**IASB/FASB Meeting**
**Week commencing 14 March 2011**

IASB Agenda reference **3C**

FASB Agenda reference **60C**

| | |
|---|---|
| Project | **Insurance contracts** |
| Topic | **Education session on explicit risk adjustment** |

# VALUATION OF LIABILITIES

Jo Oechslin, Chief Risk Officer, Munich Re

Presentation to IASB and FASB

London, 15 March 2011

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# Agenda

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## Setting the scene

Determination of the best estimate liabilities

Calculation of the risk margin

Summary

# IFRS 4 – Time value of money

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1. Exposure Draft:
   - Life insurance liabilities and non-life claims liabilities discounted using a current, risk-free discount rate, adjusted for liquidity
   - Discount rate reflects the characteristics of the insurance liability

2. Tentative Decisions (February 2011):
   - Objective of discount rate for non-participating contracts confirmed
   - No method for determining the discount rate will be prescribed
   - Discount rate should
     - Be consistent with observable current market prices
     - Exclude any factors that influence observed rates but are not relevant to the insurance contract liability
     - Reflect only risks and uncertainties that are not reflected elsewhere in the measurement of the liability

# IFRS 4 – Risk adjustment

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1. Exposure Draft:
   - Maximum amount the insurer would rationally pay to be relieved of the risk that the ultimate fulfilment cash flows exceed those expected
   - Important information about risk that is an integral part of the insurer's business model
   - Techniques for estimating the risk adjustment limited
     - Confidence level
     - Conditional tail expectation
     - Cost of Capital
   - Remeasured at each reporting period
2. Tentative Decisions (February 2011):
   - Inclusion of an explicit risk adjustment in the measurement of insurance liabilities provides relevant information to users, if there are techniques that could faithfully represent the risk inherent in insurance liabilities

# Valuation of liabilities at Munich Re

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- Market-consistent valuation of liabilities is deeply rooted in Munich Re's key performance measures, and are also externally disclosures
  - Market-consistent embedded value
  - Available financial resources
  - Economic Risk Capital
  - In the future: Solvency II metrics (Own Funds, SCR)
- The above performance indicators are the basis of all relevant management processes at Munich Re
  - Risk strategy
  - Value-based management (incl. link to compensation)
  - Product design and pricing
  - Asset Liability Management
  - Annual planning
- Munich Re believes that transparency on the basis of market-consistent valuation can improve the discipline of the insurance market

# Example: Summary of economic capital disclosure

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## Position as at 31 December 2010

| €bn | | 31.12.2010 | 31.12.2009 |
|---|---|---|---|
| Available financial resources (AFR) | 29.6 | **29.6** | 28.4 |
| Economic risk capital[1] | 11.8 / 8.9 | **20.7** | 17.4 |
| Economic capital buffer | 4.1 / 4.8 | **8.9** | 11.0 |
| Economic capital buffer after share buy-back and dividends[2] | 2.6 / 4.8 | **7.4** | 9.3 |


**Capital strength maintained, despite higher risk exposures**

[1] Solvency II capital based on VaR 99.5%, Munich Re internal risk model based on 175% of Solvency II capital.
[2] After announced dividend for 2010 of €1.13bn to be paid in April 2011 and €0.35bn outstanding from 2010/11 share buy-back programme.

# Reconciliation of AFR with IFRS equity

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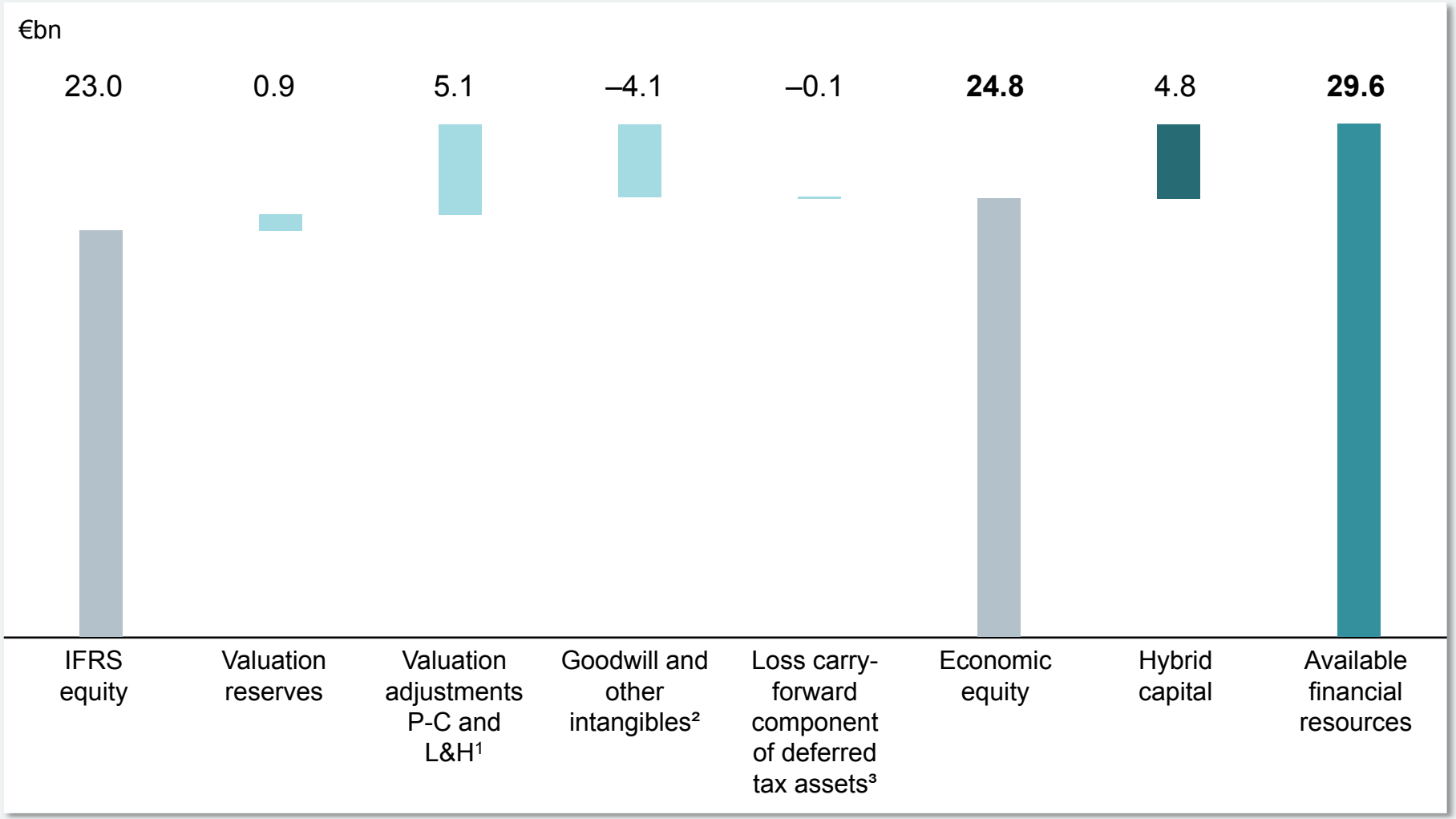


[1] Includes discount of reserves and embedded value not recognised in IFRS equity.
[2] Deduction net of tax effects.
[3] Deduction only of the amount not covered by excess of deferred tax liabilities on solo-entity level.

# Agenda

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Setting the scene

**Determination of the best estimate liabilities**

Calculation of the risk margin

Summary

# Best estimate valuation – Three examples

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| | Certain P&C lines | Index-linked life insurance | Traditional life insurance |
|---|---|---|---|
| Cash flow | Cash flows not dependent on capital markets | Simple cash flow dependency on capital markets (e.g. guarantee plus option on index) | Complex cash flow dependency on capital markets |
| BE valuation | Discount expected cash flows at risk free rate | Value options and guarantees using analytical tools (e.g. black scholes) | ▪ Average of discounted cash flow value using a set of deliberately calibrated scenarios |
| Replicating portfolio | Zero coupon bond portfolio, matching the expected value of cash flow by time bucket | Portfolio of zero coupon bonds and options | ▪ Stochastic simulation of a large number of scenarios<br>▪ Derivation of a replicating portfolio based on statistical techniques |
| Tools | Actuarial techniques for cash flow projection | Financial mathematics | ▪ Embedded Value models<br>▪ Economic Scenario Generators<br>▪ Replication tools |

Complexity

# Modelling of P&C cash flows

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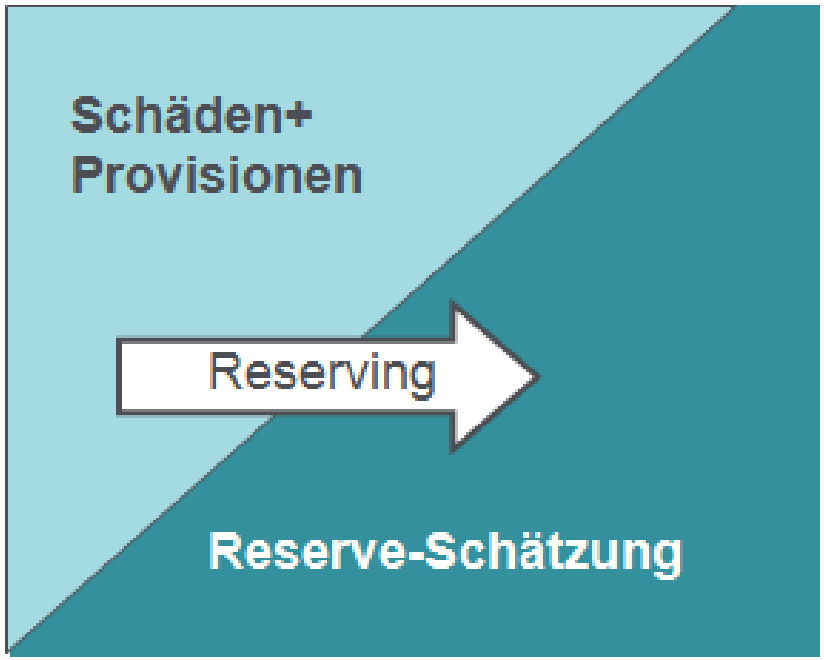
## Basic losses

- Modelling of basic losses based on historic data and respective statistical methods
- Data pool identical to the one for reserving purposes (claims triangles). Projection of cash flows based on reserving methods

## Illustration




Cash flow projection based on claims triangles

**Projection of cash flows based on traditional actuarial techniques**

# Valuation of complex life liabilities

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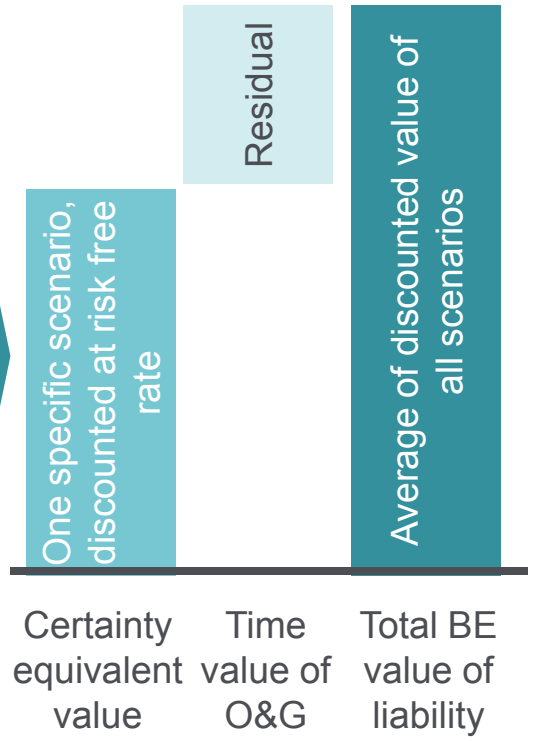
## Economic Scenario Generator

- Generation of a set of market-consistent scenarios
  - Calibrated to a specific valuation date and to a given asset universe
  - A set usually comprises between 5'000 and 50'000 scenarios, extends over 30 to 100 years and covers multiple currencies
- Commercial ESC's available
  - Barrie & Hibbert
  - TSM (Deloitte)
  - …

## Cash Flow Model

- Allows projection of cash flows over entire run-off for each of the scenarios in the set
- Commercial software available, e.g.
  - Prophet
  - …
- Subject to public audit

## Valuation




**Valuation on the basis of economic scenarios required**

# Replicating life insurance liabilities

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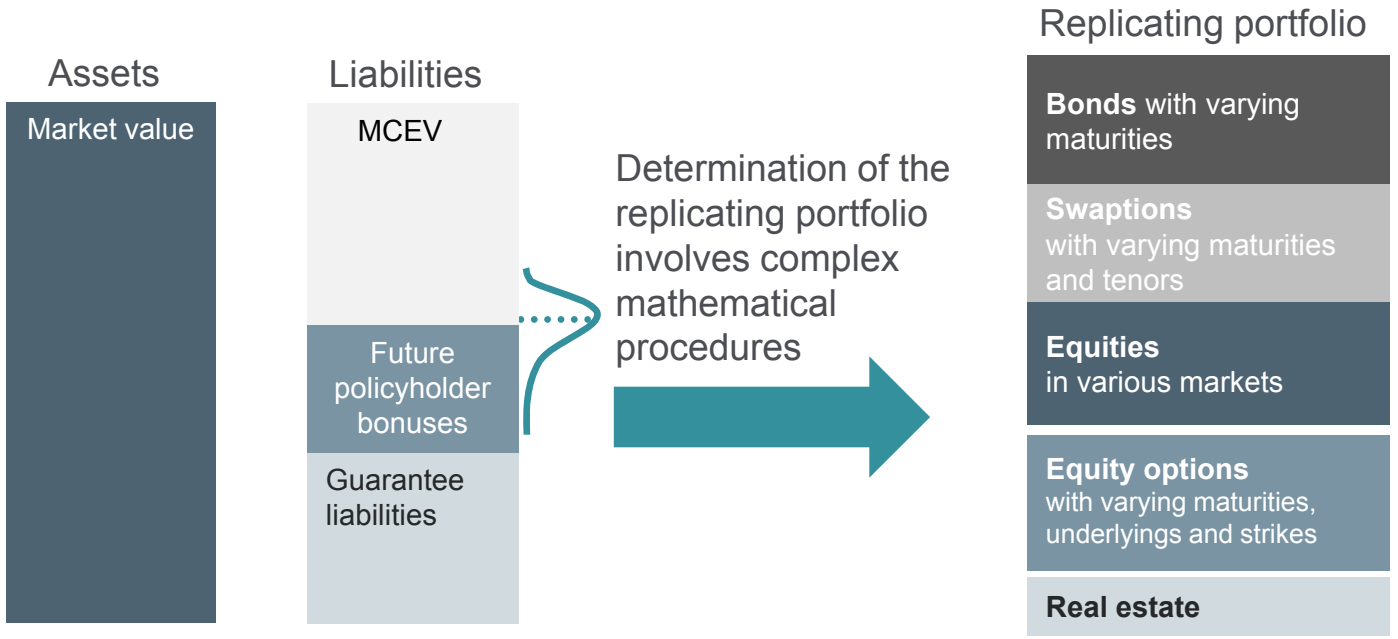
## Replication of traditional primary life insurance products




- MCEV valuation used as basis for economic balance sheet
- Management treatment of policyholder bonuses valued using management rules
- Market-consistent valuation using risk-neutral capital market scenarios
- Replication of MCEV used as basis for risk measurement

**In life insurance, the value of liabilities is dependent on capital markets**

# Replicating portfolio – an example

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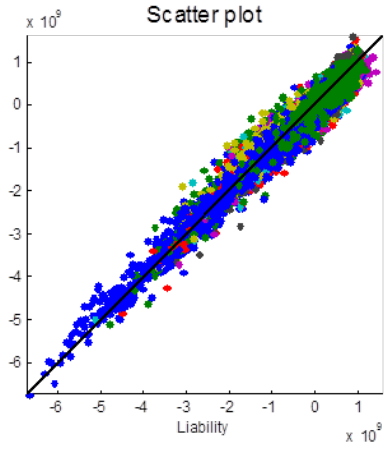
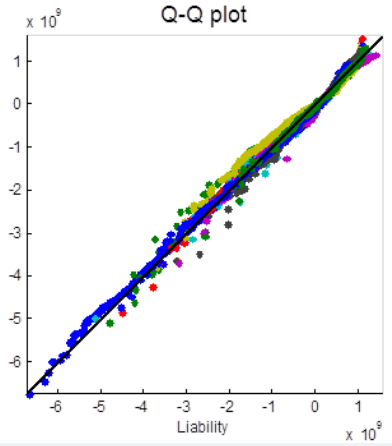
**Optimization report**

| | |
|---|---|
| Number of instruments | 39 |
| Number of constraints | 6 |
| Number of scenarios | 13.000 |
| R2 | 97,5% |
| Correlation | 98,8% |
| Corr. @ -200bp | 98,1% |
| Corr. @ -100bp | 98,6% |
| Corr. @ Basis | 98,3% |
| Corr. @ +100bp | 97,4% |
| Corr. @ +200bp | 96,1% |
| Corr. @ Twist up | 98,3% |
| Corr. @ Twist down | 97,8% |
| Corr. @ IR Vol +25% | 98,6% |
| Corr. @ EQ Vol +25% | 98,3% |
| Corr. @ RE Vol +25% | 97,9% |
| Corr. @ EQ -30% | 98,3% |
| Corr. @ RE -30% | 98,5% |
| Corr. @ Creditspread +100bp | 98,3% |
| Log10(1-norm Cond. Numb.) | 10,2 |
| Log10(2-norm Cond. Numb.) | 9,9 |




**Replicating Portfolio**

in Mio.€

| Instrument | Nominal | MV |
|---|---|---|
| Cash | -3110 | -3.110 |
| Zero Bond 1Y | 3498 | 3.459 |
| Zero Bond 6Y | -8002 | -7.052 |
| Zero Bond 11Y | 101 | 75 |
| Zero Bond 21Y | 161 | 86 |
| Zero Bond 26Y | -456 | -214 |
| Zero Bond 31Y | 1340 | 562 |
| Zero Bond 40Y | -2005 | -703 |
| Credit Bond AA 6Y 0% | 8314 | 6.823 |
| Forward Swap EUR_10y 1Y 10Y 3.5% | -378 | -22 |
| Forward Swap EUR_10y 6Y 10Y 3.5% | 867 | 1 |
| Forward Swap EUR_10y 16Y 10Y 3.5% | 433 | 13 |
| Forward Swap EUR_10y 21Y 10Y 3.5% | 1479 | 74 |
| Forward Swap EUR_20y 1Y 20Y 3.5% | 306 | 19 |
| Forward Swap EUR_20y 6Y 20Y 3.5% | -772 | -27 |
| Forward Swap EUR_20y 20Y 20Y 3.5% | -938 | -98 |
| Receiver Swaption EUR_10y 1Y 10Y 2.25% | -700 | -8 |
| Receiver Swaption EUR_10y 6Y 10Y 2.25% | -3078 | -46 |
| Receiver Swaption EUR_10y 11Y 10Y 2.25% | -2799 | -56 |
| Receiver Swaption EUR_10y 16Y 10Y 2.25% | -1579 | -41 |
| Receiver Swaption EUR_10y 21Y 10Y 2.25% | -2044 | -64 |
| Receiver Swaption EUR_10y 1Y 10Y 3.5% | -1836 | -134 |
| Receiver Swaption EUR_10y 6Y 10Y 3.5% | -2095 | -123 |
| Receiver Swaption EUR_10y 11Y 10Y 3.5% | -3257 | -201 |
| Receiver Swaption EUR_10y 16Y 10Y 3.5% | 515 | 35 |
| Receiver Swaption EUR_10y 21Y 10Y 3.5% | -1951 | -144 |
| Receiver Swaption EUR_20y 1Y 20Y 2.25% | -785 | -10 |
| Receiver Swaption EUR_20y 6Y 20Y 2.25% | 541 | 16 |
| Receiver Swaption EUR_20y 11Y 20Y 2.25% | -58 | -2 |
| Receiver Swaption EUR_20y 16Y 20Y 2.25% | -1301 | -67 |
| Receiver Swaption EUR_20y 1Y 20Y 3.5% | 1799 | 184 |
| Receiver Swaption EUR_20y 6Y 20Y 3.5% | -414 | -47 |
| Receiver Swaption EUR_20y 11Y 20Y 3.5% | 225 | 28 |
| Receiver Swaption EUR_20y 16Y 20Y 3.5% | -492 | -67 |
| Index EUR_Eq 1Y | -19 | -19 |
| Index EUR_RE 1Y | 477 | 478 |
| Index Put EUR_Eq 6Y 120% | -112 | -34 |
| Index Put EUR_RE 6Y 100% | -256 | -23 |
| Index Put EUR_RE 21Y 100% | -911 | -54 |

**Replicating portfolio mimics relevant characteristics of liability**

# The risk-free interest rate term structure

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## Basic risk free interest rates

Different interest rates qualify for the basic risk free interest rate term structure:

- Government bond rates,
- Swap rates.

Swap rates outclass government bond rates in relevant aspects.

If the chosen interest rate term structure is not entirely risk free then some adjustment for credit risk is necessary.

## Extrapolation

The basic interest rate term structure does sometimes not cover the long maturities of insurance liabilities such that the basic interest rates must be extrapolated. Many issues have to be solved:

- Basis for extrapolation (e.g. forward rates)?
- Ultimate forward rate?
- Starting point for extrapolation?
- Extrapolation method?
- Speed of convergence?

## Illiquidity premium

In times of stressed liquidity financial markets, a part of the excess return of illiquid assets can be earned risk free. For certain insurance liabilities, this illiquidity premium should be accounted for. The subsequent issues have to be solved:

- How to determine the illiquidity premium?
- Until when can the illiquidity premium earned?
- How to apply to insurance products?

**The topic is of material impact on the valuation of liabilities**

# Swap rates vs. Government bond rates

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## Principles proposed by the CFO Forum and CRO Forum[1]

Principles for the selection of the basic risk-free interest rate:

1. For each currency where swaps exist and are sufficiently liquid and reliable, the basic risk-free interest rate applicable to the valuation of a liability should be based on the swap curve appropriately adjusted to remove credit risk.
2. When using swaps where the deposit period on the floating rate leg is not overnight an adjustment for long-term through-the-cycle credit risk appropriate to the deposit period should be made.
3. Where swaps do not exist or are not sufficiently liquid and reliable from a certain point, the basic risk-free interest rate applicable to the valuation of a liability should have reference to the government curve in that currency.
4. For government curves where the government is of credit quality lower than AAA an adjustment for long-term through-the-cycle credit risk should be made.
5. In all cases, the basic risk-free interest rates should follow a smooth progression.

**Clear proposal to use swap rates as the basis for the risk-free interest rates.**

[1] CFO Forum and CRO Forum: *QIS 5 Technical Specification: Risk-free interest rates*, April 2010

# On extrapolation of the risk-free interest rates

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## Principles supported by the CRO Forum[1]

Principles for the extrapolation of the basic risk-free interest rates:

1. The extrapolated part of the basis risk free interest rate curve should be calculated and published by […], based on transparent procedures and methodologies, with the same frequency and according to the same procedures as the non extrapolated part.
2. Extrapolation should be based on forward rates converging from one or a set of last observed liquid market data points to an unconditional ultimate long-term forward rate to be determined for each currency by macro-economic methods. Methods can take differences between currencies into account. The principles used to determine the macro-economic long-term forward rate should be explicitly communicated.
3. Criteria should be developed to determine the last observed liquid market data points which serve as entry point into the extrapolated part of the interest curve and for the pace of convergence of extrapolation with the unconditional ultimate long-term forward rate.
4. Techniques should be developed regarding the consideration to be given to observed market data points situated in the extrapolated part of the interest curve.
5. …

**These principles are clearly plausible but the devil is in the details of implementation.**

[1] CRO Forum: Best Practice Paper - Extrapolation of Market Data, August 2010

# On the determination of the illiquidity premium

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## Issues around the illiquidity premium

The illiquidity premium is generally not observable but must be determined mark-to-model.

- The illiquidity premium depends on the individual asset considered and the depth, liquidity and transparency of the respective market the asset is traded in – there is no uniform market price for illiquidity.
  - Especially, the illiquidity premium can depend on the maturity of the respective asset.
  - The determination of an illiquidity premium in principle requires two types of assets sharing all features except of liquidity.
- The separation of the illiquidity premium and the spread for (expected and unexpected) credit risk is not straightforward but rather depends on the model used. Typically, credit spread and the illiquidity premium are positively correlated. Deriving the illiquidity premium from more risky assets bears the risk of overestimating the illiquidity premium.

**The determination of the illiquidity premium is rather difficult and hardly objective.**

# Components of the spread

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## Components of the total spread

The spread, i.e. the yield of an asset and the liquid risk-free rate, comprises more than just a loading for the credit risk.

Research work evidenced that by end of 2008 spreads exceeded by far the cost of credit risk mitigation and included a component which was much less visible in the years before.

The wider bond spreads can be attributed, at least to a certain extent, to the existence of a liquidity premium, compensating the investor in corporate bonds for illiquidity.

Even in case of a perfect AL-Match, the NAV decreased due to the increase of the liquidity premium during the financial crisis.

In normal times, the liquidity premium is assessed to be almost zero.


Decomposition of the spread

**Changes in the liquidity premium should not affect the NAV in a perfect AL-Match.**

# Methods of calculation of a liquidity premium for assets

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## Determination of the liquidity premium

Three main methods currently used by practitioners to estimate the liquidity premium in financial markets are

- the **CDS Negative-Basis Method** which compares the spread on a corporate bond with the spread of a Credit Default Swap for the same issuing entity, same maturity, same seniority and same currency.
- the **Covered Bond Method** which involves choosing a pair of assets which, besides liquidity, are assumed to offer equivalent cash flows and equivalent credit risk. The primary example is an index of covered bonds versus swaps.
- the **Structural Model Method** which involves the use of option pricing techniques to calculate a theoretical credit spread which compensates only for credit (default and spread) risk. The difference between the theoretical spread and the actual market spread is typically taken to be liquidity premium.

**Financial literature recognizes drawbacks for each of these methods.**

# Principles underlying the use of the illiquidity premium

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## Principles underlying the use of the illiquidity premium[1]

1. The risk free reference rate applicable to the valuation of a liability should be the sum of a basic risk free reference rate and a liquidity premium depending on the nature of the liability.
2. The liquidity premium should be **independent of the investment strategy** adopted by the company.
3. The liquidity premium applicable to a liability should **not exceed the extra return which can be earned** by the insurer by holding illiquid assets **free of credit risk**, available in the financial markets and matching the cash flows of the liability.
4. **The liquidity premium applicable to a liability should depend on the nature of the liabilities having regard to the currency, the predictability of their cash flows** (e.g. the ability to cash back/withdraw/surrender) **and the resilience to forced sales of illiquid assets covering technical liabilities** (e.g. where any loss of liquidity premium can be transferred to policyholders).
5. The liquidity premium should be **calculated and published by […]** with the same frequency and according to the same procedures as the basic risk free interest rate.
6. The liquidity premium should be **assessed and quantified by reliable methods based on objective market data** from the relevant financial markets and consistent with solvency valuation methods.
7. No liquidity premium should be applied to liabilities in the absence of a corresponding liquidity premium evidenced in the valuation of assets.
8. …

**There is a broad support for these principles but the devil is in the details of implementation.**

[1] CEIOPS: Task Force Report on the Liquidity Premium, March 2010

# Agenda

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Setting the scene

Determination of the best estimate liabilities

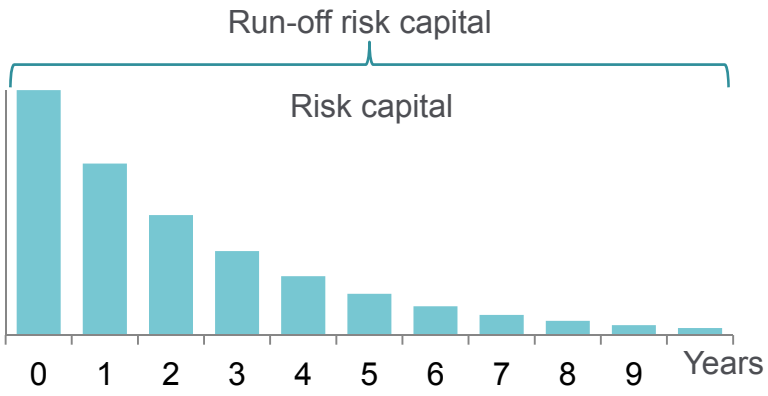
**Calculation of the risk margin**

Summary

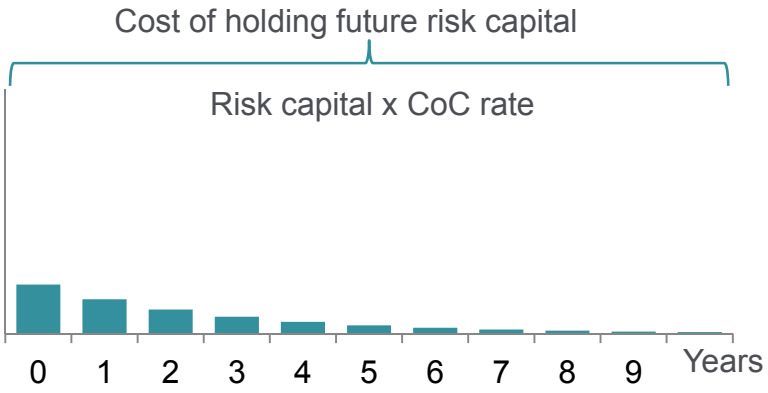
# Calculation of the risk margin using the CoC approach

## Calculation of the risk margin in three steps

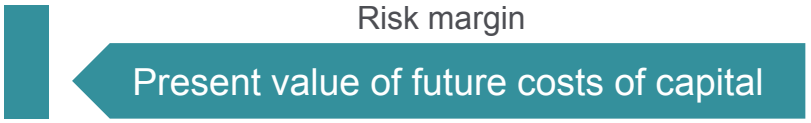
**Step 1**
Project risk capital




**Step 2**
Multiply with CoC rate




**Step 3**
Discount with risk free rate




Topics regarding the CoC approach to be considered:

- Risks covered
- Diversification
- Starting year
- Cost of capital rate
- Risk free rate
- …

# On inclusion of market risk in the risk margin

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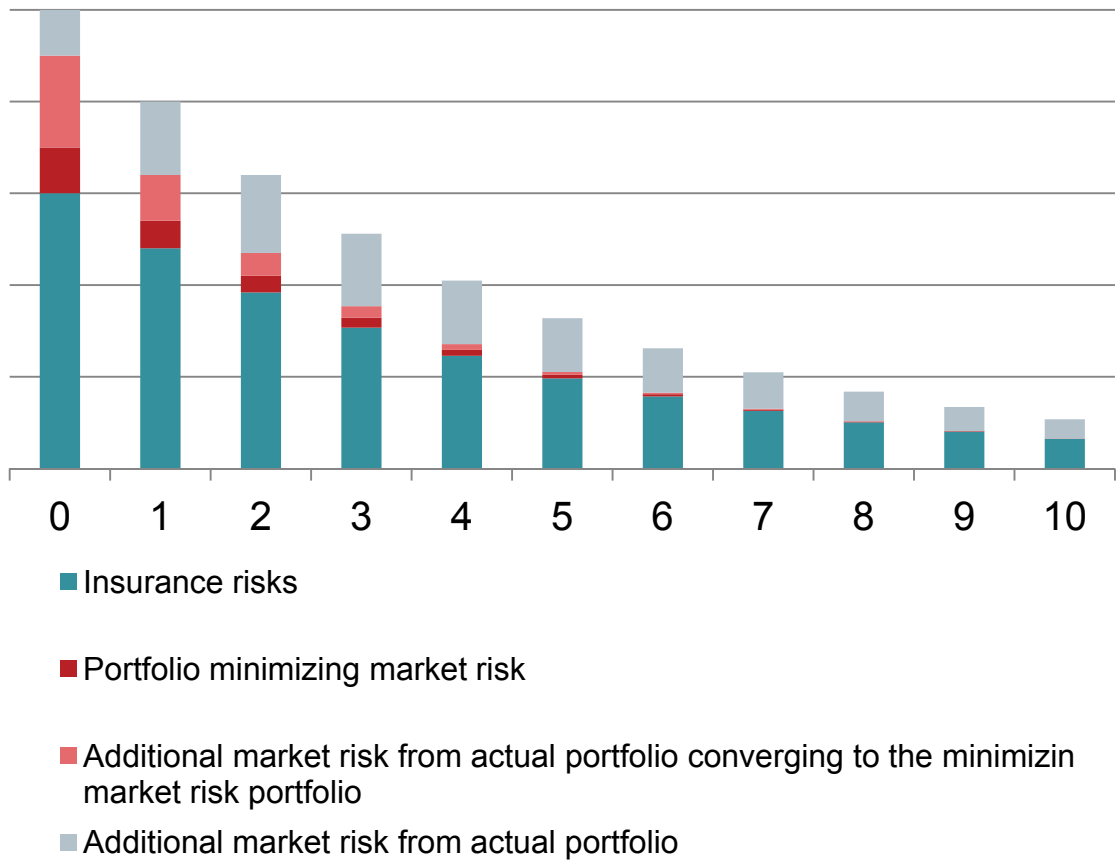
## Run-off risk capital for different market risks




The undertaking can converge the assets covering the best estimate liabilities swiftly to a replicating portfolio minimising/eliminating the market risk to a negligible amount.

Thus, market risk should not be covered in the projected risk capital used for determining the risk margin.

Diversification shall be considered in the projected risk capital

# Market prices vs. market value of technical provisions

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## CRO Forum[1]

„The CRO Forum emphasises that market-consistency refers to values that are consistent with those observed in deep and liquid financial markets and therefore draws a distinction between market-consistent valuation and observed pricing practices in the insurance markets. Insurance premium rates and prices are not considered an adequate basis for the valuation of insurance liabilities because primary insurance markets are illiquid and inefficient and because pricing practices in the primary insurance markets are driven by a range of considerations beyond the economic value of the liabilities generated.“

## Examples

Observed market prices deviate from the theoretical concept underlying the determination of market value of technical provisions due to several reasons:

- market cycles,
- business growth strategies,
- low profit margin in certain lines of business are accepted when these lobs are door opener for more profitable lobs,
- rating of the reference undertaking expected profits of new business of acquired business,
- and many more.

**Observed market prices are not reflecting the market value of technical provisions.**

[1] CRO Forum, „Market Value of Liabilities for Insurance Firms“, p.4, 2008.

# Components of the cost of capital rate

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## Components of the total cost of capital

The cost of capital rate is the return in excess of the risk-free rate required investors for bearing non-hedgeable risks.

The excess of the risk free rate comprises expected returns on

- non-hedgeable risks
- hedgeable risks
- franchise value

'Total return' approaches cover the total cost of capital and thus need to be adjusted to exclude franchise value and required return on hedgeable risks.


**The appropriate cost of capital rate is the return required on capital used to support non-hedgeable risk on existing business**

# Proposed and actually used CoC-rates of the CRO Forum

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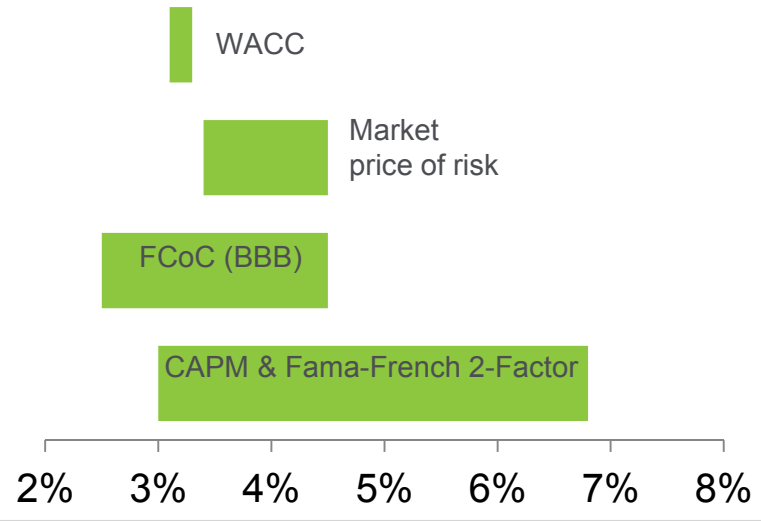
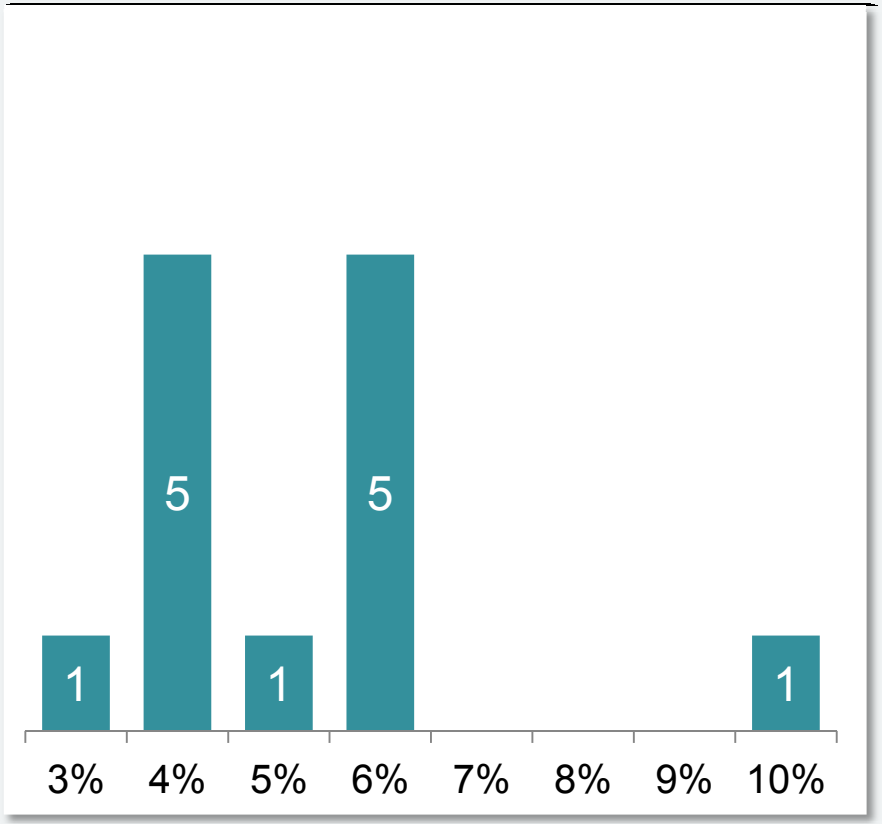
## Range of possible CoC-rate values

Based on the results of the different methods to asses the CoC-rate, the CRO Forum suggest the CoC-rate to be within the range between 2.5% and 4.5%.




## CoC-rates used by CRO Forum members[1]




**The CRO Forum has proposed a range of 2,5% to 4,5% for the CoC rate**

[1] CRO Forum: „Internal models benchmarking study“, 2009

# Agenda

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Setting the scene

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**Summary**