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Eidgenössische Finanzmarktaufsicht FINMA
Autorité fédérale de surveillance des marchés financiers FINMA
Autorità federale di vigilanza sui mercati finanziari FINMA
Swiss Financial Market Supervisory Authority FINMA

Internal Models - FINMA's experience

Bahnhofkolloquium

Martin Jakob

March 10 2014

IM review process -current state

- FINMA has to verify if the model is useful to meet the qualitative, quantitative and organizational requirements.

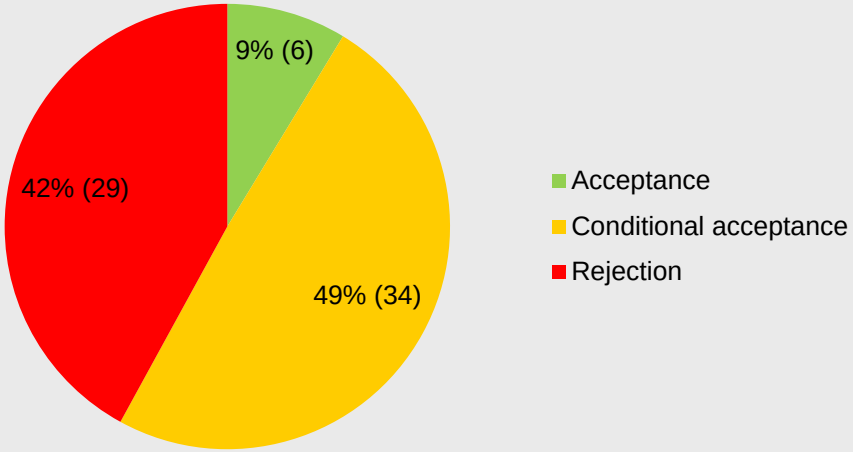
    1. Result of FINMA's IM-Model review: Report
    2. Discussion of report with company

- Based on 1. and 2., FINMA has to produce a **decree** (either acceptance, conditional acceptance or rejection).

- Problem: Decree is always written in legal terms while the model deals with quantitative modeling and risk measurement.

Decisions by Dec. 31 2013

First decisions already communicated to companies (in total)



	L	NL	Re	Grp
Acceptance	1	2	2	
Cond. acceptance	8	11	13	2
Rejection	3	9	11	6

Needs of companies

- A model change required by FINMA typically affects various domains of a supervised insurer. Depending on the scope of the change it takes time for the company to
  - develop
  - test
  - document
  - communicate internally and to the supervisor
- Therefore FINMA tries to send its new comments / decisions well ahead of next SST phase («no surprise on short notice»).

Examples of Trade Offs experienced

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Scientific rigor

Various problems of modelers call for pragmatic solutions

FINMA's decision is in juridical terms

Company specific

Equal treatment of equal things

Decision on a case by-case basis

Market wide

Model Evolvement through time

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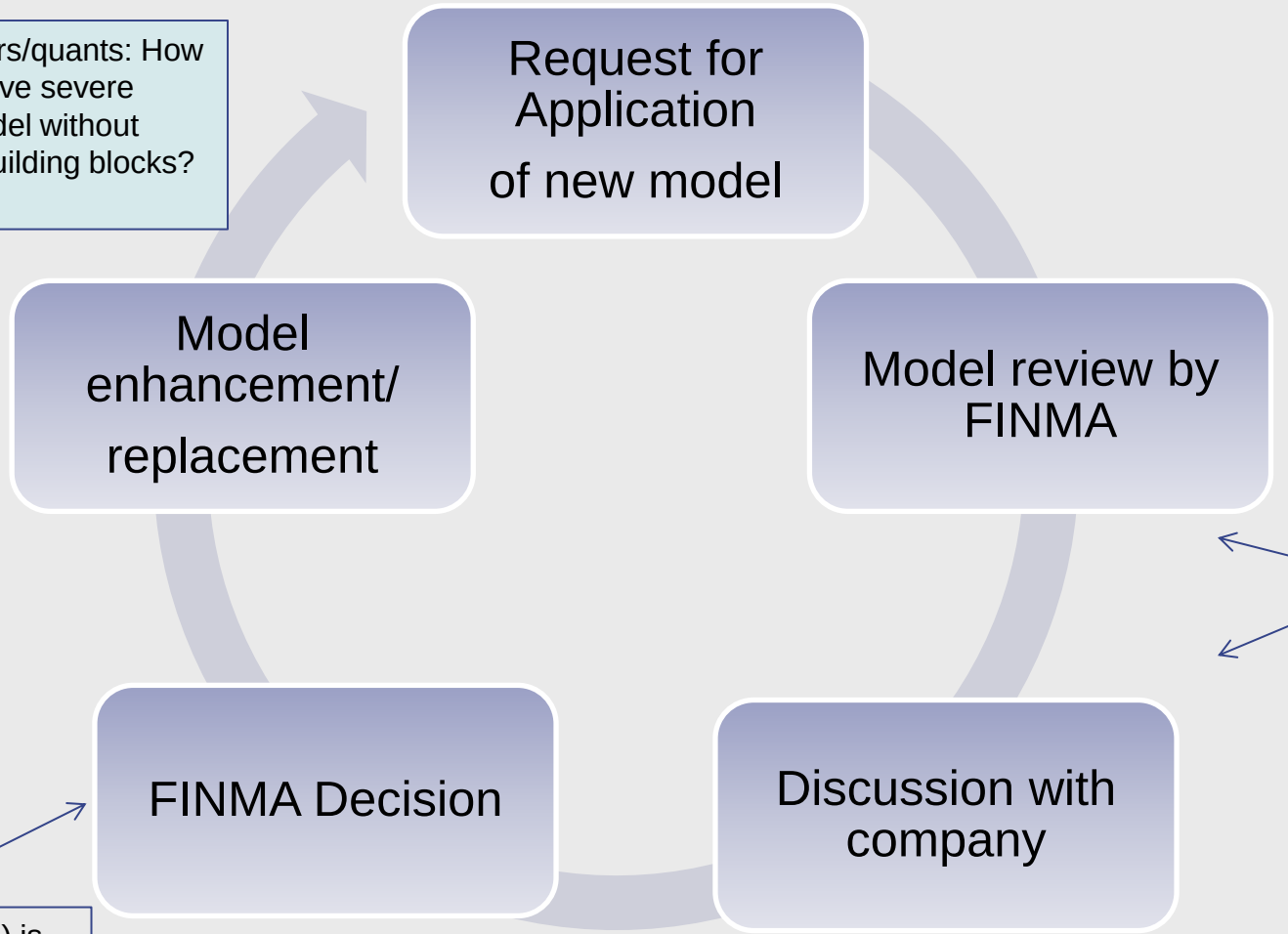
Question for modelers/quants: How is it possible to remove severe deficiencies of a model without removing its basic building blocks?



Final decision (decree) is always written in legal terms.

On consistency

- Remember slides earlier presented

The Importance of Being Consistent

con·sis·tent (k&n-'sis-t&nt): marked by harmony, regularity, or steady continuity **:** free from variation or contradiction

Merriam-Webster Online Dictionary

For the Swiss regulator, consistency of the SST is key

Without consistency:

- results are intransparent, prudence will be implicit
- a layer of economically irrelevant arbitrage instruments will be developed to exploit regulatory inconsistencies

Main requirements on consistency:

- **between valuation of assets and liabilities**
- **between valuation and risk quantification**
- **between individual and group level solvency tests**
- **between insurers and reinsurers**
- **between life and nonlife**

Bundesamt für Privatversicherungen BPV
Office fédéral des assurances privées OFAP
Ufficio federale delle assicurazioni private UFAP
Uffizi federal d'assicuranzas privatas UFAP

4

Consistency and valuation

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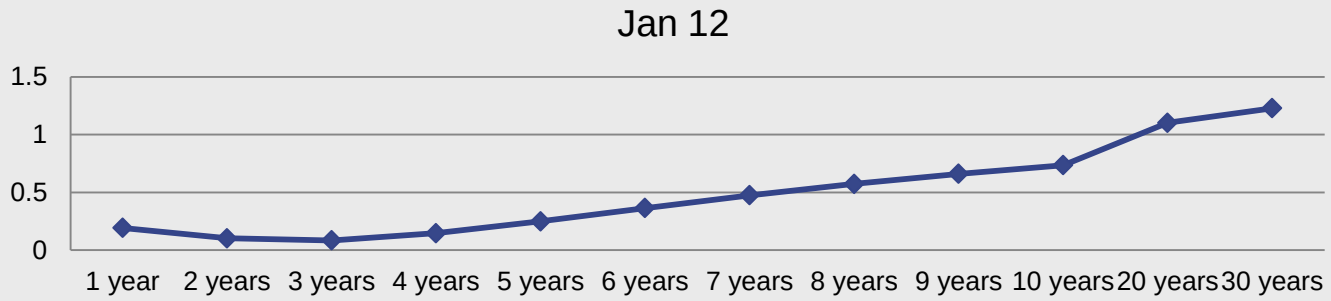
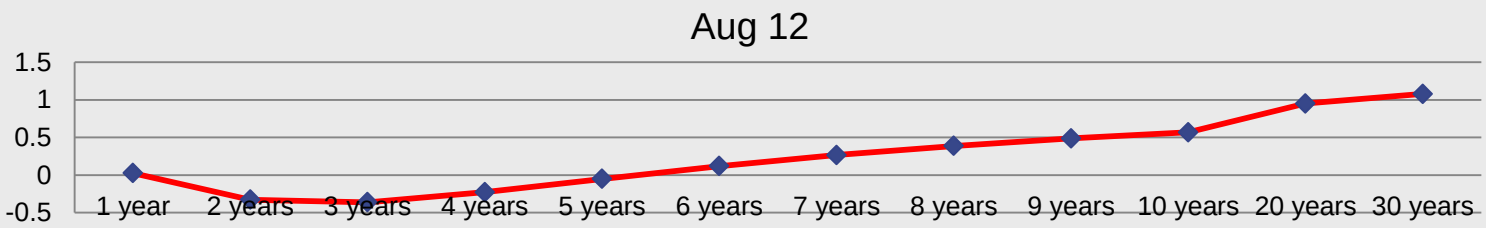
- Important aspect of SST: Valuation of financial instruments has to be done by «methods that are recognized in mathematical finance»
- Some financial instruments used in insurance industry proved to be difficult to value (fundamental questions: freeness of arbitrage, market completeness, replicability of assets and liabilities, calibration issues).
- If valuation is difficult, how much more difficult is it is to measure the risks, i.e. the deviation of the value of a position within, say one year's time?

It is FINMA's experience that, at least on a practical level, these problems can be solved.

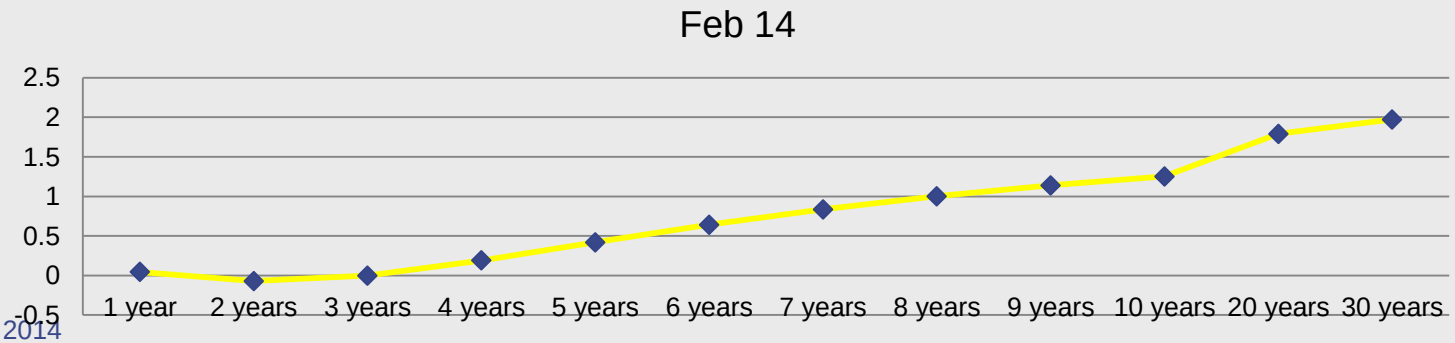
Risk models and reality

- Which stochastic interest rate models do attribute a strictly positive probability to these risk free zero coupon rates?





Source: SNB



Documentation issues (examples)

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- Difficult wording:

“In case of the presence in the treaty of the clause called first aggregate deductible, the loss to be ceded through the XoL treaty for the first instalment of one layer is not ceded to the reinsurers but retained by xy company; other reinstalments being ceded to the reinsurers.”

- Insufficient justification:

“The Gauss copula is fast and easlily implemented and lends itself to the Monte Carlo studies of risk. […] This aggregation procedure is widely used in the industry and only depends on the risk dependency structure used in the model […].”

Model issue: High dimensions

- Apart from the well-known fact that the Gaussian copula has weak tail dependency (already apparent in two dimensions) there is another problem:
- *"Assume that there is a sequence ($\Sigma^{(n)}$) of structural matrices for Gaussian copulas, where $\Sigma^{(n)}$ is an n-dimensional positive definite matrix. Further assume that the corresponding sequence of spectra tends to a small set. Then the corresponding sequence of standardized sums of identically distributed random variables that are dependent via the Gaussian copulas tends to follow a normal law."*

Characteristic function:

$$\varphi(t) = \int_{[0,1]^n} e^{it'\tilde{q}(z)} \cdot \exp\{\frac{1}{2} q(z)'[diag(\sigma_1^{-2}, \ldots, \sigma_n^{-2}) - \Sigma^{(n)}] q(z)\} \frac{\prod \sigma_i}{|\Sigma^{(n)}|^{1/2}} dz_1 \wedge \cdots \wedge dz_n$$

Conclusion

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- With SST we have a reasonable framework to assess the risk of an insurance company in a *holistic* way (for small, mid sized and large entities and groups, all types of insurers)
- Possibility to use internal models gives incentives for insurers to understand their own risks and to measure them.

- However, a principle-based and risk-oriented approach has its price:

  Internal model review is demanding for all people involved

  Not all questions are settled (some not even theoretically)

  Time consuming w.r.t. processes and discussions

Conclusion

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- Avoid going back to rule-based procedures

- Rule based risk assessment means
  - Focusing on compliance rather than on understanding underlying risks
  - Inconsistency
  - Incentives to arbitrage
  - Systemic risk

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