



Solvency II – Quo vadis?

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Swiss Re Solvency II Homepage: Top Topics →
Solvency II



Contents

- **Preliminary Remarks**
- Evolution of valuation methods and solvency models
- Valuation of Liabilities and Quantiles
- Modelling Risks
- Conclusion / Discussion



History: From “collegia funeratica” to global Reinsurance

- Poor people could not afford their funerals in the ancient Rome
- Therefore they agreed to help each other in the case of death in order to finance the costly funeral ceremonies
- This is diversification (raison d'être of insurance)
- But did they need regulation and supervisors?
- No, because the whole was based on trust
- But now the insurance industry has become a global play and there is a need for a efficient regulation which does not destroy the underlying principle of diversification



Glarus fire of 1861



- 600 buildings burned down
- 3'000 homeless people
- Damage in excess of CHF 10m versus reserve of Cantonal Fire Insurance of CHF 0.554m

- Perception that such events include huge accumulation risk that cannot be dealt with by local insurers effectively
- Foundation of Swiss Re with broader geographical scope to benefit from diversification effects



San Francisco earthquake 1906



- Earthquake and fire devastate 7 square kilometres and destroy 25'000 houses
 - About 250'000 homeless people
- Various insurance and reinsurance companies refuse claim payments because fire policies contain no reference to earthquake damage
 - Swiss Re is prompt in paying and builds a strong reputation that fuels future business growth
 - Swiss Re is already global and one of the biggest players



Do the right things and do the things right



- We do not need a lot of regulation but relevant one
- Transparency is not the art of producing telephone books full of information, but rather concise and relevant information for transparency
- Beware of the principal agent problem of regulators
- It is key that the new regulation is developed in coordinated efforts between regulators and industry. Only by this
 - Regulation becomes relevant and applicable
 - Is accepted by all parties
 - Can enhance the value creation of the sector



6 Axioms for good and successful regulation

1. It must be **anticipatory**
2. It must be **nimble**
3. It must have integrated and coordinated systems for **developing company positions**
4. it must **cultivate dependable relationships with regulators**
5. it must be **capable of implementing strategies** to accomplish corporate goals
6. it must be **able to manage a crisis** to minimise negative impacts and reputational harm

The principles of Solvency II are broadly established but the detail has yet to be defined

EU Solvency II regime: 3 pillar approach

Pillar I

Target capital requirements (in addition to min. capital requirements) with

- available capital:
economic valuation of assets & liabilities
- required capital:
standard risk model or **internal** risk models


Pillar II

Supervisory review of strength and effectiveness of risk management systems

- risk governance (incl. policies, guidelines, ...)
- internal controls (incl. reports, limit systems, etc)

Pillar III

Public disclosure (enhancement of market discipline)

- 
- Current focus of conceptual elaboration within the EU
 - Principles broadly known but details still to be defined
 - Start of the drafting phase of the Solvency II soon (Q4 2005)

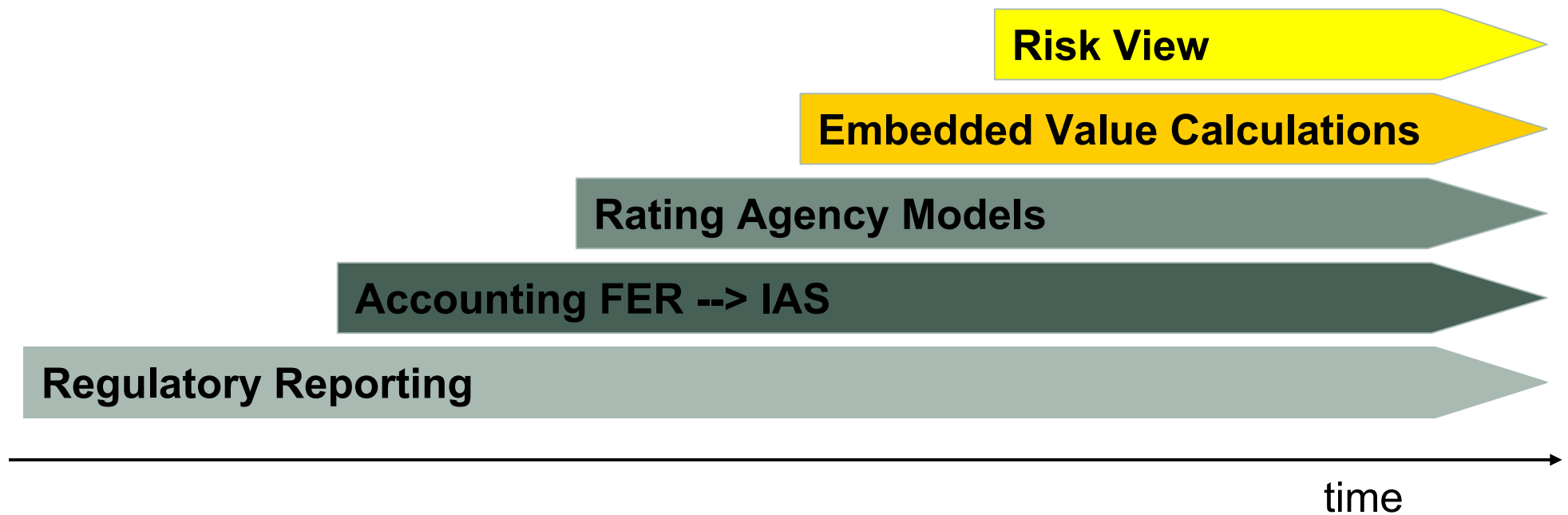


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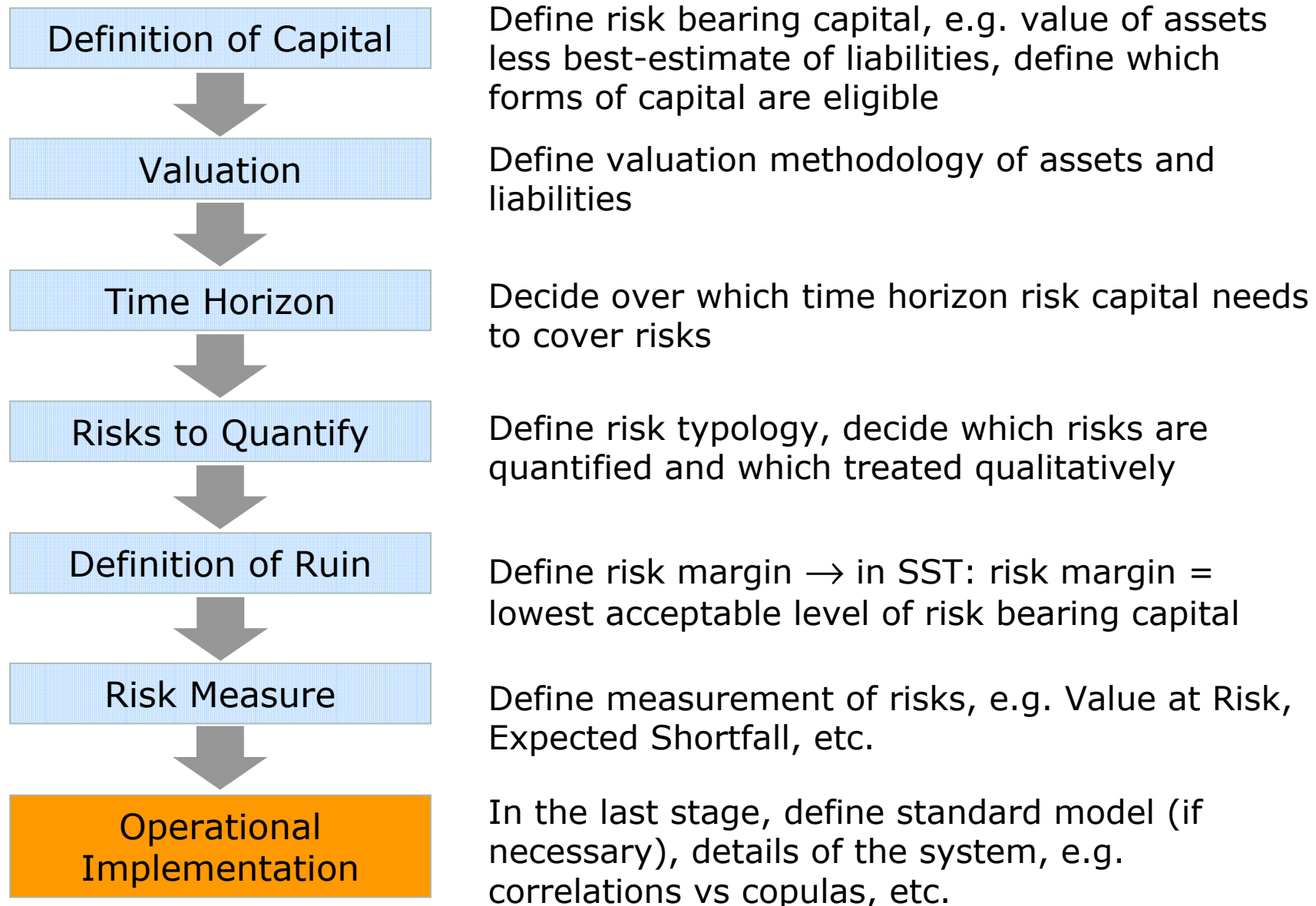


Evolution of valuation methods



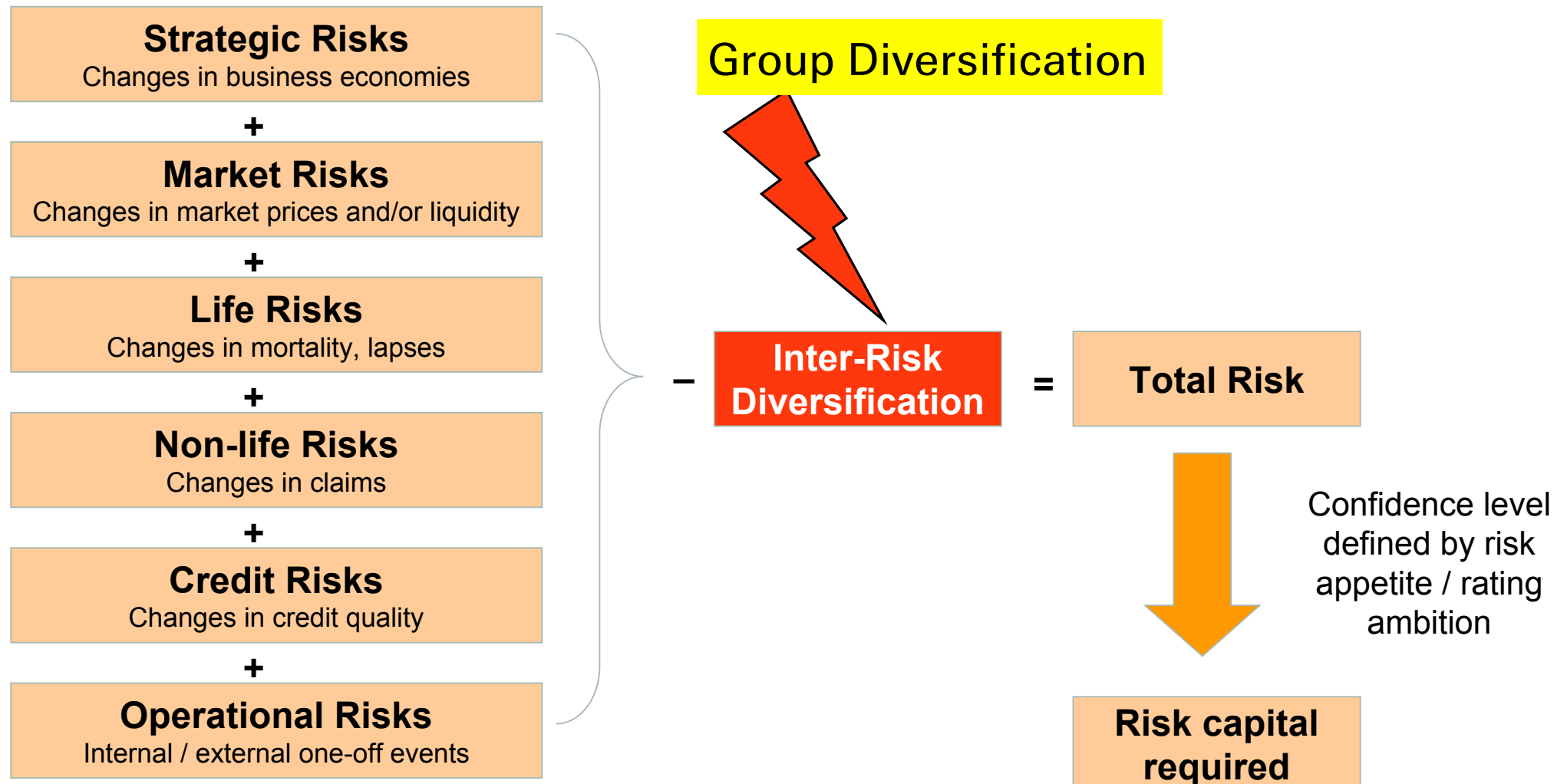


Designing a Solvency Test



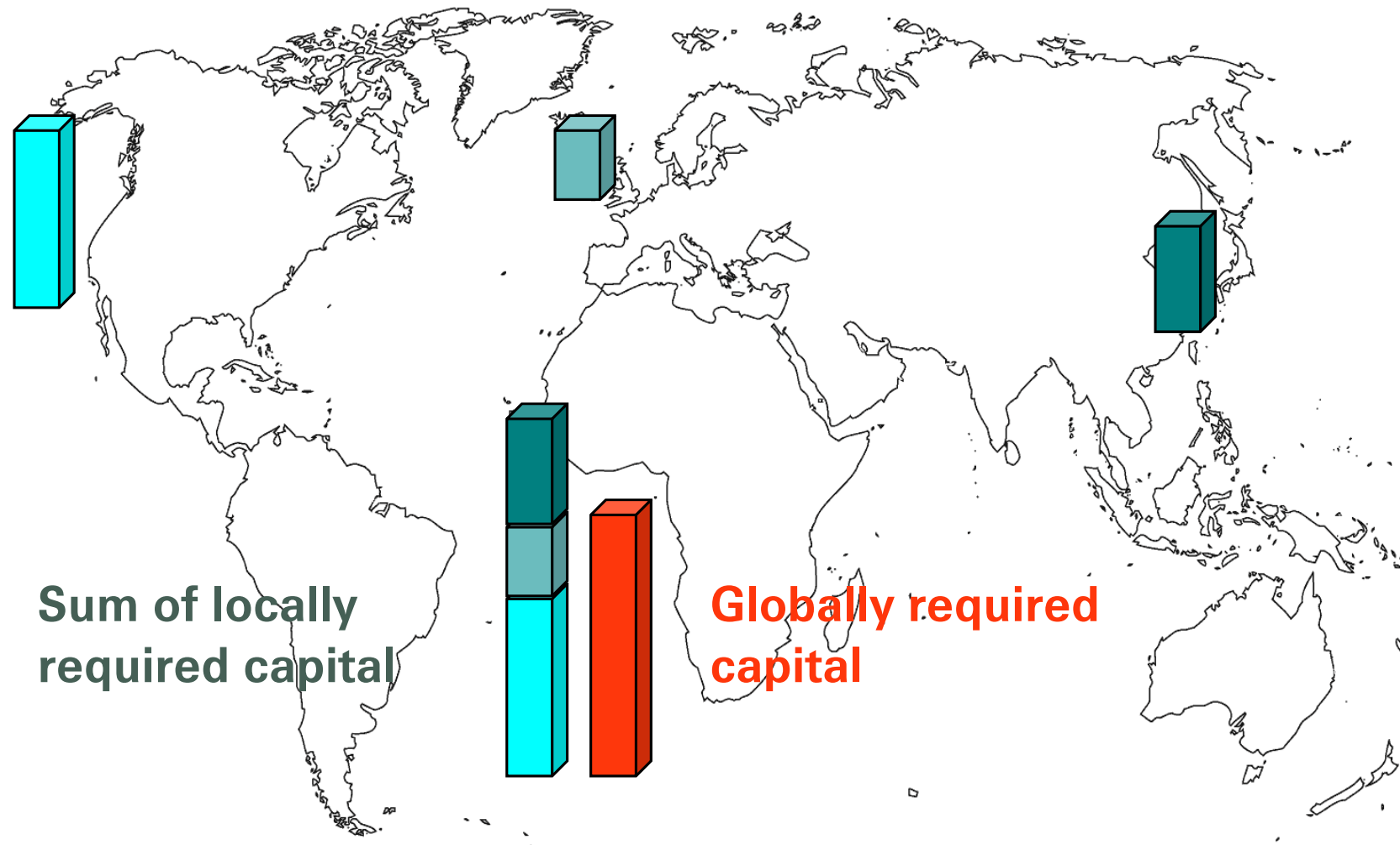


Consistency





Diversification benefit



→ Insurability of extreme losses depends on global risk sharing: disastrous flood losses in China are shared within a global pool



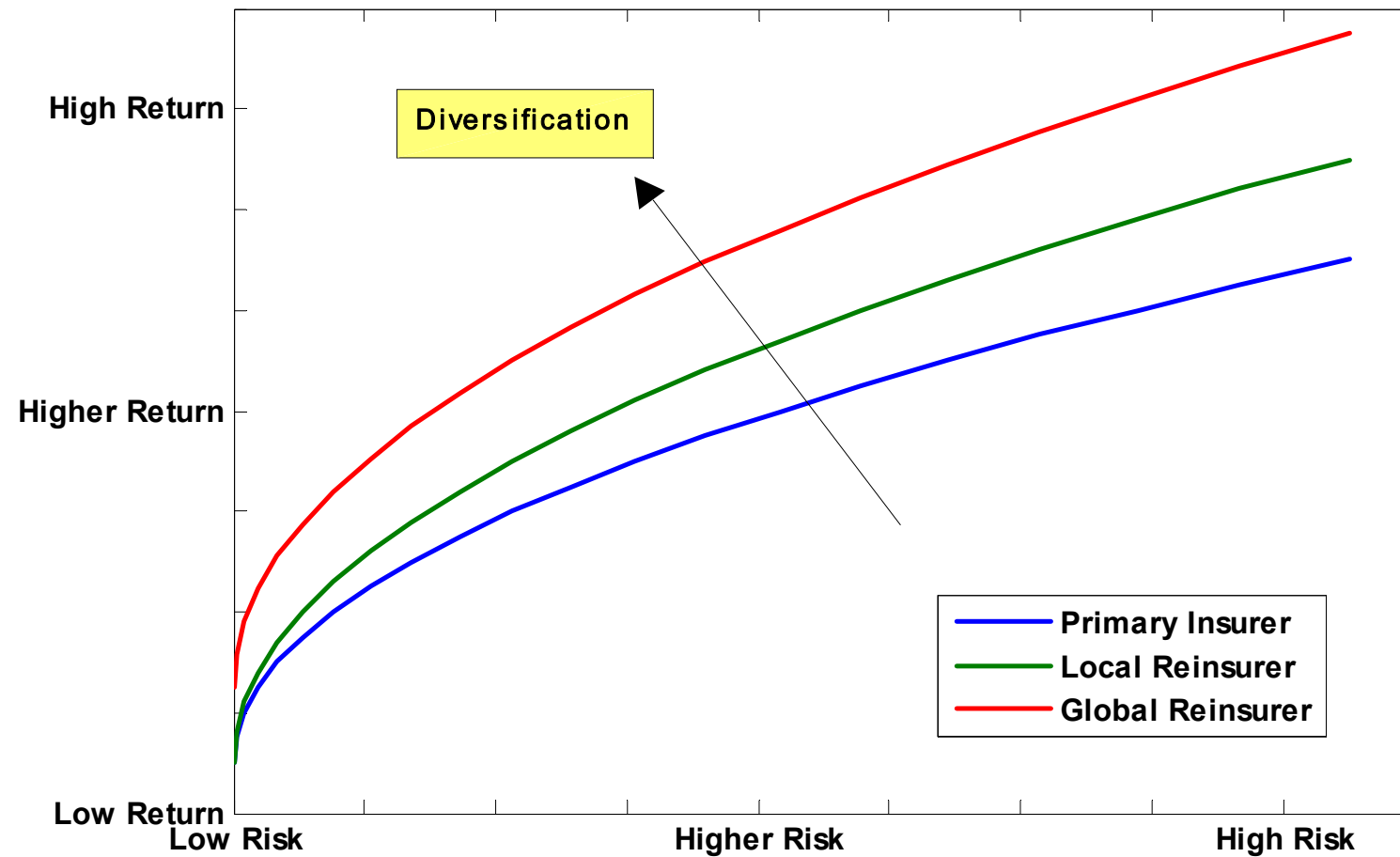
Trust and Insolvency

- Diversification and Capital fungibility are twins
- Not allowing for it results in higher capital costs for the insurance product leading to either
 - higher prices for the end-user or to
 - a less profitable insurance sector for the shareholder, resulting in withdrawal of capital in the longer term

Therefore it is imperative



Raison d'être of reinsurance





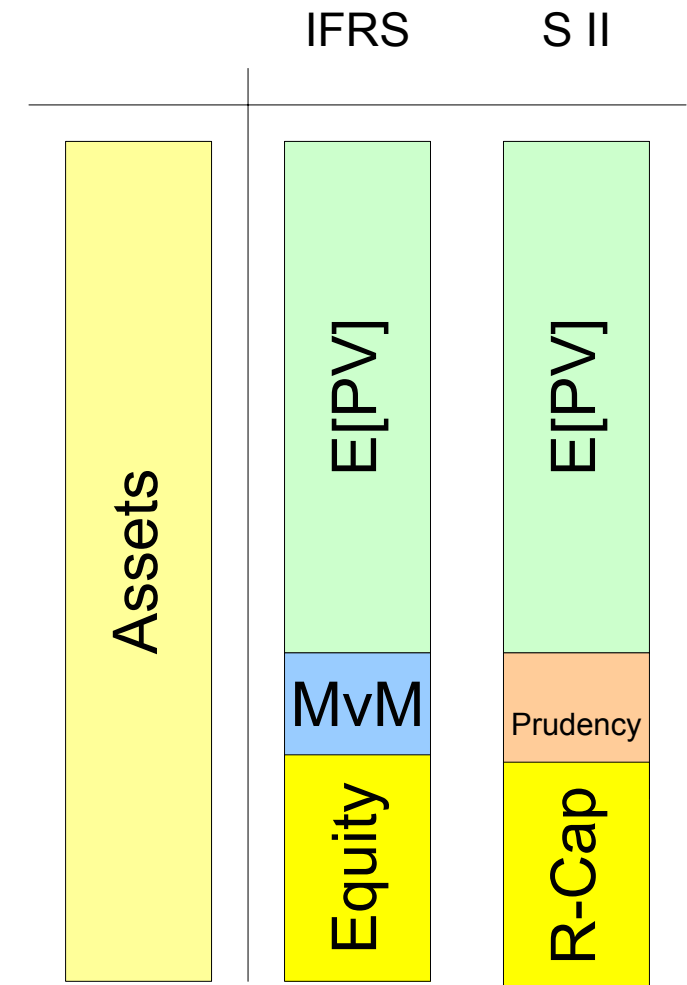
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Principles for the valuation of liabilities

- Mark-to-market principle:
Replicating cash flows
- Two step approach
 - Expected PV
 - Market Value Margin
- Options etc. to be considered
- Two approaches for MVM
 - Cost of Capital
 - Quantile Approach



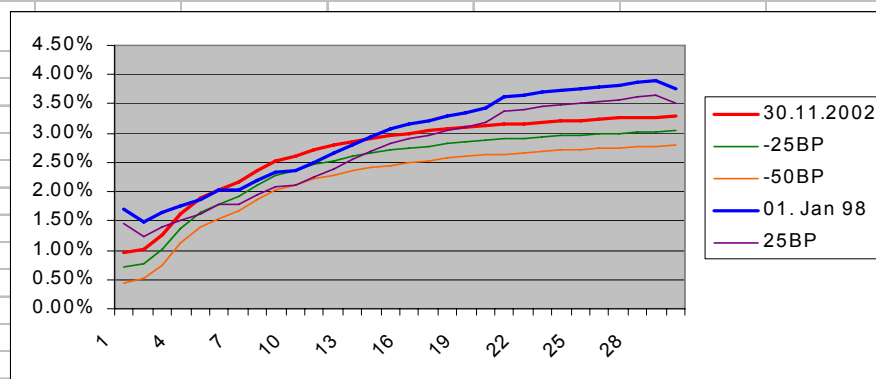


Annuity Portfolio

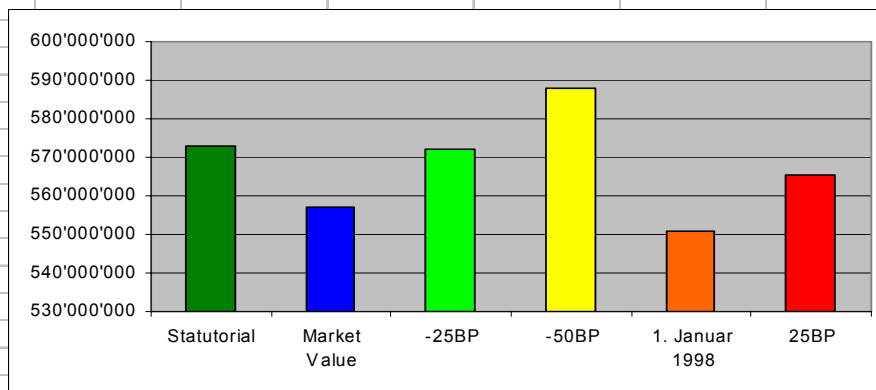
Yield Curve	Calc Forward Rates										
Base Year	2003										
Stat Interest	3.50%										
Scenario	1	2	3	4	5	6	7	8	9	10	11
30.11.2002	0.95%	1.02%	1.25%	1.62%	1.89%	2.03%	2.18%	2.35%	2.53%	2.62%	2.71%
-25BP	0.70%	0.77%	1.00%	1.37%	1.64%	1.78%	1.93%	2.10%	2.28%	2.37%	2.46%
-50BP	0.45%	0.52%	0.75%	1.12%	1.39%	1.53%	1.68%	1.85%	2.03%	2.12%	2.21%
01. Jan 98	1.71%	1.48%	1.66%	1.76%	1.87%	2.04%	2.04%	2.20%	2.34%	2.36%	2.50%
25BP	1.46%	1.23%	1.41%	1.51%	1.62%	1.79%	1.79%	1.95%	2.09%	2.11%	2.25%

Results

Sum of Annuities [E 1996/2000]	38'964'389	
Mathematical Statutorial Reserve	573'117'616	Difference
Market Value	556'879'280	-16'238'336
-25BP	571'956'500	-1'161'116
-50BP	587'755'665	14'638'049
1. Januar 1998	550'684'111	-22'433'505
25BP	565'553'755	-7'563'861

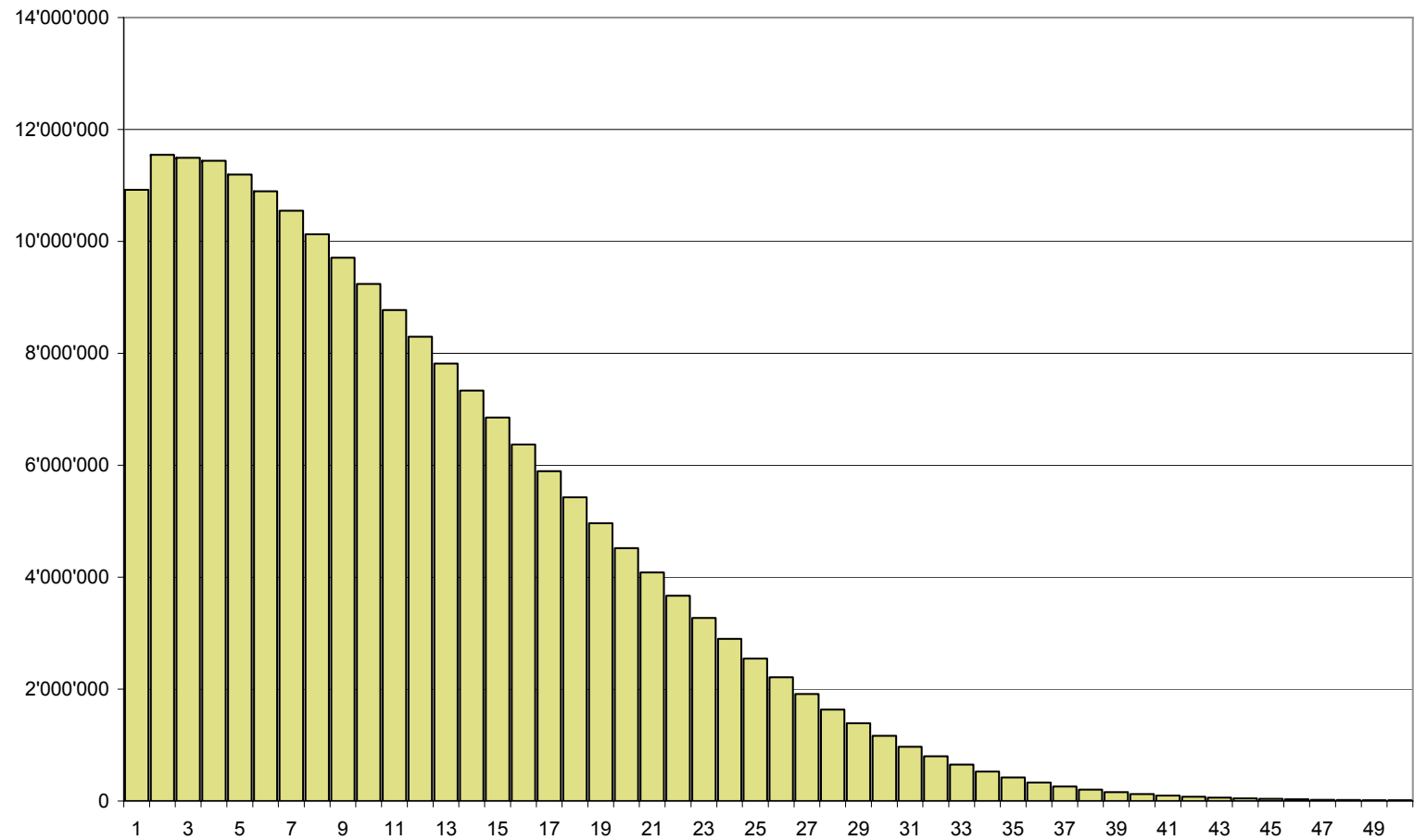


Effective Group Life: Annuities in Payment





Replicating Portfolio – Expected Values



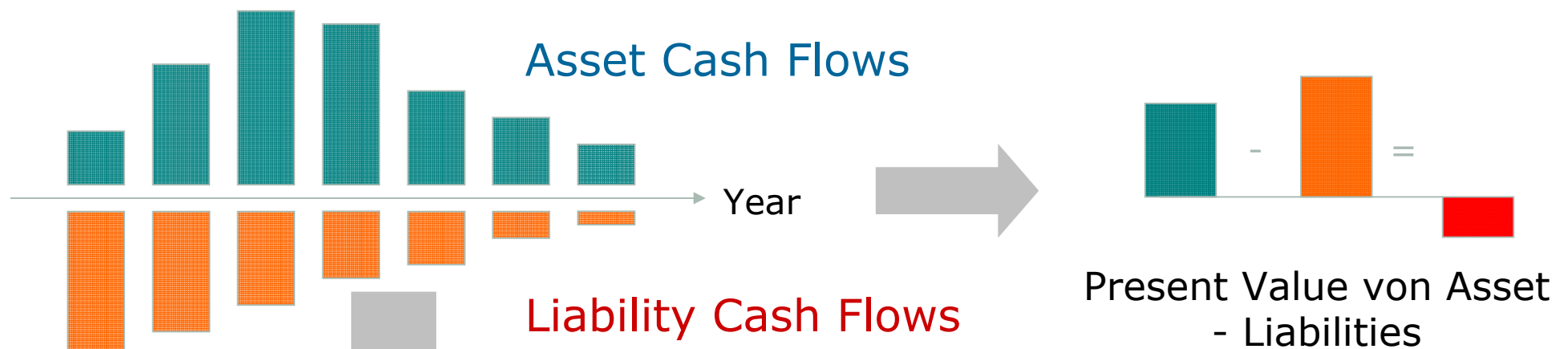
Liquid **Not Liquid**

Model Risk

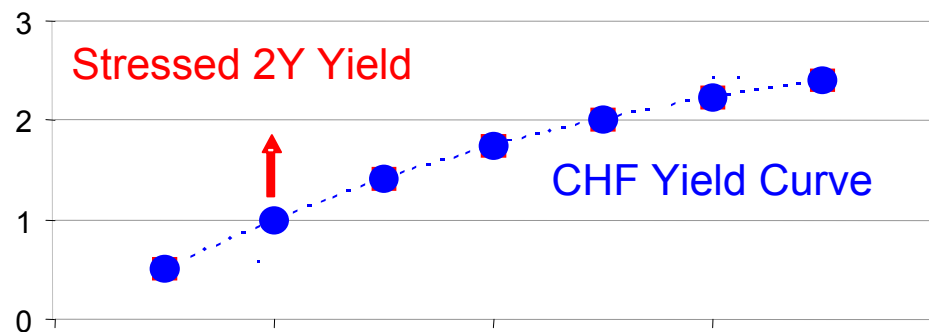


Cash Flow Concept

Example: Sensitivity to 2 Year CHF Yield



Change of present value of net cash flow (assets-liabilities) due to change in the 2 year CHF yield





Quantiles

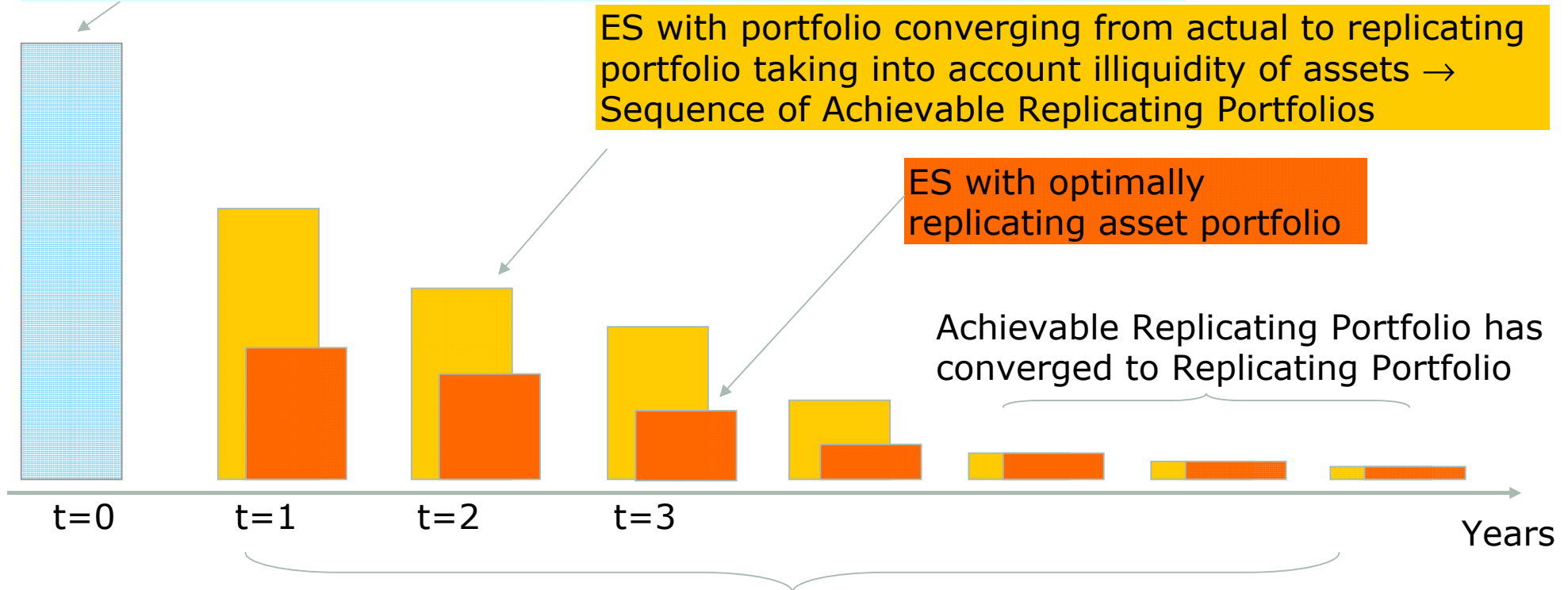
- A 75% CI does not make sense if one only allows for diversifiable risks, at least for life insurance
- Even the add-on as prescribed by CEIOPS does not make sense
- However: No generally accepted models for non-diversifiable risks are available

# Policies	MR Portfolio	Std Dev	S(PF) / MR	3 σ in MR
1'000	32'314'031	256'092	0.7925%	2.378%
3'000	96'942'094	443'564	0.4576%	1.373%
10'000	323'140'314	809'833	0.2506%	0.752%
30'000	969'420'941	1'402'672	0.1447%	0.434%
100'000	3'231'403'138	2'560'918	0.0793%	0.238%
300'000	9'694'209'414	4'435'639	0.0458%	0.137%
1'000'000	32'314'031'380	8'098'332	0.0251%	0.075%
3'000'000	96'942'094'140	14'026'723	0.0145%	0.043%
10'000'000	323'140'313'800	25'609'176	0.0079%	0.024%



The SST Concept: Cost of Capital

ES at $t=0$ does not enter calculation of the risk margin necessary at $t=0$ → risks taken into account for 1-year risk capital and risk margin are completely disjoint and there is no double-counting



ES: 1-Period (e.g. 1 year) risk capital = Expected Shortfall of risk-bearing capital

Future ES entering calculation of risk margin at $t=0$



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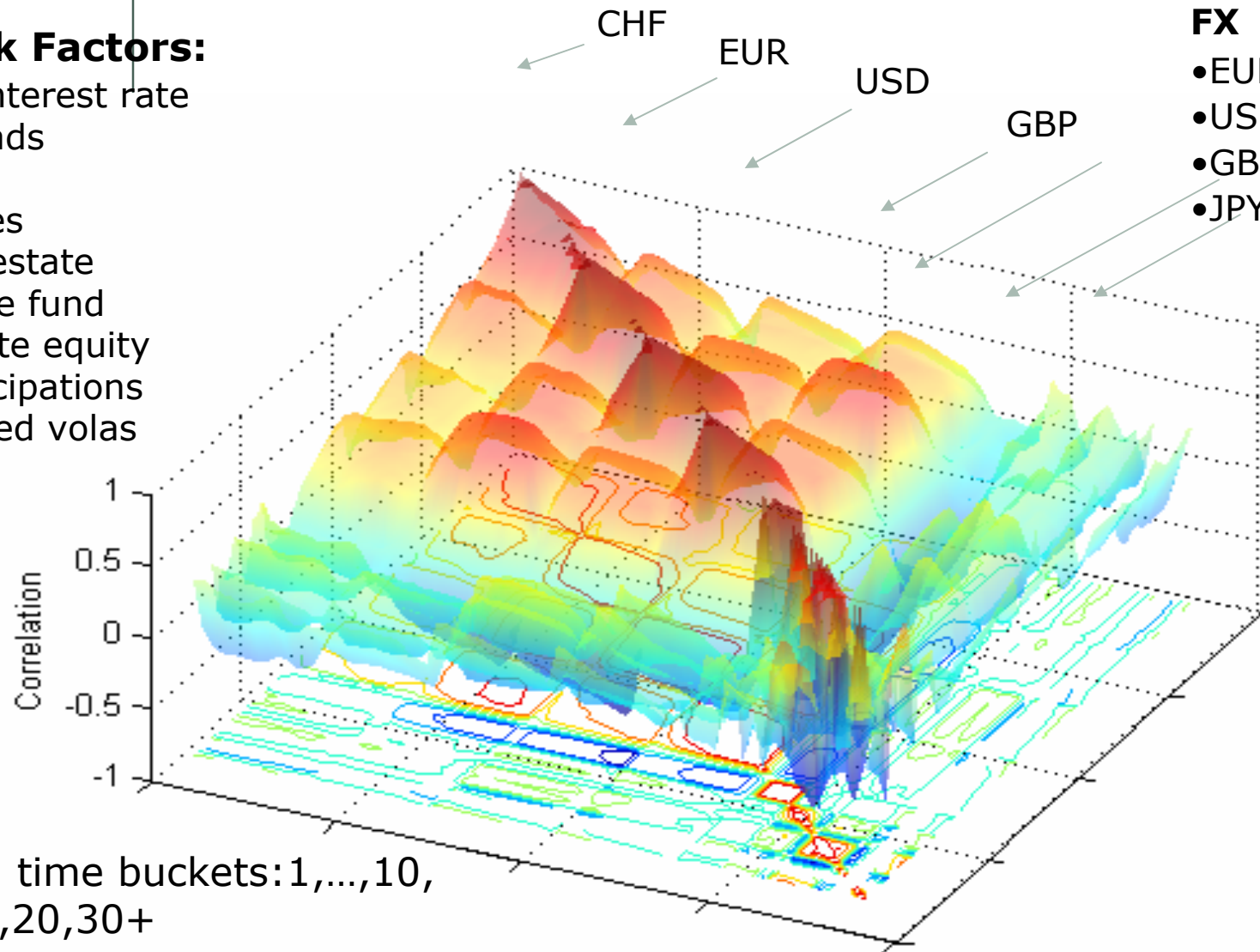
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Standard Model: Market Risk

75 Risk Factors:

- 4*13 interest rate
- 4 spreads
- 4 FX
- 5 shares
- 4 real estate
- 1 hedge fund
- 1 private equity
- 1 participations
- 3 implied volas



i.r. time buckets: 1, ..., 10, 15, 20, 30+

FX

- EUR
- USD
- GBP
- JPY

Spreads

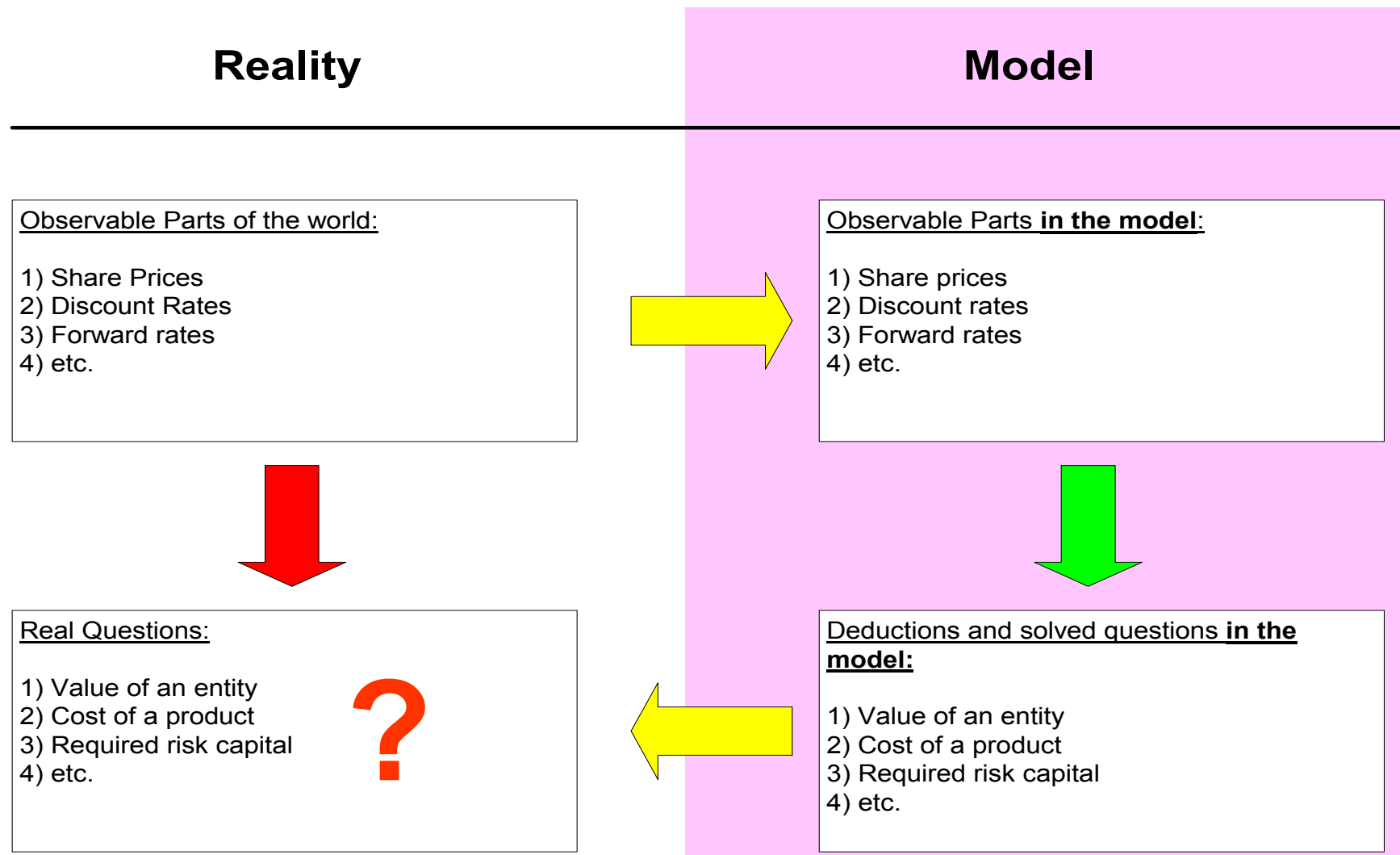
- AAA
- AA
- A
- BAA

Equity

- Shares
 - CHF
 - EUM
 - USD
 - GBP
 - JPY
- Real Estate
 - IAZI
 - Commercia
 - Rüd Blass
 - WUPIX A
- Hedge Funds
- Private Equity



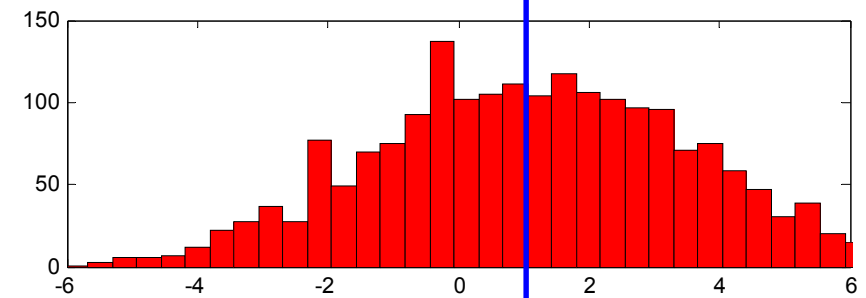
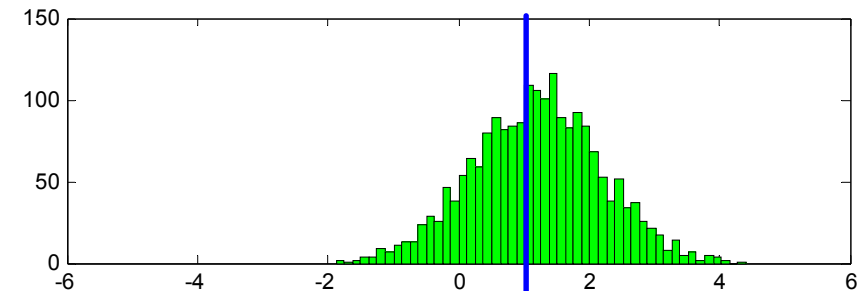
Difference between a model and the reality → KISS-Models





Model the different risks involved

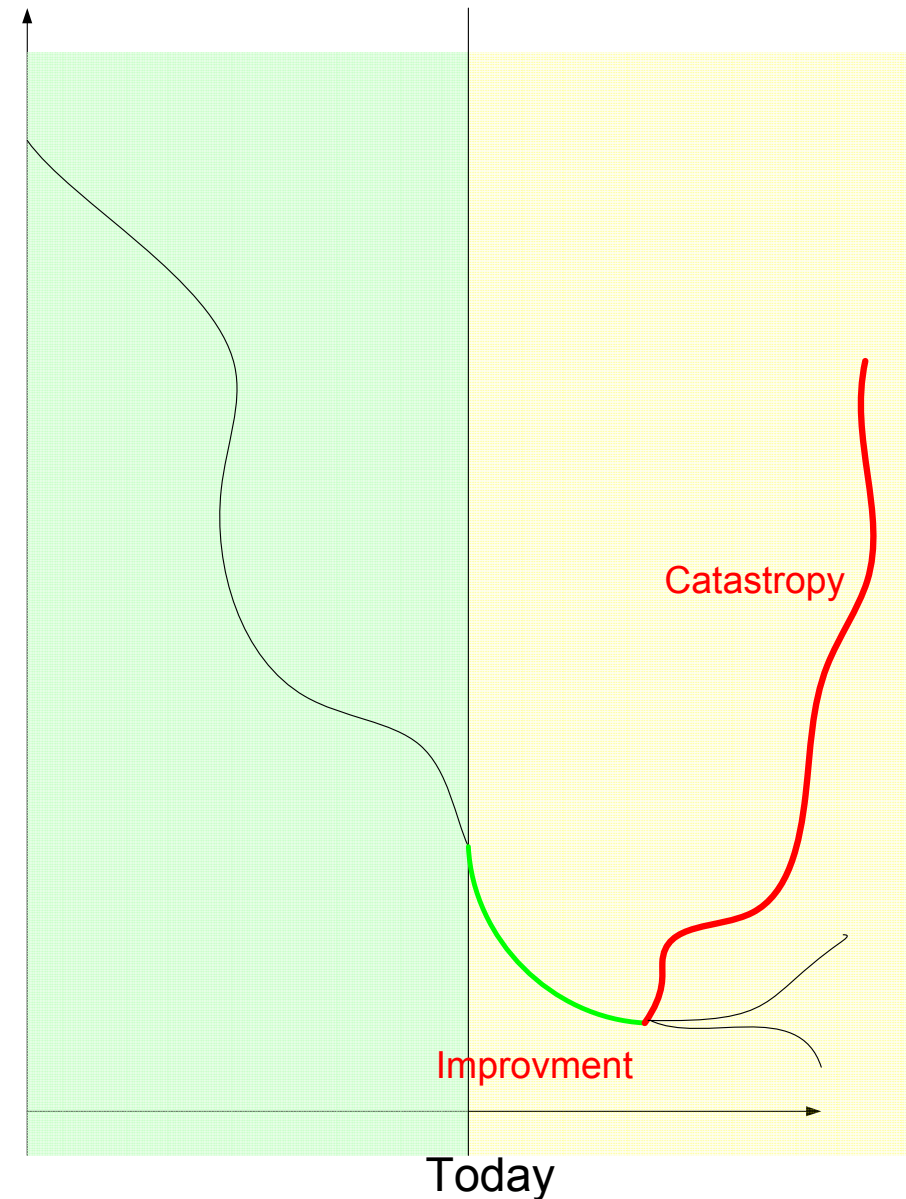
- Problem: How to model the different risks to what extent?
- Which risks are dependent resp. independent?
- Some risks are relatively easy: Asset risks (eg Geometric brownian motion)
- Other risks are more difficult
 - Bonus rates
 - Disability
 - Longevity
- Some risks are almost inaccessible
 - Operational
 - Legislation





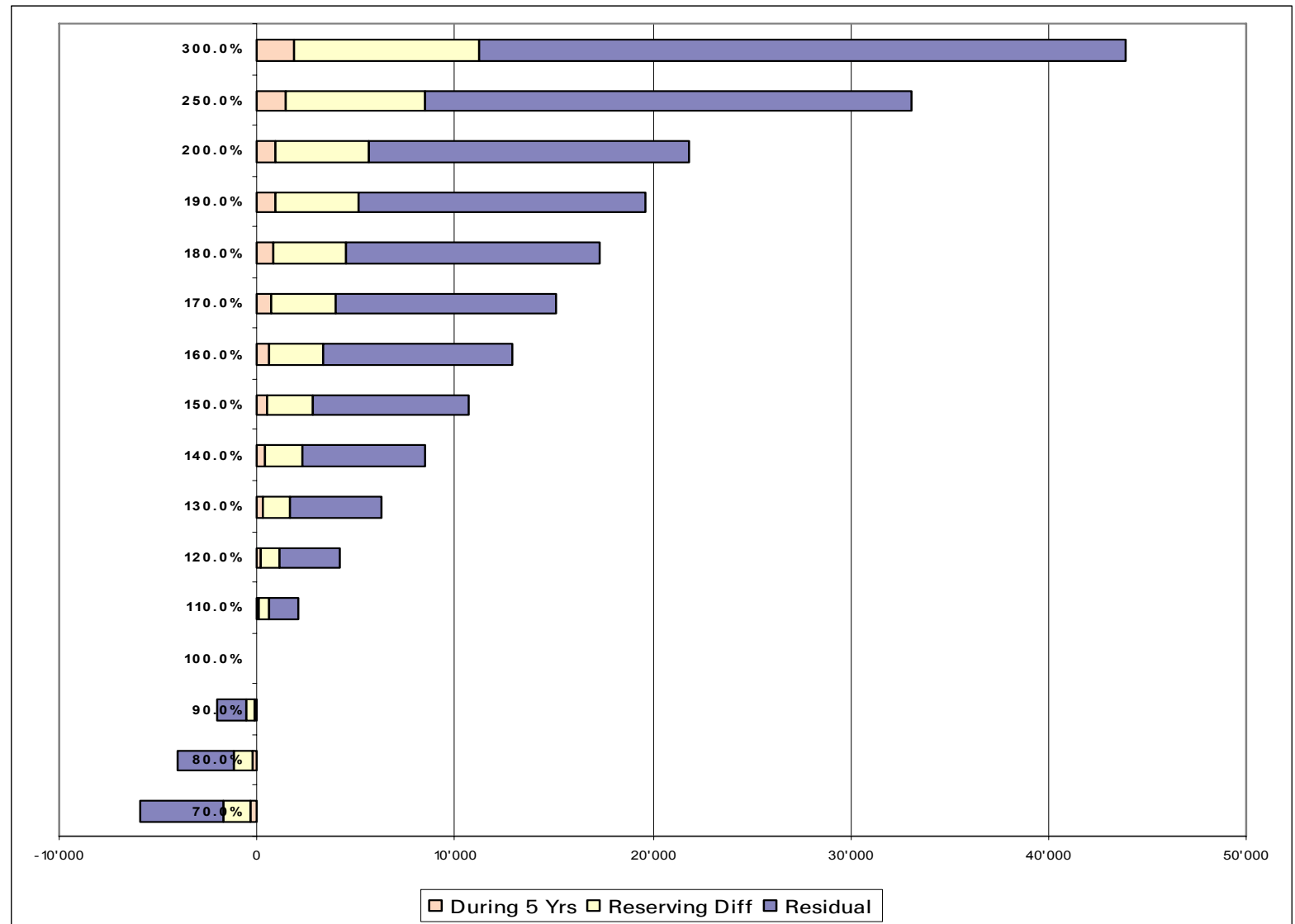
Example: Ageing

- In the last 100 years the expected life span increased tremendously
- There is no generally accepted model for these effects
- Never the less: A 10% faster improvement of mortality is equivalent to roughly 1% of reserves
- On the other hand there is an extensive discussion about a influenza pandemic



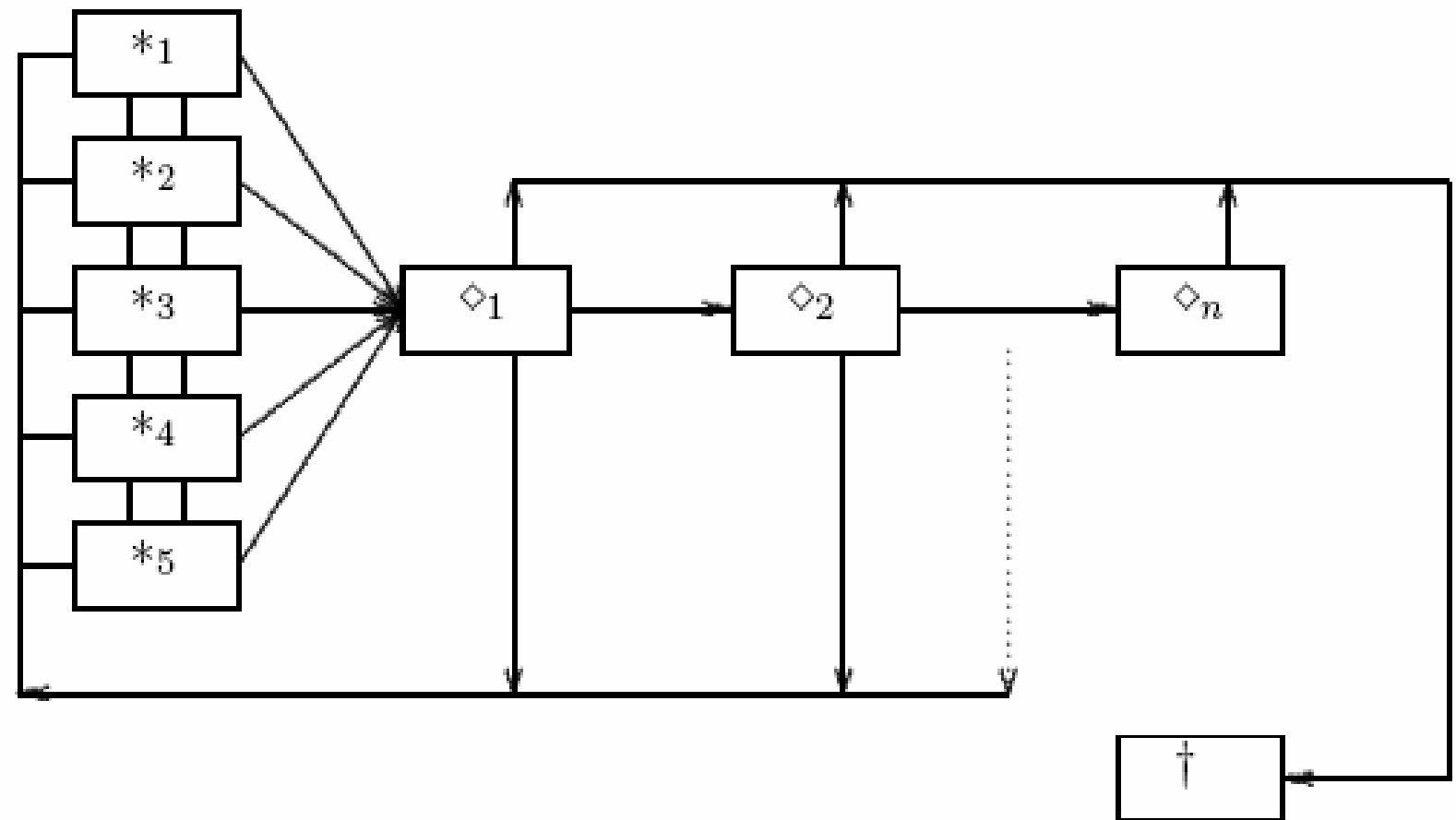


Numerical Example



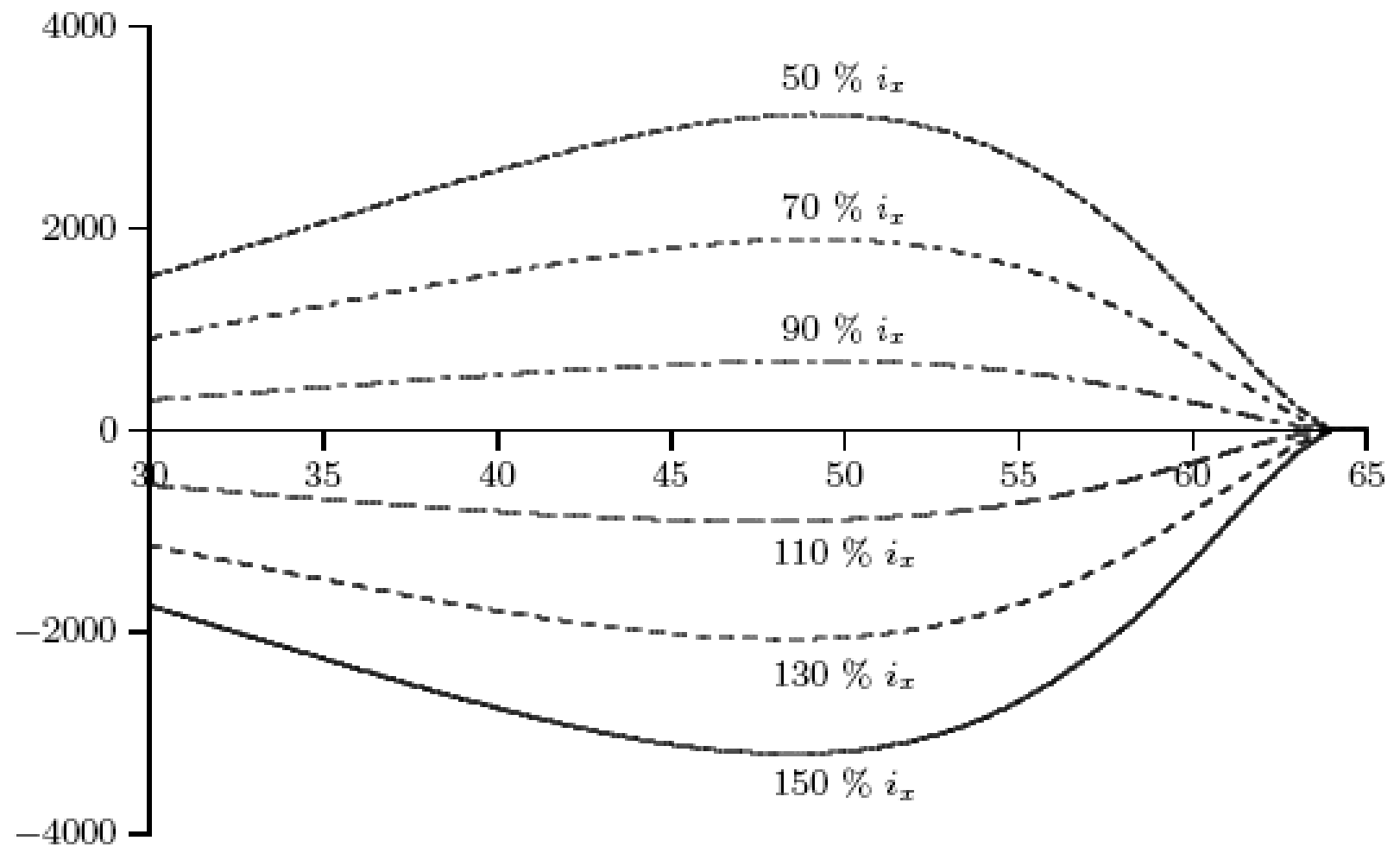


Sort of Models





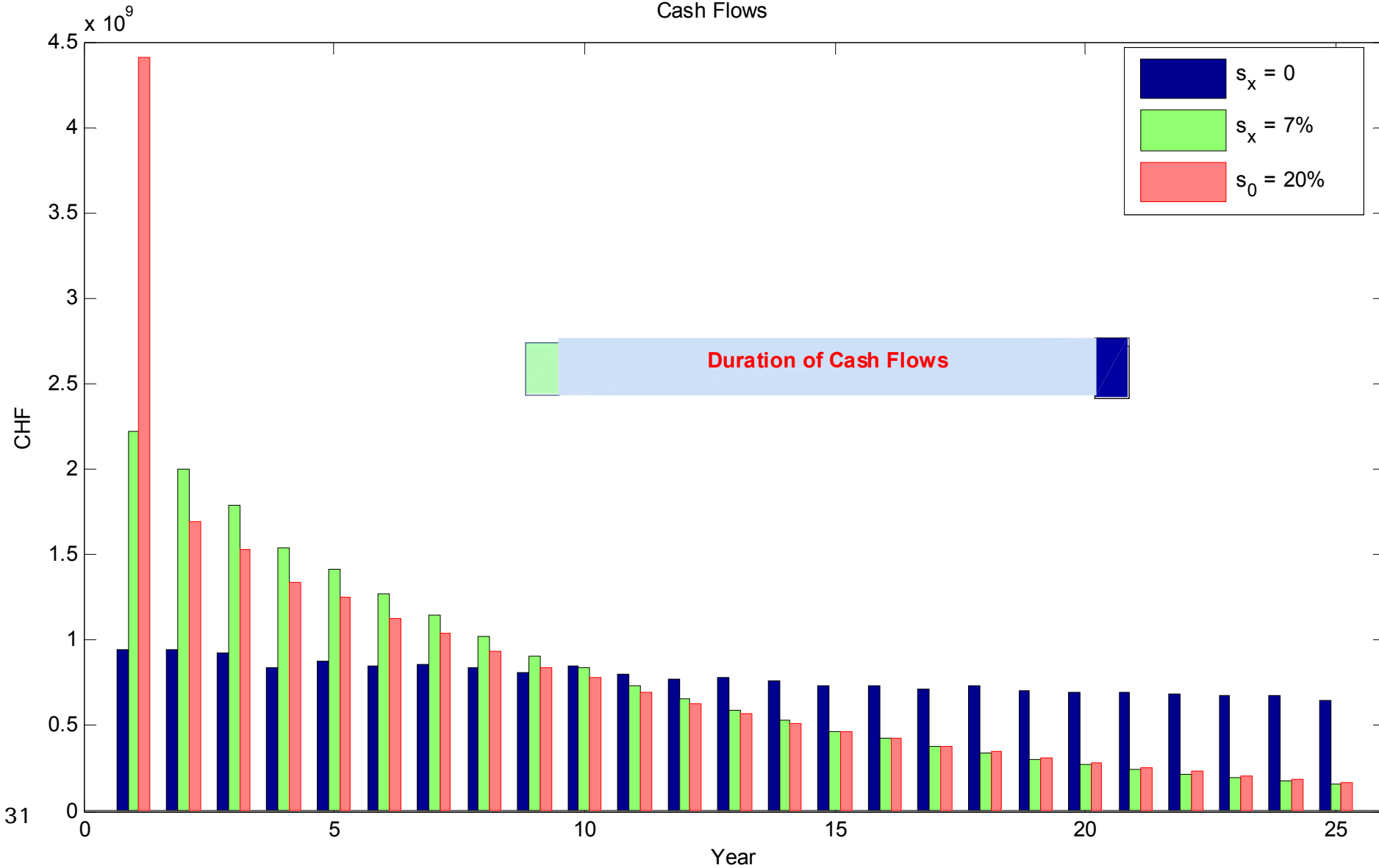
Results





Parameters: real Life-portfolio

Cash Flows





Principles defining the SST

Defines Output

- 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 risk 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 risk margin**
- 5. Under the SST, an insurer's capital adequacy is defined if its target capital is less than its risk bearing capital**
- 6. The scope of SST is legal entity and group / conglomerate level domiciled in Switzerland**
- 7. Scenarios defined by the regulator as well as company specific scenarios have to be evaluated and, if relevant, aggregated within the target capital calculation**

Defines How-to

- 8. All relevant probabilistic states have to be modeled probabilistically**
- 9. Partial and full internal models can and should be used**
- 10. The internal model has to be integrated into the core processes within the company**

Transparency

- 11. SST Report to supervisor such that a knowledgeable 3rd party can understand the results**
- 12. Disclosure of methodology of internal model such that a knowledgeable 3rd party can get a reasonably good impression on methodology and design decisions**

Responsibility

- 13. Senior Management is responsible for adherence to principles**



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Axioms for trust in internal models

Primary Requirements

- Solvency II need to be based on principles
- Model designed with a must have instead of a need to have approach
- Public Transparency of the model and documentation
- Four-eye principle
- Parameters

Secondary Requirements

- Educated designers and reviewers



Comparing SST and Solvency II

- Both SST and Solvency II are based on economic principles
- SST and Solvency II require both a sound risk management framework for all companies
- SST is fully principles based and requires the companies to interpret them correspondingly
- The entity has the duty (by defining additional threat scenarios) to think about their own risk.



Impact of SST on the Swiss Market

- First → fear: how good am I?
 - Afterwards
 - Improvement of risk management
 - Better understanding of the own risks
 - Better understanding of profit drivers and of guarantees (!)
 - Market will become more transparent / efficient and new products will emerge
- The implementation of SST brings important additional insights and is therefore much more important than applying any prescribed formula!**



Scylla and Charybdis



Scylla
and
Charybdis





Different levels for protection



	Life Insurance	P&C Insurance	Re-Insurance
Product	Savings Old age - annuities	B2C Risk	B2B Risk Capital Protection
Main Risk	Individual Wealth after Retirement	Claim paying ability in case of event	Counterparty risk
Possible Supervision	Solvency calculation Risk governance Transparency	Solvency calculation Risk governance Transparency	Solvency calculation Risk governance Transparency
	Capital requirements Policyholder protection	Capital requirements Policyholder protection	
	ALM requirements Ring fenced assets		



Lessons learned from the SST

- Involve the industry as early and as much as possible
- Define guiding principles for the new solvency system (like Moses: the ten commandments)
- **Do not try to build a monolithic one-fits-all formula, but rather relay on the principles such as the SST and apply as many existing standard approaches as possible (eg for assets)**
- Accept that no model will 100% capture the reality – therefore: **Model designed with a “must have” instead of a “nice to have approach” – model only the most relevant risk drivers**
- Make field-tests