Swiss Solvency Test (SST) and Solvency II: The Swiss Experience

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History
Timeline

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<td>SST Principles, SST White Book</td>
<td>Standard Model template, Documentation, Parameterization</td>
<td>SST Scenarios, Approach for company-specific scenarios</td>
<td>Methodology, Documentation</td>
</tr>
</tbody>
</table>

Enforcement

Field Tests

Standard Model Parameterization

Models

- Development and pre-approval
- Approval process

It was key to implement the SST quickly and limit the development time
SST Principles

1. All assets and liabilities are valued market consistently.
2. Risks considered are market, credit and insurance risks.
3. Risk-bearing capital is defined as the difference of the market consistent value of assets less the market consistent value of liabilities, plus the market value margin.
4. Target capital is defined as the sum of the Expected Shortfall of change of risk-bearing capital within one year at the 99% confidence level plus the market value margin.
5. The market value margin is approximated by the cost of the present value of future required regulatory capital for the run-off of the portfolio of assets and liabilities.
6. Under the SST, an insurer’s capital adequacy is defined if its target capital is less than its risk bearing capital.
7. The scope of the SST is legal entity and group / conglomerate level domiciled in Switzerland.
8. Scenarios defined by the regulator as well as company specific scenarios have to be evaluated and, if relevant, aggregated within the target capital calculation.
9. All relevant probabilistic states have to be modeled probabilistically.
10. Partial and full internal models can and should be used. If the SST standard model is not applicable, then a partial or full internal model has to be used.
11. The internal model has to be integrated into the core processes within the company.
12. SST Report to supervisor such that a knowledgeable 3rd party can understand the results.
13. Public disclosure of methodology of internal model such that a knowledgeable 3rd party can get a reasonably good impression on methodology and design decisions.
14. Senior Management is responsible for the adherence to principles.
SST Framework
Reasons for Developing the SST

• At the beginning of 2000, many insurers in Switzerland and Europe had high exposures to equity risks
  
  • Financial market risk did not give rise to regulatory capital requirements
  
  • Life companies gave high performance guarantees during the 80s and 90s. With the falling interest rates during the 90s, the guarantees could not be met using government bonds. Insurers then invested heavily in risky assets (mainly shares) to achieve required returns
  
  • Valuation of insurance liabilities did not require taking into account embedded options
  
  • Statutory valuation allowed discounting with the expected investment return, giving further incentives to invest heavily in risky assets
  
  • Group pension business (which was and is written by many life insurers) had a guaranteed minimal interest rate which is set by politics. This leads to a situation where the minimal interest rate is sticky, in particular in times of elections

When the stock market crashed in 2001/2002, this led to substantial problems in the European and Swiss insurance market

In Switzerland, both the regulatory authority and the industry realized the need to a change in regulation and the business model
In the white paper (2004) regulator and industry agreed to

- Change from rule based to principle based regulation
- Consistent valuation of assets and liabilities
- Use internal models to adequately reflect the risks of a specific company
- Increase risk awareness within top management of the industry
- Increase transparency
Rules vs. Principles

“Liberty means responsibility. That is why most men dread it”, George Bernard Shaw

To give incentive for risk and capital management and to put responsibility to senior management and the board of directors, it is essential that the approach to supervision is principles-based

- However, principles-based supervision is more challenging both for the supervised and for the supervisors
- There is pressure by some (among senior management, appointed actuaries, supervisors, etc.) that regulation becomes more prescriptive and rules-based
- It is essential that both the supervisors and senior management accept that the price of freedom is responsibility
- The responsibility for the SST lies with senior management and the board of directors not with the Responsible Actuary
• Looking back:
• «Principle based» was indeed a challenge in the beginning as people were unsure on how to deal with principles and were looking for guidance
• Today the industry has the experience and takes the responsibility
Internal vs Standard Model

Standard vs. Internal Models

Risk Quantification:
- Using **standard models** for life, P&C and health companies, if the standard models capture the risk the companies are exposed to appropriately.
- Using **internal models** for reinsurers, insurance groups and conglomerates and all companies for which the standard model is not appropriate (e.g. if they write substantial business outside of Switzerland).

*The use of an internal model is the default option, the standard models can only be used if they adequately quantify the company’s risks.*

Slide from Philipp Keller, FINMA, 2007
Internal vs Standard Model

Today:
• Almost all companies have an internal model
• Models have become more and more complex over the years
• Number of models approved by regulator is low

→ 2015 announcement of FINMA:
  «Standard model shall be used instead»
What we learned

- Consistency is key: Inconsistency in the approach to define suitable forms of capital and the SST led to a substantial amount of extra work and lack of certainty.
- It has been key to enshrine some elements in hard laws, e.g. the basic concepts of market consistent valuation. Not doing this leads to the risk of the risk-based system to become easily compromised. E.g. by writing 'relevant risk-free interest rate' rather than 'risk-free interest rate' in the Solvency II directive, it allowed a complete re-definition of what 'risk-free interest rates' actually are.
- It is important for the solvency framework to be flexible. At the time of development of the SST, sovereign risk was never discussed, now it is widely seen as one of the major risk exposures for Swiss companies.
- It was helpful to develop the SST with all stakeholders (industry, associations, academics and other interested parties) since this allowed to obtain buy-in by industry. However, it only worked by the regulators having clear ideas beforehand.
What we learned

- Doing the right compromises has been critical for the success of the SST. In general, compromises which benefit only part of the constituency should be avoided at all costs, since it opens the solvency framework up for further weakening (e.g. Solvency II: Equity dampener (F) → Liquidity premium (UK) → Ultimate Forward Rate (D) → Matching Adjustment (E, UK) → ...)

- Implementation takes time. The supervisory approach for a principles-based RBC system differs from risk-sensitive model. Developing the required models (for valuation and risk quantification) by insurers is also time-consuming

- Currently, most sophisticated players see the SST as a competitive advantage, in particular large international groups and reinsurers.

- Criticism comes mainly from mid-sized life insurers which struggle in the low-interest rate environment which argue that the SST limits their freedom to invest in (illiquid) corporate bonds

- The SST has been one (but not the only) reason why the Swiss insurers performed much better during the current financial crisis than their peers in the EU and the US. It gave incentives for ALM and for proper hedging and reduced the impact of the low interest rates.
SST Development

What we learned

Scenarios

<table>
<thead>
<tr>
<th>Capital relevant</th>
<th>P</th>
<th>For information only</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Distress</td>
<td>0.5%</td>
<td>Default of Reinsurer</td>
<td>0.0%</td>
</tr>
<tr>
<td>Pool Default</td>
<td>0.5%</td>
<td>Panic in sports stadium</td>
<td>0.0%</td>
</tr>
<tr>
<td>Longevity</td>
<td>0.5%</td>
<td>Immobiliencrash</td>
<td>0.0%</td>
</tr>
<tr>
<td>Disability</td>
<td>0.5%</td>
<td>LTCM (1998)</td>
<td>0.0%</td>
</tr>
<tr>
<td>Lapse</td>
<td>0.5%</td>
<td>Aktienmarktcrash (2000/2001)</td>
<td>0.0%</td>
</tr>
<tr>
<td>Health daily allowance</td>
<td>0.5%</td>
<td>Finanzkrise 2008</td>
<td>0.0%</td>
</tr>
<tr>
<td>Pandemic</td>
<td>1.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company outing accident</td>
<td>0.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial accident</td>
<td>0.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under-reserving</td>
<td>0.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terror event</td>
<td>0.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Quadrant-Scenarios</td>
<td>0.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Since 2014, the number of descriptive scenarios has been reduced by FINMA and replaced by annually automatically generated ‘quadrant-scenarios’.

* Quadrant
A quadrant $Q \subseteq \mathbb{R}^2$ is defined as the intersection of finitely many half spaces. That is, we can find $k \geq 0$, $x_i \in \mathbb{R}$ and (non-degenerate) linear forms $\lambda_i \in (\mathbb{R}^2)'$ over $\mathbb{R}^2$ such that

$$Q = \bigcap_{i=1}^k \lambda_i^{-1}([x_i, \infty]).$$
What we also learned

• With the introduction of Solvency supervision the hope was to have no more approval process for new products, tariffs or surrender values → these rules are still in place

• Whenever the regulator is of the impression solvency surveillance goes not far enough a rule on statutory reporting can be implemented (similar to “Zinszusatzreserve” in Germany)
The Impact of the SST
The Impact of the SST

It is difficult to separate the impact of the SST from the much greater effect of the ongoing financial crisis and the ultra-low interest rate environment.

The comparison with Solvency II are also difficult due to financial repression being implemented in the EU.

In Switzerland, since 2003 and accelerated after 2008, insurers:

- Increased investment in long-term bonds (sovereign and highly rated commercial)
- Reduced equity positions except for real estate
- Reduced guarantees in long-term life policies
- Improved risk and capital management
The Impact of the SST

Under-reserving and lack of capital

Statutory reserves – despite being based on prudent assumptions and parameters – were shown to be deficient for many life insurance products. Some companies sold long-term life insurance products with high interest rate guarantees (in one case a life insurer offered 4% guarantees up to 2006). Market consistent technical provision were substantially higher than statutory ones in these cases, leading to massively lower solvency ratio for the SST than under Solvency I. The restoration of the solvency position for some life insurers was a multi-year effort, made more difficult by the financial crisis and the low-interest rate policies of central banks. Most life insurers managed to stabilize and restore their solvency position by:

- De-risking their asset portfolio
- Changing new products
- Recapitalization by shareholders
- Changing existing guarantees (mutuals)
- More efficient capital structures
The Impact of the SST

Under-reserving and lack of capital

The restoration of distressed balance sheets was helped since the period until the solvency ratio has to be re-established is not specified by law. This allows for sufficient time to de-risk the portfolio and to – if necessary – change the products.

Solvency II has very short restoration periods: 3 months to restore the MCR, 6 months to restore the SCR

In practice, the restoration of the solvency position of a life insurer is often a multi-year task
The insurance market is stable, with the number of life insurers steadily dropping and the number of reinsurers increasing.

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Life</strong></td>
<td>22</td>
<td>22</td>
<td>21</td>
<td>21</td>
<td>20</td>
<td>19</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td><strong>P&amp;C</strong></td>
<td>78</td>
<td>79</td>
<td>79</td>
<td>79</td>
<td>79</td>
<td>81</td>
<td>80</td>
<td>79</td>
</tr>
<tr>
<td><strong>Reinsurers</strong></td>
<td>25</td>
<td>28</td>
<td>26</td>
<td>27</td>
<td>27</td>
<td>26</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td><strong>Captives</strong></td>
<td>46</td>
<td>42</td>
<td>42</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>34</td>
<td>33</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>289%</td>
<td>325%</td>
<td>359%</td>
<td>340%</td>
<td>342%</td>
<td>348%</td>
<td>377%</td>
<td></td>
</tr>
<tr>
<td><strong>Life</strong></td>
<td>202%</td>
<td>222%</td>
<td>245%</td>
<td>279%</td>
<td>281%</td>
<td>301%</td>
<td>318%</td>
<td></td>
</tr>
<tr>
<td><strong>P&amp;C</strong></td>
<td>324%</td>
<td>377%</td>
<td>446%</td>
<td>407%</td>
<td>420%</td>
<td>425%</td>
<td>456%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>383%</td>
<td>424%</td>
<td>439%</td>
<td>356%</td>
<td>347%</td>
<td>332%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SST</strong></td>
<td>144%</td>
<td>212%</td>
<td>205%</td>
<td>170%</td>
<td>190%</td>
<td>193%</td>
<td>173%</td>
<td></td>
</tr>
<tr>
<td><strong>Life</strong></td>
<td>87%</td>
<td>117%</td>
<td>145%</td>
<td>105%</td>
<td>145%</td>
<td>153%</td>
<td>149%</td>
<td></td>
</tr>
<tr>
<td><strong>P&amp;C</strong></td>
<td>152%</td>
<td>236%</td>
<td>225%</td>
<td>188%</td>
<td>206%</td>
<td>203%</td>
<td>191%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>231%</td>
<td>292%</td>
<td>246%</td>
<td>220%</td>
<td>219%</td>
<td>233%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Solvency I ratios are bad indicators for economic health. SST ratios have reacted to the credit crunch (2008) and to the EUR sovereign crisis (2011).
The Impact of the SST

Investments of life insurers

The Investment mix of life insurers has been stable since before the introduction of the SST. Fixed income securities, real estate and mortgages constitute over 80% of life insurers assets.

<table>
<thead>
<tr>
<th>Investment Category</th>
<th>end of 2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Participations</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Fixed Income Securities</td>
<td>57</td>
<td>59</td>
<td>59</td>
<td>61</td>
<td>60</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>Loans and debt register claims</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Mortgages</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Equities and similar investments</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Collective Investments</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Alternative Investments</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Net derivatives positions</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Time deposits and other money market investments</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Receivables from reinsurers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other investments</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Liquid assets</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Investments Life in percentage
Comparison SST and Solvency II
Main Differences

The SST is more principles based and relies more on internal models than Solvency II.

The SST standard model was designed as a methodology, rather than a formula, leaving room for company specific parameters. The Solvency II uses a very complex, rules-based standard formulae.

The SST standard model allows the mapping of most – even complex – reinsurance contracts or risk mitigation measures in the standard model. The Solvency II standard formulae can only capture very simple reinsurance contracts.

The SST puts less focus on Pillar 2 than Solvency II.

There are fewer public disclosure requirements in the SST. This allows for a more open discussion between insurers and supervisors.

Solvency II doesn’t allow to add capital charges. The approval of internal models then becomes very involved for any risk where the supervisor has more conservative assumptions. Often supervisors then demand that the insurer have to include the methodology and parameters for the internal model and for internal use.
## General

<table>
<thead>
<tr>
<th></th>
<th>SST</th>
<th>Solvency II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legal Framework</strong></td>
<td>Insurance Supervision Act + Insurance Supervision Ordinance + Circulars</td>
<td>Directive + Implementing Measures + Level 3 Guidance</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>2006 with fully binding capital requirements in 2011</td>
<td>2016+</td>
</tr>
<tr>
<td><strong>Standard Approach</strong></td>
<td>Standard Model or methodology</td>
<td>Standard Formula, factor based</td>
</tr>
<tr>
<td><strong>Internal Models</strong></td>
<td>Base-case is the use of an internal model. Mandatory for all reinsurers and insurance groups</td>
<td>With approval, but use of the standard formula is the base-case</td>
</tr>
<tr>
<td><strong>Group Requirements</strong></td>
<td>Based on legal entity modeling, taking into account the ownership relations and intra-group transactions and limited capital mobility Each legal entity has to be economically solvent</td>
<td>Based on a consolidated approach</td>
</tr>
<tr>
<td><strong>Financial Market Risk</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Credit Risk</strong></td>
<td>Yes</td>
<td>Yes (but no EUR sovereign risk)</td>
</tr>
<tr>
<td><strong>Insurance Risk</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Operational Risk</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Liquidity Risk</strong></td>
<td>Partially (liquidity risk due to lack of capital mobility for groups)</td>
<td>No</td>
</tr>
</tbody>
</table>
## General

<table>
<thead>
<tr>
<th>Risk Measure</th>
<th>SST</th>
<th>Solvency II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Shortfall</td>
<td></td>
<td>Value at Risk</td>
</tr>
<tr>
<td>Confidence Level</td>
<td>99%, but can be changed by FINMA for different type of insurers or for different market situations</td>
<td>99.5% (fixed in SII Directive)</td>
</tr>
<tr>
<td>Time Horizon for capital</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>Capital Add-ons</td>
<td>For failings in operational risk management, for shortcomings of models</td>
<td>No</td>
</tr>
<tr>
<td>Levels</td>
<td>33% of TC, 80% of TC and 100% of TC</td>
<td>MCR and SCR</td>
</tr>
<tr>
<td>Supervisory Interventions</td>
<td>Below 33% of TC immediate restoration of solvency or revocation of license, below 80% of TC restoration of Solvency and de-risking, below 100% restoration of Solvency</td>
<td>Below MCR ultimate supervisory actions, below SCR graduated actions</td>
</tr>
<tr>
<td>Restoration periods</td>
<td>Below 33% immediate, below 80% of TC: 2 years, below 100% of TC: 1 year, in practice often longer</td>
<td>Below MCR: 3 months, below SCR: 6 months</td>
</tr>
<tr>
<td>Public disclosure</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
# Standard Approaches

<table>
<thead>
<tr>
<th></th>
<th>SST</th>
<th>Solvency II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Risk factor approach. Modelling of underlying risk factors (e.g. interest rates, mortalities, etc.)</td>
<td>Risk class approach, calculation of separate risk classes and sub(-sub...) classes and aggregation with correlation matrices</td>
</tr>
<tr>
<td>Dependencies and Diversification</td>
<td>Modelled on the lowest level of risk factors</td>
<td>Modelled by using correlations</td>
</tr>
<tr>
<td>Aggregation</td>
<td>Non-hedgeable risks; financial market risk after the LLP are considered non-hedgeable</td>
<td>Via a sequence of hierarchical correlation matrices (of more than 5 levels)</td>
</tr>
<tr>
<td>Implementation</td>
<td>Spreadsheet, documents,</td>
<td>Spreadsheet, software</td>
</tr>
<tr>
<td>Complexity</td>
<td>Conceptually simple</td>
<td>Highly complex</td>
</tr>
<tr>
<td>Consistency</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>
## Valuation

<table>
<thead>
<tr>
<th></th>
<th>SST</th>
<th>Solvency II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valuation Standard</td>
<td>Market Consistent</td>
<td>Market Consistent for P&amp;C and some life products, matching adjustment (amortized cost) for certain life products, discounting with Ultimate Forward Rate approach</td>
</tr>
<tr>
<td>Balance Sheet</td>
<td>Total Balance Sheet Approach</td>
<td>Total Balance Sheet Approach</td>
</tr>
<tr>
<td>Replication assumptions</td>
<td>Government bonds</td>
<td>Mix of government bonds, swaps + own assets (for products allowing the matching adjustment)</td>
</tr>
<tr>
<td>Risk margin</td>
<td>Cost of capital approach</td>
<td>Cost of capital approach</td>
</tr>
<tr>
<td>Cost of capital rate</td>
<td>6%</td>
<td>6</td>
</tr>
<tr>
<td>Granularity</td>
<td>Per LoB</td>
<td>Per LoB</td>
</tr>
<tr>
<td>Level</td>
<td>Per Legal Entity</td>
<td>Per Legal Entity</td>
</tr>
<tr>
<td>Discount rate</td>
<td>Risk free (Swaps when using temporary easing)</td>
<td>Risk free based on Ultimate Forward Rate and interpolation Expected return of won assets for products using matching adjustments</td>
</tr>
</tbody>
</table>
## Group Requirements

<table>
<thead>
<tr>
<th></th>
<th>SST</th>
<th>Solvency II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method</strong></td>
<td>Granular Approach</td>
<td>Consolidated Approach</td>
</tr>
<tr>
<td><strong>Diversification</strong></td>
<td>Diversification depends on structure of the group (ownership relations) and CRTI in place</td>
<td>Assumed full diversification within the group</td>
</tr>
<tr>
<td><strong>Capital</strong></td>
<td>Assumed to be transferred only if legally binding CRTI are in place</td>
<td>Assumed to be fully mobile</td>
</tr>
<tr>
<td><strong>Assumption on Group</strong></td>
<td>Management exercises LLPO if capital of a subsidiary &lt; 0</td>
<td>Management never exercises LLPP</td>
</tr>
<tr>
<td><strong>Calculation</strong></td>
<td>Internal model mandatory</td>
<td>Standard formula or internal model</td>
</tr>
<tr>
<td><strong>Capital Requirement</strong></td>
<td>For each legal entity, taking into account all material IGTs</td>
<td>For the consolidated group</td>
</tr>
</tbody>
</table>
SST, Solvency I and Solvency II

- Market consistency, life
- Market consistency, P&C
- Sensitivity to market risk
- Sensitivity to risk, life
- Sensitivity to risk, P&C
- Capital requirements Life
- Capital requirements P&C
- Incentives for ALM
- Capturing of reinsurance (business ceded)
SST, Solvency I and Solvency II

- Pillar 1
- Pillar 2
- Pillar 3
- Compliance costs
- Principles versus rules
- Complexity of model
- Documentation requirements

Legend:
- Solvency I
- Solvency II
- SST
SST and Solvency II

Supervisory Style

Principles-based

Qualitative focus

Rules-based

Quantitative focus
SST Standard Model and Solvency II formula

SST Standard Model

Total capital requirement via aggregation of impacts of underlying event / risk factors

Capital Requirement

Credit Risk

Basel III Approach

Market Risk

Underwriting Risk

Solvency II Standard Formula

Total capital requirement via a sequence of aggregations of risk-subcategories and -categories

Operational + Basic SCR + Adjustment

Solvency Capital Requirement (SCR)

Market

Health

Default

Life

Non-Life

Intangible Assets

Int. Rate

Mortality

Lapse

CAT

Mortality trend

Longevity

Expenses

Non-SLT Health

Equity

Morbidity

Revision

Non-Rev.

Property

Lapse

SLT Health

Non-Prop

Spread

CAT

CAT

Currency

Nat Cat

Concentration

Non-Misc

Counter-cyclical Premiums

Misc

Operational Risk

Interest rates

Spreads

Volatilities

Equities

FX

Market Risk

Credit Risk

Underwriting Risk

Total capital requirement via aggregation of impacts of underlying event / risk factors

SST Standard Model Solvency II Standard Formula

Capital Requirement via Basel III Approach

Total capital requirement via a sequence of aggregations of risk-subcategories and -categories
Solvency II Standard Formula

Defined by a hierarchy of correlations

\[ \text{SCR} = \text{Basic SCR} + \text{SCR}_{op} + \text{Adj} \]

Basic SCR = \( \sum_{i} \text{Corr}_{i,j} \cdot \text{SCR}_i \cdot \text{SCR}_j \)^{1/2}

A small selection of equations defining SCR_{non-life}

\[ \text{SCR}_{\text{non-life}} = \sqrt{\text{Corr}_{\text{non-life}} \cdot \text{SCR}_{\text{non-life}}} \]

\[ \text{NL}_{\text{non-life}} = \text{BOF} (\text{stressshock}, \text{stressshock}_2) \]

\[ \text{SCR}_{\text{non-life}} = \sqrt{\text{SCR}_{\text{non-life}} + \text{SCR}_{\text{non-life}}} \]

\[ \text{SCR}_{\text{non-life}} = \sqrt{\sum \text{SCR}_{\text{non-life}}} \]

\[ \text{SCR}_{\text{non-life}} = \max (\text{SCR}_{\text{non-life}}, \text{SCR}_{\text{non-life}}) \]

\[ \text{SCR}_{\text{non-life}} = \max (\text{SCR}_{\text{non-life}}, \text{SCR}_{\text{non-life}}) \]

\[ \text{SCR}_{\text{non-life}} = \max (\text{SCR}_{\text{non-life}}, \text{SCR}_{\text{non-life}}) \]
Consequences to the actuarial profession
Responsibility

- Before SST: actuaries were responsible for the «liability side of the balance sheet»
- Today: Calculation in SST depend on asset side
- Question: who is responsible for the SST calculation?

This has to be discussed within the actuarial profession as well as with other functions in the company
Conclusion
Conclusion

- SST is a good steering tool
- SST is a volatile measure
- Risk awareness within the company has increased
- SST helps for the communication within the company