Swiss Solvency Test (SST)
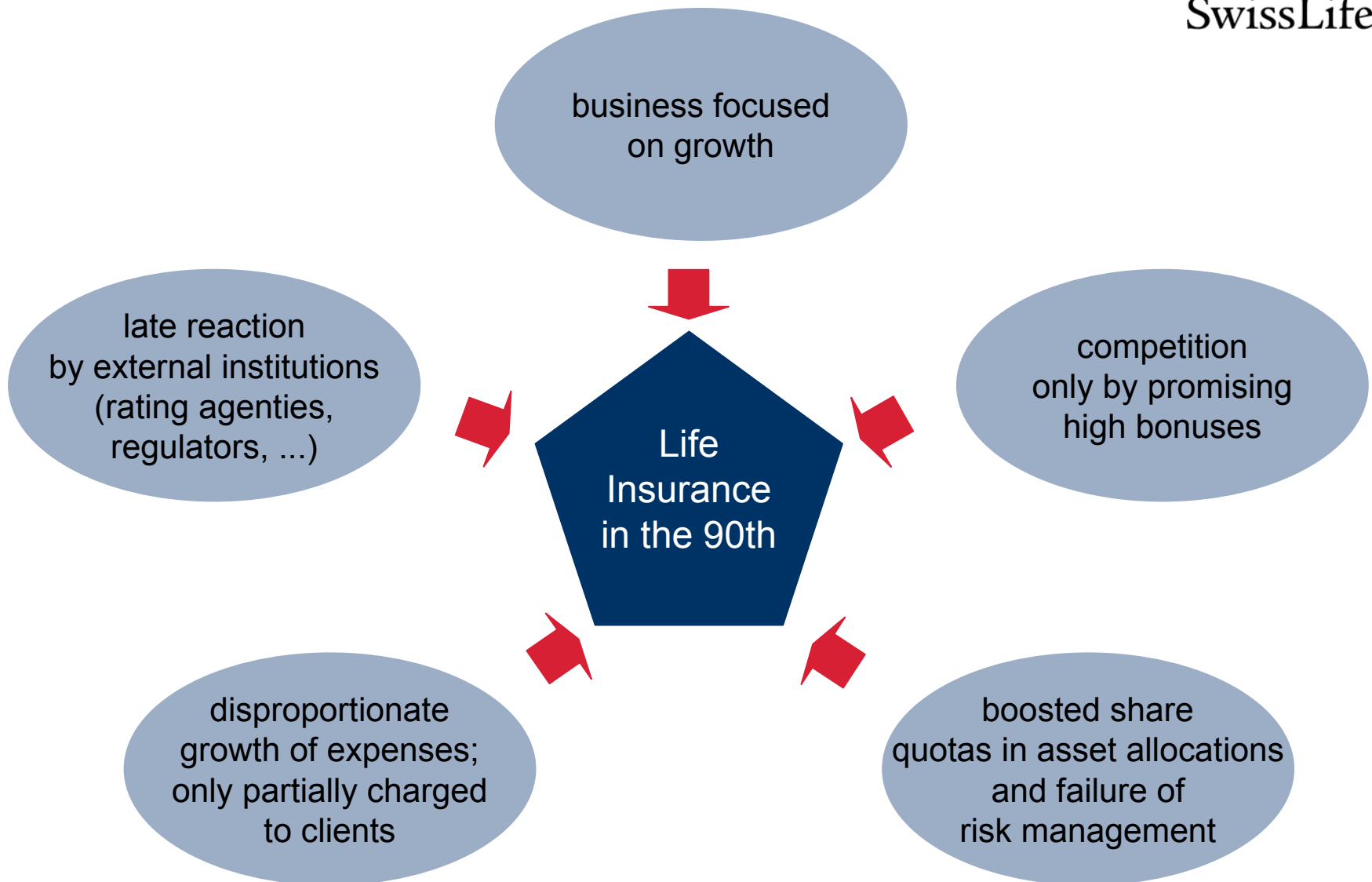**WestLB Versicherungs-Forum 2005**

Fritz D. Ehlers, Swiss Life, Düsseldorf, April 14th 2005

Contents

1. Solvency II

2. Project SST

3. Aims and concept of the SST

4. Future developments

Erroneous trends in the 1990th

business focused
on growth

late reaction
by external institutions
(rating agenties,
regulators, ...)

competition
only by promising
high bonuses

Life
Insurance
in the 90th

disproportionate
growth of expenses;
only partially charged
to clients

boosted share
quotas in asset allocations
and failure of
risk management

Current regulation and its shortcomings

Solvency I risk measurement:

- Asset risk accounted for only rudementary: 4% of mathematical provisions
- Liability risk: volume measures (risk exposure, risk premiums)
- Asset-liability risk: Not taken into account

Life insurance market:

- Decreasing interest rate margins (market vs guaranteed rates)
- Increasing investment in equities / high risk exposures
- Defaults of life insurance companies

➡️
- Solvency margin unreliable as risk indicator
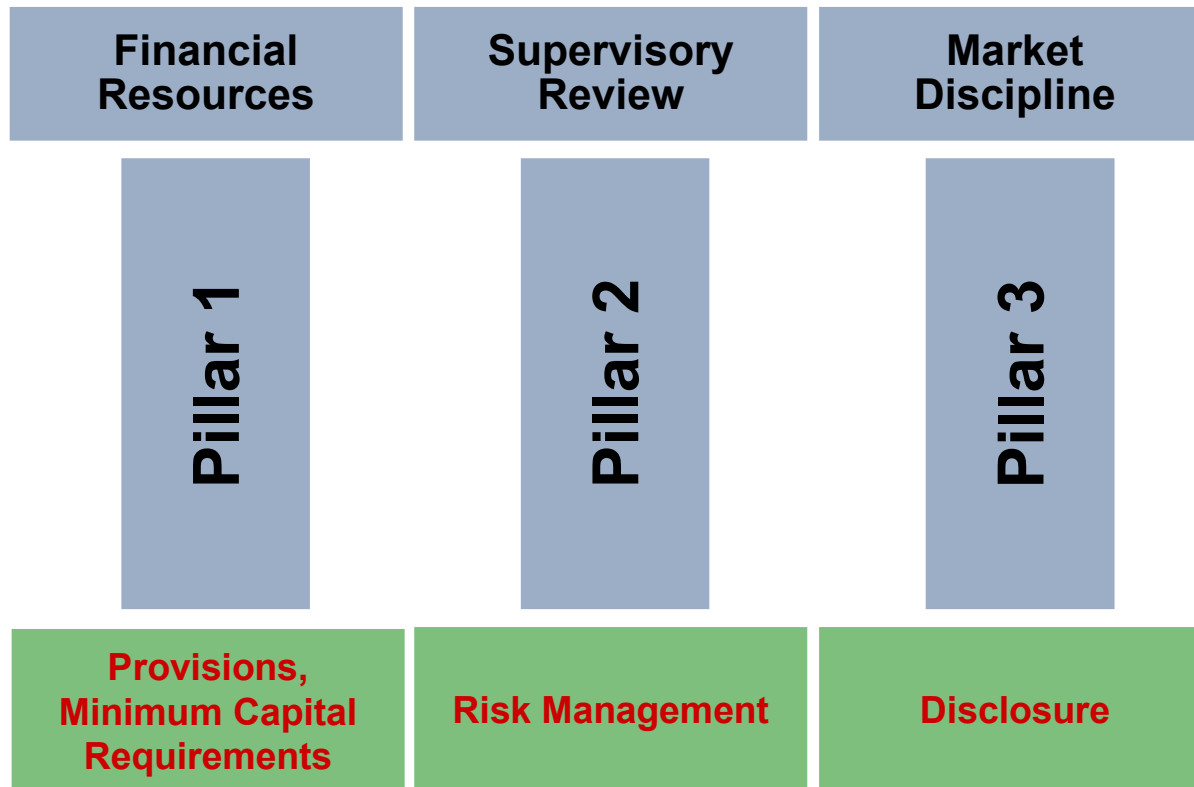- Capital requirements not adequate

Solvency II
Objectives

- Create framework matching true risks

- Encourage company measure & control of risk

- Need for greater harmonisation (European level, international level, convergence of financial sectors)

- Avoid sectoral arbitrage

- More efficient group/conglomerate supervision

- Flexible and efficient regulatory framework

- Compatible with international developments

Solvency II
The 3 pillars

Financial Resources	Supervisory Review	Market Discipline
Pillar 1	Pillar 2	Pillar 3
Provisions, Minimum Capital Requirements	Risk Management	Disclosure

Solvency II Project

IASB Accounting	OECD Development	US/ NAIC
IAIS Solvency	Solvency II	Canadian, Australian, Swiss work
IAA Groupe Consultative (Actuarial Guidance)	Member states' projects (UK, NL, ...)	Basel II

Risk-based insurance supervision

- Finland: Risk-based framework since early 1980s

- Canada: very sophisticated risk-based supervision, continually developed since mid 1980s

- USA: based on Canadian approach, more rule-based

- Australia: Since 2001 for P&C

- Singapore: Introduced 2004

- South Africa: In development

- UK: In development

- NL: In development

- Switzerland: In development

Contents

1. Solvency II

2. Project SST

3. Aims and concept of the SST

4. Future developments

Swiss Solvency Test
Timeline (1)

- **2002**: H Lüthy appointed as new director of the FOPI

  - Re-orientation of the FOPI towards an increased prudential supervision

- **May 2003**: start of the Swiss Solvency Test SST-Project:

  - All large insurers, re-insurers, actuarial and insurance associations participated

- **Dec 2003**: first conceptual work finished

- **Up to May 2004**: work on standard model, formulation of scenarios, asset model and high-level documentation for test-run

- **May 2004**: start of test-run (field test 2004)

- **Sep 2004**: end of test-run (calculations to be finished)

- **Nov 2004**: technical reports handed in to the regulator (FOPI)

Swiss Solvency Test Timeline (2)

- **year-2004 field test participants:**

Life	Non-life	Health
Providentia	Baloise	CSS
Swiss Life	Mobiliar	Helsana
Winterthur	Winterthur	Innova
Zurich		Visana

  risk perimeter: Swiss business only

- **17 Jan 2005**: meeting Swiss Life-FOPI to discuss the field test results

- **Jan - May 2005**: refinement of concepts, methodology, ...
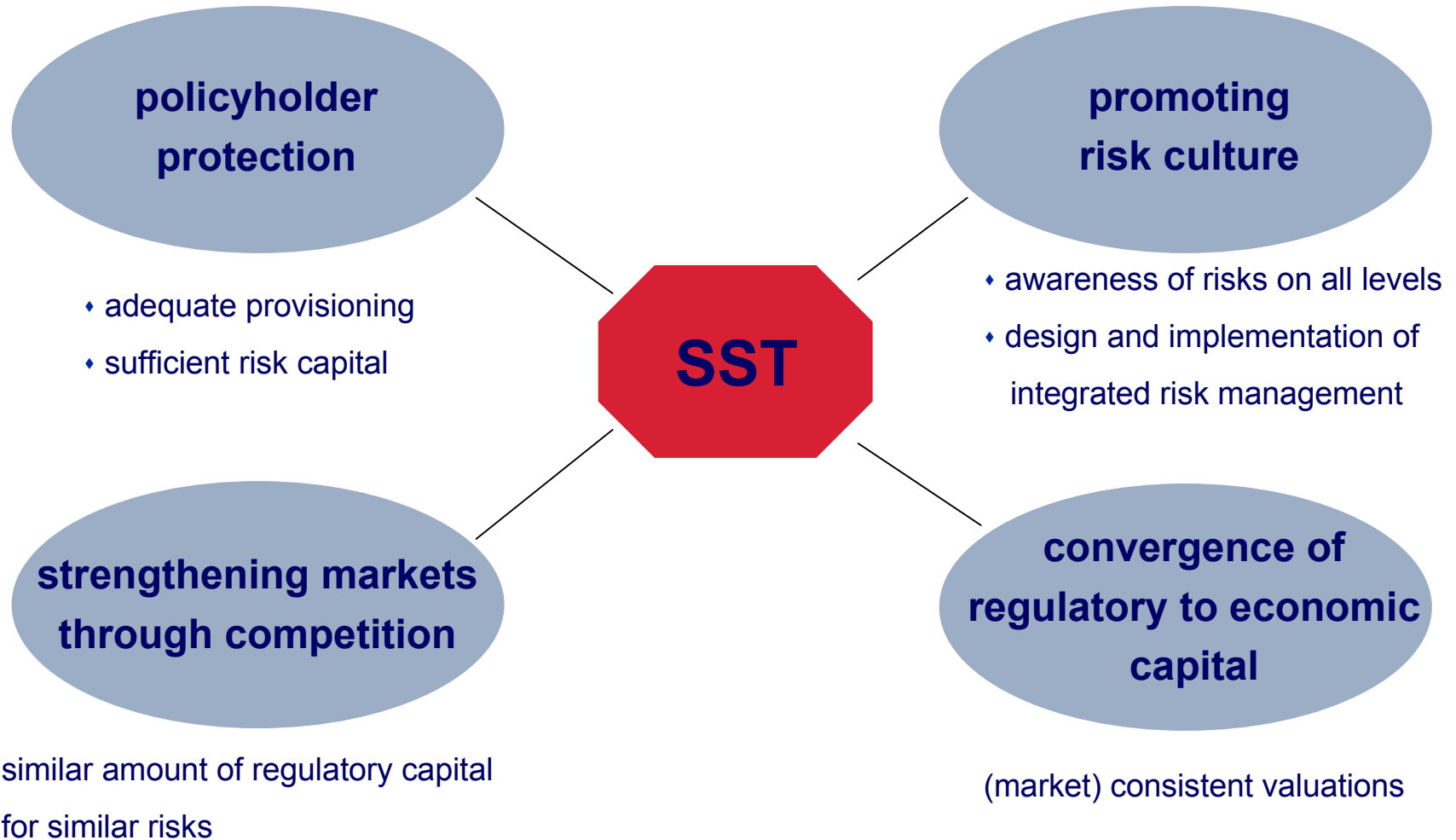
Swiss Solvency Test
Timeline (3)

- **Jun 2005**: start of second field test

  - field test open to all life- and non-life insurance undertakings

  - expected number of field test participants: 40 ~ 50 (15 life insurers)

  - risk perimeter: legal entity

- **Sep 2005**: end of second field test run

- **as of 1 Jan 2006:** SST (presumably) operative and legally binding (VAG, "Versicherungsaufsichtsgesetz")

  - SST/target capital calculations will stay within Pillar 2 as long as the Solvency II target capital calculations remain in Pillar 2

Contents

1. Solvency II

2. Project SST

3. Aims and concept of the SST

4. Future developments

Aims for the SST

policyholder protection

- adequate provisioning
- sufficient risk capital

promoting risk culture

- awareness of risks on all levels
- design and implementation of integrated risk management

SST

strengthening markets through competition

similar amount of regulatory capital for similar risks

convergence of regulatory to economic capital

(market) consistent valuations

SST concept
Overview

- Principle-based framework

- Market-consistent valuation of assets and liabilities

- Quantified risks: capital market, insurance, credit risks

- Other risks (operational etc.) accounted for qualitatively

- Standard models for asset-liability, life, non-life, and health risks

- Additional scenarios for market, credit and underwriting risks

- Risk measure: expected shortfall of risk bearing capital with time horizon of 1 year

- Aggregation method to combine standard and scenario results

- "Risk margin" to cover for the cost of holding statutory capital during run-off

- Internal models can and should be used

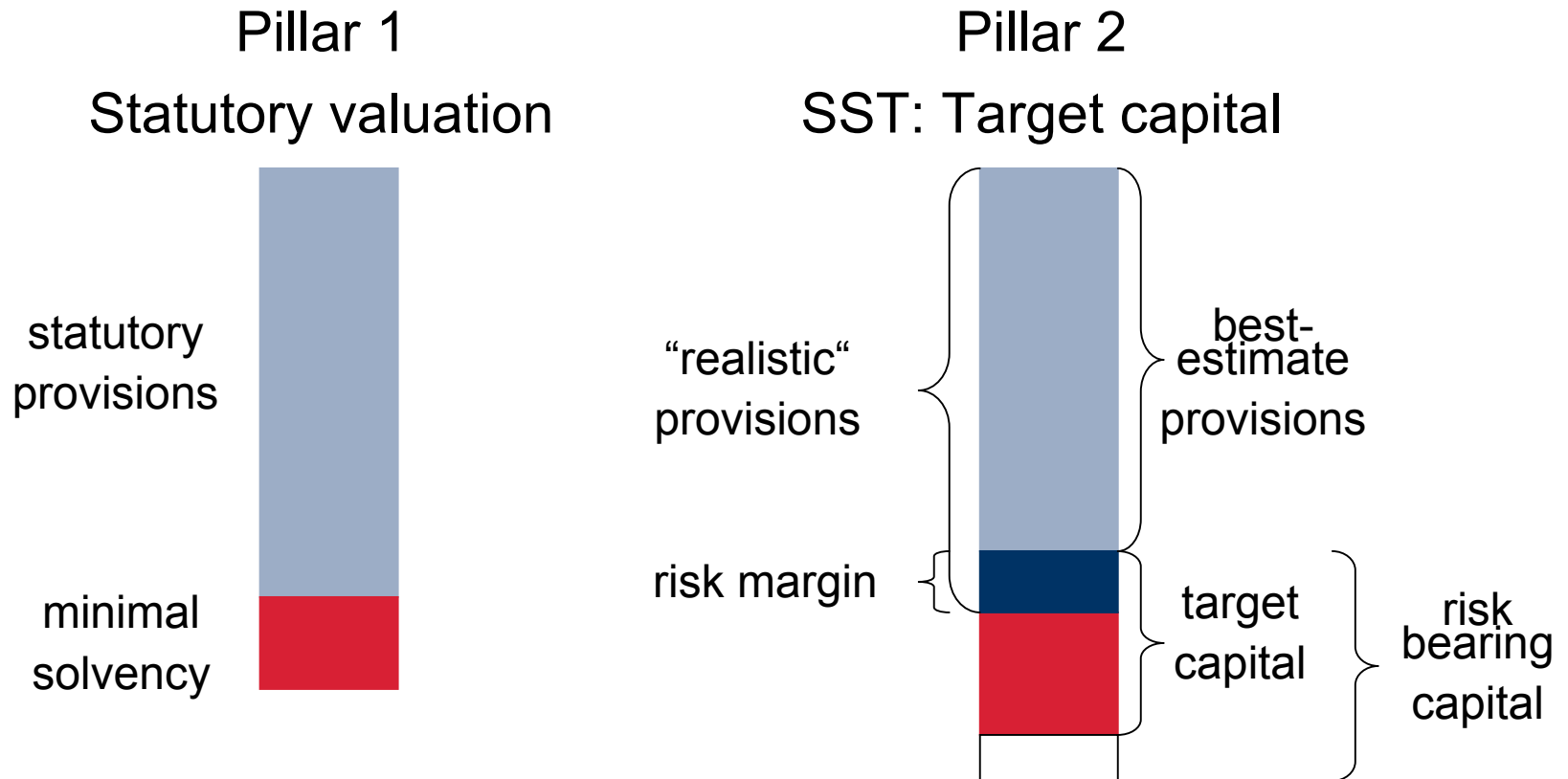- Responsibility for target capital calculation is with the management

SST concept
Risk classification
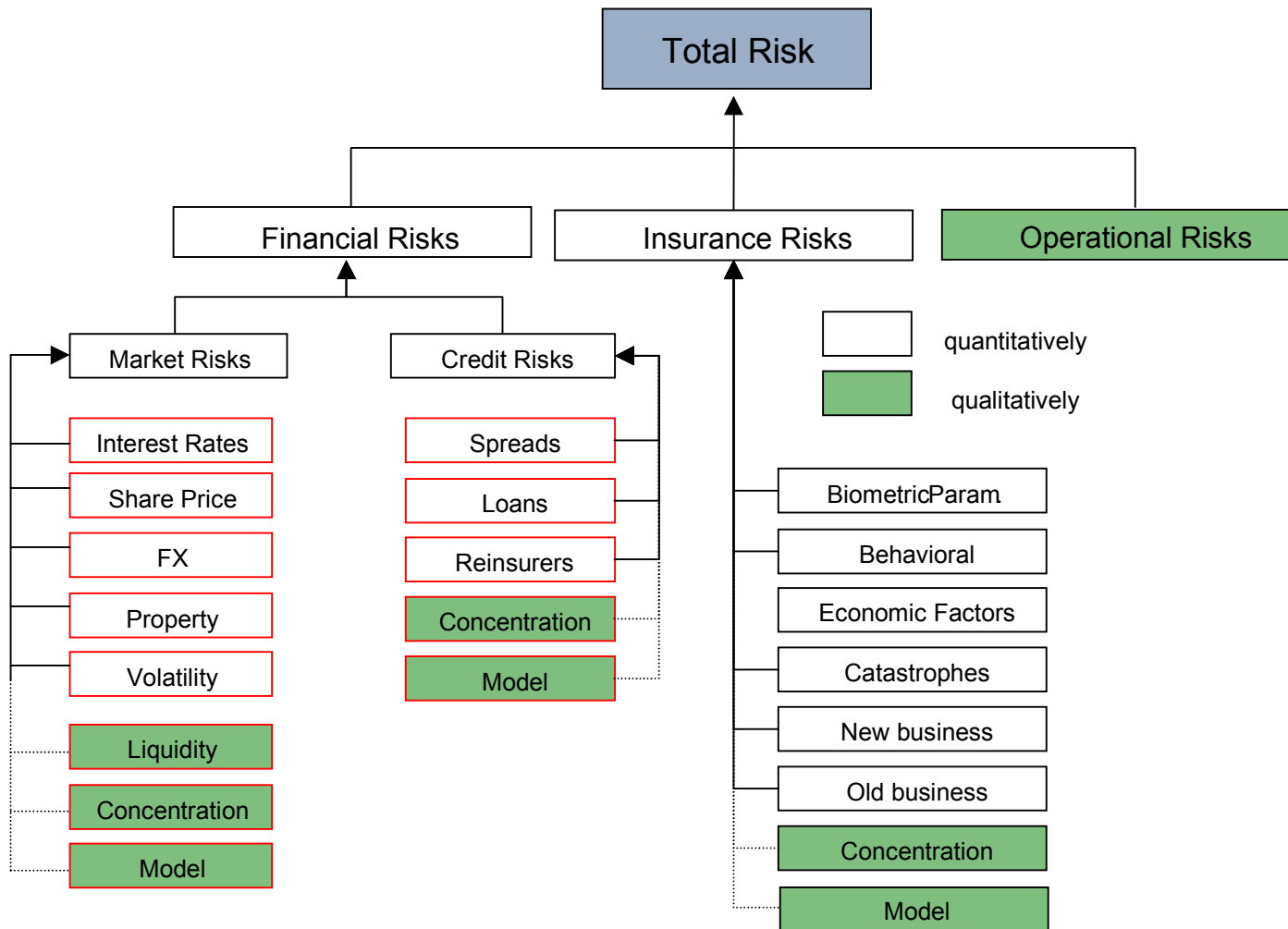
Solvency supervision
Pillar 1 and pillar 2

Two complementary valuation methods are used

Pillar 1

Statutory valuation

Pillar 2

SST: Target capital

statutory provisions

minimal solvency

"realistic" provisions

risk margin

best-estimate provisions

target capital

risk bearing capital

SST concept
Policyholder protection

Risk-based solvency standard:

- Accounts for the actual risks run by the company

Ensure that each company has sufficient capital:

- Time horizon one year

- Confidence level of 1% (may change)

- Capital after one year in these cases is on average sufficient for another insurance company to take over the contractual and legal liabilities and to cover the cost of statutory capital

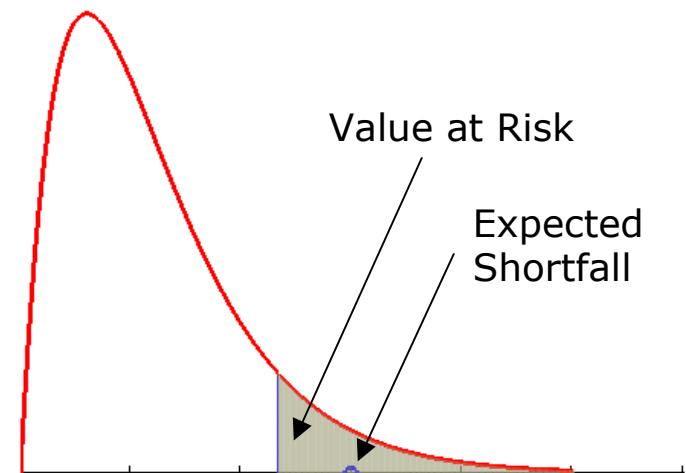# SST concept
Risk measure

Time horizon:

1 year (pragmatic and compatible with many internal models of insurers)

Definition of target capital:

Target capital Z is defined as the Expected Shortfall of the change of risk-bearing capital on a given confidence level a plus a Risk Margin

Shareholders: Only default or non-default is relevant not the size of default (Limited liability put option) $\Rightarrow$ VAR is adequate risk measure

Insurered: In case of default, it matters how much capital is left $\Rightarrow$ Expected Shortfall is more appropriate than VAR
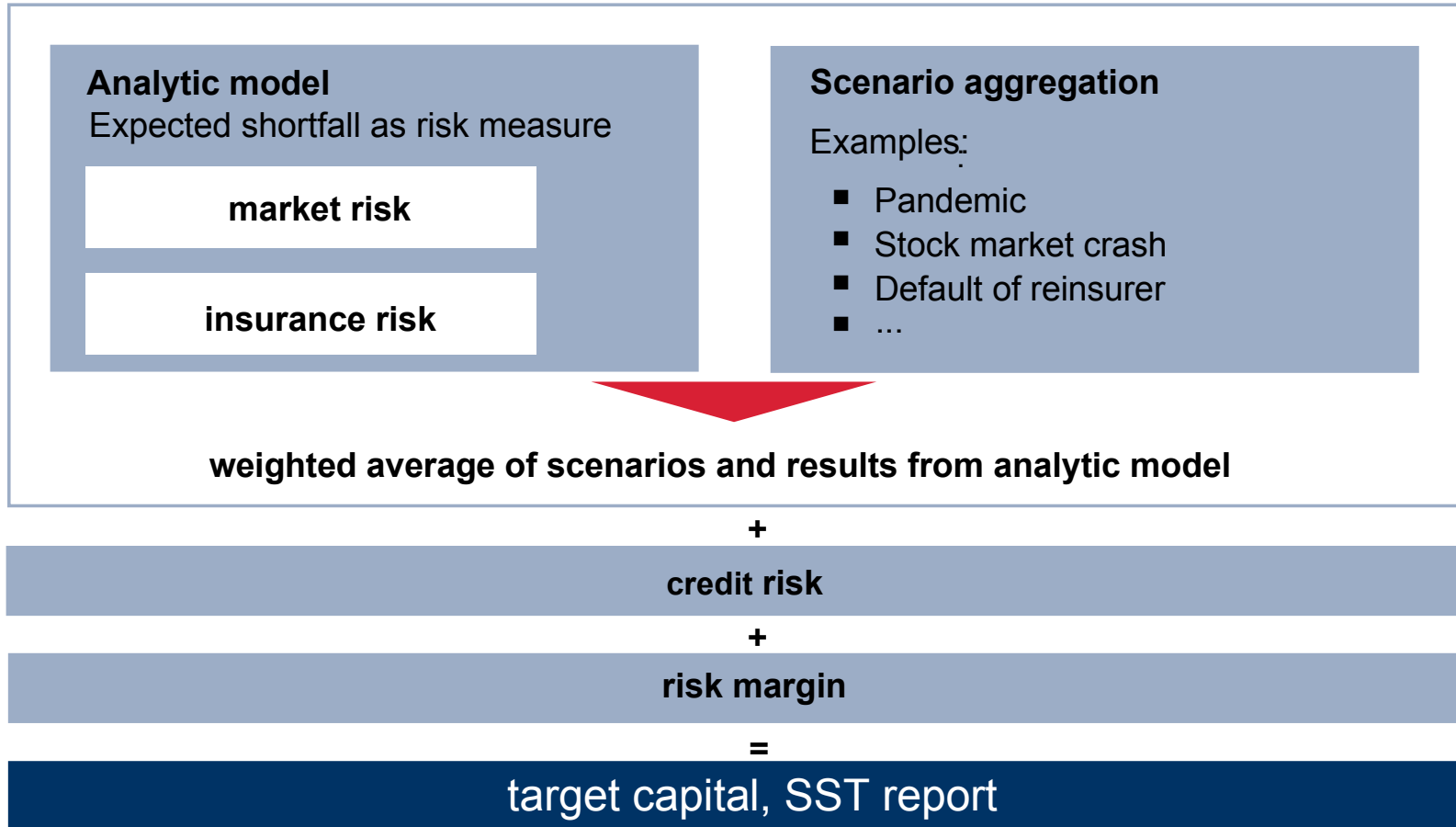
Value at Risk

Expected Shortfall

SST concept
Target capital for life insurance model

Analytic model
Expected shortfall as risk measure

> **market risk**

> **insurance risk**

Scenario aggregation

Examples:

- Pandemic
- Stock market crash
- Default of reinsurer
- ...

weighted average of scenarios and results from analytic model

+

credit risk

+

risk margin

=

target capital, SST report

SST concept: Cash flow representation of assets and liabilities

SwissLife

cash flows are the basic building blocks:

Assets

Liabilities

RBC
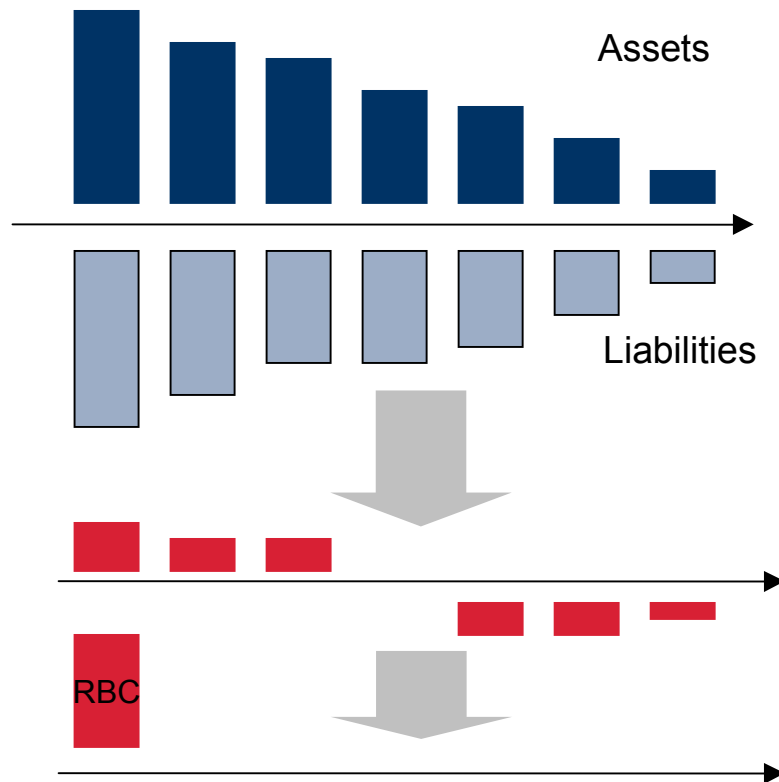
The future cash flows of all assets and liabilities have to be discounted with appropriate discount factors (valid as of the valuation date). Then, the present value of assets minus liabilities is used to arrive at the risk-bearing capital (modulo some adjustments)

SST concept
Life insurance model

Standard model	Scenarios
• Risk factors **mortality, longevity, morbidity, recovery, lapse, embedded options, expenses** **• Assumptions** - **Changes of risk factors are normally distibuted** - **Specified covariances for test run** - **Linear dependence of capital on risk factors** - **Biometric risks independent from market risks**	• Pandemic • Mortality (long term changes) • Longevity • Lapse • Scenarios defined by appointed actuary

SST concept
Asset-liability model

A number of risk-factors are specified and effects of changes in risk-factors have to be calculated for assets and liabilities at the same time

-> change in a risk-factor implies a change in risk-bearing capital

For the field-test, 18 market-risk risk-factors have been defined

Asset model -> normal distributed with zero mean and given volatility: Simple RiskMetrics type model which is defined by a covariance matrix

Risk Factors

- Interest Rate: risk-free prescribed by regulator
  - Sensitivities:
    - Shift for different time buckets
    - Interest rate volatility
- FX: EUR, GBP, USD, JPY
  - Sensitivities:
    - Changes for each currency
    - Volatility
- Equity (shares, alternative investments, property)
  - Sensitivities:
    - Shares: global index and volatility
    - AI: AI-Index
    - Property: Index
- Credit Risk: Change of spread

| Limited number of risk factors: they should cover main risks, but should not replace internal model. | If a company's asset risks are not captured by regulatory model, the appointed actuary needs to adapt model, e.g. by adding risk factors or adjusting coefficients | The asset model is supplemented with scenarios to take into account non-normality |

SST concept
Asset-liability scenarios

For test run: historical scenarios:

- Stock Market Crash 1987
- Nikkei Crash 1989
- European Currency Crisis 1992
- US Interest Rates 1994
- Russia / LTCM 1998
- Stock Market Crash 2000

  - Effects are mapped on risk factors -> Evaluation of scenarios can be done using sensitivity analysis

- Default of reinsurer
- Financial distress of company
- Appointed actuary has to add company specific scenarios if asset scenarios do not cover risks sufficiently

Example: Financial Distress

The Financial Distress Scenario is inspired by collapse of First Executive

Definition

- Equity-like instruments drop by 30%
- Parallel-shift of risk-free interest rate by 300bp
- Lapse = 25%
- New business reduced by 75%
- If insurer has a rating, rating is reduced to subinvestment grade

SST concept
Credit risk

- Credit risk (excluding reinsurers) are handled with stochastic model (spread volatility) and a credit risk capital charge (CRCC)
- CRCC will be added to target capital

- CRCC equals Basel II credit risk charge using the standard approach

- Reason for special treatment of credit risk:

  - Using this approach, consistency with banking regulation is achieved (For banks Basel II credit risk charge is added to market risk charge)

  - Easy to calculate

  - Basel II standard approach is not based on (explicit) risk measure. It would be impossible to derive distribution function (or scenario) from Basel II credit risk capital charge

- Companies can use internal portfolio models for credit risk (e.g. CR+, Credit Metrics, …) but have to use Basel II risk measure and quantile. Capital charge from internal models has to be added to target capital
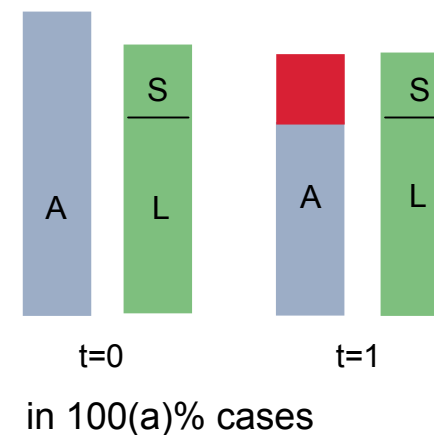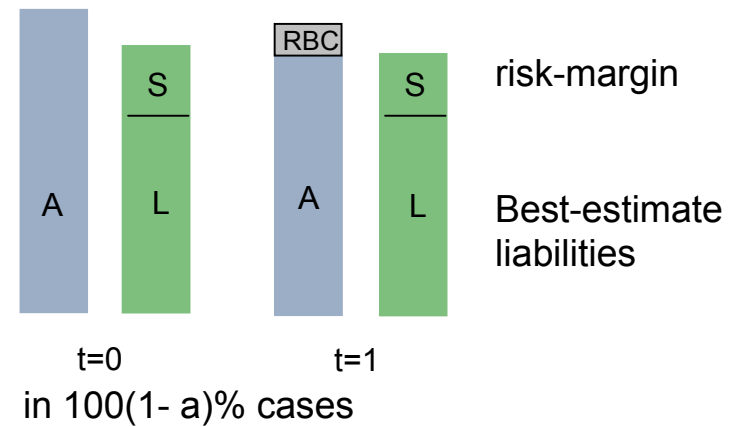
SST concept
Risk margin (1)

For insurance risks: target capital needs to take into account risks after time-horizon 1 year

Not good enough: Target capital defined such that risk-bearing capital is positive with given probability (e.g. 99%) after 1 year

Correct: Target capital defined such that risk-bearing capital exceeds risk margin S on best-estimate with given probability after 1 year

→ Solvency II / APRA / IAA compatible

in 100(1- a)% cases

in 100(a)% cases

SST concept
Risk margin (2)

Risk margin on best-estimate provisions:

Covers risks which emanate after 1 year time-horizon of SST

(Run-off risks after 1 year) -> integral part of SST

Market consistent provisions = Best-estimate provisions + risk margin
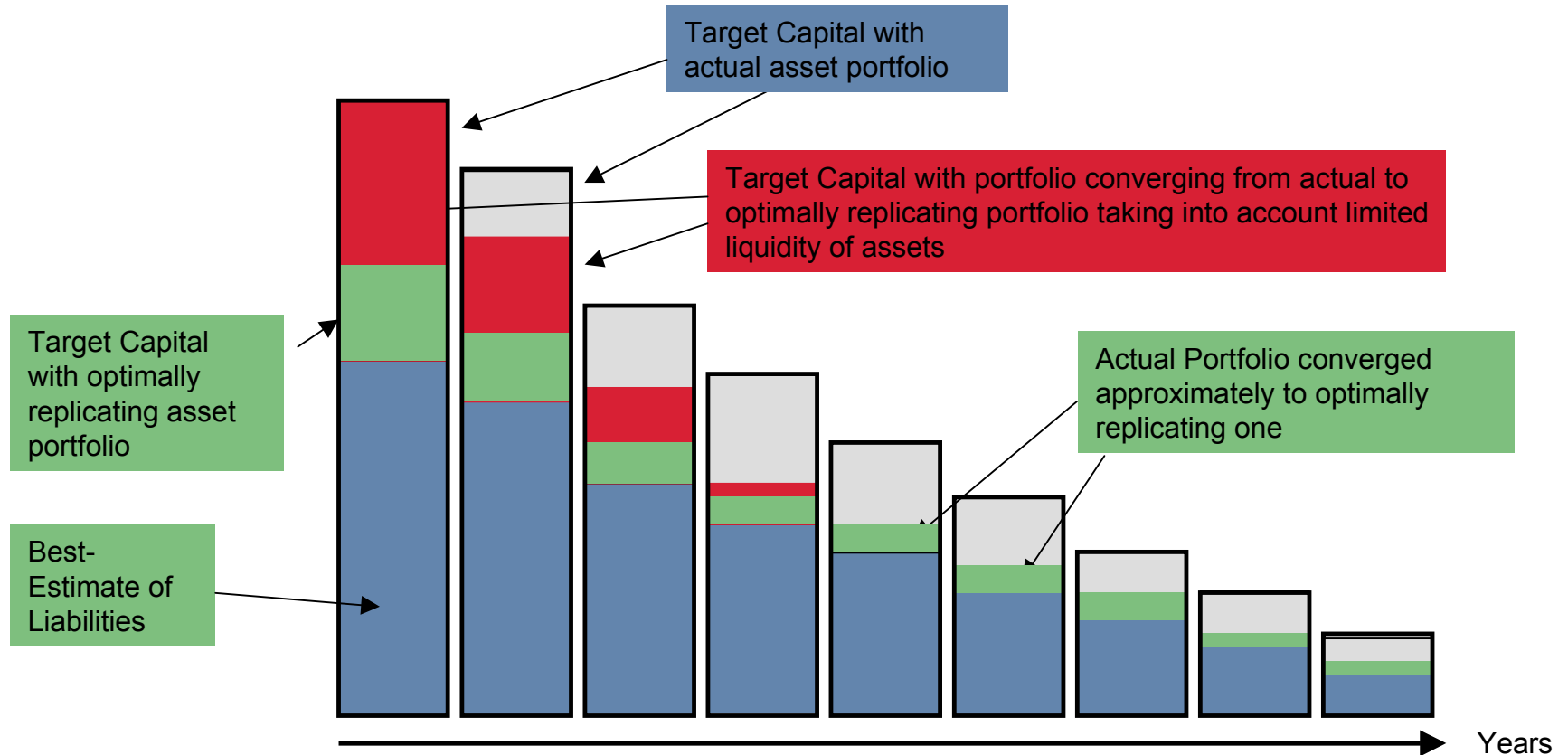
Risk margin = cost for future regulatory capital

A third party taking over portfolio would be compensated for having to put up regulatory capital
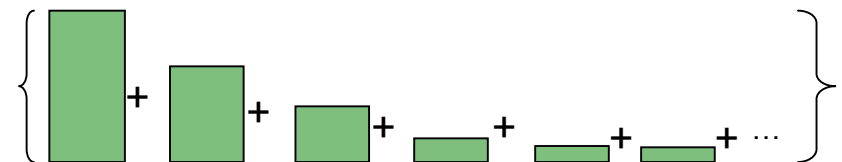

Advantage of definition:

- Economic

- Market view enters calculation via cost of capital

- Depends on whole run-off

- Is easier to determine than a quantile approach

SST concept
Risk margin (3)

Target Capital with actual asset portfolio

Target Capital with portfolio converging from actual to optimally replicating portfolio taking into account limited liquidity of assets

Target Capital with optimally replicating asset portfolio

Actual Portfolio converged approximately to optimally replicating one

Best-Estimate of Liabilities

Years

Risk Margin = Cost of Capital * PV of

Swiss Solvency Test
Scope

Institutions covered by the SST

Swiss insurance companies with branches (also in foreign countries)

(Capital under management of life insurance in Switzerland:

$\approx$ CHF 220 bn)

Institutions not covered by the SST

Autonomous pension funds

(Capital under management: $\approx$ CHF 480 bn)

2003 figures

Contents

1. Solvency II

2. Project SST

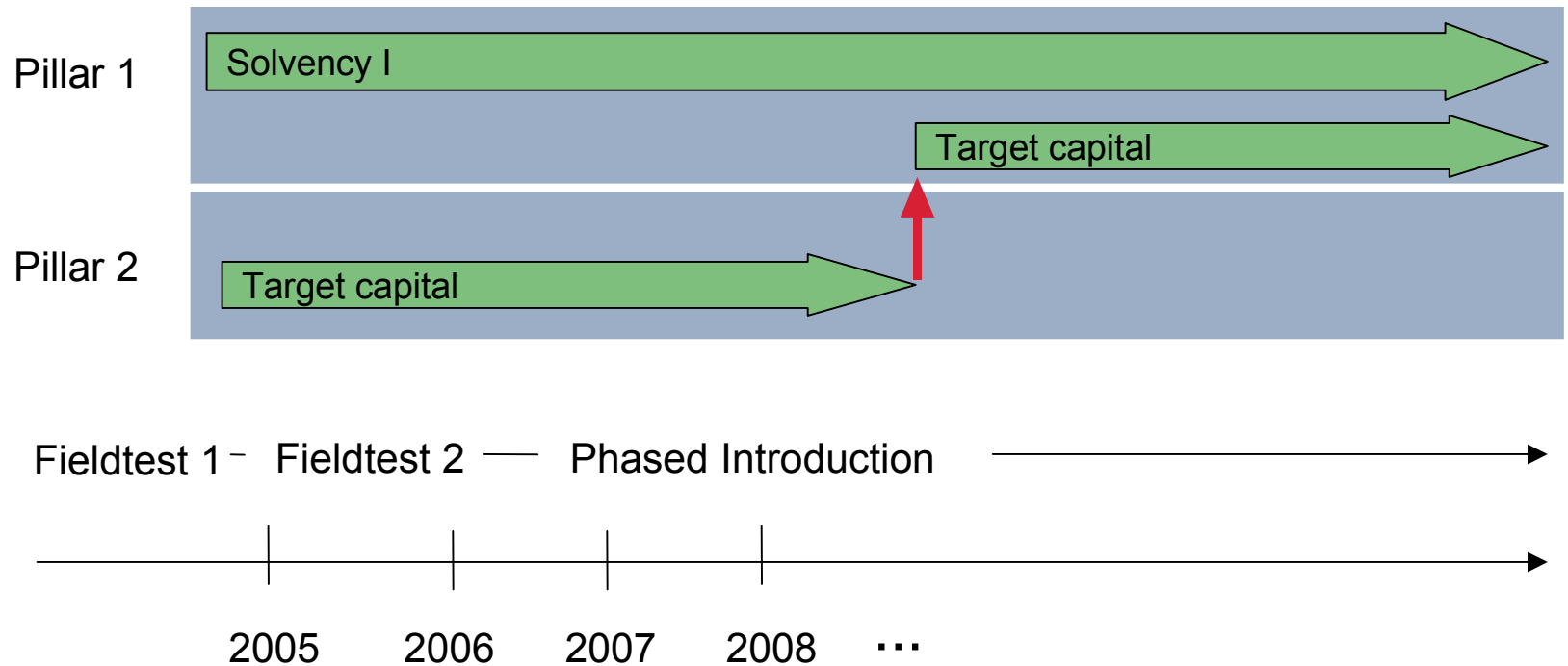3. Aims and concept of the SST

4. Future developments

Swiss Solvency Test
Current issues

- Requirements for internal models

- Diversification effects in groups

- Modelling issues (e.g. embedded options)

- Cooperation of regulators: Consistent application of the SST

- Consistency of the SST with Solvency II

Swiss Solvency Test
Transition to pillar 1

Pillar 1

Solvency I

Target capital

Pillar 2

Target capital

Fieldtest 1 ─ Fieldtest 2 ── Phased Introduction

2005   2006   2007   2008   ···

Reference

White paper of the Swiss Solvency Test:

www.bpv.admin.ch/de/pdf/white_paper_sst.pdf

Thank you