Solvency

Emile Stipp
Group Health Actuary
Discovery Health

16 July 2008

Cutting the Gordian Knot

Agenda

- **Introduction**
- **What is happening locally and internationally?**
- **Risk Based Capital models**
  - How do they work?
  - How to construct an RBC model for a medical scheme
  - RBC results for Discovery
- **Solvency and the REF**
- **Conclusion**

Introduction

- What are "reserves"? Assets held to cover liabilities and to protect against adverse fluctuations in liabilities
- What is "solvency"? *Checking* whether assets held are sufficient
- Here, we set our solvency requirement to 25% of gross contributions, at a single point in time every year
- This is the law, and we will comply with it

Introduction

- **The point of this presentation is to:**
  - see how solvency regulation is developing internationally,
  - how these developments may be applied to our environment,
  - and explore the need for a new way of measuring solvency
- **25% may be the right solvency level for your scheme, or it may be too high, or it may be too low**
- **Risk-based capital would help you determine whether you are technically solvent or not**

What is happening internationally?

- **The world is following Europe, and "Solvency II"**
- **Calculating required capital on the basis of static accounting results is "limited in scope" and does not go beyond the balance sheet[1]**
- **Risk based capital (RBC) involves:**
  - Factoring in the risks a company is exposed to
  - While addressing capital needs (e.g. of a growing insurer)
- **The main principle is that capital adequacy and solvency regimes have to be sensitive to risk[2]**

1. *Chandrasekar, P; Kumar, N; Warrier, SR "Journey of Insurer Solvency regulations – 2007 and beyond", IAA*
2. *IAIS, "Principles on capital adequacy and solvency", www.iaisweb.org, 28 May 2007*

What is happening internationally?

- **Early EU directives (70s) simply followed ratio based approach – similar to our 25%, but calibrated better to the nature of the insurer and insurance**
- **Solvency I was still "rules based", as opposed to Solvency II which is "principles based", but did focus on the main risks:**
  - Technical: insufficient premiums, morbidity, lapses etc
  - Investment: liquidity, matching, interest rates etc.
  - Non-technical: management, credit risk etc.
- **Unlike "point in time" approach, Solvency I stipulated that solvency requirements should be met at all times**

What is happening internationally?

- **What all solvency regimes had in common[3]:**
  - "Minimum Solvency Requirement" (minimum surplus of assets over liabilities)
  - Insurer had to prove that amount of free capital (the "available solvency margin") exceeds the MSR
  - The regulator would intervene at the "control level"
  - The "solvency test" shows compliance with regulator's requirements
- **Note our 25% requirement does not even require quantification of assets required to meet liabilities**

3. IAIS Sub-Committee on Solvency and Actuarial Issues, "On Solvency, Solvency Assessments and Actuarial Issues", 15 March 2000

What is happening internationally?

- **How does Solvency II move things forward?**
  - It goes beyond rules based (accounting basis)
  - To principles based, where valuation of liabilities specified by general solvency principles and does not have detailed rules – flexible and adaptive
- **Note consistency with IFRS!**
- **Solvency II takes insurers from a quantitative approach to a qualitative approach to disclosure**
- **FSA in UK has already adopted principles based approach in anticipation of Solvency II**
- **FSB in SA also introducing RBC for GI**

What is happening here & internationally?

FCR

- Financial Condition Reporting: a proposed FSB RBC regime
- Improve risk management, capital use
- Align with international regulatory approaches

ICAS

- Individual Capital Adequacy Standards: an FSA RBC regime
- Long-term & Short-term
- Pre-empt introduction of European framework
- Tried to anticipate the design & nature of Solvency II

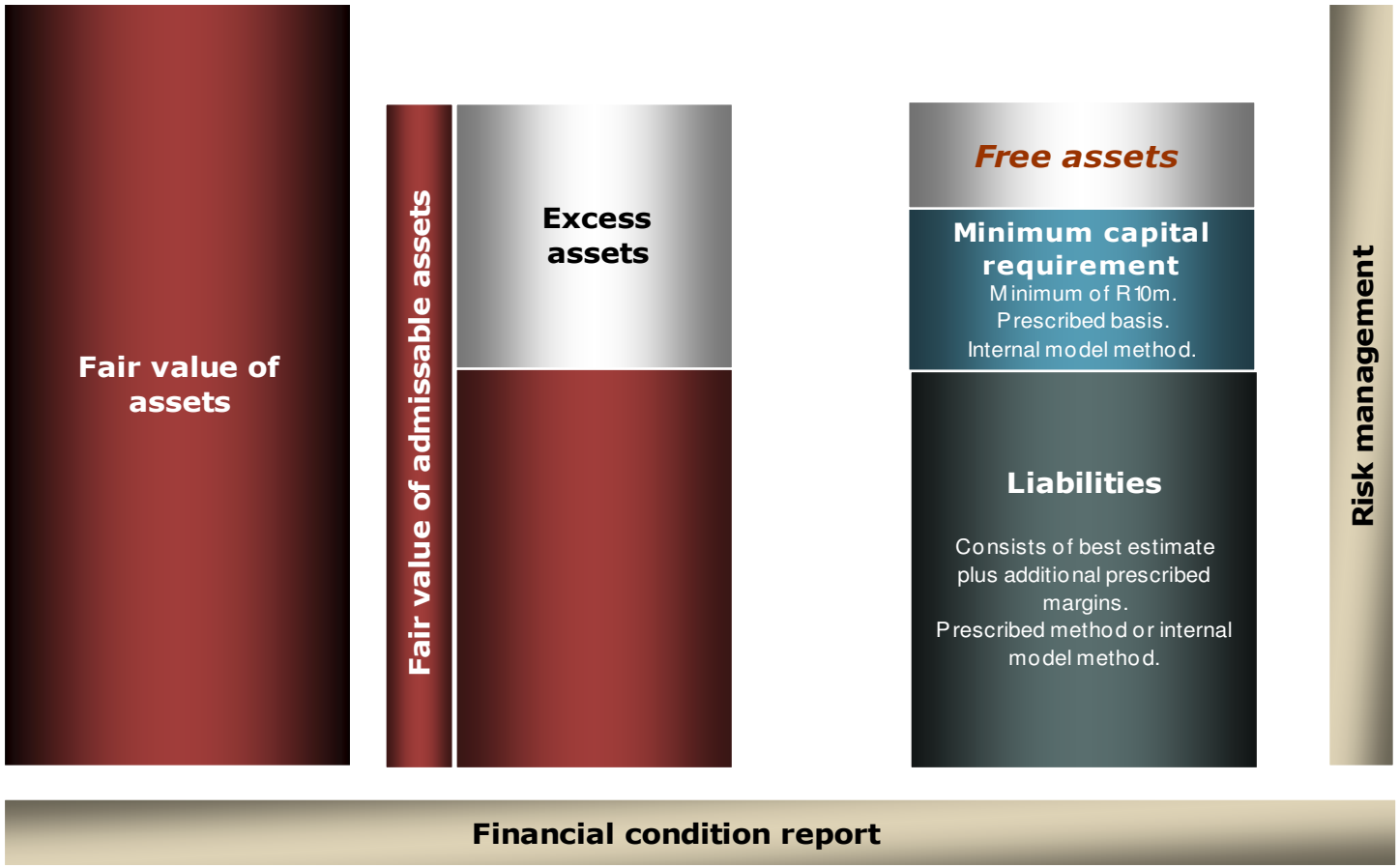
Solvency II

- Proposed unified, prudential reserving & regulatory framework for European Union insurers & reinsurers
- Long-term & Short-term
- Policyholder protection, fair & stable markets

l van der Merwe; A Ericsson, "FCR vs Solvency II vs ICAS", ASSA GI Convention, 7 July 2008

How do RBC models work?

- **Consider FSB RBC model:**



Stipp, E; Isaacson, S; "FCR for South African Short Term Insurers", Deloitte, 5 November 2005

Cutting the Gordian Knot

How do RBC models work?

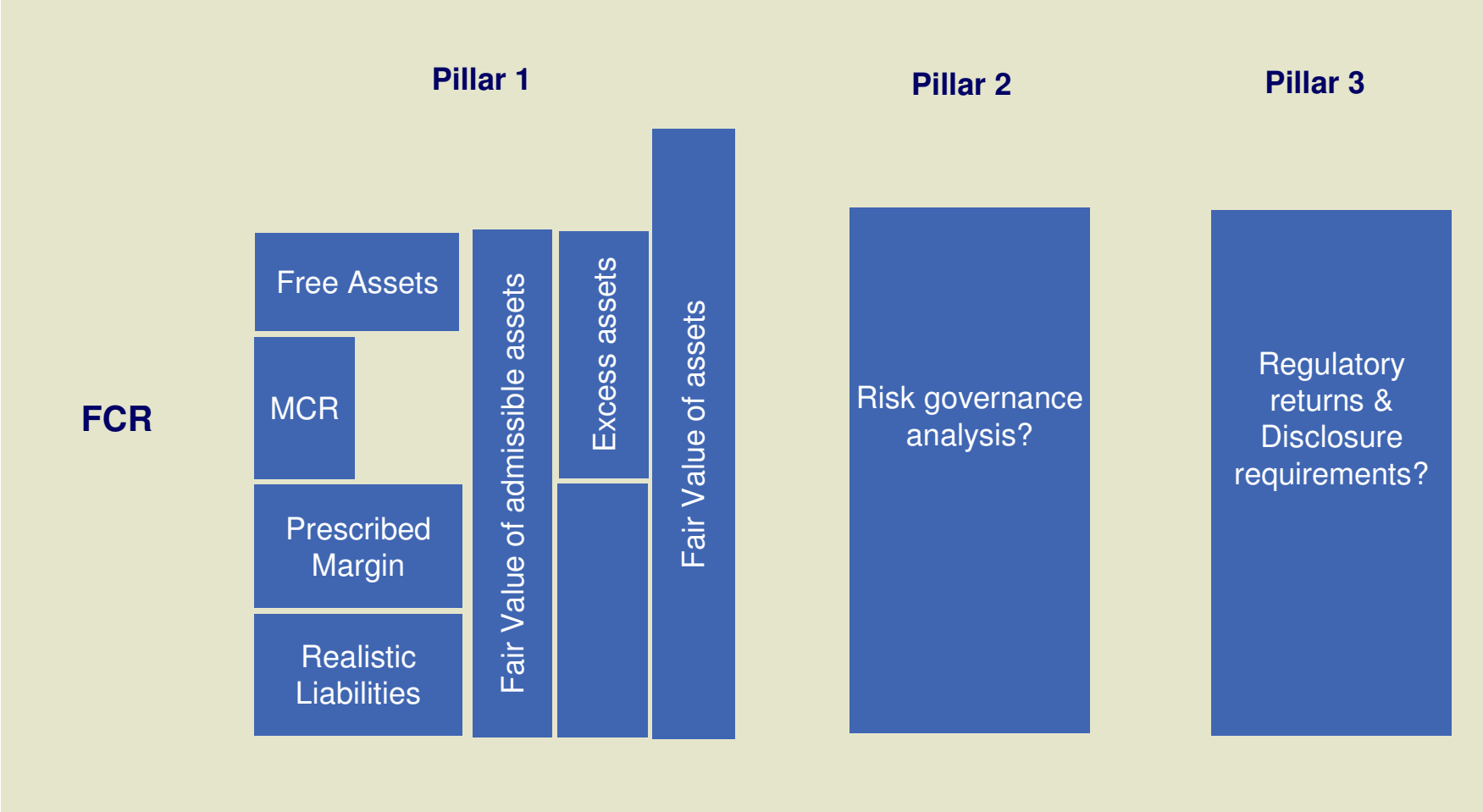
- **Consider FSB RBC model:**

Industry Calibration	Certified Model	Internal Model
Necessarily approximate Must be prudent for all companies May not be appropriate for circumstances of individual companies	More precise for liabilities & individual cricumstances of companies Involves judgment Hence requires professional certification	Maximum precision for liabilities and assets Also requires professional certification Leads to greatest understanfing of risks Provided models are transparent & realistic

Stipp, E; Isaacson, S; "FCR for South African Short Term Insurers", Deloitte, 5 November 2005

How do RBC models work?

- **Consider FSB RBC model:**

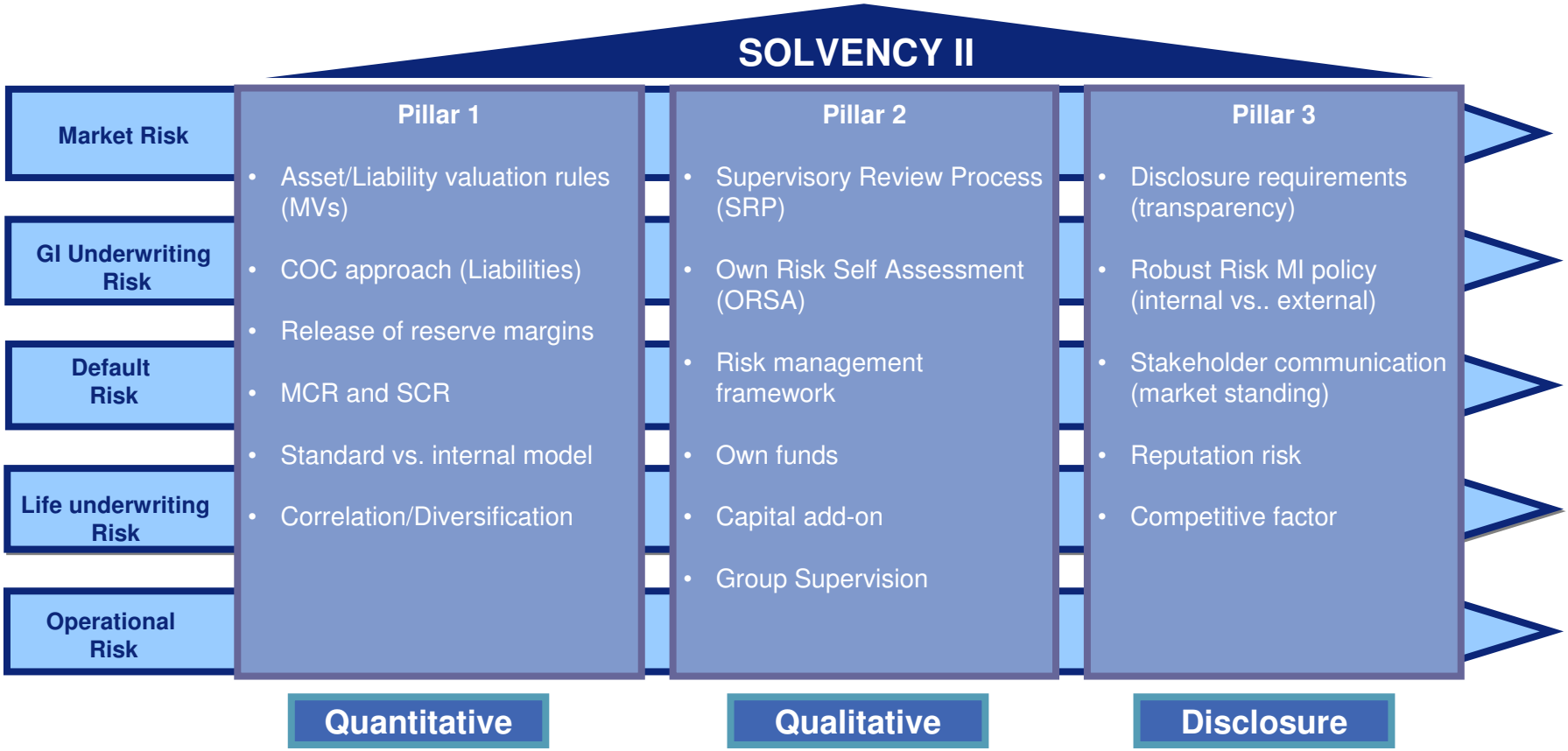


Stipp, E; Isaacson, S; "FCR for South African Short Term Insurers", Deloitte, 5 November 2005

Cutting the Gordian Knot

How do RBC models work?

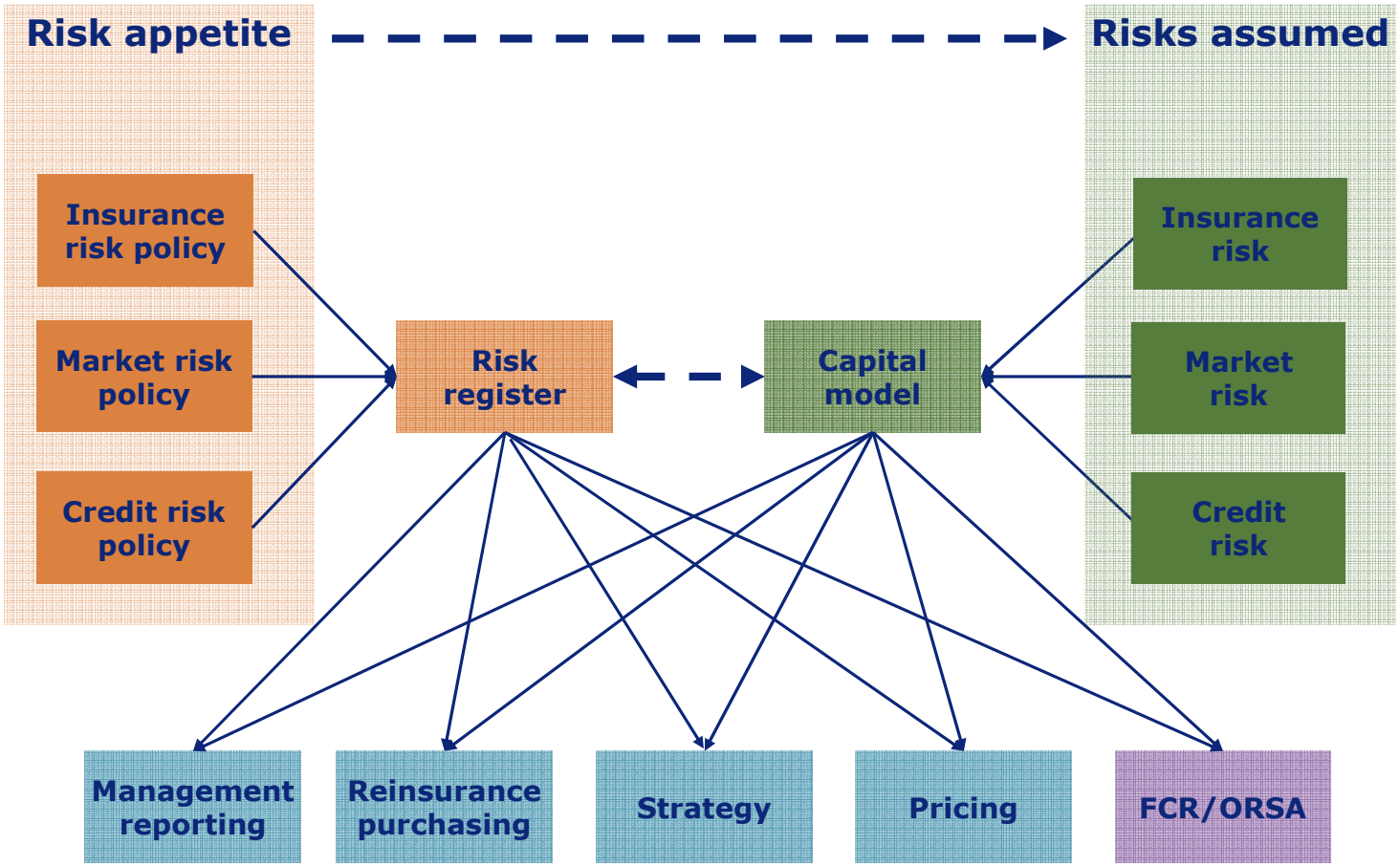
- **Consider Solvency II:**



J van der Merwe; A Ericsson, "FCR vs Solvency II vs ICAS", ASSA GI Convention, 7 July 2008

How do RBC models work?

- **What is a real internal model?**



J van der Merwe; A Ericsson, "FCR vs Solvency II vs ICAS", ASSA GI Convention, 7 July 2008

Cutting the Gordian Knot

RBC models for Medical Schemes

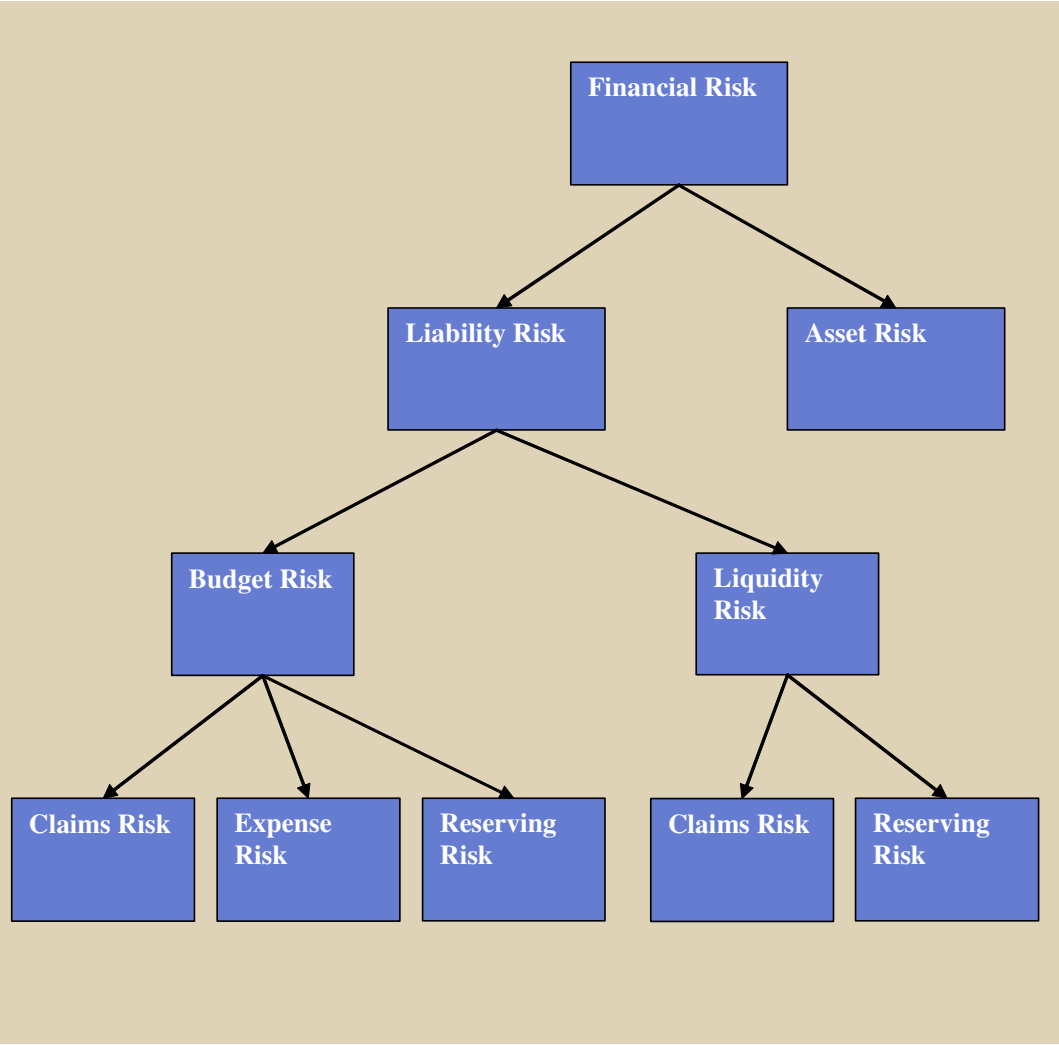
- **Discovery investigated RBC from two perspectives:**
  - Deloitte asked to develop RBC model and calibrate it consistently with FSB RBC approach – March 2006[4]
  - Applied FSA solvency framework to DHMS – December 2006[5]
- **Will refer to these as "Deloitte model" and "FSA model"…**

4. Stipp, E; Isaacson, S, "Risk-based Capital for Discovery Health Medical Scheme", Deloitte, March 2006

5. Mill, B, "Application of PruHealth Independent Capital Assessment (ICA) Methodology to Discovery Health Medical Scheme (DHMS)", Discovery Health (Pty) Ltd, 31 December 2006

RBC models for Medical Schemes

- **Deloitte model framework:**



Points to note:

1. **Set at 99.5% level of sufficiency i.e. protecting against ruin as a result of worst loss in 200 years**
2. **These risks are correlated!**

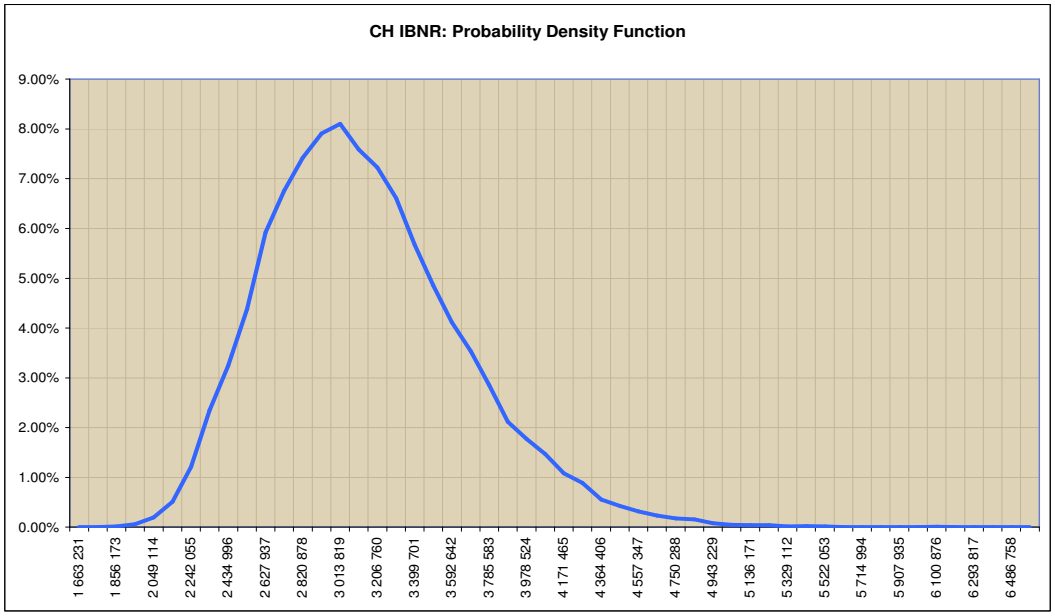
Cutting the Gordian Knot

RBC models for Medical Schemes

- **Budget risk component of liability risk:**
  - Risk of claims in FY higher than budgeted
  - Risk of expenses in FY higher than budgeted (typically negligible)
  - Risk of prior year IBNR run-off being higher than expected
- **To determine budget risk, consider actual vs budgeted claims & expenses in prior years**
  - Fitted statistical distributions to budgeted vs actual claims in prior years
  - Normal distribution: appropriate for accurate budgeting
  - Gamma / lognormal: where tendency to under-budget
  - For DHMS, similar results (low std devn)

RBC models for Medical Schemes

- **Consider risk of adverse IBNR development:**
  - Looked at distribution of actual claims development relative to chain ladder method of IBNR reserving
  - Used bootstrapping with scaled Pearson residuals and re-sampling with replacement, e.g. for chronic claims:



Cutting the Gordian Knot

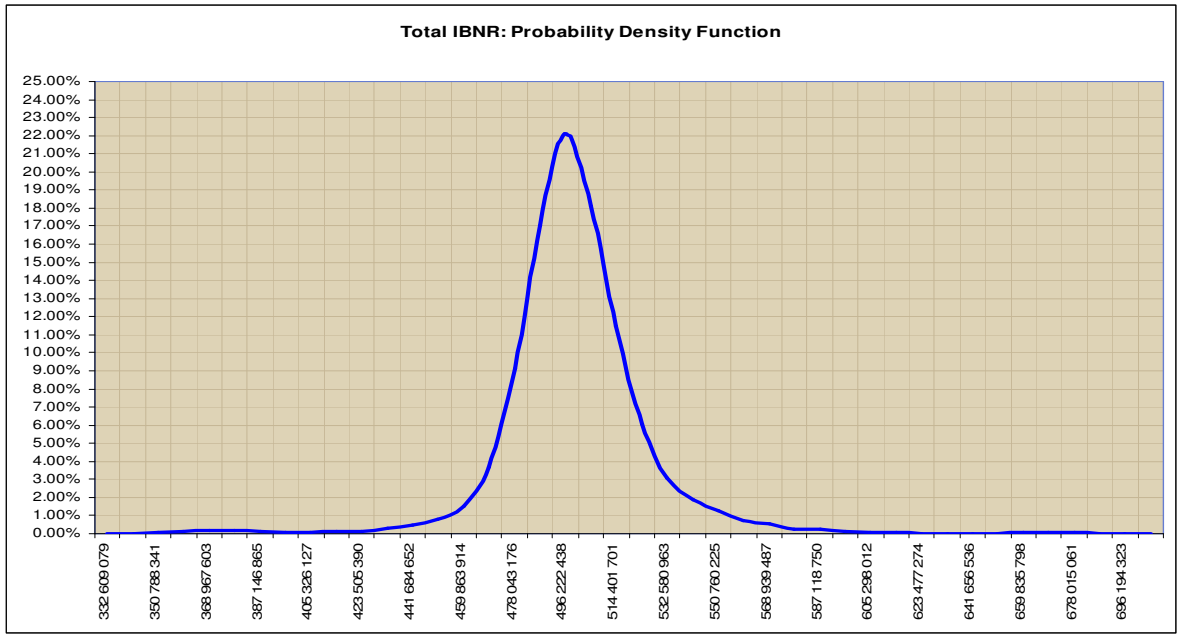
RBC models for Medical Schemes

- **Consider risk of adverse IBNR development:**
  - Investigate for IH, OH and Chronic separately
  - But *run-off* for each of these correlated – determine correlation matrix
  - Due to different claim submission and processing for chronic, not as strongly correlated as run-off for IH and OH

Correlation matrix			
	IH	OH	CH
IH	100.00%	58.74%	13.13%
OH	58.74%	100.00%	0.68%
CH	13.13%	0.68%	100.00%

RBC models for Medical Schemes

- **Consider risk of adverse IBNR development:**
  - Now combine into single statistical distribution, to determine overall budget reserving risk for all claim types



  - To avoid ruin at 99.5% level of certainty, IBNR of R495m needs to increase to R582m

Cutting the Gordian Knot

RBC models for Medical Schemes

- **Now combine claims, expenses and reserving budgeting risks to determine overall budget risk capital**
  - At 99.5% level of sufficiency, this was R2.013bn in 2006
  - Consisted of:
    - 88.95% claims budget risk
    - 4.71% reserving budget risk
    - 6.34% expense budget risk
  - Shows relative contribution of elements of risk to overall budget risk

RBC models for Medical Schemes

- **Now consider liquidity risk:**
  - First element: ensure scheme has positive funds throughout the year – capital requirement over 1 year time horizon
  - Second element: more long term approach of ensuring capital does not drop below what is required as starting value for capital in following year – i.e. ensuring adverse experience in current year does not erode capital to the extent that a strain is experienced in following year
- **I.e. additional risk quantified here: claims payments may fluctuate during year and capital drop below starting value**

RBC models for Medical Schemes

- **Liquidity risk was not a major risk for DHMS, due to combination of:**
  - seasonal claims (higher in winter months, which follow later in year)
  - ATB, which only arise in latter half of year
  - Hence, initial surplus arising in earlier parts of year means that liquidity risk was fairly minor
  - Modelled this by considering variation in monthly results over 50 000 simulations using bootstrapping
- **Result: liquidity risk of R745m required, mainly arising out of second element of risk**

RBC models for Medical Schemes

- Overall Liability Capital Charge (LCC) is simply sum of budget risk charge and liquidity risk charge
- I.e. in 2006 = R2.758bn at 99.5% sufficiency

- Asset risk depends on investments
- To the extent that assets backing budgeted liabilities are invested in non-cash, the scheme would have to hold extra capital to avoid risks arising from drop in market value of assets

RBC models for Medical Schemes

- **DHMS held sufficient cash assets not to attract Asset Capital Charge (ACC) in 2006**
- **In theory, ACC determined using stochastic asset model.**

Charges are:

	Capital Charge
Cash	0%
Near Cash	0%
Bonds	11.25%
Property	24.63%
Equities	38%
Other	38%

RBC models for Medical Schemes

- **Final step: combine ACC with Liability Capital Charge (LCC) to determine Total Capital Required (TCR)**
- **But there are covariance effects between ACC and LCC**
  - Internationally, simple heuristic rule applied of summing squares and taking square root of result
- **But, if assets backing *capital charges* invested in non-cash, then needs to be grossed up to allow for risk of simultaneous drop in asset values, i.e.**

$$TCR = \sqrt{\left(ACC / g_1\right)^2 + \left(LCC / g_2\right)^2}$$

RBC models for Medical Schemes

- **Overall, Deloitte model prescribed capital in 2006 of 13.64% of gross contributions, as opposed to 25%**
- **Note: the Deloitte model is very conservative, given 99.5% sufficiency level, and formulation of liquidity risk**
- **In the current financial year, using gross contribution budget of R20bn, this would have meant solvency of:**
  - R2.73bn, and not R5bn, as under current requirement
  - Had we followed a risk-based capital approach, we could have given R2 670 per member per year back in benefits, or contributions could have been lower by R220 pmpm

RBC models for Medical Schemes

- **What were the results of the FSA model?**
  - Following UK FSA rules with appropriate modification, allowed for:
    - Pricing risk, claims volatility risk, inflation risk, catastrophe risk and reserving risk = insurance risk
    - Asset mismatching risk, unexpected cashflows and asset concentration = liquidity risk
    - Credit risk
    - Equity risk and interest rate risk = market risk
  - Total capital required was just over 7% of gross contributions
  - In 2008, this means we could have had lower capital by R3.6bn, or R4 235 pm, or R353 pmpm, for one year

Cutting the Gordian Knot

Solvency and the REF

- **The current solvency requirement will become even more onerous on members once the REF is implemented**
- **Particularly as schemes with higher risks will tend to receive money from the REF – and should theoretically have lower solvency requirements**
- **The way in which REF payments / receipts interact with a scheme's budget risk and liquidity risk will become very important**
- **It would be inappropriate to ignore these risks**
  - And will prejudice exactly those schemes the REF wants to help

Conclusion

- **The current solvency requirement:**
  - Is considerably behind international developments
  - Is inconsistent with scheme risks (lower with lower premiums, solvency required in respect of savings contributions, makes no allowance for claims budget and contribution margins)
  - Imposes double whammy on members (% of contributions)
  - And all of this in an environment where the *only* source of capital is member contributions
- **The point is that 25% is too high for some schemes and too low for others**

Conclusion

- **Which schemes should have lower capital?**
  - Those with better budgeting and reserving practices (typically tends to be larger schemes, but not necessarily)
  - Those with more prudent assets backing their liabilities and their MCR
  - Those that front-end claims expenses via benefit design, leading to potential liquidity problems if they have volatile claims
- **Schemes with the opposite circumstances will need more capital – 25% might be way too low for some schemes**

Conclusion

- **Consider the financial results of some schemes in 2007:**

edical Schemes	Members end 2007	Growth	Underwriting result	Total surplus	Year end solvency
iscovery	837,707	35,090	642,945,000	1,145,650,000	23.00
cheme 1	77,924	913	-50,479,000	28,402,000	28.56
cheme 2	93,955	-7,713	98,315,503	178,204,464	29.98
cheme 3	73,690	9,238	-75,965,000	-42,592,000	20.20
cheme 4	60,956	5,804	-90,429,334	-38,341,107	42.08
cheme 5	35,450	2,391	952,158	36,381,381	49.06
cheme 6	197,082	152,480	120,417,290	132,501,531	8.39
cheme 7	22,067	-1,386	-12,527,725	11,007,183	14.98
cheme 8	46,485	1,587	-7,920,000	18,640,000	21.00
cheme 9	82,305	-7,654	-72,637,335	-25,579,879	17.60
cheme 10	36,650	-4,501	-16,825,000	12,127,000	15.40

- **Given that cost of capital is borne by members…**
- **…capital efficiency is even more important…**
- **…for members' protection and for ensuring affordability**

Conclusion

- **The move to RBC is urgent and important**
- **Whilst the workings of RBC models may be complex, they can be made simple in application**
  - If Solvency II framework or FSB FCR framework used
  - If professional certification required and industry model developed
- **And will lead to far better appreciation of risk and more prudent risk management in medical schemes**
- **Capital efficiency and better risk management should be top priorities, particularly with the introduction of the REF**

Questions?