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

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- 4. Consequences to the Actuarial Profession
- 5. Conclusion









### Timeline



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
- Target capital is defined as the sum of the Expected Shortfall 4. of change of risk-bearing capital within one year at the 99% confidence level plus the market value margin
- The market value margin is approximated by the cost of the present value of future required regulatory capital for the runoff of the portfolio of assets and liabilities
- Under the SST, an insurer's capital adequacy is defined if its 6. 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
- **Defines How-to** 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
- Transparency 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



**Defines Output** 



### **SST Framework**





- 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





### Rule based vs principle based (1/2)

"Liberty means responsibility. Th	nat is why most men dread it", George Bernard Shaw
To give incentive for risk and capital mana responsibility to senior management and t essential that the approach to supervision	gement and to put he board of directors, it is is principles-based
<ul> <li>However, principles-based supervision is supervised and for the supervisors</li> </ul>	more challenging both for the
<ul> <li>There is pressure by some (among senio actuaries, supervisors, etc.) that regulati prescriptive and rules-based</li> </ul>	r management, appointed on becomes more
<ul> <li>It is essential that both the supervisors a accept that the price of freedom is respo</li> </ul>	and senior management nsibility
<ul> <li>The responsibility for the SST lies with se board of directors not with the Responsibility</li> </ul>	enior management and the ole Actuary
	Slide from Philipp Keller, FINMA,
Bundesand für Privatvesicherungen BPV     Critice Mederal des assanances privates GRAP     Utico foderale delle association (private UKAP	6





### Rule based vs Principle based (2/2)

- 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**

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 open 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

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

Since 2014, the number of descriptive scenarios has been reduced by FINMA and replaced by annually automatically generated 'quadrant-scenarios\*'

#### Quadrant

\*

A quadrant  $Q \subset \mathbb{R}^{82}$  is defined as the intersection of finitely many half spaces. That is, we can find  $k \ge 0$ ,  $x_i \in \mathbb{R}$  and (non degenerate) linear forms  $\lambda_i \in (\mathbb{R}^{82})'$  over  $\mathbb{R}^{82}$  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)









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





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 ration 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

• More efficient capital structures

- Changing new products
- Recapitalization by shareholders
- Changing existing guarantees (mutuals)





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 derisk 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

		2007	2008	2009	2010	2011	2012	2013	2014
lega- entities	Life	22	22	21	21	20	19	19	18
	P&C	78	79	79	79	79	81	80	79
	Reinsurer	25	28	26	27	27	26	28	29
	Captives	46	42	42	35	35	35	34	33
Branches	Life	4	4	4	4	4	4	4	3
	P&C	39	43	46	47	45	42	44	47

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

		2008	2009	2010	2011	2012	2013	2014
Solvency I	Total	289%	325%	359%	340%	342%	348%	377%
	Life	202%	222%	245%	279%	281%	301%	318%
	P&C	324%	377%	446%	407%	420%	425%	456%
	Reinsurer	383%	424%	439%	356%	347%	332%	
SST	Total	144%	212%	205%	170%	190%	193%	173%
	Life	87%	117%	145%	105%	145%	153%	149%
	P&C	152%	236%	225%	188%	206%	203%	191%
	Reinsurer	231%	292%	246%	220%	219%	233%	



### 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

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

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

	SST	Solvency II
Legal Framework	Insurance Supervision Act + Insurance Supervision Ordinance + Circulars	Directive + Implementing Measures +Level 3 Guidance
Implementation	2006 with fully binding capital requirements in 2011	2016+
Standard Approach	Standard Model or methodology	Standard Formula, factor based
Internal Models	Base-case is the use of an internal model. Mandatory for all reinsurers and insurance groups	With approval, but use of the standard formula is the base-case
Group Requirements	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	Based on a consolidated approach
Financial Market Risk	Yes	Yes
Credit Risk	Yes	Yes (but no EUR sovereign risk)
Insurance Risk	Yes	Yes
Operational Risk	No	Yes
Liquidity Risk	Partially (liquidity risk due to lack of capital mobility for groups)	Νο





### General

	SST	Solvency II
Risk Measure	Expected Shortfall	Value at Risk
Confidence Level	99%, but can be changed by FINMA for different type of insurers or for different market situations	99.5% (fixed in SII Directive)
Time Horizon for capital	1 year	1 year
Capital Add-ons	For failings in operational risk management, for short-comings of models	No
Levels	33% of TC, 80% of TC and 100% of TC	MCR and SCR
Supervisory Interventions	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	Below MCR ultimate supervisory actions, below SCR graduated actions
Restoration periods	Below 33% immediate, below 80% of TC: 2 years, below 100% of TC: 1 year, in practice often longer	Below MCR: 3 months, below SCR: 6 months
Public disclosure	No	Yes





### **Standard Approaches**

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





### Valuation

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





### **Group Requirements**

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





### SST, Solvency I and Solvency II







### SST, Solvency I and Solvency II







### **Balance Sheets**







### SST and Solvency II



### SST Standard Model and Solvency II formula

### SST Standard Model

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

#### **Solvency II Standard Formula**

XICONGRESSO ATTUARI

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





### **Solvency II Standard Formula**







# Consequences to the actuarial profession





- Bevor 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









