Property/Casualty Liabilities at Fair Value

Casualty Loss Reserving Seminar
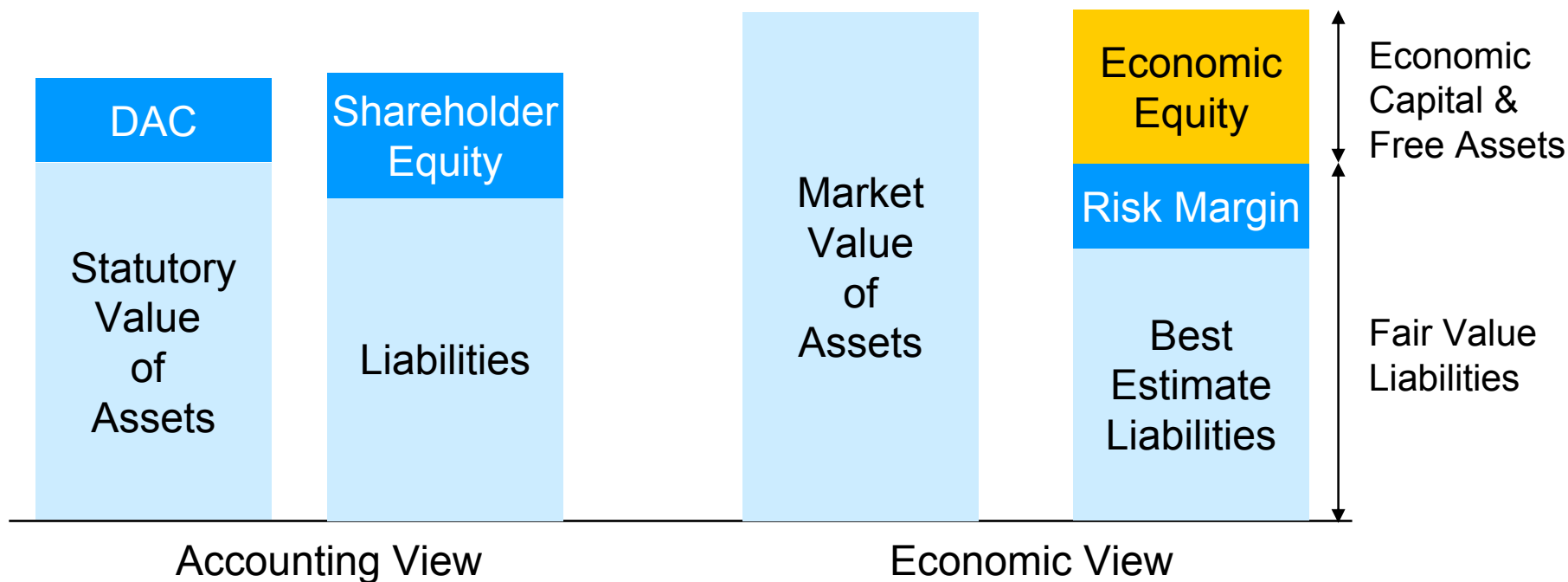
Bruce Fell, FCAS, MAAA, CFA

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Fair Value in a P/C Insurance Context

- Major difference between current accounting and fair value approach is the valuation basis for liabilities associated with insurance policies (policy benefits, loss liabilities, etc.)

- Fair value should reflect the following:
  - Present value to reflect future payments of liabilities
  - Risk margin to reflect uncertainty of liabilities
  - This is described as the amount that marketplace participants would demand as compensation for taking on risks associated with liabilities.

Accounting view vs. Economic view

Accounting View:
- DAC
- Statutory Value of Assets
- Shareholder Equity
- Liabilities

Economic View:
- Market Value of Assets
- Economic Equity
- Risk Margin
- Best Estimate Liabilities
- Economic Capital & Free Assets
- Fair Value Liabilities

Note: Best Estimate Liabilities = Unbiased Discounted Expected Liabilities

Elements of the economic value balance sheet

Assets	Liabilities
Market Value of Assets	**Best Estimate Liabilities (BEL)** **Risk Margin (RM)**
	Economic Capital (EC)

- **Economic Capital = capital required to meet risk/return objectives**

- **For calculating risk margin, we exclude free assets**

Elements of the economic value balance sheet

- **Risk Margin**
  - BEL + RM = true market price of liabilities
  - Financial Economics suggest several reasons for BEL ≠ market price
    - Lack of liquid market
    - Need to run-off liabilities, tying up capital for long periods
    - Frictional costs of capital
    - Risk averse market
    - Market bias due to information asymmetry

Total Required Capital

Assume time horizon 1 year and a 1% risk of ruin:

- Value at Risk (VaR) establishes the total amount of capital necessary to cover the 10th worst scenario given 1,000 scenarios

Shaded area = 1%

Loss

Value at Risk
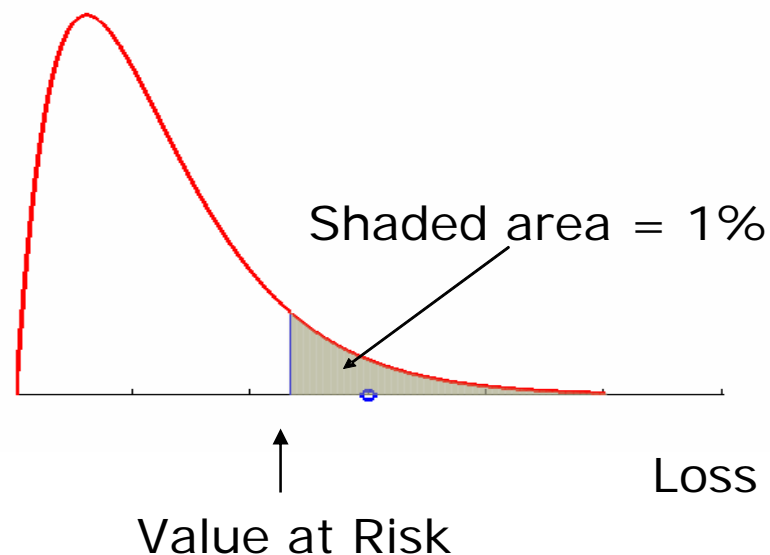
Economic Capital can be established by desired rating			
AAA	**AA**	**A**	**BBB**
VaR 99.99%	**VaR 99.97%**	**VaR 99.93%**	**VaR 99.74%**

Risk Margin Based on Economic Capital

- Annual cost of holding capital =
  Total Required Capital * (Required return on EC – Investment return on assets)

- Risk margin = present value of annual cost of holding capital for current and all future years

- Risk Margin reflects
  - Investment income on total required capital
  - Required return on economic capital

A Fair Value Example

- **For a given line of business for accident year 2007:**
  - Undiscounted liabilities = $100,000
  - Payment patterns selected based on historical data
  - Risk-free yield curve based on spot rates
  - Raw security factor establishes total required assets using stochastic methods with historical data
    — (e.g. Bootstrap, Mack method, etc.)
  - Timing security factor incorporated to reflect uncertainty of payment pattern
    — Judgmentally established by speeding up payment pattern and shifting yield curve

Run-off of Liabilities

Payout Year	Nominal Unpaid	Payment Pattern	Annual Payments	Discount Rates	Discounted Unpaid
2008	100,000	5.0%	5,000	82.80%	82,804
2009	95,000	5.0%	5,000	84.39%	80,170
2010	90,000	10.0%	10,000	86.34%	77,706
2011	80,000	10.0%	10,000	87.85%	70,281
2012	70,000	10.0%	10,000	89.62%	62,736
2013	60,000	15.0%	15,000	91.71%	55,024
2014	45,000	15.0%	15,000	93.30%	41,985
2015	30,000	15.0%	15,000	94.90%	28,471
2016	15,000	10.0%	10,000	96.18%	14,427
2017	5,000	5.0%	5,000	97.61%	4,881

Other Assumptions

- Risk-free yield curve

Duration	Month			Year							
	1	3	6	1	2	3	5	7	10	20	30
Yield	2.76	2.78	2.80	2.90	3.10	3.25	3.50	3.70	4.04	4.50	4.60

- Raw Security Factor = 1.75 based on stochastic reserving techniques at the 99th percentile
- Timing Security Factor = 1.05 based on evaluating the impact on discounted value of liabilities as a result of payment pattern speed-up
- Final Security Factor = 1.75 x 1.05 = 1.84 (A)
- Investment Return on Assets = 4.5% (B)
- Required Return on Capital = 15.0% (C)

Calculation of Risk Margin

(1) Year	(2) Discounted Unpaid	(3) Required Assets	(4) Required Capital	(5) Annual Cost of Capital	(6) PV Cost of Capital	(7) Economic Capital	(8) Economic Income	(9) Return on EC
2008	82,804	152,153	69,349	7,282	27,197	42,152	6,323	15%
2009	80,170	147,313	67,143	7,050	23,995	43,147	6,472	15%
2010	77,706	142,784	65,079	6,833	20,544	44,534	6,680	15%
2011	70,281	129,142	58,861	6,180	16,793	42,068	6,310	15%
2012	62,736	115,278	52,542	5,517	13,131	39,410	5,912	15%
2013	55,024	101,107	46,083	4,839	9,584	36,499	5,475	15%
2014	41,985	77,147	35,162	3,692	6,183	28,979	4,347	15%
2015	28,471	52,316	23,845	2,504	3,419	20,426	3,064	15%
2016	14,427	26,510	12,083	1,269	1,428	10,655	1,598	15%
2017	4,881	8,968	4,088	429	373	3,714	557	15%

(3) = (2) x (A)
(4) = (3) – (2)
(5) = (4) x [(C) – (B)]

(6) = PV of column (5) using 15% rate
(7) = (4) – (6)
(8) = (4) x (B) + change in (6)
(9) = (8) / (7)

Risk Margin = 32.8% = (6) / (2)

Fair Value Estimate

(1)	Nominal Liabilities	$100,000
(2)	Discount Factor	82.8%
(3)	Risk Margin	32.8%
(4)	Fair Value Factor	110.0%
(5)	Fair Value Liabilities	110,002
(6)	Difference (FV less Nominal)	$10,002

(4) = [1.0 + (2)] x [1.0 + (3)]

(5) = (1) x (4)

(6) = (5) – (1)