23 December 2005

Solutions to major issues for Solvency II

Joint submission by the CRO Forum and CEA

Chief Risk Officer Forum

CEA

Comité Européen des
Assurances

This presentation includes elements of the original responses as well as further comments of the Chief Risk Officer Forum and the Comité Européen des Assurances to CEIOPS-CP-04/05, "Draft Answers to the European Commission on the 'second wave' of Calls for Advice in the framework of the Solvency II project."

Support was provided by Mercer Oliver Wyman in the presentation of the results and conclusions.

Note that this document supersedes 'Major Solvency II Issues Joint Submission 20051223 v02' to correct minor errata.

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FR – France	Fédération Française des Sociétés d'Assurances (FFSA)
GR – Greece	Association of Insurance Companies-Greece
HU – Hungary	Magyar Biztositók Szövetsége (MABISZ)
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CEA observer

ICISA (International Credit Insurance & Surety Association

Objective: describe our highest priority issues for Solvency II, and the solution for the highest priority issue that we all support on the basis of sound economics and practicality

Rationale for this paper

- We have noted the large quantity of material submitted to CEIOPS, by ourselves and other stakeholders, in response to the "Draft Answers to the European Commission on the 'second wave' of Calls for Advice in the framework of the Solvency II project"

- We realise that stakeholders often use different terminology for the same concepts and opinions. To help focus the debate and clarify positions we have prepared this joint submission which covers our position on the ***overall framework and the highest priority issue*** for Solvency II regarding Pillar I valuation of insurance liabilities, as well as pointing out other high priority issues
  - Detailed technical papers on other high priority issues will subsequently be produced

- While representing different groups or sub-groups of stakeholders we have a common commitment to helping to ensure that **Solvency II is based on sound economic principles** and develops into a workable and appropriate risk-based supervisory system capable of addressing the current and future needs of the European Insurance industry
  - Any other system restrictions or mixed models that increase the regulatory capital burden or inhibit risk mitigation will put the insurance industry at a relative disadvantage to other financial institutions that operate under Basel II

- ***The views expressed are supported by*** the Chief Risk Officer Forum (CRO Forum) and the Comité Européen des Assurance (CEA)

Executive summary: Overall Framework

- Pillar I Solvency Capital Requirements should be **based on a total balance sheet, market-consistent value based approach**. This means that:
  - **All assets and liabilities are valued based on a market value** where one exists and, where not, on projected best estimate cash flows valued using market-consistent techniques[1]
  - **Available Solvency Capital is defined as Market Value of Assets minus Market Value of Liabilities (MVL)**
  - **Solvency Capital Required (SCR) is defined as the value at risk** over one year to a 1 in 200 confidence level, taking into account diversification across the risks and risk mitigation in place. In other words, it represents the amount of assets needed on top of technical provisions calculated on a market-consistent basis (and therefore including Best estimate + MVM) to ensure that there will be sufficient assets to cover projected technical provisions (BEL + MVM) in one year's time in 99.5% of the cases

- The valuation of assets and liabilities and the SCR can be determined **either by approved internal model or by a Standard Approach**, in either case the core principles above are the same but clearly the Standard Approach will be more approximate and therefore more conservative

- While Pillar I and the SCR will be based on a one-year value based approach, any risks not taken into account in Pillar I should as a separate requirement be taken into account in Pillar II[2]

- **All three Pillars should be sufficiently harmonised** so that it is the nature of the business and the risks that determines solvency and reporting requirements and not the location of the company

- **There should be no prudence included on top of the market value of liabilities** to cover the risk that the actual values over time vary from the current market value estimates – **it is the purpose of the solvency capital requirement to cover this risk** – **a mixed approach where some risk is put within the valuation of liabilities or assets and some within the solvency requirement will not work** for an industry as complex and varied as the insurance industry and is likely to have a range of unintended and inappropriate consequences including reducing transparency, creating excess capital burden and encouraging solvency arbitrage.
  - We recognise that for regulatory intervention in extreme situations there is a need for absolute legal certainty and prudence. However, we believe these issues are covered by the role of the MCR rather than impacting the valuation of economic liabilities.

- While it is important that the accounting definition of liabilities and that used for solvency are consistent and reconcilable it should be recognised that they may not be the same – **accounting considerations should not affect the definition used for solvency calculations**

1. 'Market values' and 'projected best estimate cash flows using market-consistent techniques' are each cases of an 'economic value' as defined in the attached glossary of terms
2. Note that failure to meet such requirements (should they be necessary), should be tackled firstly by requiring adequate action by the company. Any capital add-ons within Pillar II will need careful design and implementation in European legislation to ensure adequate harmonisation.

Executive summary: Top priority issue discussed in this paper

1. **The valuation of insurance liabilities**

   – Technical provisions[1] for solvency purposes should be set equal to the market-consistent value of liabilities (MVL), including the value of both hedgeable and non-hedgeable risks

   – The value of hedgeable risks should be determined by mark-to-market approaches, i.e. where market prices can be observed they should be used; this is conceptually identical to a best estimate plus market value margin (MVM) approach as employed for non-hedgeable risks except that in this case the observed market price already includes the MVM

   – The value for non-hedgeable risks is determined by an appropriate mark-to-model approach:

     □ For non-hedgeable non-financial risks, liability values are determined as best estimate plus MVM and we recommend a 'cost of capital' approach for determining the MVM rather than setting arbitrary confidence interval standards

     □ For non-hedgeable financial risks, using appropriate economic methods to extend market prices (e.g. discount rates, volatility surfaces) is also an option in addition to the 'best estimate plus MVM' approach

   – As long as risk absorption capacity of product features is taken into account, the MVL should not include arbitrary liability floors such as surrender value floors and should not be based on the market values of minimum guaranteed liability cash flows, as this may not appropriately reflect the value of the liabilities[2]

     □ If any guarantee floors are required for regulatory purposes, this should be within the MCR or SCR capital requirements

   – Additional prudential margins for solvency should be reflected in the MCR and SCR rather than the technical provisions

   – The MCR automatically provides a prudence level above the MVL

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1. Technical provisions refer to the balance sheet items representing the reserves, and can be calculated differently according to the framework e.g. traditional technical provisions include some prudence whereas "economic" technical provisions consist of the MVL (so including risk margins) without inclusion of any further prudence

2. This discussion on arbitrary floors relates to individual contract-level valuations, where the imposition of minimum values/floors without regard to portfolio effects would significantly overstate the portfolio-level value of the liabilities

Executive summary: Other priority issues, that will be reviewed in detail at a later date

2. The standard approach
– Should be based on the same economic principles as an internal model but simplified as far as possible
– Should incorporate risk mitigation, diversification and other best practice modelling elements; avoid perverse incentives; yet still be practical to apply

3. Diversification
– Risk concentration contributes to insurer insolvency and diversifying strategies are the basis for sound risk management
– Ignoring diversification in solvency assessments for companies and groups leads to a material excess capital burden, above what is economically required to meet obligations (even in stress scenarios)
– Consequently, diversification should be recognised in both the solo and group solvency tests

4. Risk mitigation
– Should be fully recognised in both Pillar I and Pillar II capital requirements
– A principles-based approach to admissibility of risk mitigation instruments will ensure that some forms of mitigation are not arbitrarily favoured over others

5. Principle-based and not rule-based
– e.g. with respect to investment rules, the standard approach and internal model take market and credit risk into account, so there should be no further arbitrary restrictions on investment flexibility (apart from large concentrations akin to the banking rules)

6. Group lead vs. home supervisors
– In order to keep Solvency II's original spirit of harmonised and common regulation, the roles and authorities of the group lead and home supervisors should be clarified and role of lead supervisor strengthened to guarantee adequate harmonisation and keep the framework practical and efficient. Some of these changes can be made in advance of Solvency II with the review of the IGD

1. Technical provisions refer to the balance sheet items representing the reserves, and can be calculated differently according to the framework e.g. traditional technical provisions include some prudence whereas "economic" technical provisions consist of the MVL without inclusion of any prudence

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Section 1

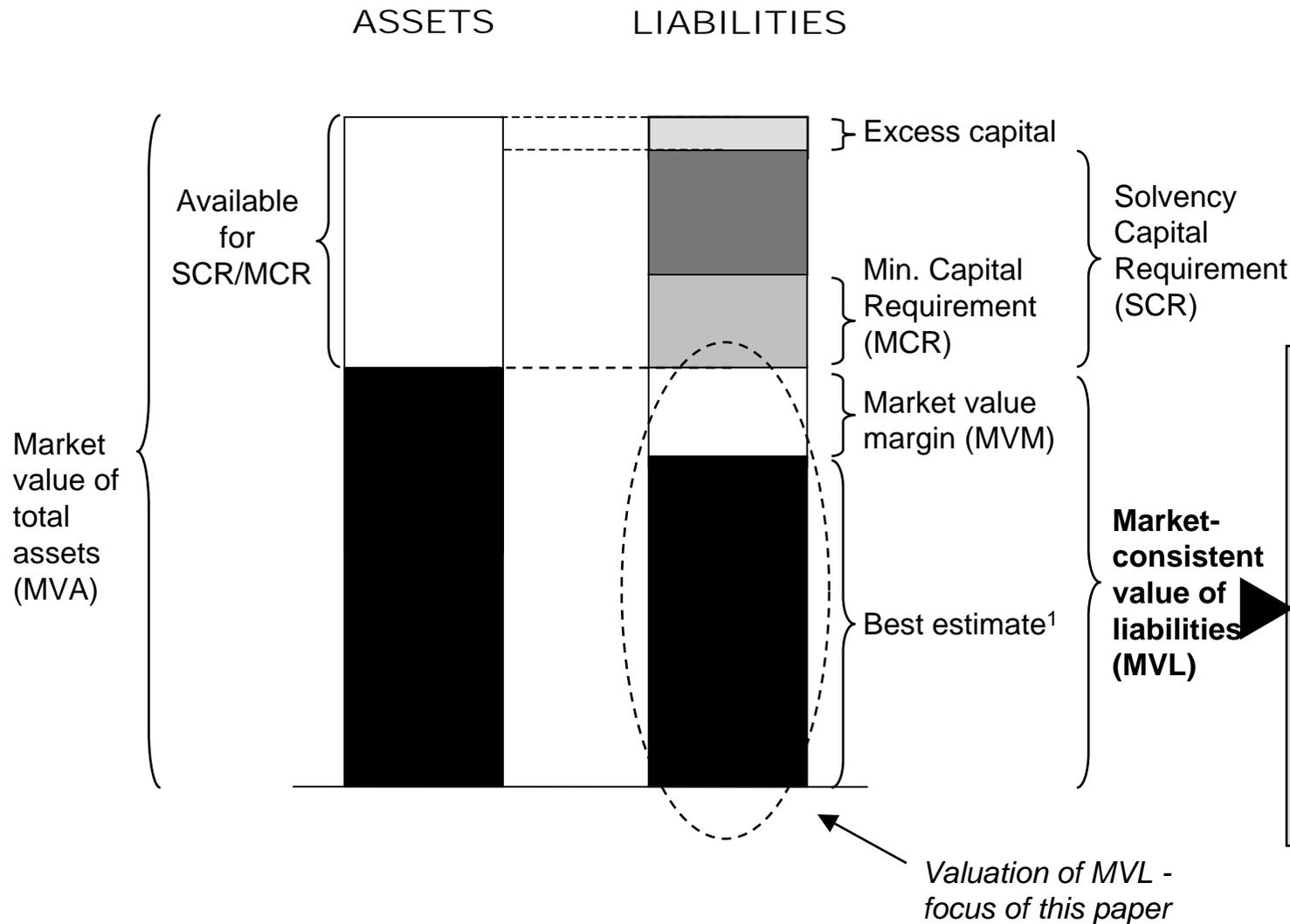## Pillar 1 capital requirements – conceptual overview

This discussion focuses on the capital requirements for Pillar I purposes

- ■ We recognise the need and value of the additional Pillar II requirements on top of Pillar I

- ■ However, Pillar I and Pillar II serve different purposes, and therefore will be treated separately

- ■ Pillar I requirements are currently being considered and will form the basis upon which this paper is written

- ■ Pillar II will be addressed in a later CFA by CEIOPS

Pillar I	Pillar II
Financial Resources	**Supervisory Review**
Basic principles:	Additional requirements:
■ **Economic value based approach**	■ Multi-year **continuity testing**
■ Capital requirement over a **1-year time horizon**, however includes i**mpact on all future liabilities** and therefore represents "fair value"	■ Run-off **sensitivity analysis** over lifetime of the product
■ Capital calculated to a confidence interval of **99.5%** (i.e. 1 in 200 year event)*	
■ Accounts for **diversification** effects across risks and **risk mitigation**	

*This is based on the assumption of a VaR measure. A TailVaR measure would be a lower confidence level

Overview of the Economic Balance Sheet

ASSETS **LIABILITIES**

Excess capital

Solvency Capital Requirement (SCR)

Available for SCR/MCR

Min. Capital Requirement (MCR)

Market value margin (MVM)

Market value of total assets (MVA)

Market-consistent value of liabilities (MVL)

Best estimate[1]

Section Key issues:

2 **No** inclusion of additional arbitrary prudential margins in technical provisions on top of MVMs

3 Valuation of MVL

4 Cost of Capital approach for MVMs
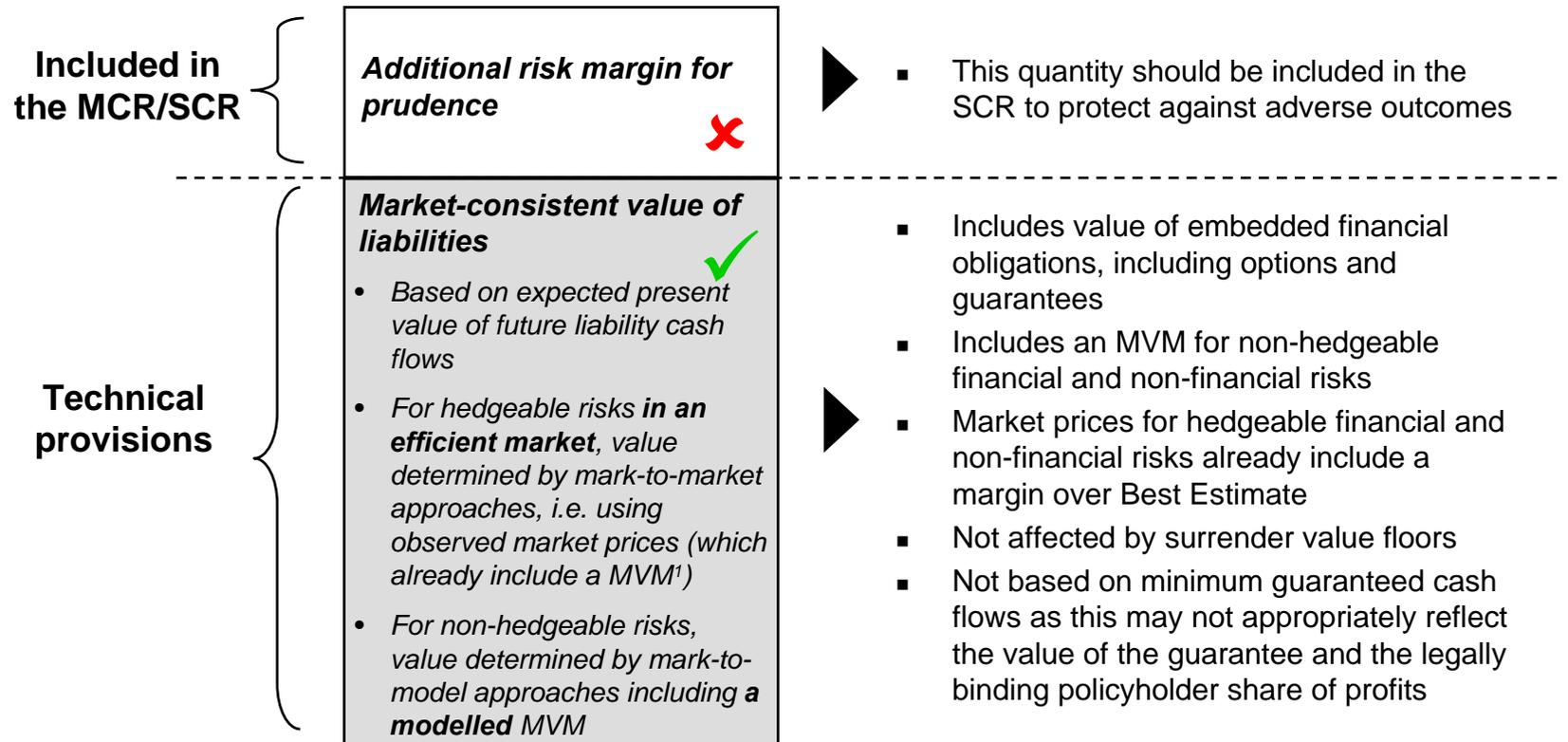
Valuation of MVL - focus of this paper

1. It should be noted that for prices directly inferred from market prices, the price already includes the risk margin (or market value margin)

Section 2

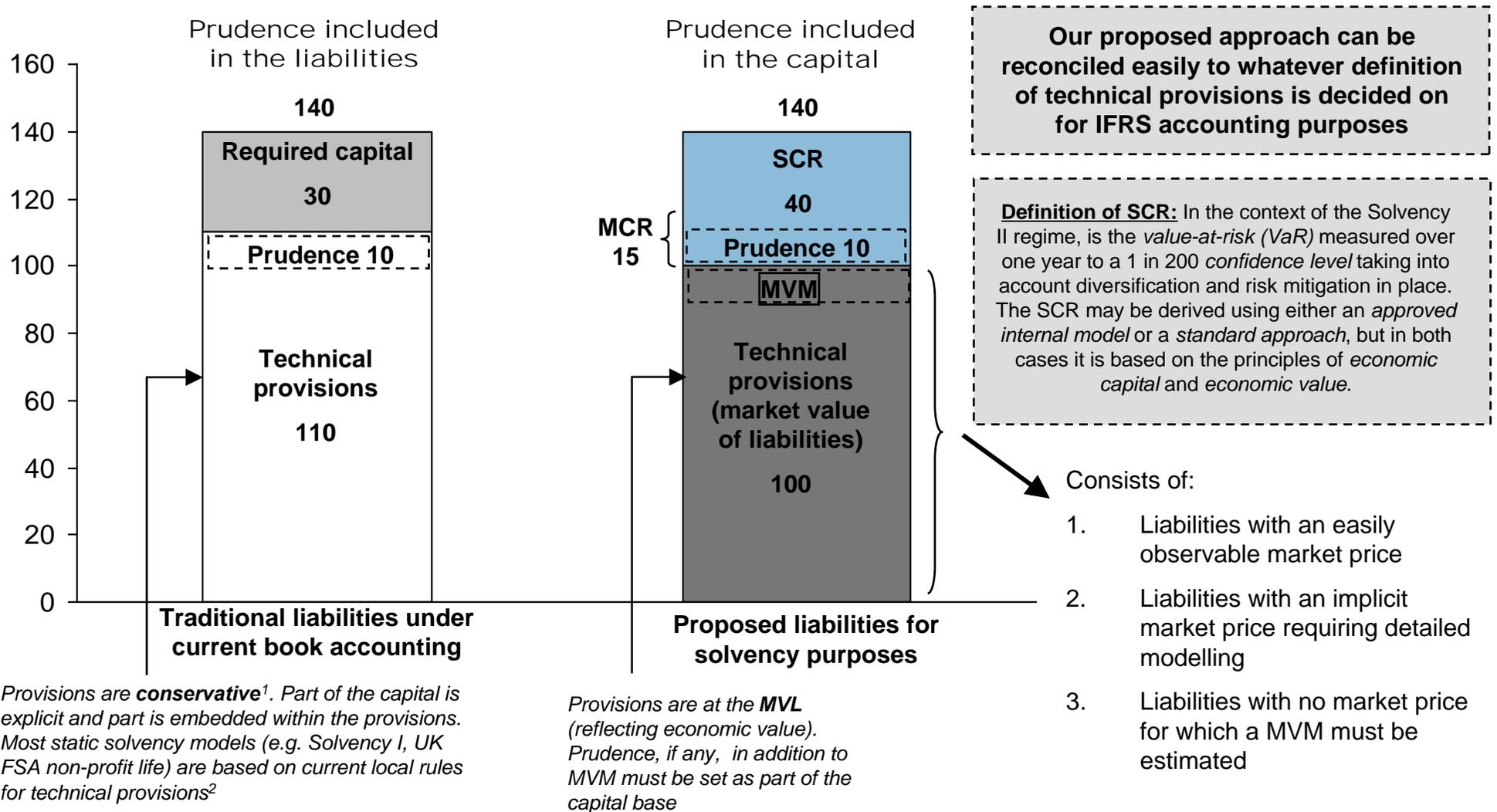# No prudential margins in technical provisions

Technical provisions should consist of the market value of liabilities (MVL) and exclude any additional prudential margins

Possible components of the technical provisions

Included in the MCR/SCR

Additional risk margin for prudence ❌

▶ ■ This quantity should be included in the SCR to protect against adverse outcomes

Technical provisions

Market-consistent value of liabilities ✔

- *Based on expected present value of future liability cash flows*
- *For hedgeable risks **in an efficient market**, value determined by mark-to-market approaches, i.e. using observed market prices (which already include a MVM[1])*
- *For non-hedgeable risks, value determined by mark-to-model approaches including **a modelled** MVM*

▶
- Includes value of embedded financial obligations, including options and guarantees
- Includes an MVM for non-hedgeable financial and non-financial risks
- Market prices for hedgeable financial and non-financial risks already include a margin over Best Estimate
- Not affected by surrender value floors
- Not based on minimum guaranteed cash flows as this may not appropriately reflect the value of the guarantee and the legally binding policyholder share of profits

* Definition: The ***Market Value Margin (MVM)*** is the cost of risk, i.e. risk margin in addition to the best estimate liability (i.e. the expected present value of best estimate future cash flows) required by the market. **It is necessary in order to correctly value best estimate cash flows**

Under our proposal, margins for prudence are either absorbed into the MCR / SCR, or kept separate but labelled as capital

Prudence included in the liabilities

Prudence included in the capital

Our proposed approach can be reconciled easily to whatever definition of technical provisions is decided on for IFRS accounting purposes

Definition of SCR: In the context of the Solvency II regime, is the *value-at-risk (VaR)* measured over one year to a 1 in 200 *confidence level* taking into account diversification and risk mitigation in place. The SCR may be derived using either an *approved internal model* or a *standard approach*, but in both cases it is based on the principles of *economic capital* and *economic value*.

Traditional liabilities under current book accounting

Proposed liabilities for solvency purposes

Consists of:

1. Liabilities with an easily observable market price

2. Liabilities with an implicit market price requiring detailed modelling

3. Liabilities with no market price for which a MVM must be estimated

*Provisions are **conservative**[1]. Part of the capital is explicit and part is embedded within the provisions. Most static solvency models (e.g. Solvency I, UK FSA non-profit life) are based on current local rules for technical provisions[2]*

*Provisions are at the **MVL** (reflecting economic value). Prudence, if any, in addition to MVM must be set as part of the capital base*

1. Note: these may not necessarily be conservative enough in times of stress as the elements of prudence are by reference to arbitrary features such as discount rate rather than being risk sensitive

2. Source: CEA, Solvency Assessment Models Compared, Essential groundwork for the Solvency II project, page 17

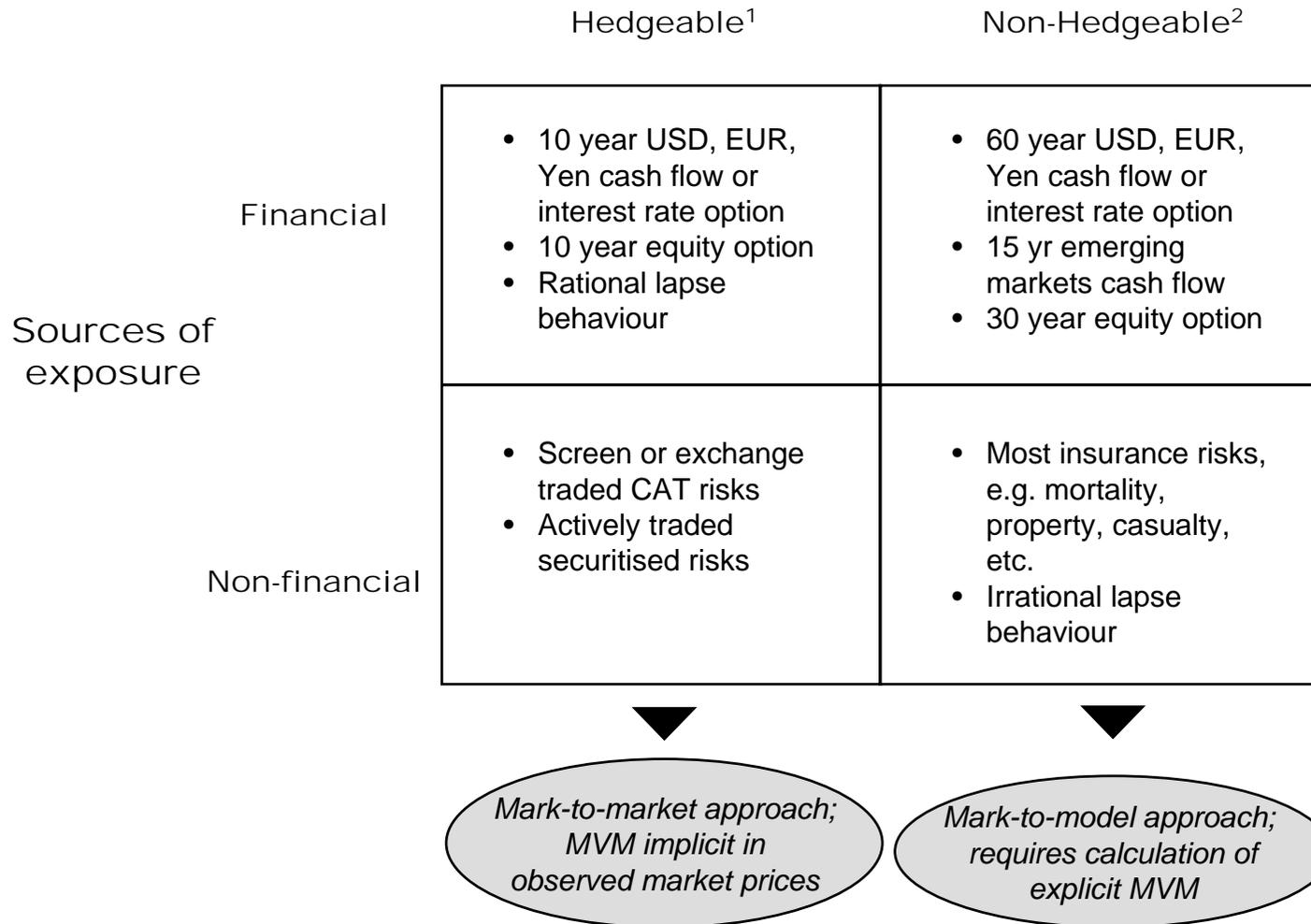# Rationale for proposed inclusion of prudence margins within the MCR / SCR

- Technical provisions should be transparent for harmonisation across the EU, and in line with market (transfer) prices

- Other financial services sectors do not include prudence into the valuation of the liabilities, but rather into the required capital

- As the MCR corresponds to the level of capital below which the regulator is required to take action, the MCR acts as the prudence level desired above MVL to cover against model error, timing error and run-off margin, if appropriate.

- **Should CEIOPS desire a legally certain measure that is prudent for regulatory intervention purposes, then this should be addressed within the capital framework but not within the technical provisions**

Section 3

Valuation of MVL

For MVL valuation purposes, hedgeable and non-hedgeable risks should be treated differently

Management options

	Hedgeable[1]	Non-Hedgeable[2]
Financial	• 10 year USD, EUR, Yen cash flow or interest rate option • 10 year equity option • Rational lapse behaviour	• 60 year USD, EUR, Yen cash flow or interest rate option • 15 yr emerging markets cash flow • 30 year equity option
Non-financial	• Screen or exchange traded CAT risks • Actively traded securitised risks	• Most insurance risks, e.g. mortality, property, casualty, etc. • Irrational lapse behaviour

Sources of exposure

▼ *Mark-to-market approach; MVM implicit in observed market prices*

▼ *Mark-to-model approach; requires calculation of explicit MVM*

1. A risk that a party can reduce their exposure to by purchasing a hedging instrument or transferring the exposure to a willing, rational, diversified counterparty in an arms' length transaction under normal business conditions (i.e. securitisation e.g. derivatives, options, futures etc)
2. Risks that cannot be hedged or easily transferred to a third party due to market liquidity or interest

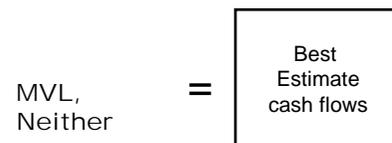# In practice, MVL valuation methods should be tailored to the nature of the risk

Component parts of MVL calculation   **Examples**

Theory

| **Market value of Liabilities (MVL)** | = | Best Estimate cash flows | + | MVM Hedgeable Financial Risks | + | MVM Hedgeable Non-financial Risks | + | MVM Non-hedgeable Financial Risks | + | MVM Non-hedgeable Non-financial Risks |

Practice

| **MVL, Hedgeable only** | = | Market prices |
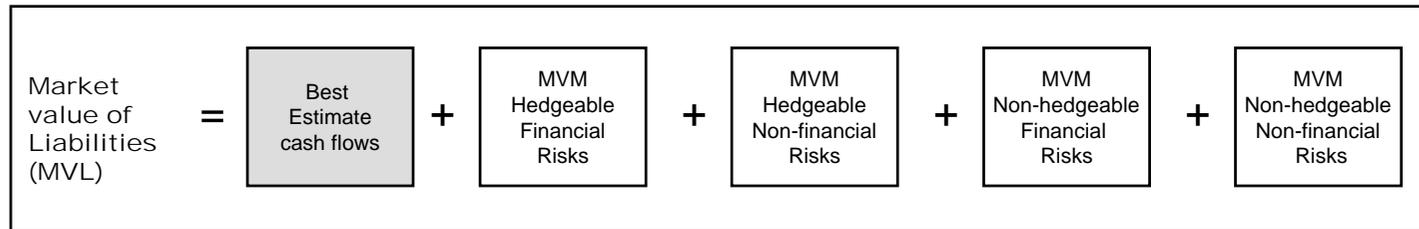
One-year investment contract with embedded guarantee

| **MVL, Non-hedgeable only** | = | Best Estimate cash flows | + | MVM Non-hedgeable Financial Risks | + | MVM Non-hedgeable Non-financial Risks |

Auto insurance contract or One-year term life insurance

| **MVL, Both hedgeable & non-hedgeable** | = | Market prices | + | MVM Non-hedgeable Financial Risks | + | MVM Non-hedgeable Non-financial Risks |

Equity-indexed annuity

| **MVL, Neither** | = | Best Estimate cash flows |

Guaranteed investment contract

▼

In the next section we propose a Cost of Capital approach for the calculation of MVMs for Non-hedgeable Non-financial risks

Section 4

Cost of capital approach for MVMs

Where an explicit MVM is applicable[1], we believe that arbitrary 'confidence intervals' is not the best available valuation approach

Market Value Margin (MVM): *By definition*, the cost of risk, i.e. risk margin in addition to the best estimate liability (i.e. the expected present value of best estimate future cash flows) required by the market

Additional risk margin for prudence: This quantity may be positive, negative, or zero (shown here as positive).

- No reason to believe that the "confidence interval" value is market consistent
- Underlying volatility obscured
- Risk-taking obscured

Probability density

MVM

✓ ✗

e.g. 75th percentile

Liability Value

Best Estimate

Liability value at specified confidence interval

Market price / Market-consistent value

Consequently, other ways of estimating the market value margin must be considered

- We are in agreement that using 75% or 90% confidence levels cannot be assumed to provide an appropriate estimate for the Market Value Margin across all insurance liabilities and that other methods should be considered

- A good alternative is the cost of capital (CoC) approach, already adopted by the Swiss in the Swiss Solvency Test. The CoC merits further investigation before fixing the final approach for Solvency II.

- The cost of capital approach has a number of theoretical and practical advantages over a confidence level approach e.g.
  - Cost of capital approach is directly linked to a view of what a rational investor would demand in excess of best estimate valuation
  - Cost of Capital approach is in fact easier to apply (unlike confidence level approach it does not require stochastic modelling)

- There are various methodological options which would need to be decided, including the definition of capital to be used and the rate or cost of capital to apply
  - ➔ A final choice from among these options requires additional work and we welcome the opportunity to cooperate with CEIOPS and national regulators on this question

We propose that a 'cost of capital' approach be used to estimate the market value margin

- When market prices are available (for **hedgeable risks**), the MVM is already included in the market price and **does not need to be estimated**

- The cost of capital approach assumes that a company in financial distress at the end of its (one-year) capitalisation horizon might need to transfer its remaining assets and liabilities to another insurer, an industry pool vehicle, or into a separate run-off entity

- For **non-hedgeable risks** (including non-financial risks such as mortality and financial risks such as unavoidable asset-liability mismatch) the receiving entity cannot, by definition, construct an asset portfolio that perfectly replicates the liability cash flows

- Consequently, capital must be held to protect against adverse outcomes

- The entity will require a return on the capital held. The cost of the future capital amounts to be held will form part of the price of the liabilities at the point of transfer

- The **market value margin** is defined as the cost of risk, i.e. A risk margin in addition to the best estimate liability (i.e. the expected present value of best estimate future cashflows) required by the market. It is estimated by the present value of the cost of future capital requirements for non-hedgeable risks and is already included in observed market prices for hedgeable risks.

- The market-consistent value of liabilities will be defined as expected present value of best estimate future liability cash flows, *plus* this market value margin

- The elements to be determined are therefore the best estimate liability value, the path-values of future solvency capital requirements, and the appropriate cost of capital charge

- *A caveat can be made that a simplified approach can be used as an appropriate proxy for small businesses where calculation and projection of Economic Capital is difficult or impractical*

The Cost of Capital approach has been introduced in the Swiss Solvency Test (SST), where it is applied by all insurers across the range of measurement capabilities

Swiss Solvency Test framework

- The SST is based on a market value of liabilities including a risk margin calculated using a CoC approach

- The risk margin is based on the cost of holding the **minimum required capital** assuming that the book is being run off and that the assets have been gradually switched in order to reduce the risks in the book as far as possible[1]

- This is intended to represent the cost a third party would incur when purchasing the book in case of insolvency

- In the SST itself: "the risk margin is calculated as being the discounted value of the future costs of maintaining the SST target capital level if the insurance portfolio was being run off by a third party. For the field test 2004, cost of capital was set at 6%"[2]

Implementation progress

- Initiated in 2003

- 2004: initial field test

- Summer 2005: new field test involving 45 insurance companies, including small companies

- The SST will be introduced in conjunction with the revised Insurance Supervision Act (ISL) planned for 1 January 2006 (a transition period for adjusting to the SST will also feature)[3]

1. Source: CEA and MOW 'Solvency Assessment Models Compared: Essential groundwork for the Solvency II project', 2005, page 17

2. Source: Federal Office of Private Insurance (FOPI) White Paper of the Swiss Solvency Test, November 2004

3. Source: FOPI Annual Media Conference 2005, 'Reinforcing risk-based supervision', May 2005, page 2
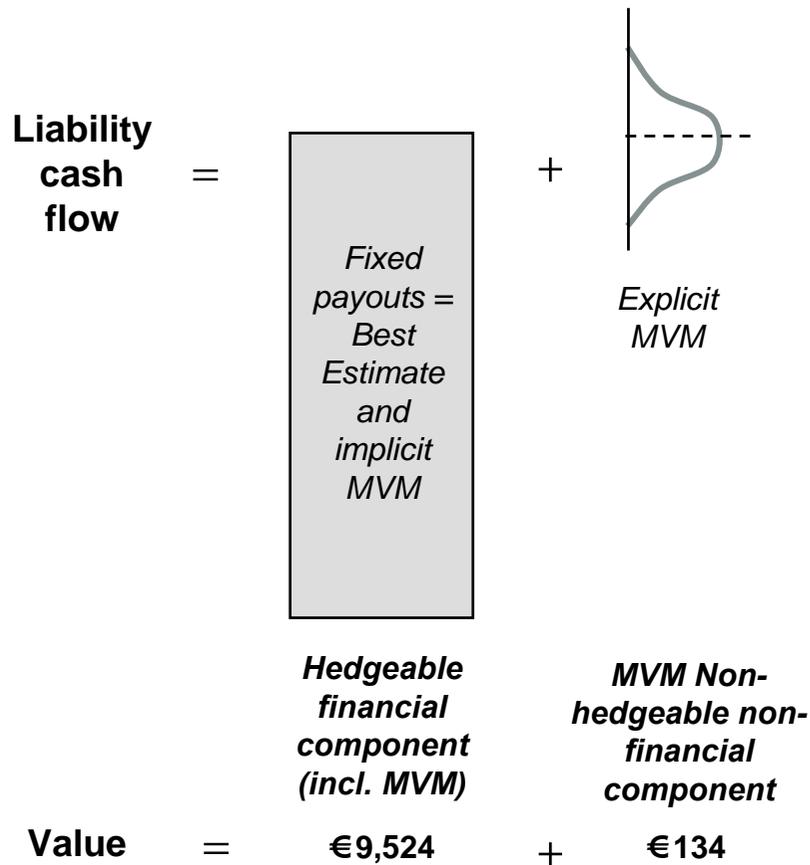
Appendix A

Product examples for proposed MVL calculation

Example 1: Life products without options or guarantees

Illustration of concept

Liability cash flow **=** *Fixed payouts = Best Estimate and implicit MVM* **+** *Explicit MVM*

Hedgeable financial component (incl. MVM)   *MVM Non-hedgeable non-financial component*

Value **=** €9,524 **+** €134

Practical example: Term life assurance

- 1,000 identical pure protection policies

- All policies have a remaining term of exactly one year, starting today

- Each pays a benefit of €1,000 at the end of the year if death occurs during the year, and nothing otherwise

- The probability of death for all assured lives is 1%

- The swap rate is 5% per annum

- The liability cash flows can be decomposed into:
    - Expected PV of future liability cash flows (including a MVM for hedgeable financial component (FC)) with a fixed payout of 1,000 x 1% x €1,000 = €10,000 in one year
    - Additional MVM for the non-hedgeable non-financial component (NFC) with an expected value of zero (when exactly 10 deaths occur), a positive (negative) value with more (fewer) than 10 deaths and a diversified economic capital requirement of €3,360

- These components are valued separately
    - FC: €10,000 in one year, valued today at €10,000 / (1.05) = €9,524
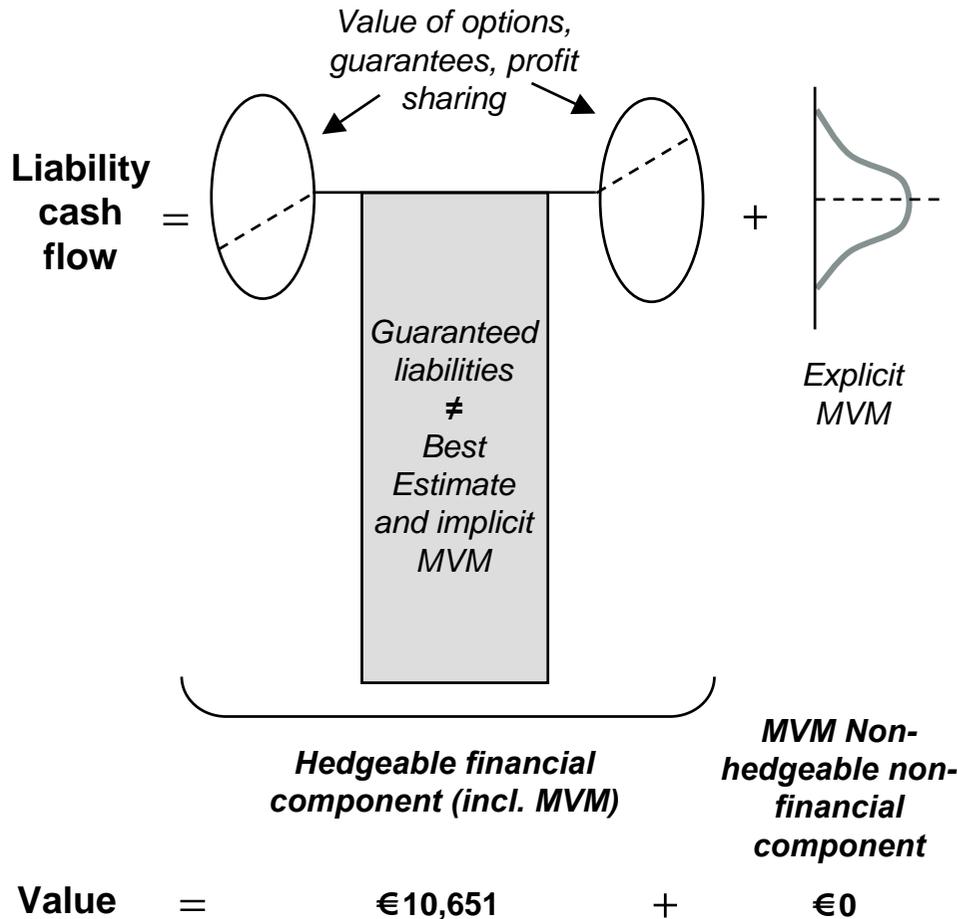   - NFC: CoC x Capital = 4%[1] x €3,360 = €134

Source: ING Corporate Insurance Risk Management, Mercer Oliver Wyman. Tax effects not included in example

1. Frictional Cost of Capital assumption of 4% to cover agency costs and cost of double taxation. Further study is required.

Example 2: Savings products with options and guarantees

Illustration of concept

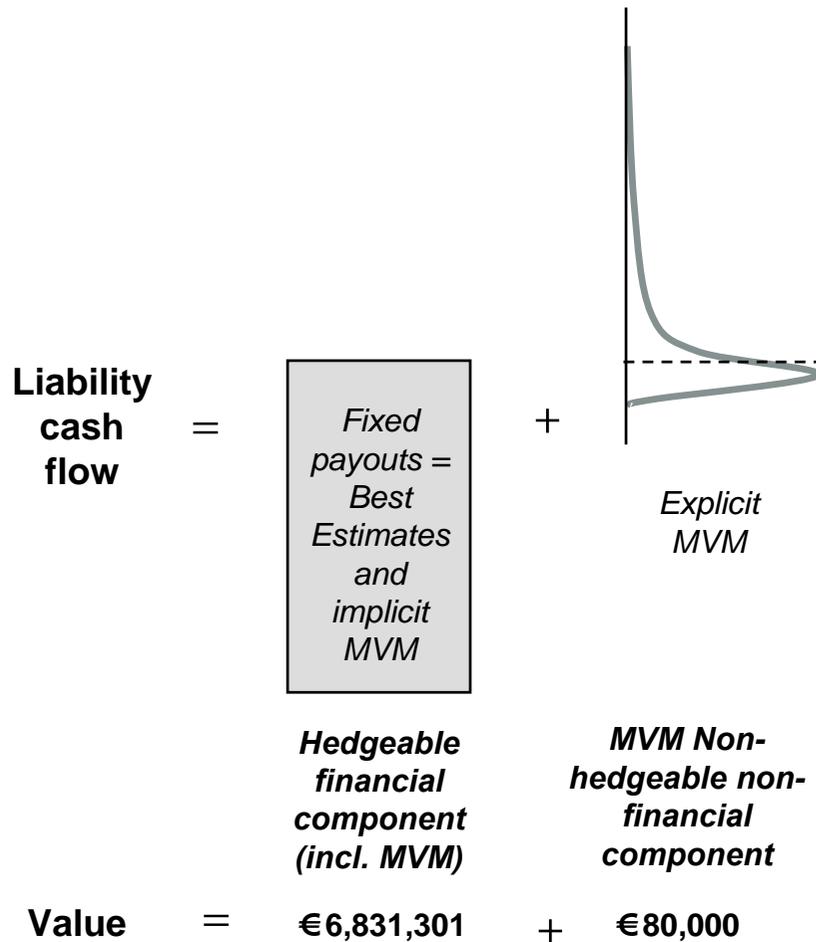*Value of options, guarantees, profit sharing*

Liability cash flow **=**

Guaranteed liabilities ≠ Best Estimate and implicit MVM

+

Explicit MVM

Hedgeable financial component (incl. MVM)

MVM Non-hedgeable non-financial component

Value **=** **€10,651** **+** **€0**

Practical example: One-year investment contract

- A € 10,000 single-premium one-year investment contract that pays the rate of increase on a major stock market index, subject to a minimum guaranteed return of 2%. Volatility of stock index = 20%.

- There is a lapse clause that allows investors to withdraw at any time before contract maturity, but they receive only a return of their initial premium should they do so

- The liability can be decomposed into:
  - Expected PV of future liability cash flows (including a MVM for hedgeable financial component (FC)), including
    - A guaranteed liability of 102% of the initial premium
    - A call option held by the investor on the underlying stock index, with an exercise price equal to 102% of the current index value
  - No additional MVM for the non-hedgeable non-financial component with an expected value of zero (since no early withdrawals are expected), as there is no economic capital requirement.

- These components are valued separately
  - FC: € 10,200/(1.05) + Call option = € 9,715 + € 936
  - NFC: 0

Source: ING Corporate Insurance Risk Management, Mercer Oliver Wyman. Tax effects not included in example

Example 3: P&C products without options or guarantees

Illustration of concept
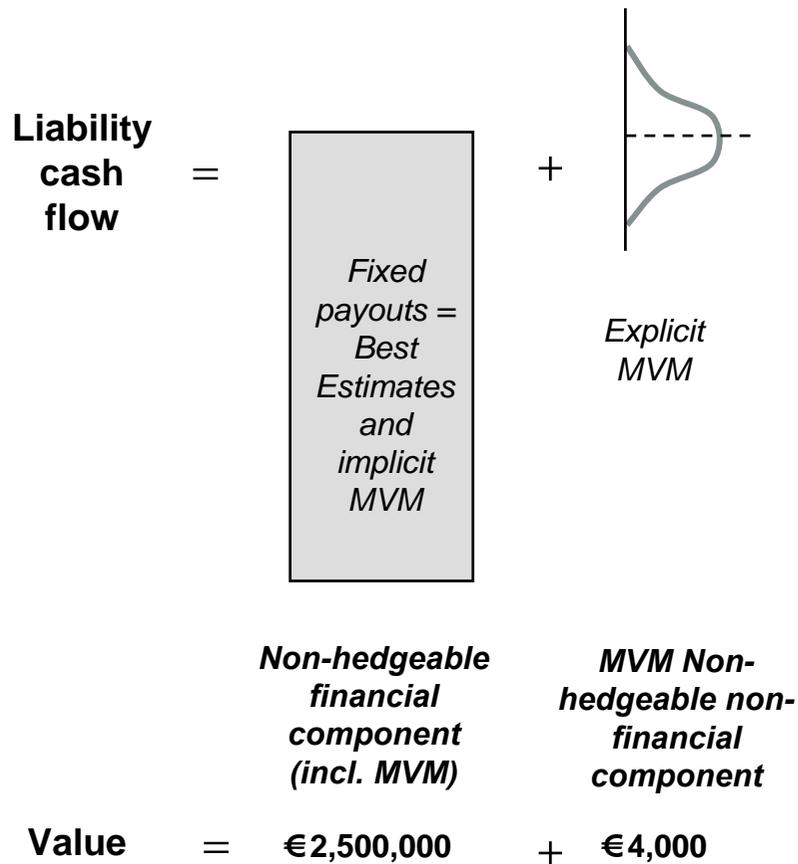
Practical example: Retail motor insurance

- A small retail motor portfolio with total premium of € 10 MM per annum that has not been reinsured

- Expected claims on the book are 70% of earned premiums. It is assumed that claims are incurred on average halfway through the year and there are no reporting or settlement delays

- The liability cash flows can be decomposed into:
  - Expected PV of future liability cashflows (including a MVM for hedgeable financial component (FC)), a fixed payout of € 10 MM x 70% = € 7 MM in six months' time
  - Additional MVM for the non-hedgeable non-financial component (NFC) with an expected value of zero (when the claims ratio is exactly 70%) and a positive (negative) value with a claims ratio of more (less) than 70%; and a diversified economic capital requirement of 20% of premium

- These components are valued separately
  - FC: € 7 MM in six months, valued today at € 7 MM / SQRT(1.05) = € 6,831,301
  - NFC: CoC x Capital = 4% x € 2 MM = € 80,000

Liability cash flow = | *Fixed payouts = Best Estimates and implicit MVM* | **+** | *Explicit MVM* |

Hedgeable financial component (incl. MVM)   ***MVM Non-hedgeable non-financial component***

Value = € 6,831,301 **+** € 80,000

Example 4: Annuity products

Illustration of concept

Liability cash flow $=$

Fixed payouts = Best Estimates and implicit MVM

$+$

Explicit MVM

Non-hedgeable financial component (incl. MVM)

MVM Non-hedgeable non-financial component

Value $=$ €2,500,000 $+$ €4,000

Practical example: Annuity in payment

- An annuity pays an income stream of €10,000 per month for the rest of a pensioner's life

- The pensioner's remaining life expectancy is greater than the maximum term for which there is a well-defined yield curve, but the company has 'completed the market' by producing a set of yields which it believes are applicable at longer terms and are consistent with all current market information

- The company has projected that the diversified economic capital requirements in future time periods in respect of non-hedgeable longevity risk have a PV of €100,000

- The liability cash flows can be decomposed into:
    - Expected PV of future liability cashflows (including a MVM for hedgeable and non-hedgeable financial components (FC): the PV of future expected payments, using the mark-to-market and mark-to-model yield curve, is 250 times the monthly pension
    - Additional MVM for the non-hedgeable non-financial component (NFC) with an expected value of zero (when annuitant mortality is as expected) and a positive (negative) value with lighter (heavier) annuitant mortality

- These components are valued separately
    - FC: €10,000 x 250 = €2.5 MM
    - NFC: CoC x Capital = 4% x €100,000 = €4,000

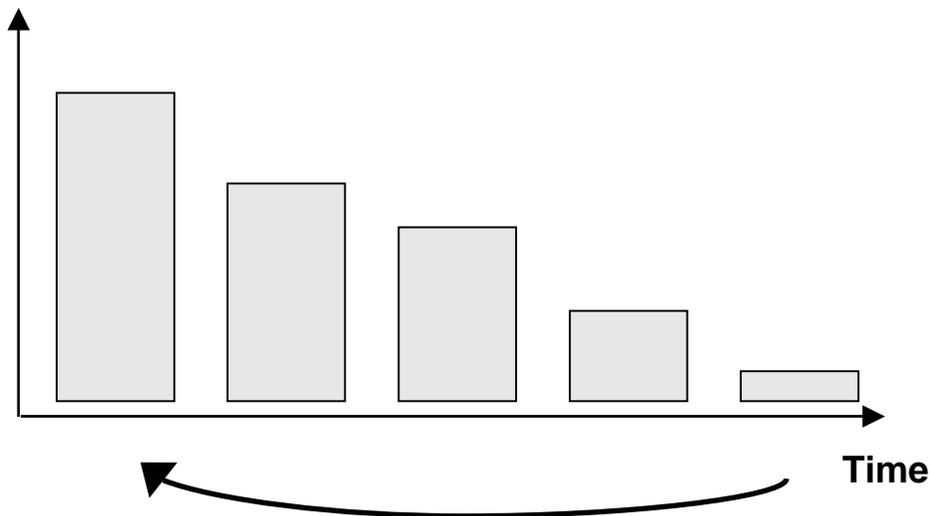Source: ING Corporate Insurance Risk Management, Mercer Oliver Wyman. Tax effects not included in example

Example 4: Annuity products cont'd

■ Multi-year products require the calculation and projection of Economic Capital for the MVM (or NFC) calculation

Illustration of concept

Economic Capital

Time

MVM = PV of Economic Capital * CoC

Practical example: EC projection for Annuity product

■ For multi-year products, EC run-off is estimated

■ Longevity risk beyond the first year is estimated by shocking the liabilities under the worst case mortality shock at every point in the future such that an EC profile is calculated

■ Assuming the pensioner's expected cash flows have a 10-year duration then:
  – EC_1 = 20,000
  – EC_2 = 18,000
  – …
  – EC_{10} = 2,000

■ Such that the PV of EC = €100,000

Appendix B

Glossary of key terms

**This glossary was prepared for the purpose of supporting this joint paper and the intention is to feed into the wider CEA - Groupe Consultatif glossary project after careful review and discussion

Glossary of key terms (1 of 4)

Term	Definition
Approved internal model	An *internal model* that may be used to fully or partially replace the *standard approach* to the *Solvency Capital Requirement (SCR)* when supervisory approval is granted. Both quantitative and qualitative requirements set by the regulator have to be met for an approved internal model.
Available solvency capital	The market value of assets minus the *market value of liabilities*
Best estimate liabilities	The expected liabilities, as represented by the arithmetic mean of a distribution, projected over the run-off period, taking into account all up-to-date financial market and actuarial information. Best estimate values do not include any *risk margins* whatsoever.
Confidence level	The critical point on the probability distribution of liability amounts (or some other quantity) before which the required capital is adequate to cover losses
Cost of capital (CoC) approach	An approach by which the *market value margin (MVM)* is determined, by applying a cost of capital charge to the present value of all future *solvency capital requirements* in order to run the liabilities off fully
Economic capital	The amount of *market-consistently valued assets* that an insurer judges it should hold in excess of *market-consistently valued liabilities* to ensure a non-negative economic surplus at a pre-determined time horizon and *confidence level*
Economic value	The value of asset or liability cash flows, derived in such a way as to be consistent with current market prices where they are available or using market consistent principles, methodologies and parameters.

NOTE: Italicised terms are defined elsewhere in the glossary

Term	Definition
Hedgeable risks	A risk that a party can reduce their exposure to by purchasing a hedging instrument or transferring the exposure to a willing, rational, diversified counterparty in an arms' length transaction under normal business conditions (i.e. securitisation e.g. derivatives, options, futures etc)
Internal model	Model developed by an insurer to determine the capital requirement on the basis of the company specific risk profile.
Market-consistent value	The market-consistent value of assets is its observed market value when available (mark-to-market). If such values are not available, a market-consistent value is determined by examining comparable market values, taking account of liquidity and other product-specific features, or on a model basis (mark-to-model). In particular, market-consistent means that up-to-date values are used for all parameters and that the valuation replicates the market prices of the calibration assets within an acceptable tolerance. The market consistent value of liabilities is the sum of the discounted *best estimate* and the *market value margin*.
Market value of liabilities (MVL)	The *market-consistent value* at which the liabilities could be transferred to a willing, rational, diversified counterparty in an arms' length transaction under normal business conditions. The MVL consists of: 1. The expected present value of future liability cashflows (which implicitly includes the *MVM* for *hedgeable risks*), and 2. An additional, explicit cost of risk for *non-hedgeable risk* (calculated as the *MVM* for *non-hedgeable risks*)

NOTE: Italicised terms are defined elsewhere in the glossary

Term	Definition
Market value margin (MVM)	The cost of risk, i.e. *risk margin* in addition to the *best estimate* liability (i.e. the expected present value of *best estimate* future cash flows) required by the market
Minimum capital requirement (MCR)	The capital level representing the final threshold that could trigger ultimate supervisory measures in the event that it is breached
Non-hedgeable risks	Risks that cannot be hedged or easily transferred to a third party due to market liquidity or interest
Risk	Potential of a deviation away from expectations, typically involving earnings or value in financial services
Risk-free rate	Theoretical interest rate at which an investment may earn interest without incurring any risk
Risk margin	A generic term, representing a buffer above discounted *best estimate* cash flows. A risk margin may be used for various reasons, e.g. to protect against worse than expected outcomes. One case of a risk margin is a *market value margin (MVM)*; in the case of the *MVM* it is calculated using *economic valuation* techniques.
Solvency capital requirement (SCR)	In the context of the Solvency II regime, is the *value-at-risk (VaR)* measured over one year to a 1 in 200 *confidence level* taking into account diversification and risk mitigation in place. The SCR may be derived using either an *approved internal model* or a *standard approach*, but in both cases it is based on the principles of *economic capital* and *economic value*.

NOTE: Italicised terms are defined elsewhere in the glossary

Glossary of key terms (4 of 4)

Term	Definition
Standard approach	In the context of the Solvency II regime, a *risk*-based model prescribed by the regulator for generating a capital requirement
Tail Value-at Risk (TailVaR)	Expresses the expected (i.e. arithmetic average) size of the loss if it exceeds the *Value-at-Risk* threshold
Value-at-Risk (VaR)	The threshold value that losses to a certain *confidence level* (e.g. in 99% of cases), would not exceed

NOTE: Italicised terms are defined elsewhere in the glossary