ACTUARIAL SOCIETY OF SOUTH AFRICA

Market Consistent Value of Liabilities

David Jewell

Liberty Life

Introduction

•There is no wide-spread standard for insurance liability valuations.

• Three major recent developments have devoted considerable resources to market consistent or fair value approaches:

- Solvency II
- MCEV
- IFRS 4 (Phase II)

• These developments have been driven in Europe, however they are attracting increasing interest and involvement.

- FASB joining IASB in its insurance project
- Regulators outside Europe watching Solvency II closely

Convergence is possible

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- European Commission
- CEIOPS
- IAIS
- CRO Forum

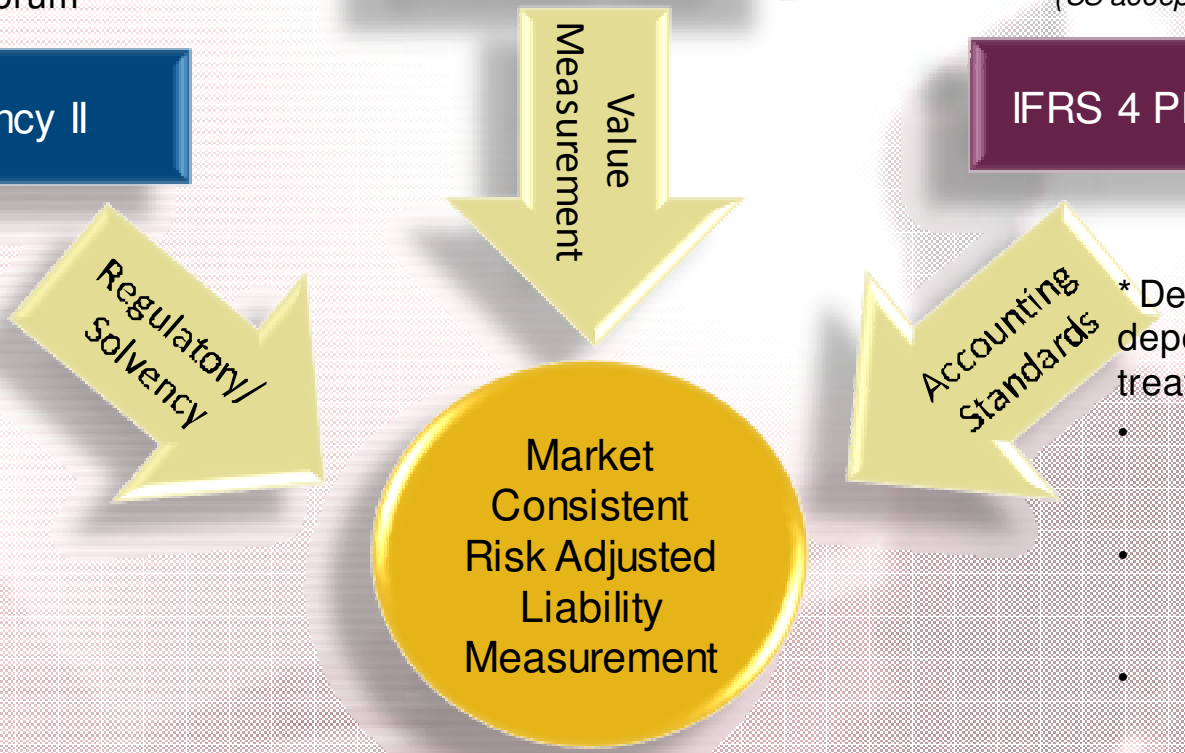
Solvency II

- CFO Forum

Market Consistent Embedded Value

- IASB
- Increasing convergence globally *(US acceptance)*

IFRS 4 Phase II *



* Degree of convergence depends on IFRS treatment of:

- Future premium increases (guaranteed insurability)
- Service margins, additional margins or composite margins
- Assumptions for non-hedgeable risks – entity specific or market estimates
- Allowance for credit risk of entity

Solvency II is the most advanced!

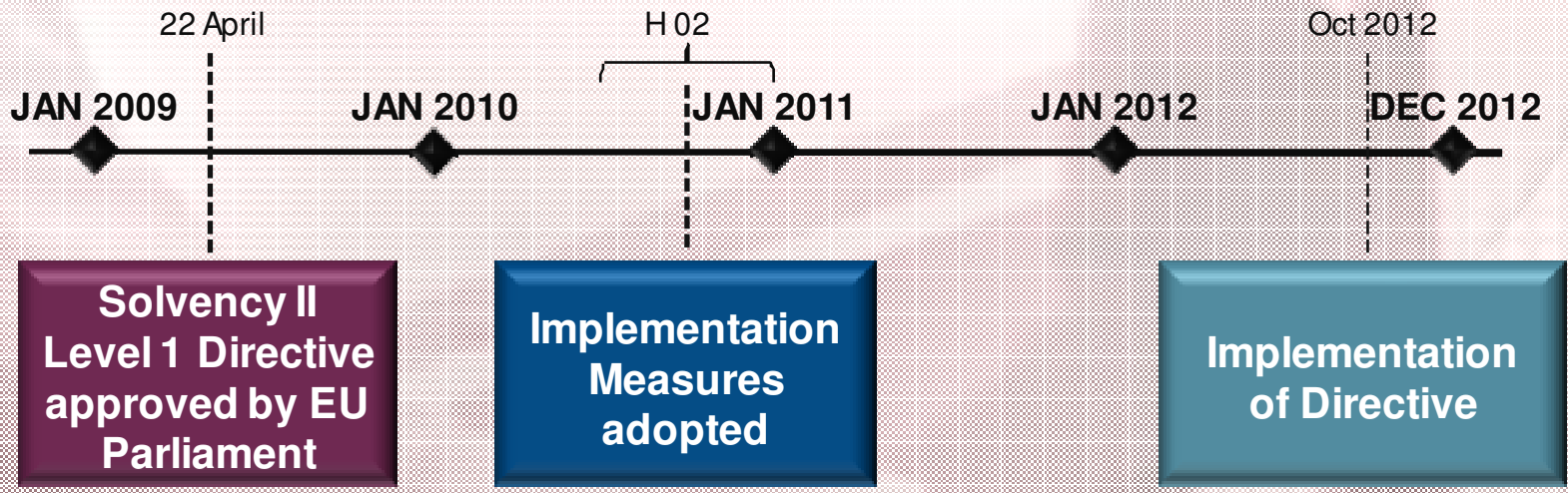
Why Solvency II as a framework?

- IFRS 4 (Phase II) is still under development
- MCEV is struggling for consistency, has limited support and significant market criticism
- **Solvency II**

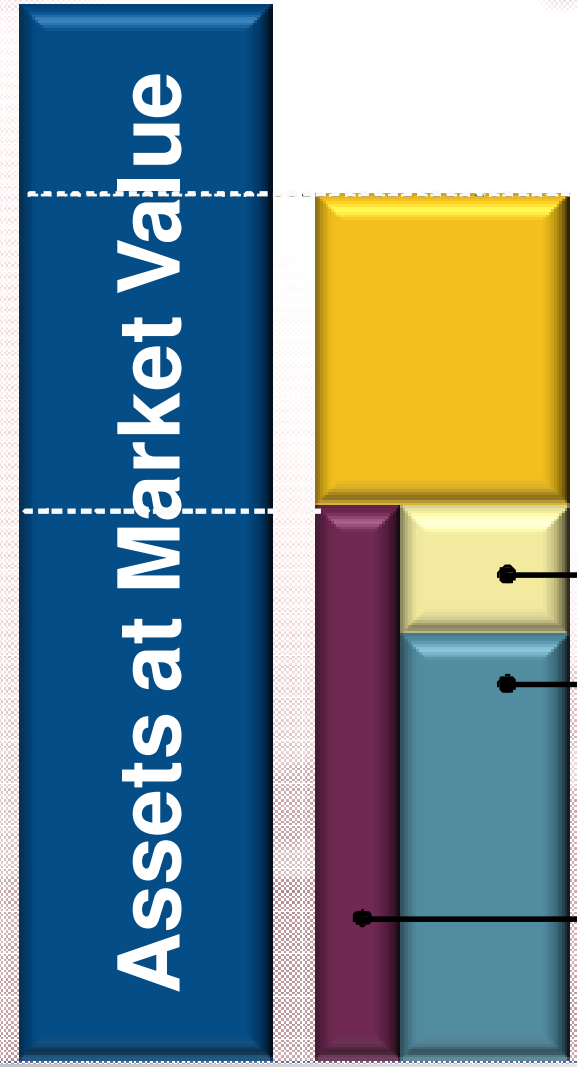
  - Has substantial *'weight'* behind it as being driven by EU parliament across EU and has overcome major approval hurdle

  - Is stable and is in the process of being implemented in the EU

  - Aligns the economic balance sheet with the risk management levers available to company management



The Solvency II approach



Available capital/ Market consistent value

Assets covering market value of liabilities

Surplus capital / Free assets

Economic capital requirement

Market value margin for non-hedgeable risks

Best estimate for non-hedgeable risks

Market value of liabilities

Market – consistent valuation for hedgeable risks

The Market Value of Liabilities

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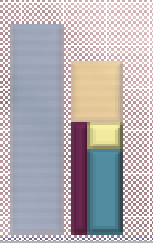
Solvency II approach

- Liabilities are valued using a cash flow model approach.
- The cash flows should be **separated into hedgeable and non-hedgeable components**.
- Certain cash flows ('symmetrically linked') can be valued **deterministically**.
  - These include cash flows such as management charges levied as a percentage of fund value, maturity and death benefits equal to the unit fund value, double sided shareholders participation, guaranteed cash flows such as annuity payments, "conventional" maturity and death benefits specified as rand amounts, etc…
- Typically cash flows which are 'non-symmetrically linked' to an underlying risk driver need to be valued **stochastically**. Due to the complexity of life insurance business this is generally done using Monte-Carlo Simulation methods.
  - These include guaranteed minimum maturity or death benefits, guaranteed annuity options, one sided shareholders participation, smoothed bonus portfolios, with-profits business, etc…
  - Dynamic policyholder behaviour (e.g. lapse rates linked to interest rates) or management action may need to be valued using Monte-Carlo methods



The Market Value of Liabilities

Hedgeable component:

- Components of the cash flow for which hedging instruments are available in the financial markets should be valued with reference to the prices of those instruments or using the same option pricing techniques and parameters that are used in valuing the hedge portfolio in the financial markets such as:
  - Fixed cash flows (e.g. annuity payments to end of yield curve)
  - Minimum return investment guarantees
  - GAOs (i.e. where swaptions of appropriate tenor are traded)
- If discounted cash flow or option pricing techniques are used this requires the use of ***'market consistent'*** assumptions such as:
  - Risk free yield curve (except perhaps longer term)– swap or govi?
  - Short-term equity option implied volatilities
  - Swaption implied volatilities

Where a deep and liquid market does not exist liabilities should be treated as unhedgeable

The Market Value of Liabilities

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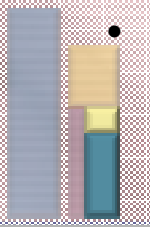
Solvency II approach

Non-hedgeable component:

- Components of the cash flow for which hedging instruments do not exist in the market (e.g. underwriting risks, expenses, long-dated interest rates) should be valued by discounting the 'best estimate' of the cash flow by the relevant market consistent discount rates.
  - The *'best estimate'* cash flow is the probability-weighted average (*i.e. the mean*). The estimation process is unbiased (*i.e. without margins*) and based on all currently available information including information of currently observable trends, but excluding effects from events not yet occurred
  - If the non-hedgeable risks are symmetrical and do not have non-standard dependencies then the*' best estimate'* assumptions can be used for these non-hedgeable risks to estimate the best estimate of the cash flow (e.g. mortality, morbidity, withdrawal, expenses, long-term risk free yields, and long-term equity option volatilities)
- The own credit characteristics of the entity are ignored in the calculation.



But wait – That's not all!

The Market Value of Liabilities

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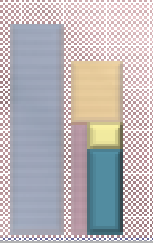
Non-hedgeable component:

- Note that the discounted non-hedgeable cash flows are **NOT** the Market Value of the non hedgeable liabilities!
  - For non-hedgeable risks the discounted cash flow method gives the ***best estimate*** value of the risk. This is however not the Market Consistent value as a market participant would want to be rewarded for the risk taken on. The value of this additional reward is known as the **Market Value Margin**.
  - There are a number of ways of calculating market value margins
    - **Cost of Capital approach** (consistent with Solvency II)
    - Percentile approach
    - Service margins/additional margins/composite margins

Solvency II approach

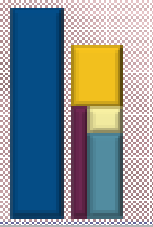


To calculate the Market Value Margin using the Cost of Capital approach the Economic Capital Requirement needs to be calculated

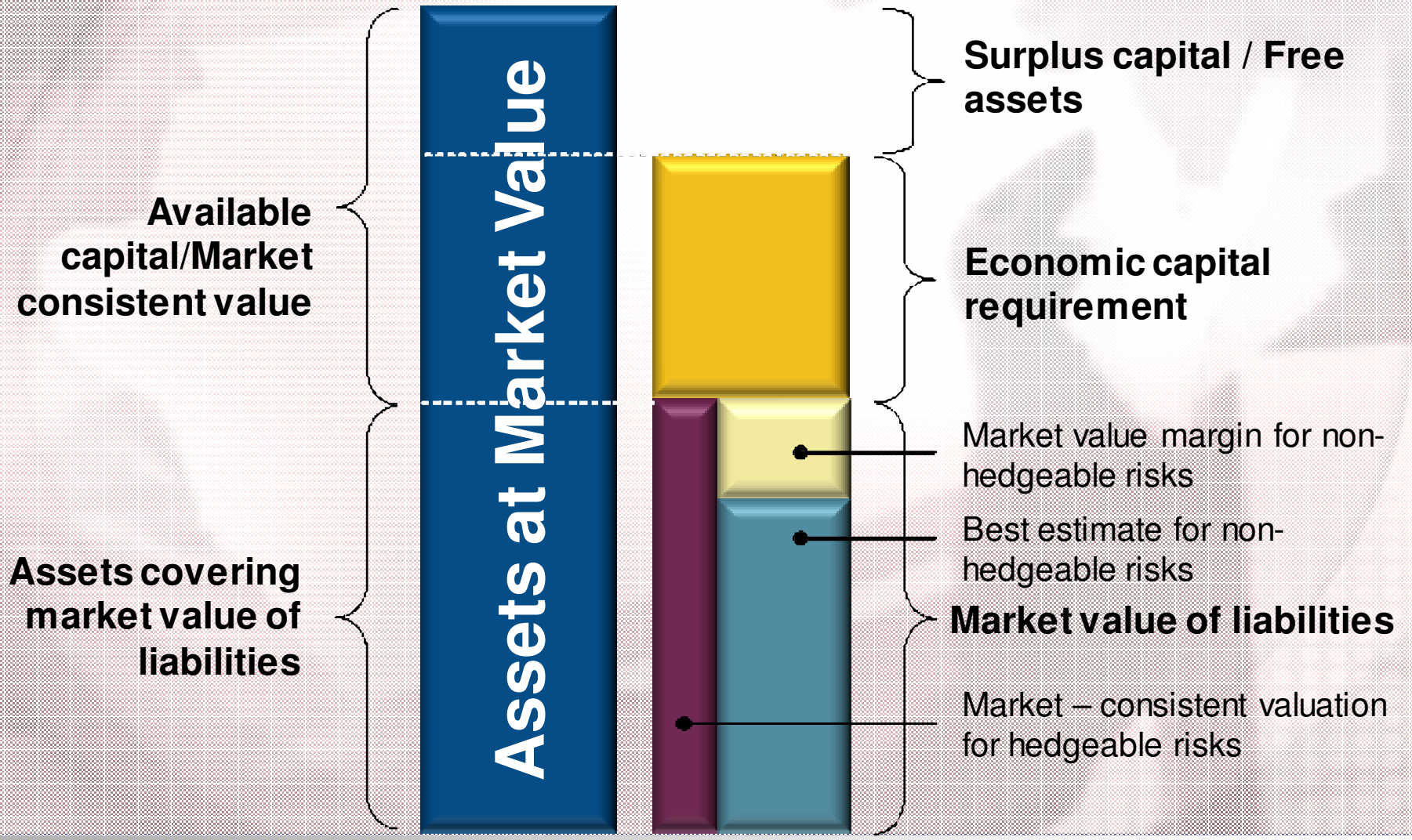
The Economic Balance Sheet

- The economic value of the assets and liabilities are their observed or modelled market consistent prices

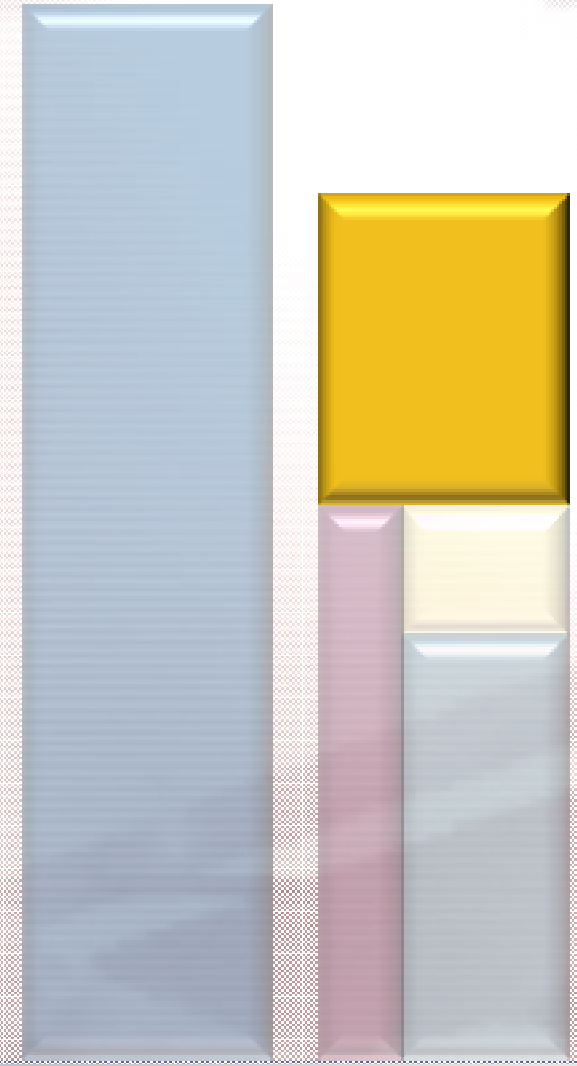
Market Consistent Price	Assets	Liabilities	
Observable	Examples: Shares, Bonds, Traded derivatives, OTC derivatives, ABS, MBS, CLOs… Observed Market Prices: •Quoted by exchange •Quoted by counterparties	• Liability cash flows driven by risks for which market prices exist (e.g. equities, interest rates) • Based on basket of instruments that replicates liability cash flow • Market prices include adjustment for risk; no further conservatism required	Hedgeable
Not Observable	Examples: Real estate, Private equity, Long-dated bonds, Long-dated swaptions,Unlisted assets… Marking to model that has evolved as the respective standard for similar assets gives the economic value.	• Liability cash flows driven by risks for which there are no market prices (e.g. mortality, withdrawal) • Value needs to be estimated • Adjustment for risk required, reflecting the discount an investor would charge for additional capital required to hold these liabilities.	Non-hedgeable



The Economic Balance Sheet



Economic Capital Requirement



Economic Capital Requirement

The economic capital requirement is defined as:

"The Amount of resources needed to protect against **economic insolvency** due to **unexpected events** over a specified time horizon at a given confidence level "

- Economic insolvency is defined as a situation where:

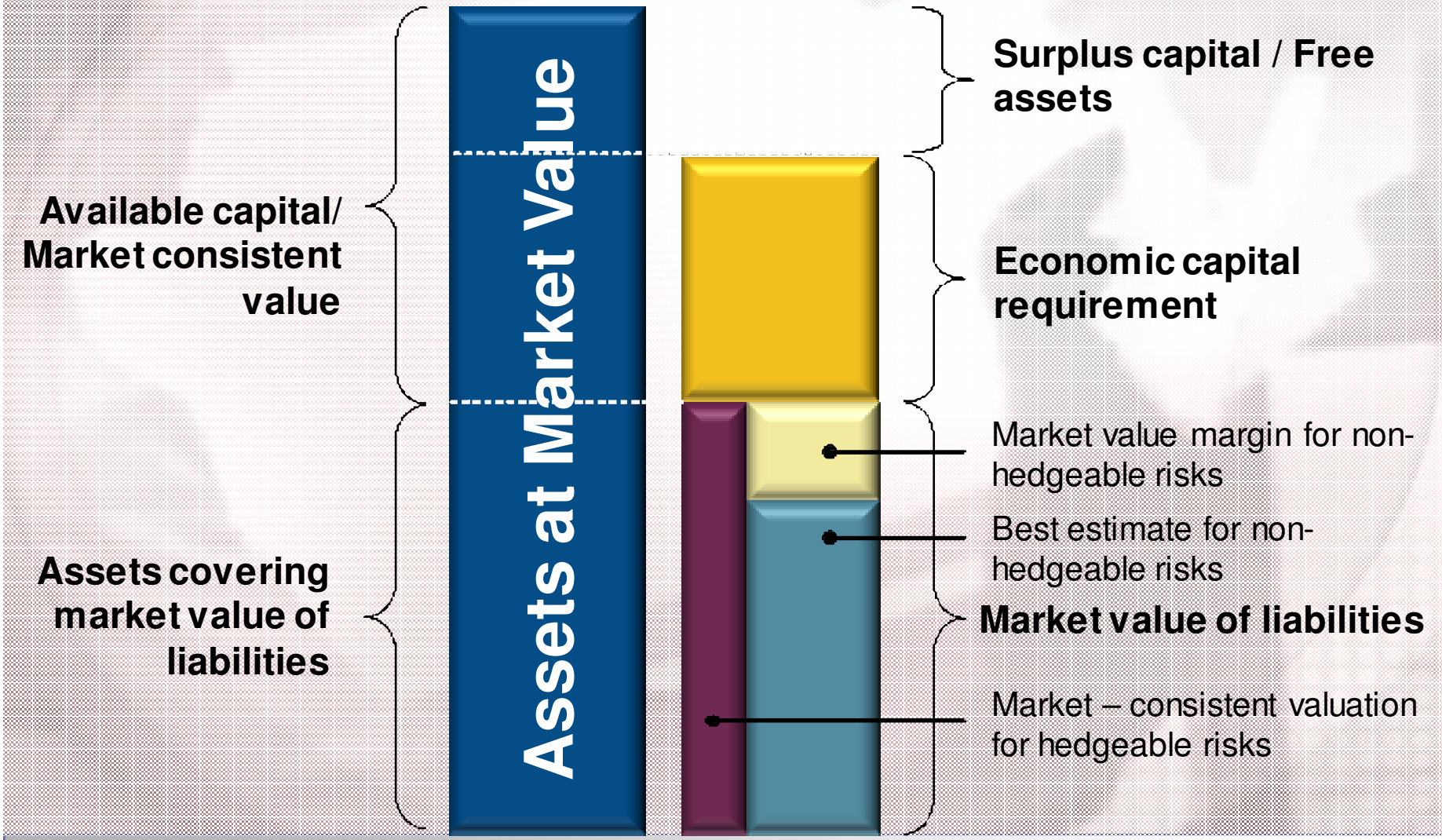
Economic (Market Consistent) Value of Liabilities

exceeds

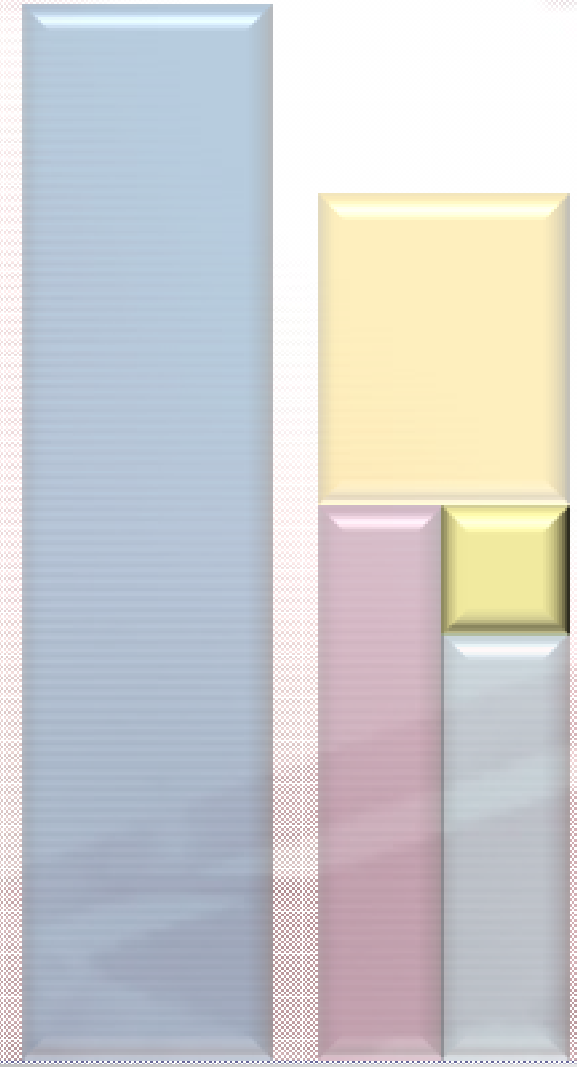
Economic (Market Consistent) Value of Assets

- Under Solvency II the chosen time horizon is 1 year and chosen confidence level is 99.5%

The Economic Balance Sheet



Market Value Margins



Market Value Margins

- Under the **Cost of Capital approach** the following high-level assumptions are made in calculating the MVM:
  - The reward a market participant requires for taking on unhedgeable risks can be measured as:

A required return in excess of the risk-free rate

(i.e a cost of capital rate)

on

The risk capital that needs to be held to back the risk

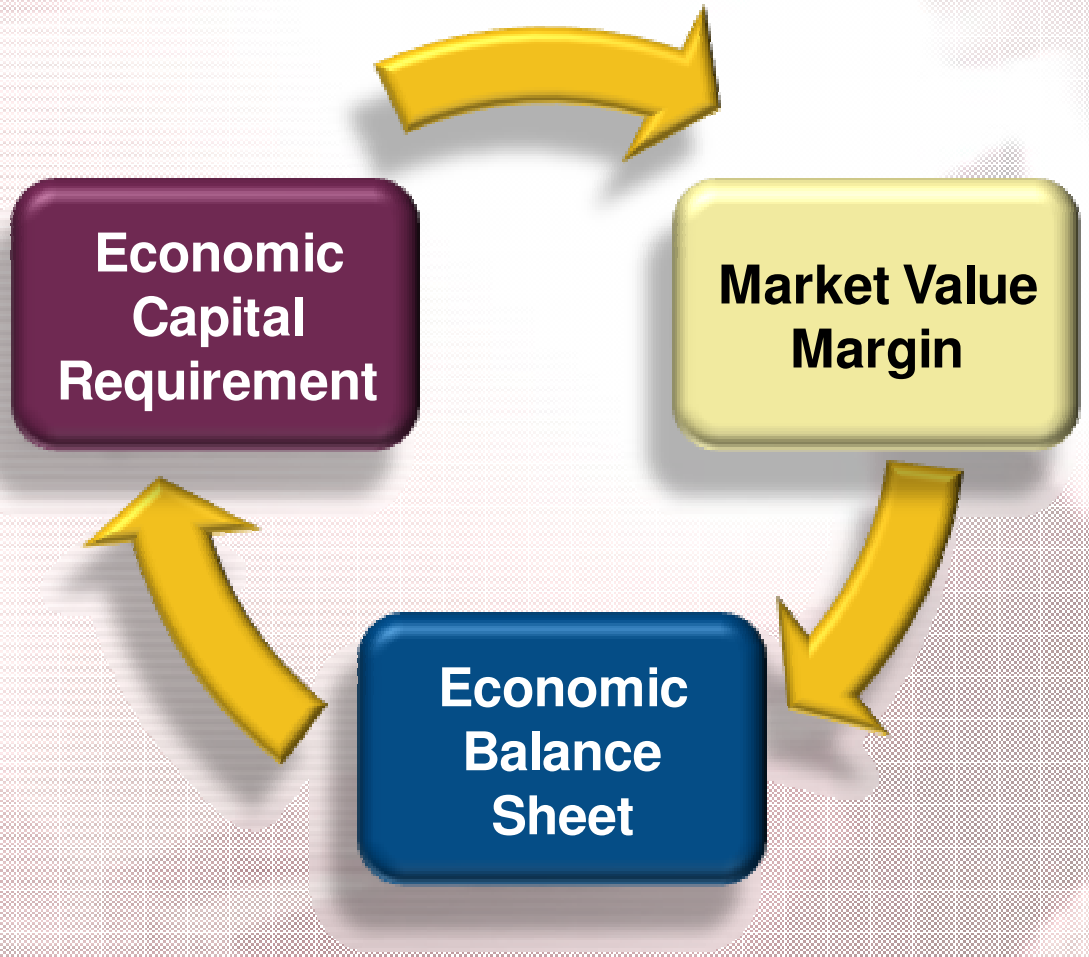
  - The capital requirement for the risk is equal to the capital requirement of a marginal market participant.
  - The capital requirement should be diversified against other non-hegeable risks, but not against hedgeable risks.

Cost of capital rate

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

- The cost of capital rate is NOT the **total** return in excess of the risk-free rate required by shareholders
  - expected return on franchise value is excluded
  - the return on hedgeable risks is excluded
- Approaches used to calibrate the cost of capital rate include:
  - the frictional cost of capital approach (e.g. double taxation, agency costs)
  - the market price of risk approach
  - estimates of the equity risk premium (e.g. derived from CAPM model or Fama-French 2-factor model)
- The 'total return' approaches (the latter two above) need to be adjusted to exclude franchise value and required return on hedgeable risks
- The cost of capital rate is subjective and subject to debate. QIS 4 used 6%, the CRO Forum recommended a range of 2.5% - 4.5%.

Calculation of the Market Value Margin



Changes required to existing models

- Existing embedded value or reserving models can be used to calculate the "best-estimate" value of the liabilities. The following changes may need to be made to these models:
  - Models may need to be capable of being run stochastically (i.e. future yield curves, returns and inflation rates are variables dependent on the simulation path)
  - Discount rates need to be based on the time zero risk-free yield curve or the stochastic discount rate
  - Projection rates (assumed rates of return) need to be based on the time zero risk-free yield curve (for deterministic calculations) or the stochastic returns (for risk-neutral Monte-Carlo calculations)
  - All assumptions should be "best estimate" assumption and no margins should be included. For assymmetircal risks or risks with non-standard dependencies, the best estimate assumption may not produce the best estimate of the liability and an appropriate adjustment may be required.
  - Any dynamic policyholder behaviour or management actions need to be modelled (e.g. the interaction between lapse rates and interest rates)

Changes required to existing models

- Existing embedded value or reserving models can be used to calculate the "best-estimate" value of the liabilities. The following changes may need to be made to these models:
  - Models need to be capable of calculating the expected cash-flows under a large number of scenarios and stresses affecting many of the assumptions underlying the model. For example:
    - Impact of catastrophes (mortality, lapse, etc…)
    - Impact of changes in the level of demographic assumptions
    - Impact of changes in the rate of change in the level of demographic assumptions
    - Impact of market movements (equity falls, exchange rate changes, yield curve shift, etc…)
    - Etc…
  - Under Solvency II, the models have to meet statistical quality, calibration, profit and loss attribution, validation and documentation standards. Meeting such requirements would likely have a major impact on model input and model development.

Conclusion

- Market consistent valuation of insurance liabilities provides consistency with assets valued at market value.

- Various initiatives underway and receiving support:
  - IFRS 4 (Phase II)
  - MCEV
  - Solvency II

- Solvency II appears to have found answers to conceptual challenges, especially the allowance for risk in respect of unhedgeable risks through market value margins (MVM's) and is in the process of being implemented for regulatory solvency purposes in Europe.

Questions…

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Questions?

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2009 Convention Lite and the Pensions, Health and Life Seminars

19-20 May 2009

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