- equity principal
- risk-free
- market risk borne by shareholder
- funding costs on liabilities

Indifference return

Underwriting capital cashflows

- debt, principal and interest
- equity principal
- risk-free
- frictional costs
- economic profit
Solvency II and SST cost of capital ≠ equity cost of capital

Accounting not relevant for assessing profitability
(more conservative, higher return on equity)

Capital requirements and investment risk are relevant

Cashflow approach provides flexible mechanism for accurately calculating economic profitability