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A Generic Framework for the Economic Valuation of Insurance Liabilities

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08 November 2018

Starter for ten ...

Generic framework¹

- How should insurance liabilities be valued?
- Is the standard Solvency II-type approach sufficient?
- Can it be generalised and how should it be calibrated?



Applications

- How can differences in valuation frameworks be interpreted?
- How should the Solvency II cost of capital rate be interpreted?
- How should you define your IFRS 17 risk adjustment?

¹ See: working paper "A generic framework for the economic valuation of insurance liabilities" at <https://www.linkedin.com/pulse/generic-framework-economic-valuation-insurance-nick-kinrade>



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Assumptions underlying standard risk margins

The insurance company is entirely equity funded and holds no debt

Capital requirements are specified as an amount in excess of the fair value of insurance liabilities

The insurance company is not subject to tax

Liability cashflows are not subject to financial market risk and are default-free

It takes no investment risk and does not engage in any other non-insurance activities

It has no excess capital or pays out all excess capital in the form of dividends

It does not plan to write new business or the market places no value on future new business



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Deriving the standard risk margin formula

Dividend discount model implies that the market capitalisation equals future dividends discounted at the cost of equity capital:

$$1 \quad MVIE_t = \sum_{k=t+1}^{\infty} DIV_k \cdot d_{t,k}^E$$

As the insurer holds no excess capital, dividends are equal to economic earnings plus change in capital requirements, as a result:

$$2 \quad MVIE_{t-1} \cdot r_{t-1,t}^E = EE_t$$

The economic earnings are also equal to the liability cash-flows plus change in value of economic liabilities plus investment income:

$$3 \quad EE_t = CF_t^l + MVIL_{t-1} - MVIL_t + MVIA_{t-1} \cdot r_{t-1,t}$$

Solving these two equations for the value of insurance liabilities gives:

$$4 \quad \underbrace{MVIL_t}_{BEL_t} = \underbrace{\sum_{k=t+1}^{\infty} -CF_k^l \cdot d_{t,k}}_{RM_t} + \underbrace{\sum_{k=t+1}^{\infty} MVIE_{k-1} \cdot (r_{k-1,k}^E - r_{k-1,k}) \cdot d_{t,k}}_{RM_t}$$

Balance sheet of simplified insurer

Fair value assets $MVIA_t$	Best estimate liability BEL_t	Fair value insurance liabilities $MVIL_t$
	Risk margin RM_t	
	Risk capital $RC_t = MVIE_t$	



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Interpreting the risk margin

Two equivalent mathematical representations of the risk margin (RM_t):

Cost-of-capital risk margin (Standard method)

Present value of capital requirements multiplied by cost of capital spread over risk-free rate

$$\sum_{k=t+1}^{\infty} MVIE_{k-1} \cdot (r_{k-1,k}^{\varepsilon} - r_{k-1,k}) \cdot d_{t,k}$$

Funding cash-flows (Alternative representation)

Difference between the cost of replicating the financing cash-flows and market value of these cash-flows

$$\sum_{k=t+1}^{\infty} DIV_k \cdot (d_{t,k} - d_{t,k}^{\varepsilon})$$



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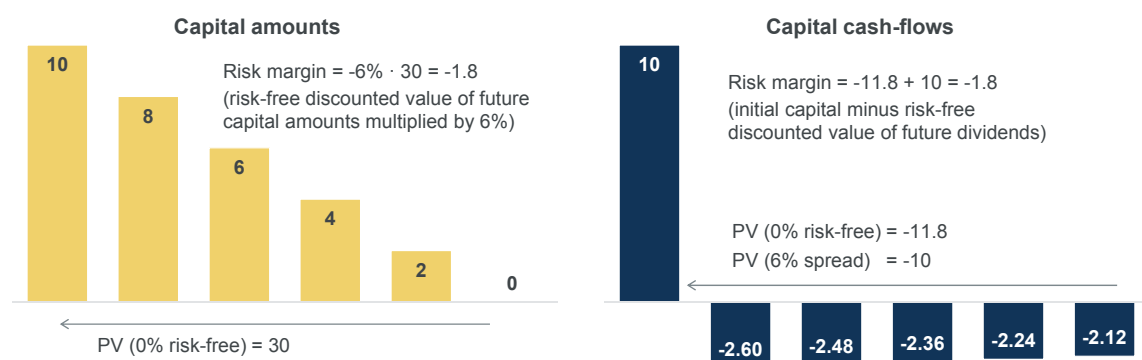


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Example¹: alternative risk margin calculations



Assume capital requirements of 10 at inception amortizing over 5 years, a 0% risk-free rate, and 6% cost-of-capital

¹ See: The Actuary magazine article "Margins for error", 9 February 2018.



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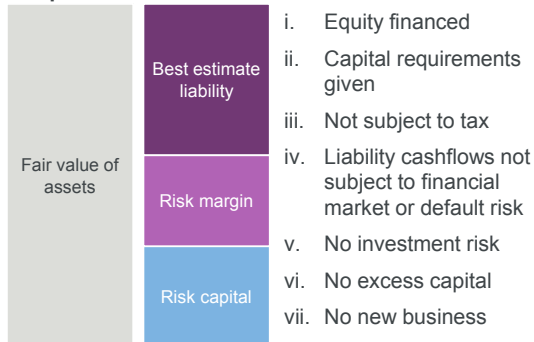
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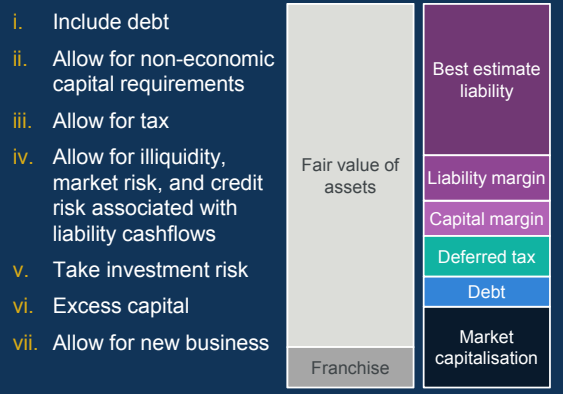
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Generalising the simple case

Simple case



Generic case



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Components of the generalised risk margin



Capital
margin

Each component is
computed based
on the same
generic formula

- Liability margin:** difference between risk-free discounted value of liability cashflows and their economic value allowing for market, illiquidity, and credit risk
- Capital margin:** cost of funding the equity and debt financing supporting insurance liabilities (pre-tax if the capital margin is treated as a temporary difference in the deferred tax calculation); comprised of:
 - the difference between the risk-free discounted value of the funding cashflows and their value at the weighted average cost-of-capital, where the funding is either or both:
 - economic risk capital requirements
 - residual capital held to meet non-economic capital requirements
 - tax on investment income on assets backing capital in excess of the tax value of insurance liabilities



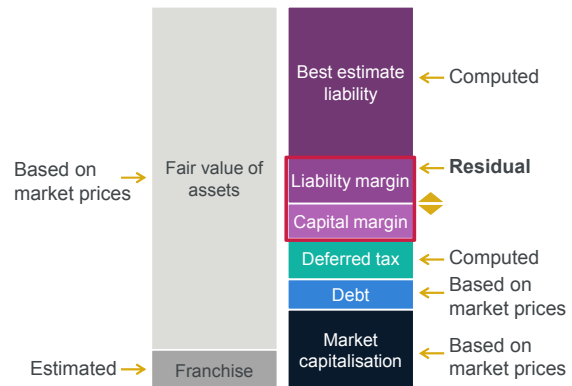
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Calibrating the margins from market prices

- Overall margin is the residual of:
 - market value of assets and estimated franchise value, less
 - market capitalisation, market value of debt, best-estimate liability, and deferred tax
- Therefore the higher the liability spread, the higher the capital margin:
 - contracts that consume risk capital pay for the spread credited to contracts that provide funding
- Once the liability spread has been decided based on market information, the insurance equity capital cost rate is then calibrated to the remaining residual value



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Calibrating the insurance equity capital cost rate

$$\text{Insurance equity capital cost rate} = \frac{\text{Equity cost-of-capital} - \text{Franchise adjustment} - \text{Investment adjustment}}{(1 - \text{tax rate})}$$

$$\text{Franchise adjustment} = (\text{price-to-equity ratio} - 1) \cdot \text{capital leverage} \cdot \text{new business margin}$$

$$\text{Investment adjustment} = \text{investment leverage} \cdot \text{capital leverage} \cdot \text{excess investment return}$$

Price-to-equity ratio

Market capitalisation to economic equity

Capital leverage

Economic equity to equity requirements backing insurance liabilities

Investment leverage

Market value of total investments to economic equity

New business margin

Return on new business in excess of equity cost-of-capital minus new business growth rate

Excess investment return

After-tax expected return on investments, less the return allocated to support insurance liabilities (including any matching adjustment or illiquidity spread), less the cost of any excess equity or debt



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Example¹: cost-of-capital calibration

Economic balance sheet	Capital information	Rates
Investments 25.0	Market capitalisation 6.0	Equity cost-of-capital spread 6%
Insurance liabilities 19.4	Capital requirements 3.6	Debt spread 3%
Debt 0.6	– debt 0.6	Excess investment return 0.15%
Economic equity 5.0	– equity 3.0	New business margin 1%
		Tax rate 25%

Franchise adjustment $((6/5) - 1) \cdot (5/3) \cdot 1\%$	Investment adjustment $(25/5) \cdot (5/3) \cdot 0.15\%$
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$$\text{Weighted average spread} = \left(0.6 \cdot 3\% + 3 \cdot \left(\frac{6\% - 0.33\% - 1.25\%}{1 - 25\%} \right) \right) / 3.6 = 5.4\%$$

$$\text{Equity spread} = 5.9\%$$

¹ See: The Actuary magazine article "Margins for error", 9 February 2018.



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Summary of generic framework

1 Market value of insurance liabilities are given by their production costs:

Expected claims, net of premiums	to policyholders
+	
Cost of servicing policies	to employees
+	
Taxation	to governments
+	
Cost of servicing capital requirements	to investors

2 The capital margin is the cost of servicing the funding cashflows, where the cost-of-capital rate should be derived from the insurers weighted average cost-of-capital adjusted for:

Taxation	Franchise value
reflect pre-tax rates and allow for frictional tax	remove profit expectation on new business from cost of equity capital
Investment risk	Liability crediting rate
remove earnings from non-insurance activities from cost of equity capital	cost of higher liability credit should be borne by the capital margin



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Round two: applications of the generic framework

Generic framework¹

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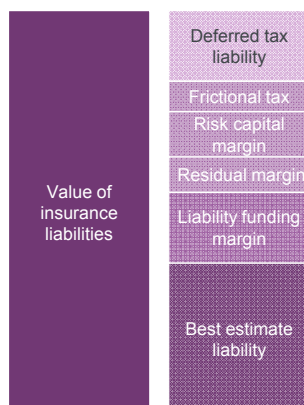
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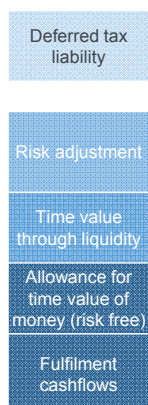
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Basis for multi-GAAP reporting

Generic economic valuation



IFRS¹



Solvency II



SST



MCEV



¹ Contractual Service Margin not shown as it is not an economic component.



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Solvency II liabilities

The Solvency II liabilities can be expressed as:

$$MVIL_t^{SII} = BEL_t + RM_t^{SCR} + RM_t^{\text{matching adj}} + \tau \cdot \left(TVL_t - \left(BEL_t + RM_t^{SCR} + RM_t^{\text{matching adj}} \right) \right)$$

- i. RM_t^{SCR} is the capital cost risk margin based on the SCR (excluding avoidable financial market risk) and a fixed 6% cost of capital spread
- ii. $RM_t^{\text{matching adj}} = \sum_{k=t+1}^{\infty} CF_k^l \cdot (d_{t,k} - d_{t,k}^{SII})$ is the value of the matching adjustment at time t , where $d_{k,t}^{SII}$ is the liability discount factor including a matching adjustment equal to the spread on matching investments

Solvency II

Deferred tax liability

Risk margin

Matching or volatility adjustment

Best estimate liability (risk-free)



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SII: assumptions underlying the 6% cost of capital

Equity after-tax cost of capital spread of 7.5-10% (without gross-up to achieve pre-tax spread)

Insignificant impact of subordinate debt

No quantification of return on franchise value

Cost of equity attributable to insurance risk is proportionate to the allocation of the overall capital requirements to insurance risk

No adjustment to the capital cost rate for impact of matching adjustment

Tax on investment income on capital is either implicitly reflected in the calibration of the capital cost rate or not allowed for



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IFRS17: an opportunity for improvement?

An entity shall apply **judgement** when determining an appropriate estimation technique for the risk adjustment for non-financial risk

- How should this judgement be applied?
- What does the IFRS17 standard and Transition Resource Group say?
- What are your objectives in defining your risk adjustment?
- Can our generic framework help you?



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IFRS risk adjustment - what does the standard say?

Risk Adjustment = compensation an entity requires for bearing the uncertainty about the amount and timing of the cash flows that arises from non-financial risk as the entity fulfils insurance contract

An entity shall adjust the estimate of the present value of the future cash flows to reflect the compensation that the entity requires for bearing the uncertainty about the amount and timing of the cash flows that arises from non-financial risk

An entity shall disclose the confidence level used to determine the risk adjustment for non-financial risk. If the entity uses a technique other than the confidence level technique for determining the risk adjustment for non-financial risk, it shall disclose the technique used and the confidence level corresponding to the results of that technique



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IFRS risk adjustment - what does the standard say?

purpose of the risk adjustment for non-financial risk is to measure the effect of uncertainty in the cash flows that arise from insurance contracts, other than uncertainty arising from financial risk

Transition Resource Group: The risk adjustment at the consolidated group level should be the same as that at the individual entity level. The level of diversification chosen is the level used in determining compensation, i.e. setting the price

...measures the compensation that the entity would require to make the entity indifferent between:

- fulfilling a liability that has a range of possible outcomes arising from non-financial risk; and
- fulfilling a liability that will generate fixed cash flows with the same expected present value as the insurance contracts



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Objectives in setting the IFRS methodology

Management & steering

- Usefulness depends on how close IFRS is to a economic view, does:
IFRS Equity – CSM + Allowance for Credit Risk = Market Cap – Franchise Value?
- How does IFRS compare to the basis used in pricing?

Volatility

- How can accounting volatility be managed?
- Can changes in the risk adjustment due to market movements be hedged?

Operational simplicity

- What is the process cost of complexity?
- Can dependency on the Solvency II Solvency Capital Requirement be avoided, if a confidence level disclosure is required?
- How often should parameters be recalibrated?

Comparability

- Will there be a market standard for the risk adjustment?
- Will a different approach be appreciated or punished by investors?
- Can the risk adjustment be explained to and understood by Boards and investors?



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How can the generic framework help?

Design	Interpretation	Developing simplifications
<ul style="list-style-type: none"> Ensure consistency with your firm's overall equity cost of capital Ensure consistency with the IAS12 deferred tax calculation (what is the implication of not allowing for frictional tax) Clarify the treatment of liquidity premiums, in particular in the risk adjustment Account for debt funding, both senior or subordinated 	<ul style="list-style-type: none"> How does the capital cost spread used in the risk adjustment relate to your firm's overall cost of capital? 	<ul style="list-style-type: none"> What is the process cost of complexity? Help understand the circumstances in which simplifications are valid Ensure that the cost of capital is calibrated on a consistent basis, regardless of the methodology used to derive risk capital See next slide for example



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Used to support the calibration of risk adjustments

<div>Economic balance sheet</div> <div><div>Investments25.0</div><div>Insurance liabilities19.4</div><div>Debt0.6</div><div>Equity5.0</div></div>	<div>Capital information</div> <div><div>Market capitalisation6.0</div><div>Capital requirements3.6</div><div><div>– debt0.6</div><div>– equity3.0</div></div></div>	<div></div> <div>WACC spread = 5.41%</div>
<div>IFRS balance sheet</div> <div><div>Investments25.0</div><div>Insurance liabilities¹19.4</div><div>Debt0.6</div><div>Equity5.0</div></div>	<div>Capital information</div> <div><div>Market capitalisation6.0</div><div><div>IFRS proxy capital1.8</div><div>– debt0.6</div><div>– equity1.2</div></div></div>	<div></div> <div>WACC spread = 5.41%?</div> <div>WACC spread = 2.81%?</div> <div>WACC spread = 10.81%?</div>

¹ Excluding Contractual Service Margin



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Summary of generic framework

- **The generic framework provides an optimal basis for multi-GAAP steering and reporting**
 - able to represent all economic frameworks
 - offers meaningful economic interpretation of the components, that can support management actions such as hedging, steering, and performance management
- **Further, it can support you in:**
 - understanding the implications of the centrally determined non-firm-specific 6% cost of capital used under EU Solvency II
 - defining an internally consistent and meaningful risk adjustment methodology for IFRS17



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Questions

Comments

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