



Introduction to Market-Based Profit Metrics

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Agenda

- Review Traditional Pricing Metrics
- Brief History of Embedded Value and Market Consistent Value of New Business
- Market Consistent Value of New Business Components
- Market Consistent Results
- Challenges
- Key Takeaways

Traditional Profit Metrics

IRR

- Statutory Internal Rate of Return
 - Rate at which Present Value of Distributable Earnings discounted to issue equals 0
 - Objective to achieve an IRR above a target IRR (hurdle rate)
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PTPM

- Pre-tax Profit Margin
 - $\text{Present Value of Pre-tax Statutory Book Profit} / \text{Present Value of Premiums}$
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ROA

- Return on Assets
 - $\text{Present Value of Pre-tax Statutory Book Profit} / \text{Present Value of Assets}$
-

Traditional VoNB

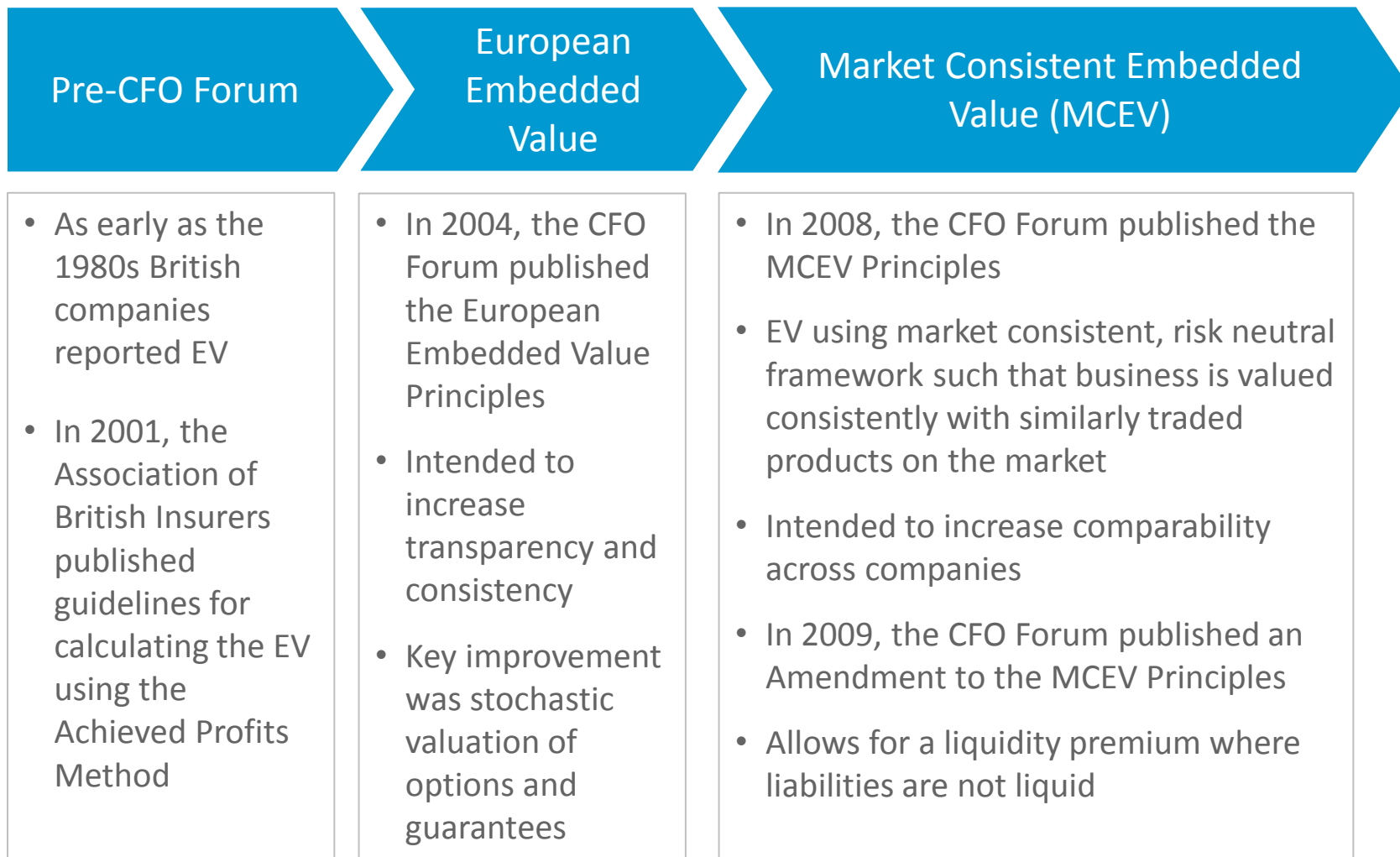
- Present Value of Distributable Earnings or Present Value of After-tax Statutory Book Profit
- Also referred to as Traditional Embedded Value

Potential Deficiencies with Traditional Profit Metrics

- When comparing products, one can have a higher IRR but add less value
- How do you determine the hurdle rate? Does it vary by product?
- Calculated using real-world regulatory reserves and capital, which may not appropriately reflect risk
- Generally does not capture the full value of options and guarantees
- Discount rate issues
 - Subjectivity in setting discount rates
 - Methodologies vary across companies
 - May not vary by product although products have different risks

Evolution of Embedded Value (EV)

Measure of the consolidated value of shareholders' interest in the business



Market Consistent Value of New Business

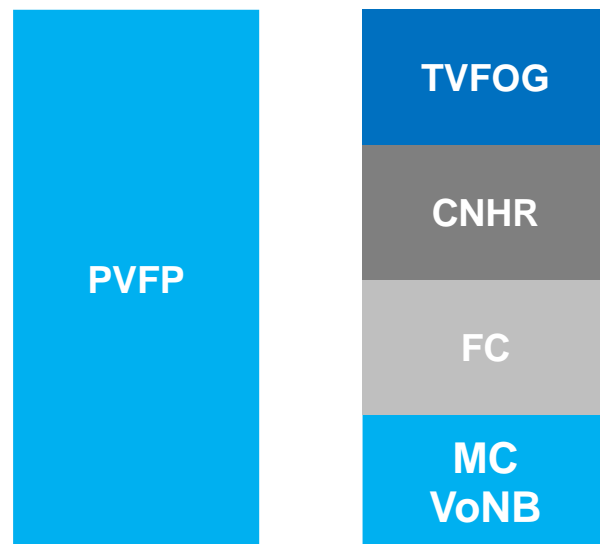
- MC VoNB =

Present Value of Future Profits (PVFP)

less Time Value of Financial Options and Guarantees (TVFOG)

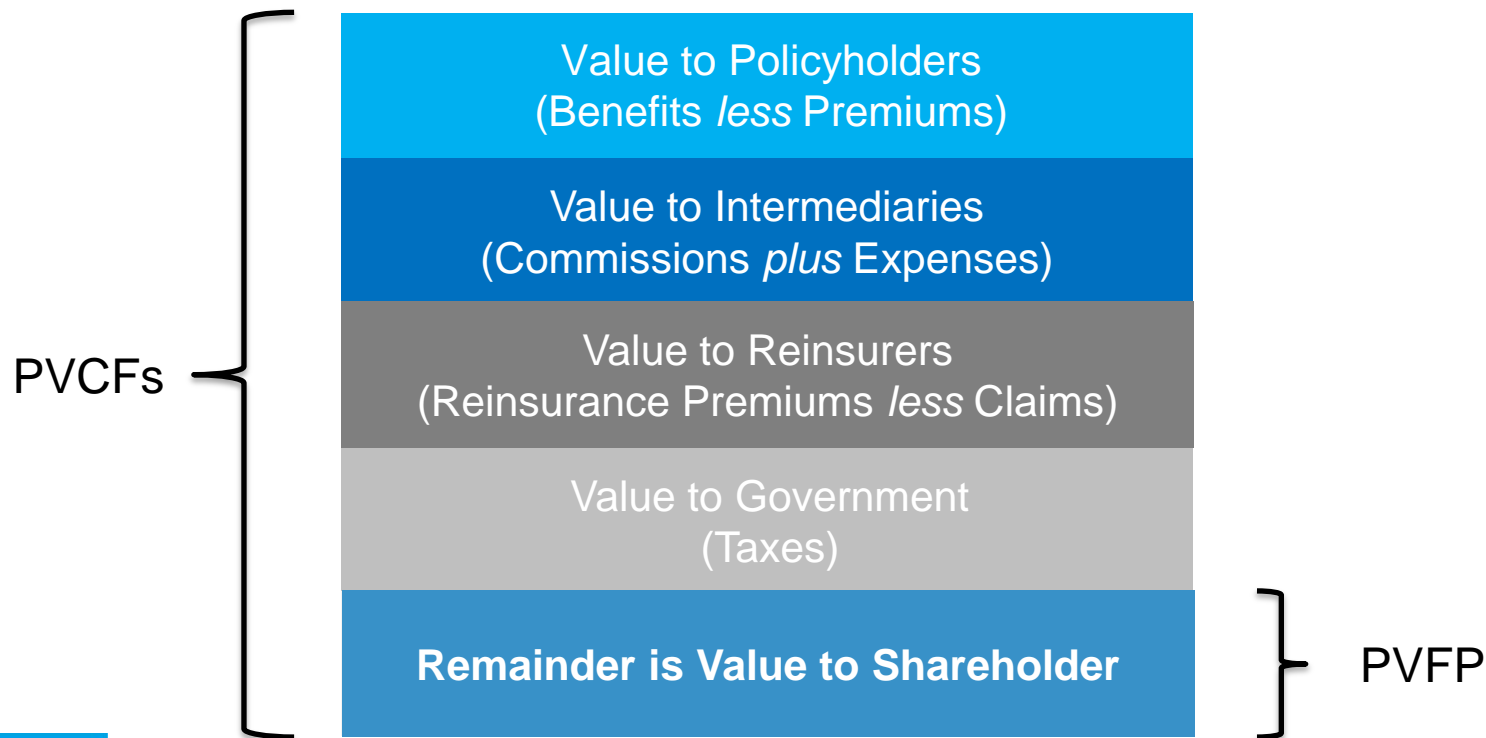
less Cost of Residual Non-Hedgeable Risk (CNHR)

less Frictional Costs of Required Capital (FC)



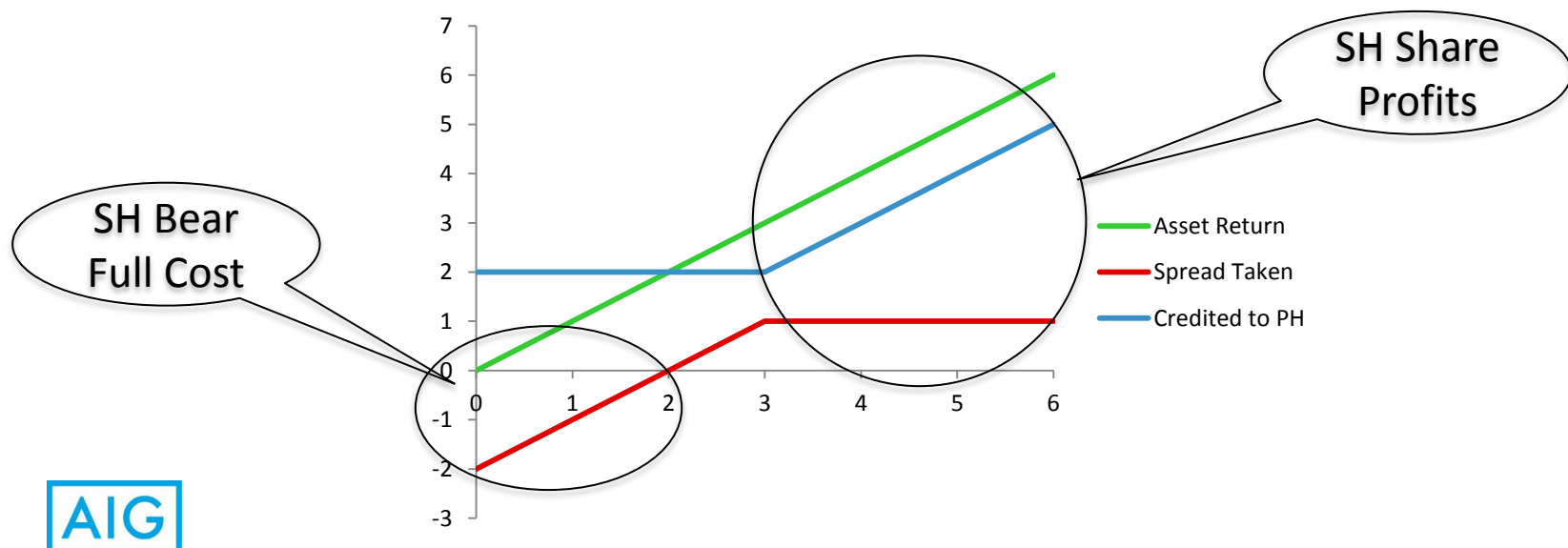
Present Value of Future Profits (PFVP)

- Present value of after-tax statutory profits
- Calculated on a deterministic basis
- Discounted using the risk free rate plus a liquidity premium where applicable
- Uses best estimate actuarial assumptions



Time Value of Financial Options & Guarantees (TVFOG)

- PVFP *less* TVFOG gives value of business adjusted for hedgeable risks
- Typically for embedded options and guarantees where there is asymmetry in the value to the shareholder
 - In positive scenarios, shareholders share profits with policyholders
 - In negative scenarios, shareholders bear the full cost due to the presence of options and guarantees
- Example: Universal life policy with minimum guaranteed crediting rate



Time Value of Financial Options & Guarantees (cont'd)

- Most common approach uses stochastic valuation:
 1. Calculate the PVFP using stochastic risk-neutral scenarios
 2. Average the results from Step 1
 3. TVFOG = PVFP using deterministic scenario *less* Average results from Step 2
- Should reflect dynamic policyholder behavior
 - Example: Policyholders may lapse more if competitor offers higher rate on UL
- Should also reflect management actions
 - Example: Management may adjust crediting rates due to changes in market conditions
- Alternative approaches may use a closed form solution, such as Black-Scholes, for simple options

Cost of Residual Non-Hedgeable Risk (CNHR)

Some examples of non-hedgeable risk for life insurance:

Mortality Trend Risk

- Risk of adverse movements in mortality improvement
- Risk that future improvement will be less than assumed

Mortality Catastrophe Risk

- Risk that mortality may be significantly higher than assumed due to a catastrophic event
- A catastrophic event could be a war, epidemic, etc.

Lapse Risk

- Risk that lapse rate is consistently lower or higher than assumed, depending on the product
- Risk that the short term lapse rate is significantly higher than assumed

Expense Risk

- Risk that expenses are higher than assumed
- Risk that expenses are increasing at a higher rate than assumed

Operational Risk



- Risk of loss resulting from inadequate or failed processes, people and systems or from external events
- Includes wide range of risks – human error, fraud, personnel management, accidents, fires, etc.

Cost of Residual Non-Hedgeable Risk (cont'd)

- The cost of capital approach is the most popular method used to calculate CNHR
- Cost of capital is return required by investor to compensate for the relative riskiness of capital backing non-hedgeable risks
- For MC VoNB, the amount of capital is determined using an internal economic capital model
- Stress-testing is usually used to determine the amount of required capital – 99.5% confidence over 1 year time horizon
- To incorporate diversification, required capital can be combined using a correlation matrix

Cost of Residual Non-Hedgeable Risk (cont'd)



- Cost of capital approach:
 1. Project required capital related to non-hedgeable risks over the lifetime of the liability
 2. Multiply required capital amount by the cost of capital rate to determine the cost of capital charge
 3. Calculate the PV of the cost of capital charges by discounting at the reference rate

Year	Project EC	(A) Project Shocked PVCF For Shock A	(B) Project Shocked PVCF For Shock B	(C) Combine Projected Shocks	(D) Project Unshocked PVCF	(E) (C)-(D) = Economic Capital	(F) CoC Rate	(G) CoC Charge = (E) * (F)	CNHR = PV CoC Charges*
1		100	70	120	55	65	8.0%	5.2	
2		90	65	110	50	60	8.0%	4.8	
3		80	60	100	45	55	8.0%	4.4	
4		70	55	90	40	50	8.0%	4.0	
5		60	50	80	35	45	8.0%	3.6	

* Discounted Using Risk Free Rate + Liquidity Premium

Cost of Residual Non-Hedgeable Risk (cont'd)

- Projecting the required capital for each risk at each point in time in the future requires significant run time, so many companies use the economic capital ratio at time 0 to estimate projected economic capital
- Economic Capital Ratio (EC Ratio) at time 0 = Economic Capital at time 0 / PV Cash Outflows at time 0

Year	(A) Project EC	(B) PV Cash Outflows	(C) EC Ratio	(D) Projected EC = (A) * (B)	(E) CoC Rate	CoC Charge = (C) * (D)	CNHR = PV CoC Charges*
1		650	10.0%	65	8.0%	5.2	
2		600	10.0%	60	8.0%	4.8	
3		550	10.0%	55	8.0%	4.4	
4		500	10.0%	50	8.0%	4.0	
5		450	10.0%	45	8.0%	3.6	

* Discounted Using Risk Free Rate + Liquidity Premium

Frictional Costs of Required Capital

- Includes tax on investment income on required capital and net of tax investment expenses on required capital

	(A)	(B)	(C)	(D) = (B)*(C)	(E)	(F)=(B)*(E)*[1-(C)]
Year	Economic Capital	Investment Income on EC	Tax Rate	Tax on Inv Inc on EC	Investment Expense	Net of Tax Inv Exp
1	65	0.7	35%	0.2	1%	0.00
2	60	1.2	35%	0.4	1%	0.01
3	55	1.4	35%	0.5	1%	0.01
4	50	1.5	35%	0.5	1%	0.01
5	45	1.4	35%	0.5	1%	0.01

VoNB Results

- Products with the following features produce lower MC VoNB
 - Material embedded options and guarantees
 - Sensitivity to policyholder behavior assumptions
 - Reliance on investment performance
- MCEV and MC VoNB results can be used to
 - Better understand underlying risk associated with a product
 - Allocate capital
 - Determine incentive compensation

Challenges

- Setting assumptions and policyholder behavior in a risk neutral environment
 - What premium do UL policyholders pay in a risk neutral environment?
 - How do we credit interest?
 - What should competitor rates be?
 - Value of dynamic policyholder behavior is increased by running stochastic scenarios – is there experience data to support these assumptions?
- Volatility
 - MC VoNB fluctuates more with market volatility than traditional metrics.
 - Potential issues with speed to market. If there is a shift in the market between the time that the product is priced and the time that the product is launched, value could vary significantly.

Challenges

- Stochastic Modeling
 - Increased run times
 - Possibility of reduced model points
 - Increased complexity leading to increased possibility for error
 - Need scenario generator
 - If stochastic models are not yet available, they will need to be created
- Disconnect between market consistent framework and reality
 - In reality, the company does hold reserves and required capital in accordance with regulatory standards
 - If we price our product using market consistent metrics we may lose our competitiveness in the market if others are still using traditional metrics

Challenges

- Range of methodologies as guidance evolves
- One of the main goals of the CFO Forum's Principles was to improve consistency and comparability across companies, but many items allow for a variety of methodologies
 - Setting liquidity premium
 - Determining shocks for CNHR
 - Determining cost of capital rate for CNHR
- The metric is still evolving, especially in the U.S. where there is no formal guidance
- Principles based guidance allows a company to tailor metrics to the specific business, but is more difficult to interpret than prescribed methods
- Getting buy-in from senior management

Key Takeaways

- MC VoNB measures the value to shareholders by taking the PVFP on a market consistent basis and making explicit adjustments for risks through the TVOFG and CNHR components
- This metric has many advantages:
 - Allows actuaries and others to better understand the risks underlying a product
 - Explicitly allows for the value of embedded options and guarantees
 - Values insurance liabilities consistent with the market
 - Has the potential to improve comparability and consistency both between products within a company and between companies
- Many challenges have yet to be resolved as MCEV practices evolve

Questions?

