

# Theory and practice of insurance liability valuation

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Calibration of the insurance cost of capital rate

Impact of taking investment risk

Huber P. (2020). Assessing the profitability of insurance contracts subject to Swiss Solvency Test capital requirements.

Bergesio A., Huber P., Koch-Medina P., Wilhelmy L. (2019). Solvency II: how adequate is the risk margin in the valuation of insurance liabilities.

Huber P., Kinrade N. (2018). A generic framework for the economic valuation of insurance liabilities.

Cashflows



Hedgeable component

Non-hedgeable component



Replicate



Hold capital buffer that incurs costs  
Idiosyncratic risk => not risk premium  
Frictional cost that applies to trapped  
capital not risk

1. The insurance company is equity funded and holds no debt
2. It is subject to an economic capital requirement
3. It pays-out all excess capital
4. It is not subject to tax
5. It takes no investment risk and has no non-insurance activity
6. Liabilities are collateralised and not subject to market risk
7. It does not write, or no value is placed on, new business

Deduct allowance for investment risk borne by shareholder (indifference return)



Deduct allowance for future new business profit



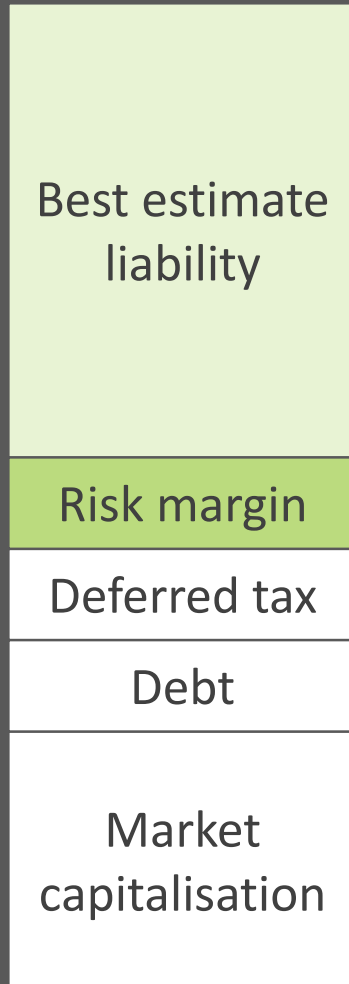
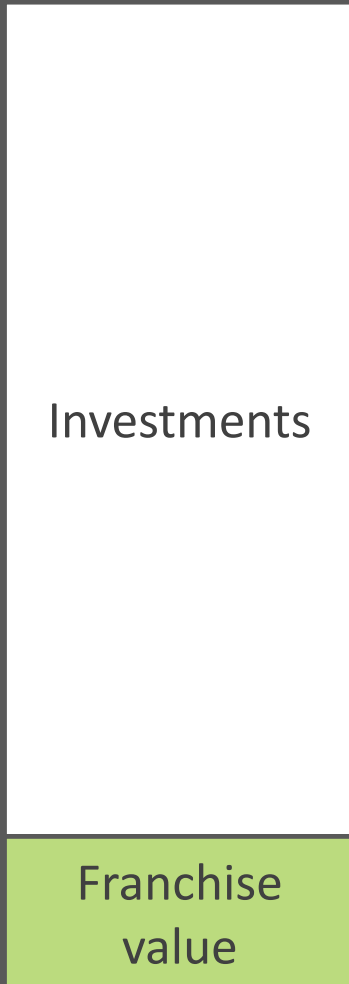
Compute weighted average cost of capital



Gross-up for tax (divide by  $1 - \text{tax}$ )



Add double tax allowance



Higher liability spread



Lower new business profitability  
or  
Higher risk margin

Lower risk margin



Lower new business profitability  
or  
Lower liability spread

Capital cost rate and capital requirement



Determine projected investments to meet capital requirement



Produce cash-flow statement with capital cashflows being the residual



Decompose capital cash-flows into: debt, equity principal, indifference return, profit



## Swiss Solvency Test

No tax liabilities

Current year capital costs excluded

Applied to minimum capital requirements (99% expected shortfall)

No allowance for diversification with new business or across entities (solo) in run-off capital requirements

## Solvency II

Deferred tax but no double tax

Covers current year capital costs

Applied to minimum capital requirements (99.5% VaR)

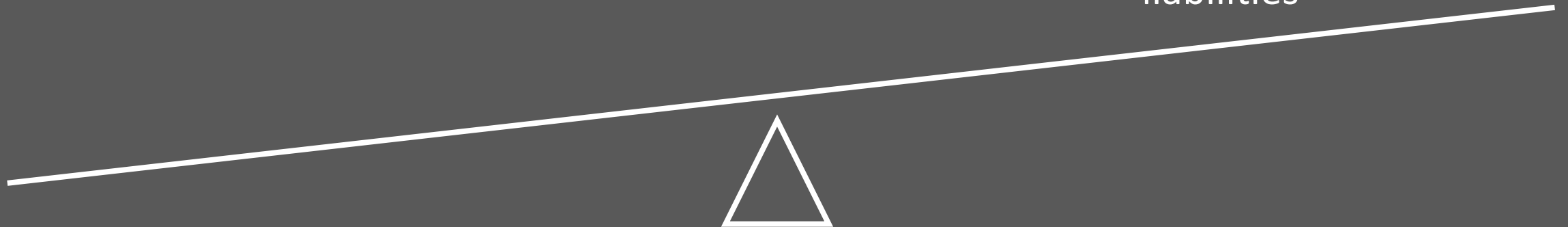
No allowance for diversification with new business or across entities in run-off capital requirements

## Additional investment risk

Benefit from investment leverage  
(corresponding to default option)

funding costs  $\neq$  illiquidity premium  
depend on collateral or seniority of  
liabilities

Additional capital requirements,  
increases double tax



## Capital cashflows



### Investment capital cashflows

- equity principal
- risk-free
- market risk borne by shareholder
- funding costs on liabilities

Indifference return

### Underwriting capital cashflows

- debt, principal and interest
- equity principal
- risk-free
- frictional costs
- economic profit

Solvency II and SST cost of capital  $\neq$  equity cost of capital

Accounting not relevant for assessing profitability  
(more conservative, higher return on equity)

Capital requirements and investment risk are relevant

Cashflow approach provides flexible mechanism for accurately calculating  
economic profitability