

National Macroprudential Insurance Regulation: a Swiss Case Study

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Aim of this presentation

The companies of an insurance market form a **network**, linked through

- investments into common asset classes,
- having similar liabilities,
- participations, reinsurance contracts, etc.

The **structure of the network** may amplify disruptions of the market additionally.

→ market concentration, similar asset allocations, etc.

▷ How do various scenarios affect this insurance network?

→ **macroprudential point of view**.

Outline

The case study is organized as follows.

- Introduce insurance market and market parameters
 - balance sheet structure according to the *Swiss Solvency Test* (SST)
- Revaluation of the balance sheets for given stress scenarios
 - financial market scenarios
 - scenarios related to insurance risk
 - ... and together with *cascade effects* (increase in lapse rates etc.)

CHF insurance market (1/2)

- We consider an insurance market with 73 insurance companies
 - ★ 15 life insurers;
 - ★ 28 non-life insurers;
 - ★ 16 health insurers;
 - ★ 14 reinsurers,with CHF as domestic currency.
 - Data on their balance sheets and on market parameters are based on
 - ★ publicly available data on the Swiss market (end of year 2013);
 - ★ information provided by some Swiss insurers;
 - ★ assumptions based on typical insurers.
- ▷ This CHF insurance market is similar to the Swiss insurance market.
→ volumes, market sensitivities, market shares.

CHF insurance market (2/2)

- Important from a macroprudential point of view is the average weighted

$$\text{SST ratio} = \frac{\sum_i \text{risk bearing capital of company } i}{\sum_i \text{target capital of company } i}.$$

- For the CHF insurance market we have (beginning of 2014)

$$\text{SST ratio} \approx \begin{cases} 140\% & \text{in life insurance,} \\ 190\% & \text{in non-life insurance,} \\ 340\% & \text{in health insurance,} \\ 230\% & \text{in reinsurance.} \end{cases}$$

Financial market stress scenarios

Assumption: The changes in the market risk factors are approximated by a multivariate normal distribution with mean $\mathbf{0}$ and positive definite covariance matrix Σ .

Recall (conditional distribution): Let $d \geq 1$ and

$$\mathbf{Z} = \begin{pmatrix} \mathbf{Z}_1 \\ \mathbf{Z}_2 \end{pmatrix} \sim \mathcal{N}_d \left(\mathbf{0}, \Sigma = \begin{pmatrix} \Sigma_{11} & \Sigma_{12} \\ \Sigma_{21} & \Sigma_{22} \end{pmatrix} \right),$$

with $\mathbf{Z}_1 \in \mathbb{R}^k$ and positive definite covariance matrix $\Sigma \in \mathbb{R}^{d \times d}$. Then, for $\mathbf{z}_1 \in \mathbb{R}^k$,

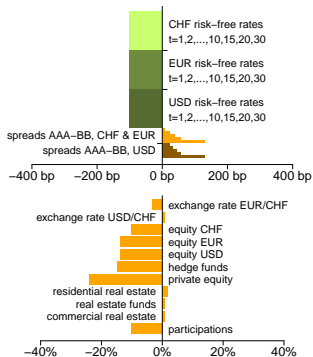
$$\mathbf{Z}_2 |_{\mathbf{z}_1 = \mathbf{z}_1} \sim \mathcal{N}_{d-k} \left(\Sigma_{21} \Sigma_{11}^{-1} \mathbf{z}_1, \Sigma_{22} - \Sigma_{21} \Sigma_{11}^{-1} \Sigma_{12} \right).$$

To define the financial market stress scenarios:

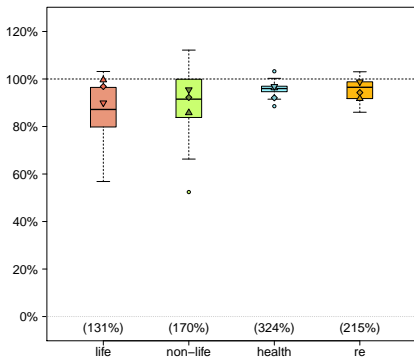
- 1) Predefine changes in some market risk factors.
- 2) Define the changes in the remaining factors by their conditional means.

Decline in all risk-free rates by 100 basis points

changes in market risk factors



impact ratio = $1 + (\Delta RBC) / RBC$

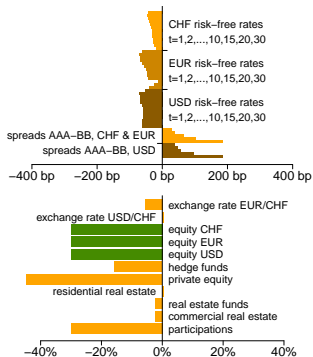


► No substantial macroprudential effect.

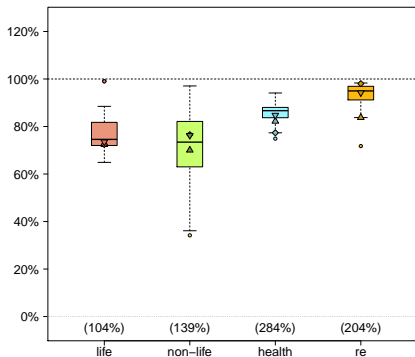
- Legend: - (lhs): predefined changes (green), resulting expected changes (orange)
 - (rhs): first (\blacktriangle), second (\blacklozenge) and third (\blacktriangledown) largest insurance company
 - (rhs), in brackets: $SST\ ratio \times impact\ ratio$ (weighted averages)

Decline in the equity markets by 30%

changes in market risk factors



impact ratio = $1 + (\Delta RBC) / RBC$

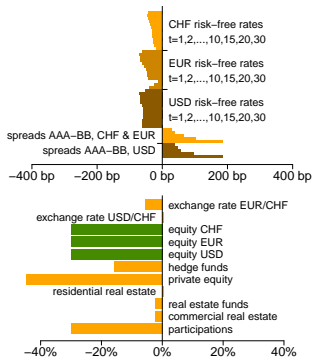


► Severe impact on the life insurance market.

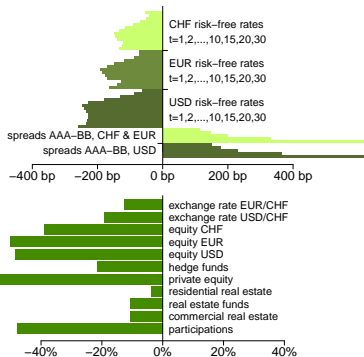
- Legend: - (lhs): predefined changes (green), resulting expected changes (orange)
 - (rhs): first (▲), second (◆) and third (▼) largest insurance company
 - (rhs), in brackets: $SST\ ratio \times impact\ ratio$ (weighted averages)

Stock market crash vs. historical scenario

decline in the equity markets by 30%



financial crisis 2007/2008 (FINMA)

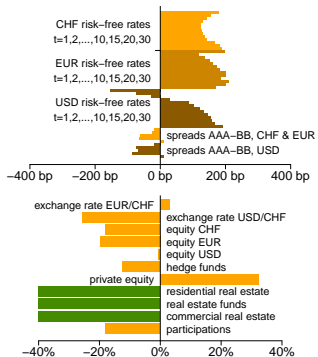


▶ The conditional expected changes (orange) provide a reasonable scenario.

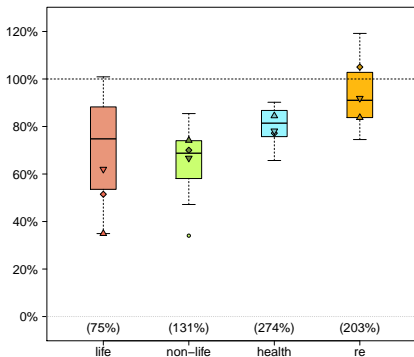
Legend: - predefined changes (green), resulting expected changes (orange)

Real estate market crash

changes in market risk factors



impact ratio = $1 + (\Delta RBC) / RBC$



▶ Drastic impact on the life insurance market; large companies are highly affected.

- Legend: - (lhs): predefined changes (green), resulting expected changes (orange)
 - (rhs): first (\blacktriangle), second (\blacklozenge) and third (\blacktriangledown) largest insurance company
 - (rhs), in brackets: $SST\ ratio \times impact\ ratio$ (weighted averages)

Conclusions

For the CHF insurance market considered we have observed the following.

- The non-life, health and reinsurance sectors are able to absorb the stress scenarios considered in an appropriate way.
- The life insurance sector is sensitive to disruptions of the financial market.
 - ★ Especially a real estate market crash is a severe danger to this sector.