A Change of Paradigm for the Insurance Industry

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DEAR-Consulting

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Agenda*

1	Risk Capital and its Management
2	Economic Valuation
3	Internal Models for Assessing Capital Needs
4	Entreprise Risk Management
5	Conclusion

*) This presentation is based on a paper available at SSRN:
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2692525

The Insurance Industry

- The insurance industry has a *long history*
- Her contribution to the economic expansion in Europe and America has been very significant in the XIXth and XXth century
- Today, a healthy insurance industry is essential to the good functioning and the development of the economy
- For many years, the management of an insurance company was limited to cashflow management
- As long as the received premiums and the financial return exceeded the claim payments and expenses, the company was considered to be profitable and thus solvent

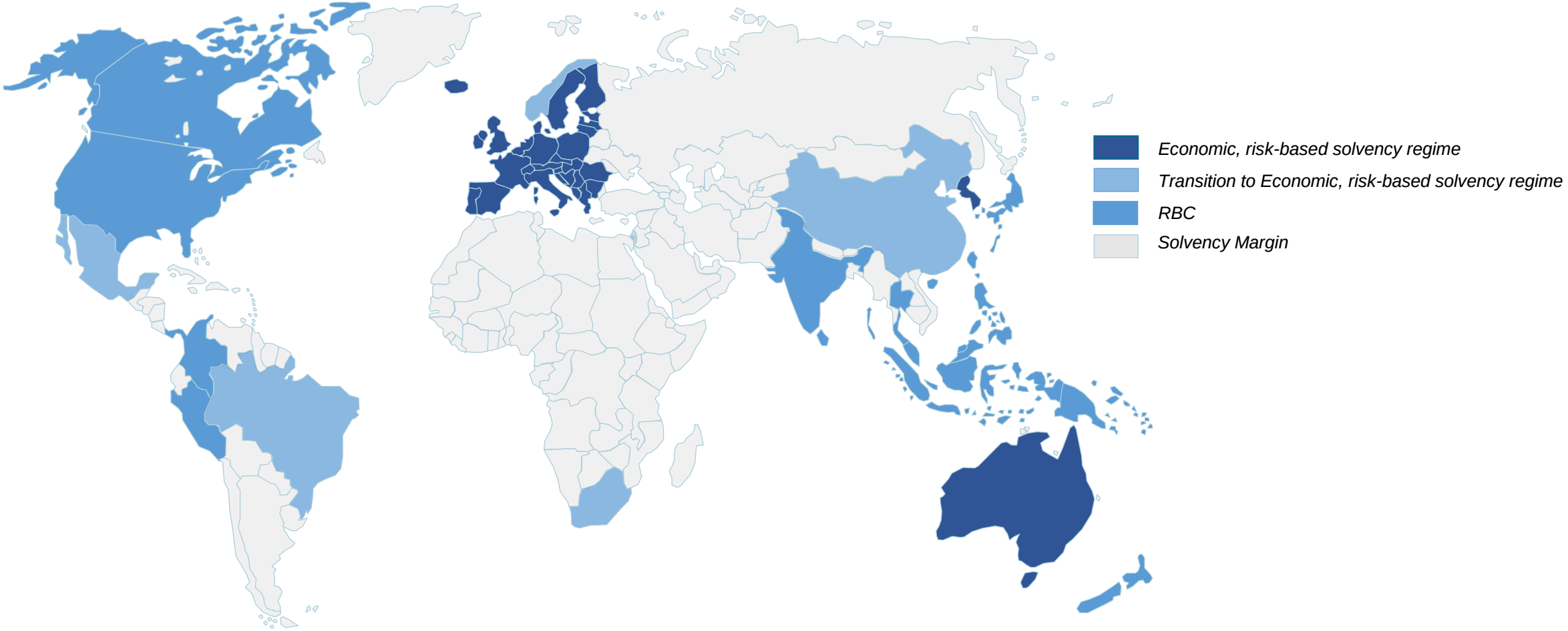
Traditional Performance Measures

- The performance measures derived from this approach were and still are:
  - The *combined ratio* in P&C: $\frac{Loss+Expenses}{Premium}$
  - The *profit* (or technical) *margin* in Life: $\frac{Operating\ Profit}{Premium}$
- Both measures allow easy comparison between companies and products
- However, they do not reflect the timing of profit or losses, the cost of capital and the riskiness of the business
- They are typical *accounting performance measures* and are even today paramount in corporate communication and media coverage

The Risk Based Solvency

- European insurance companies are implementing *Solvency 2*, while the Swiss companies have been using the *Swiss Solvency Test* (SST) since a few years
- Both regulation are intended to be *risk based* and they are followed by many more countries: C-Ross in China, Korea, Singapore, …
- Discussions are turning around certain parameters and models but do not put in question the fact that solvency should be based on a *quantitative assessment of the risks*

There is a global trend towards economic risk based solvency regulation



Performance and Risk

- As soon as companies are required to produce solvency figures based on risk evaluation, the pressure is high to produce *performance* measures *related to the risk* taken

- *Return on Equity* (ROE), which has become a *standard requirement* of bank analysts as representing the shareholders or potential investors is directly related to the risk taken

- The publication of the *Risk-Adjusted Capital* (RAC) required by Solvency points out to the need to also look at the performance related to it: the *Return on Risk Adujsted Capital* (RORAC)

Capital as a Basis to Quantify Risks

- *Capital* is used by insurance companies as *a guarantee* that they will pay the policyholder beyond the average claim for this type of policy but only up to a certain pre-determined limit which has a very low probability

- This means that determining the *capital* is a *way to assess the risk* of a contract

- The capital becomes the *monetary value* of a company that it must have, given the risk assessment of the company by a stakeholder or his agents (rating agencies, regulators, investors, management)

A Change in Paradigm

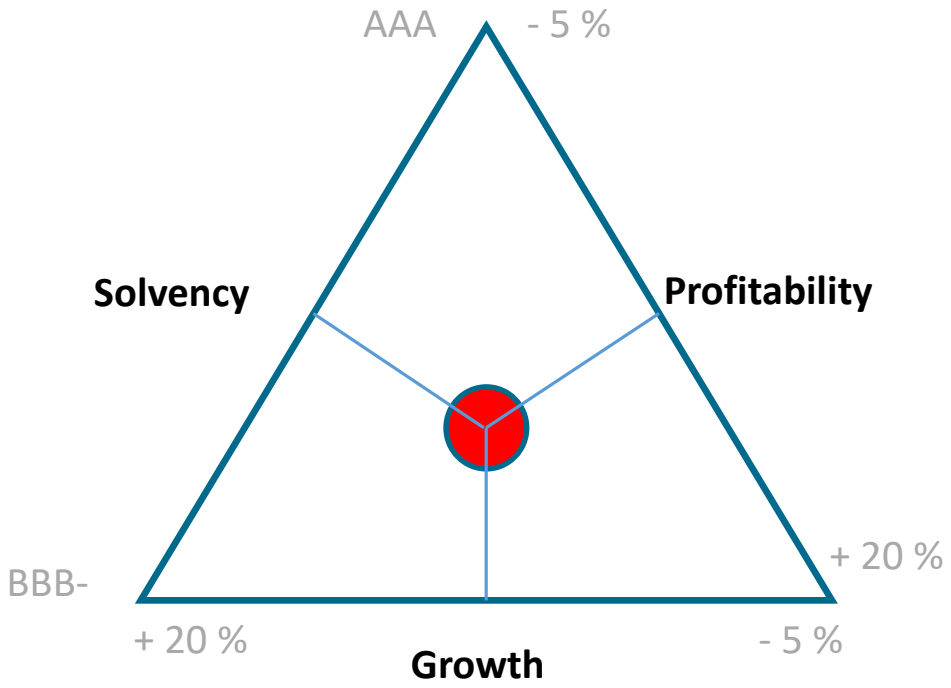
- Both the financial markets and the new regulations push the insurance industry into *new territories*: we move from a management based on accounting and cash-flow metrics to a management based on risk/return and on capital allocation

- This is a *change in paradigm* that has profound influences in the way insurance business will be judged in the future: premium will have to reflect the risk underwritten in the contract

- Combined ratio and technical return are not anymore going to be the only metrics to measure the performance of P&C and Life respectively

- Return on capital allocated to the risk (*RORAC*) needs to be taken into account as it will be reflected in the *ROE*

The Company Needs to Be Managed at the Confluence of Seemingly Conflicting Objectives



- Managing a (re)insurance company is all about optimizing under constraints
- Risk Management is all about setting these constraints according to the company's profile

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Regulatory Requirements (1/2)

- Solvency 2 and SST require that all material risks are *valued economically and market-consistent*

- The *available capital*, C_a, of the company is computed at time t_0 as the difference between the economic value of the assets, $A(t_0)$, the economic value of the liabilities, $L(t_0)$:

$$C_a(t_0) := A(t_0) - L(t_0)$$

- The RAC, C_r, is defined as: $\boldsymbol{C_r} = \mathbf{VaR_{99.5\%}}(\boldsymbol{X})$ (Solv.2) or $\mathbf{TVaR_{99\%}}(\boldsymbol{X})$ (SST)* of the random variable, X, representing the difference between assets an liabilities at a time horizon, Δt, of one year:

$$X(\Delta t) = (A(t_0 + \Delta t) - A(t_0)) - (L(t_0 + \Delta t) - L(t_0))$$

*) C_r is evaluated at $t_0 + \Delta t$ but the final value is actually discounted to t_0

Regulatory Requirements (2/2)

- The company *solvency ratio* is then defined as:

$$S = \frac{C_a}{C_r} > 1$$

- This ratio must be greater than 1 in order for the company to be solvent from a regulatory perspective
- Company will want to have a solvency ratio *clearly above 1* including a sort of *buffer* to show the stakeholders that they are here to stay
- The solvency ratio is becoming an *important benchmark* for the company stability

Economic Valuation of Assets and Liabilities

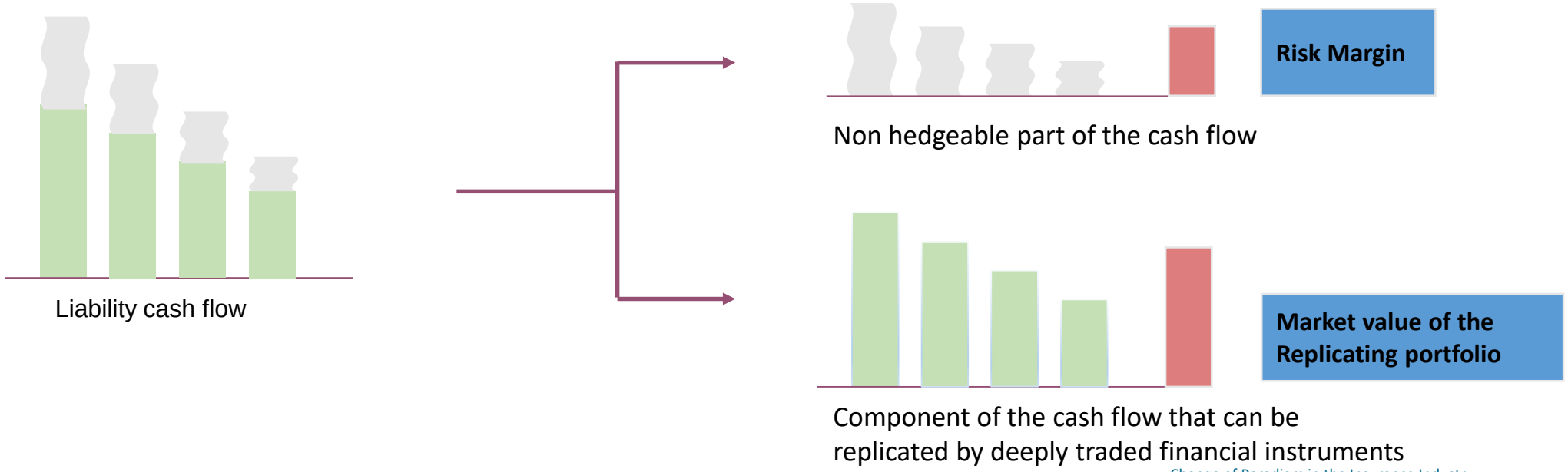
- For liquid assets, the economic value is easy to compute because it corresponds to the market value of the asset: *mark-to-market*
- However, for illiquid assets, economic value is harder to define and one needs to resort to a model: *mark-to-model*
- Similarly, *insurance liabilities* are not traded openly on the market. Therefore, there is *no real market price* that can be used for valuation
- The market consistent valuation of liabilities is thus also based on a *mark-to-model* approach
- The main idea consists in replicating the insurance liability cash flows with *deeply traded instruments*, for which reliable market prices exist, and mark-to-model the component of the cash flow that cannot be replicated

Market Consistent Valuation of Insurance Liabilities*

Insurance Liabilities
No reliable market prices for exit

Replicating market
Reliable market prices for exit

Transfer the problem of valuing illiquid cash flows to a problem of valuation of Liquid financial instruments



*) This slide is taken from a presentation by P. Keller

Problems with Economic Valuation of Insurance Liabilities (1/2)

- The choice of the financial instruments that are acceptable for replication determines the *reliability* of the market consistent valuation, the *discount rate* and the *risk margin*

- Equally, a given discount rate has implications on the set of replicating instruments:
  - A *risk-free discount rate (RFR)* implies that replication is done with credit-risk free instruments
  - An *illiquidity premium* implies that replication is done with illiquid corporate bonds
  - A *matching adjustment* implies that replication is done with the actual assets that the insurers holds

- For the replicating financial instruments to have reliable market prices, they have to be traded *in a deep and liquid* and (ideally) public market

Problems with Economic Valuation of Insurance Liabilities (2/2)

- Illiquidity risk and valuation uncertainty are difficult to quantify: replication with illiquid financial instruments leads to a *more uncertain* market consistent *value*

- Thus the pricing actuaries, who are in charge of evaluating the risk of liabilities, would have to also evaluate the *risk of investment*

- That is why it is much better to *separate both risks* and discount the liability cash flows with the RFR and leave the asset risk to the investment managers by giving them a risk budget

- Discounting with a RFR allows *to clearly separate the tasks* in the organization, and comes back to find *the best definition* and the most liquid asset to use for this rate

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Why an internal model?

At the heart of capital management the internal model gives answers to *how much capital is needed*. It is thus becoming an inescapable instrument for the industry because:

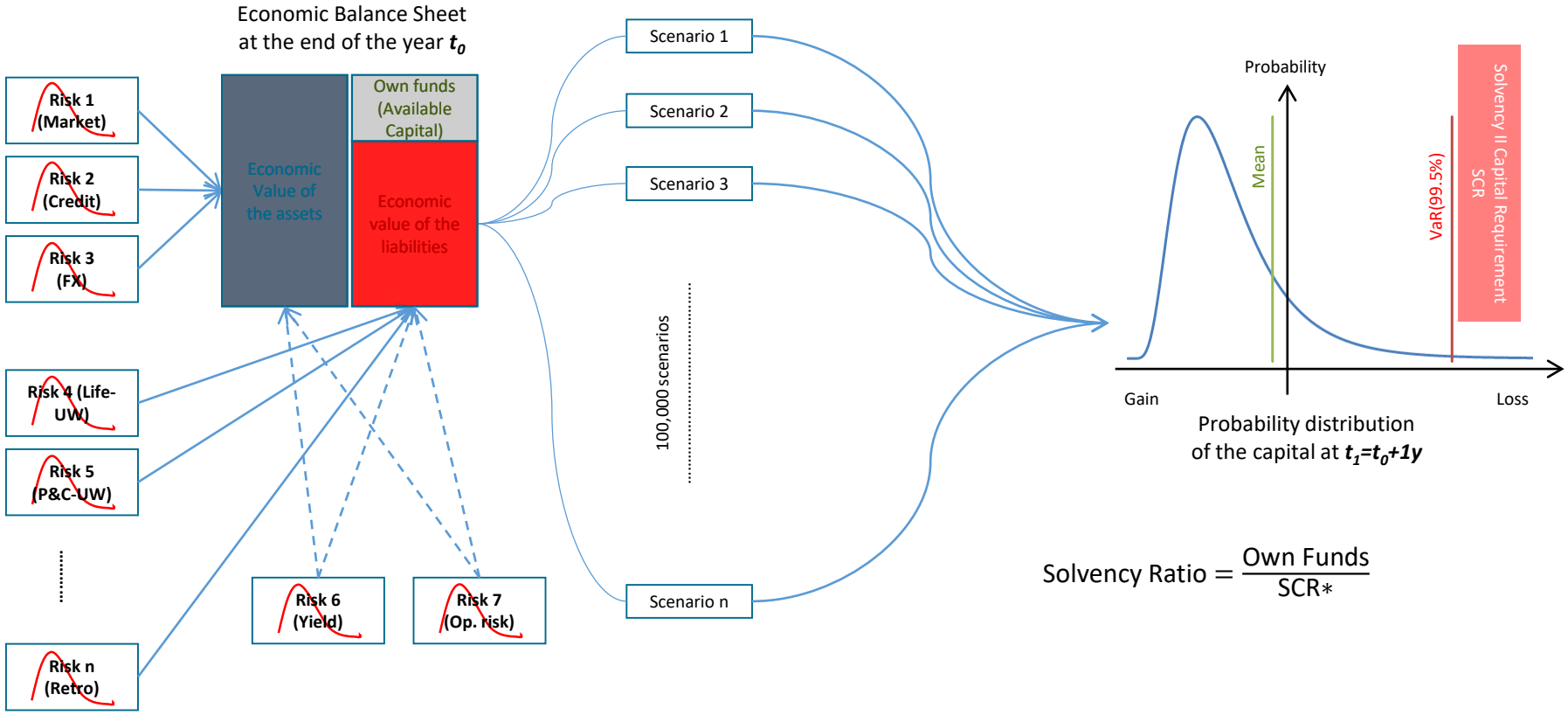
- ❑ Peak risks are growing
- ❑ Shareholders are becoming more demanding & more attentive stakeholders:
  - policyholders are concerned with financial stability
  - regulators revisit insurance (SST, Solvency II)
  - investors are better informed (Return on Equity ROE, new accounting rules)
- ❑ The integration of world financial markets requires a more *efficient use of capital*
- ❑ Insurers already have technically *mature methods* for risk analysis and capital allocation

Determining Risk-Adjusted Capital

- The *Risk-Adjusted Capital* (RAC) of an insurance company is evaluated on the basis of a *quantitative model* of its different risks
- We first need to identify the *various sources of risk*. One usually distinguishes four large risk categories:
  1. Underwriting risk (or liability risk),
  2. Investment risk (or asset risk),
  3. Credit risk (or risk of default),
  4. Operational risk
- Generally insurance companies *have the know-how* to manage and model their liability risk and are able to model the next two categories as well using standard finance models

What is an Internal Model?

An internal model is here to assess *the risk* of the economic balance sheet of the company

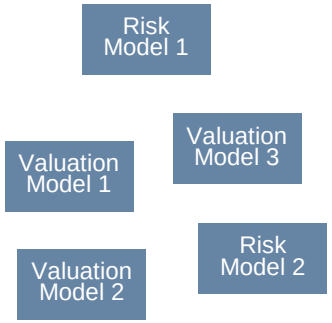


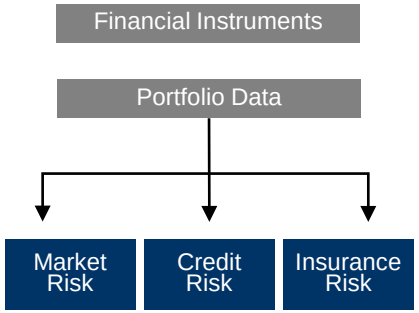
$$\text{Solvency Ratio} = \frac{\text{Own Funds}}{\text{SCR}*}$$

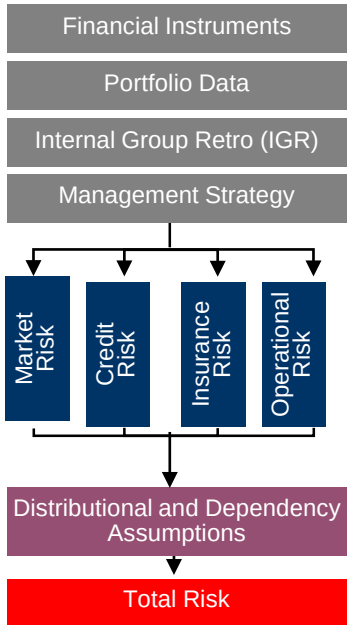
*) Measured at t_1 but discounted at t_0

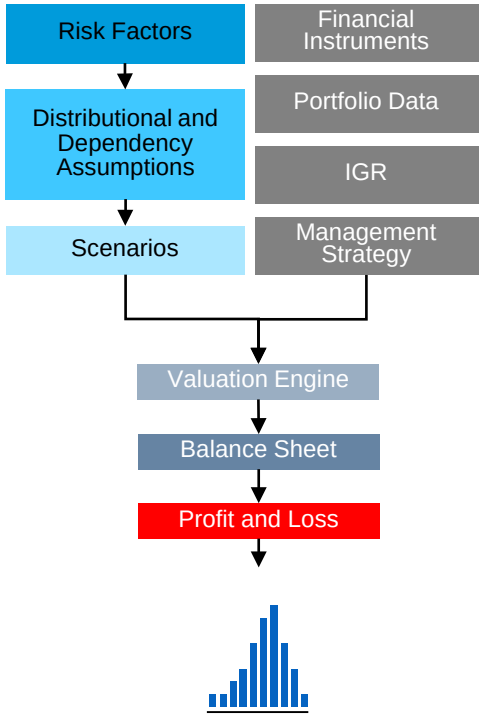
Historical Evolution of Internal Models

Mortality Tables ~1860	De Finetti* 1940	Risk Based Solvency 1995-2000	Capital Management ~2005
	Value Protection	Value Sustainment	Value Creation
Collection of sub models quantifying parts of the risks	Quantification of different risk types with portfolio effects	Risk types are combined to arrive at the company's total risk	Modelling of underlying risk drivers and emphasize on the whole distribution









Slide inspired by Philipp Keller

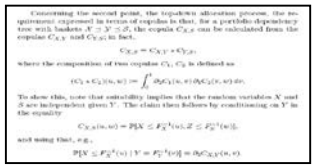
*) B. de Finetti `Il problema dei pieni `, Giornale dell'Istituto Italiano degli Attuari , Vol. 11, No. 1, pp. 1-88, 1940

Internal Model Developments

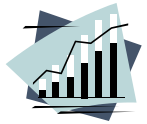
Reality

Simplification

Model (abstraction)



Methodology

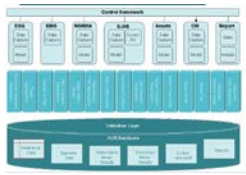


Data

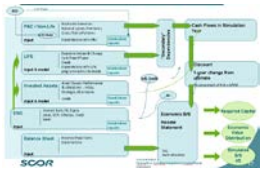
Assumptions

Industrialization

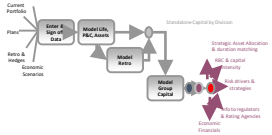
Model realization



Conceptual Framework



Implementation Framework



Processes

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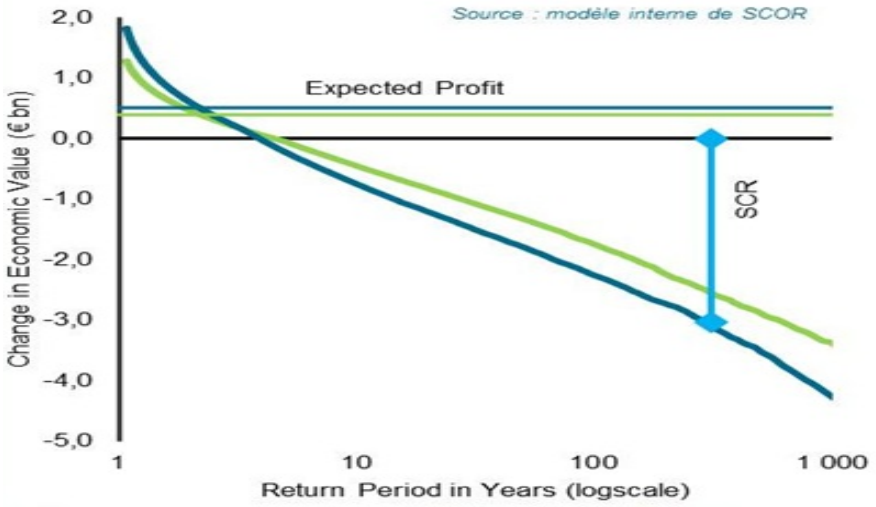
It all starts with the definition of an insurer's risk appetite

- An insurer's risk appetite defines the risks it will and will not take
- Risk appetite is personal and business specific

- Setting the risk appetite framework comes within the competency of the board

Profitability according to risk scenarii depends on risk appetite



- A higher risk appetite leads to a higher profitability gap between favourable and adverse scenarios
- The blue curve corresponds to a higher risk appetite than the green one

Risk Management Culture

- Establishing a risk culture with *strong awareness of policies and guidelines* at all levels of management, and execution for key risks facing the organization, requires:
  - ✓ Clearly defined overall *risk tolerance* deduced from stakeholder requirements
  - ✓ Clearly defined *risk preferences* stating which risks to take at all and in what proportion
  - ✓ Clear vision of overall risk profile
  - ✓ Limits for single risks deduced from overall risk tolerance, risk preferences, and risk profile

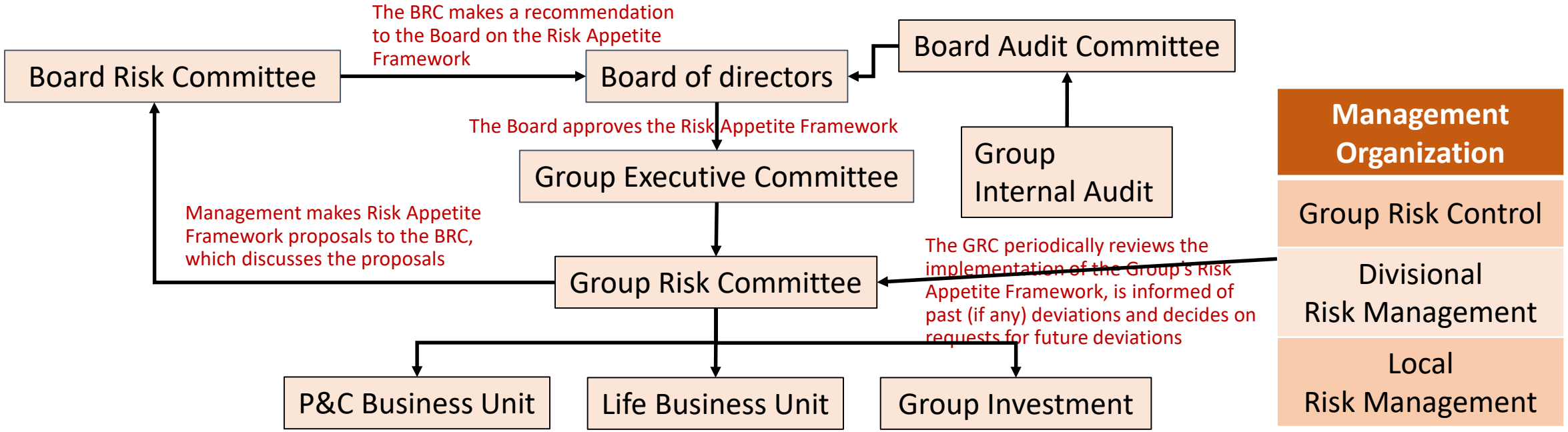
Entreprise Risk Management and Company Organization

- Today *managing risk* means also *managing the strategy* of an insurance company
- Enterprise Risk Management is based on the *recognition* that there is a *risk* associated with each *performance* and the two must be *proportionate*
- There are many aspects of managing a company based on risk and not only on cash-flows
- We *concentrate* here on the *organizational consequences* of managing risk and capital
- One first consequence is the *changing role of actuaries*, that moved from estimating reserves and pricing insurance policies, to estimating capital and risk

Risk Management is at the Heart of an Insurer Organizational Structure

Strong governance, processes and controls support risk management

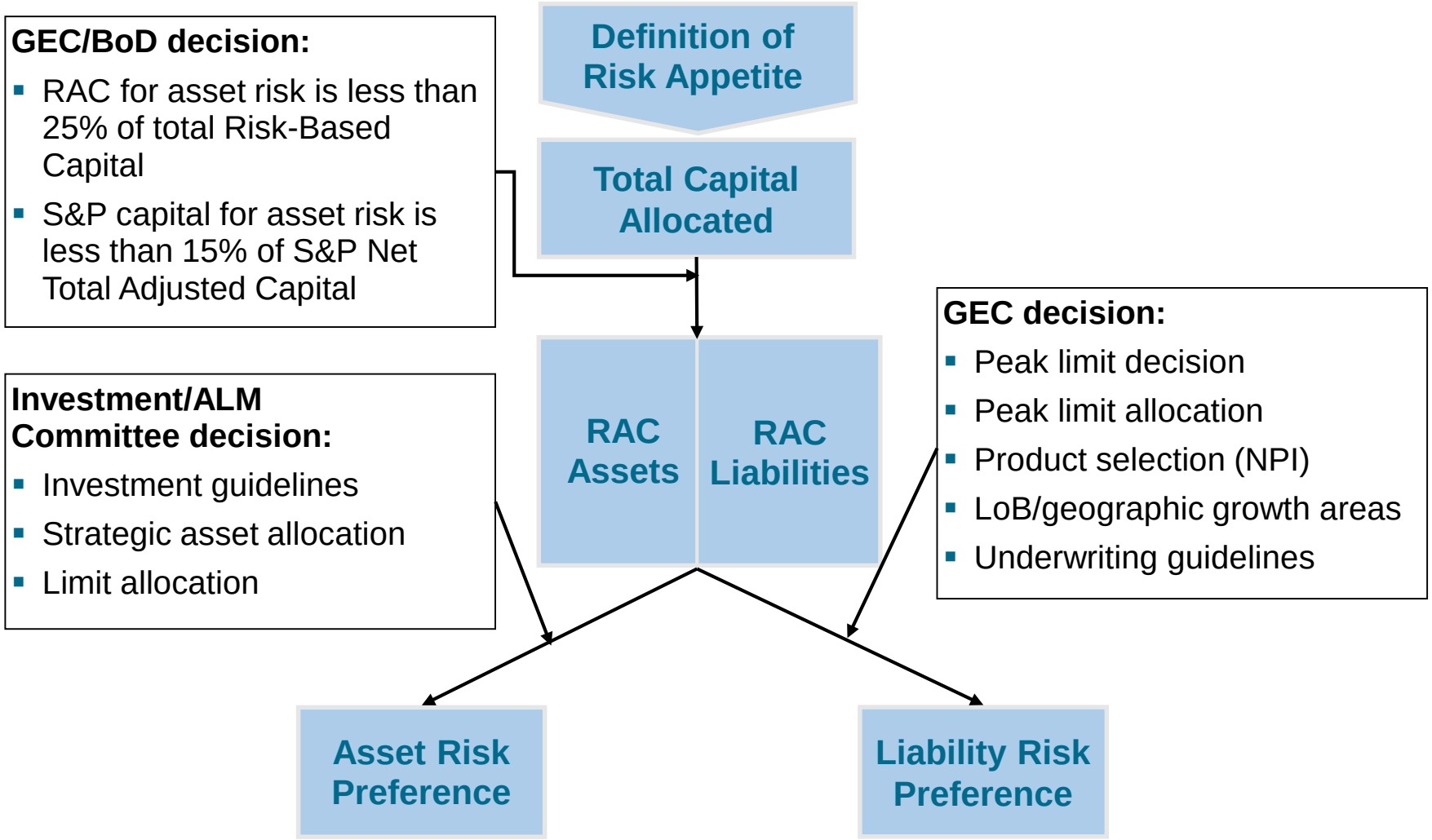
- ❑ The *Management* and the *Board* should be *deeply involved* in steering the Group's risk profile
- ❑ The risk appetite framework should be *continually evolving* to enhance management of risk and capital



Changes in the Organizational Structure

- In most of the *traditional* companies, the *CRO reports to the CFO*. His team is part of the CFO team
- In the *new* structure, the *CRO reports to the CEO* and is part of the Group Executive Committee (GEC). His team is independent of the finance and accounting team and is *transverse* to the organization
- The Board of Directors has, besides the Audit Committee, a *Board Risk Committee*
- The company has a *Group Risk Committee* that reports to the GEC
- In the GRC participate *all top managers* of the business units and the heads of the risk management organization

Process to Derive Risk Preference and Risk Profile



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Conclusion

- Insurance is moving *from cash-flow* management to *risk and capital* management
- This implies *long-term commitment* and a *complete reorganization* of the company's structure
- Despite many *controversies* and *skepticism*, the *quantitative approach* is becoming increasingly *important*
- *Internal models and complex IT systems* to process large amounts of data are becoming *core activities*
- *Economic valuation* will have to *evolve* in taking better into account the specificities of insurance liabilities
- ERM will soon be part of insurer DNA's