

# Value and Capital Management

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Session 3: PC & LH Industries

# Managing capital and value: 3 core skills from a Finance & Risk perspective

## Better Information – What gets measured, gets managed

- How to value risk-based, capital intensive businesses?
- How to link management actions, risk adjusted performance measures (RAPMs) and other, Key Performance Indicators to value?

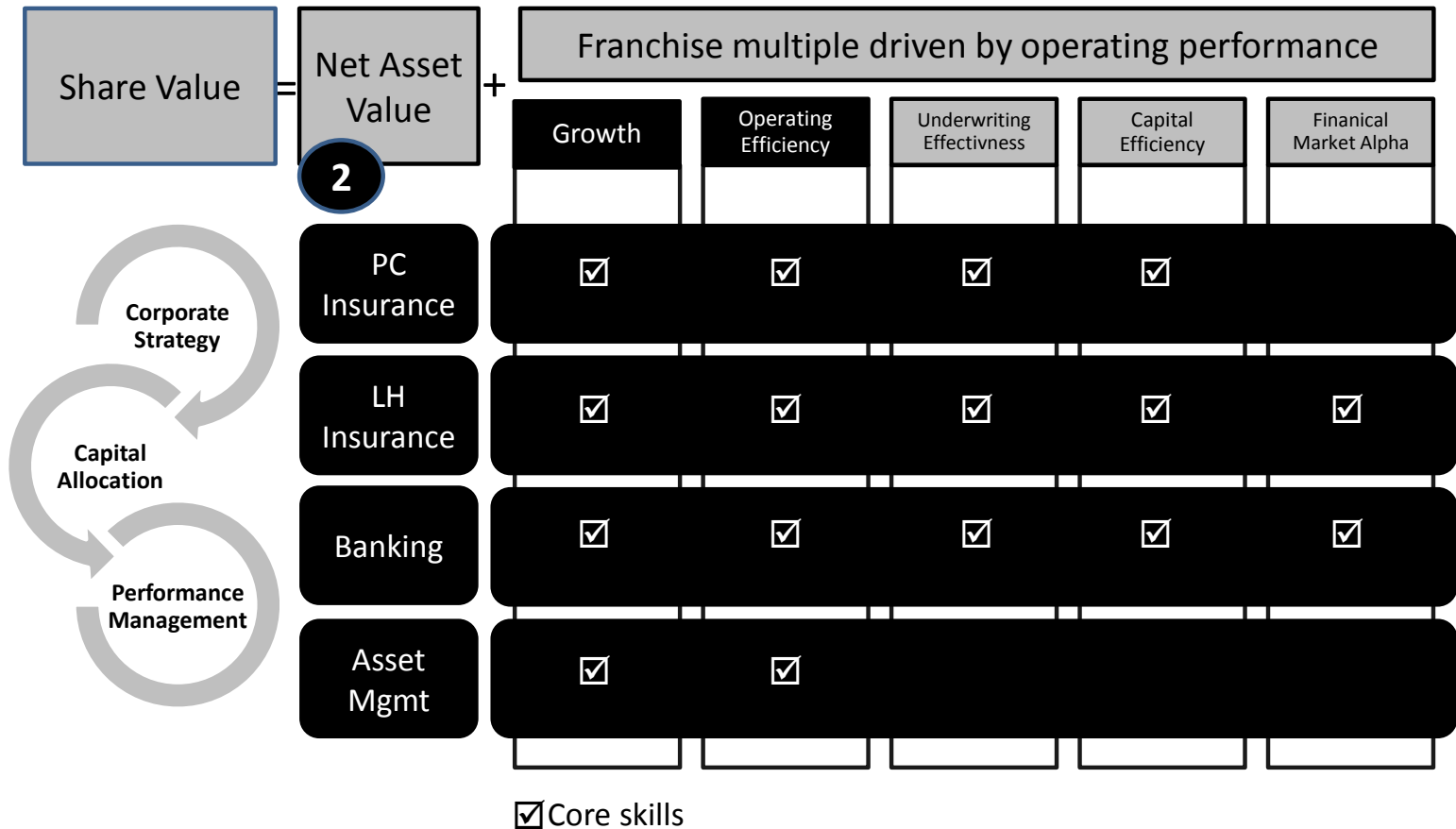
## Better Insights – How to create value through operations

- What “rules of the game” (or generic strategies) create value in each business segment?
- What core skills are required in each segment?

## Better Decisions – How Finance & Risk creates value

- Strategic planning and capital allocation
- Balance sheet, asset/liability and liquidity management
- Risk management and risk underwriting

## 2. Better Insights – What strategies, initiatives and KPIs by segment?



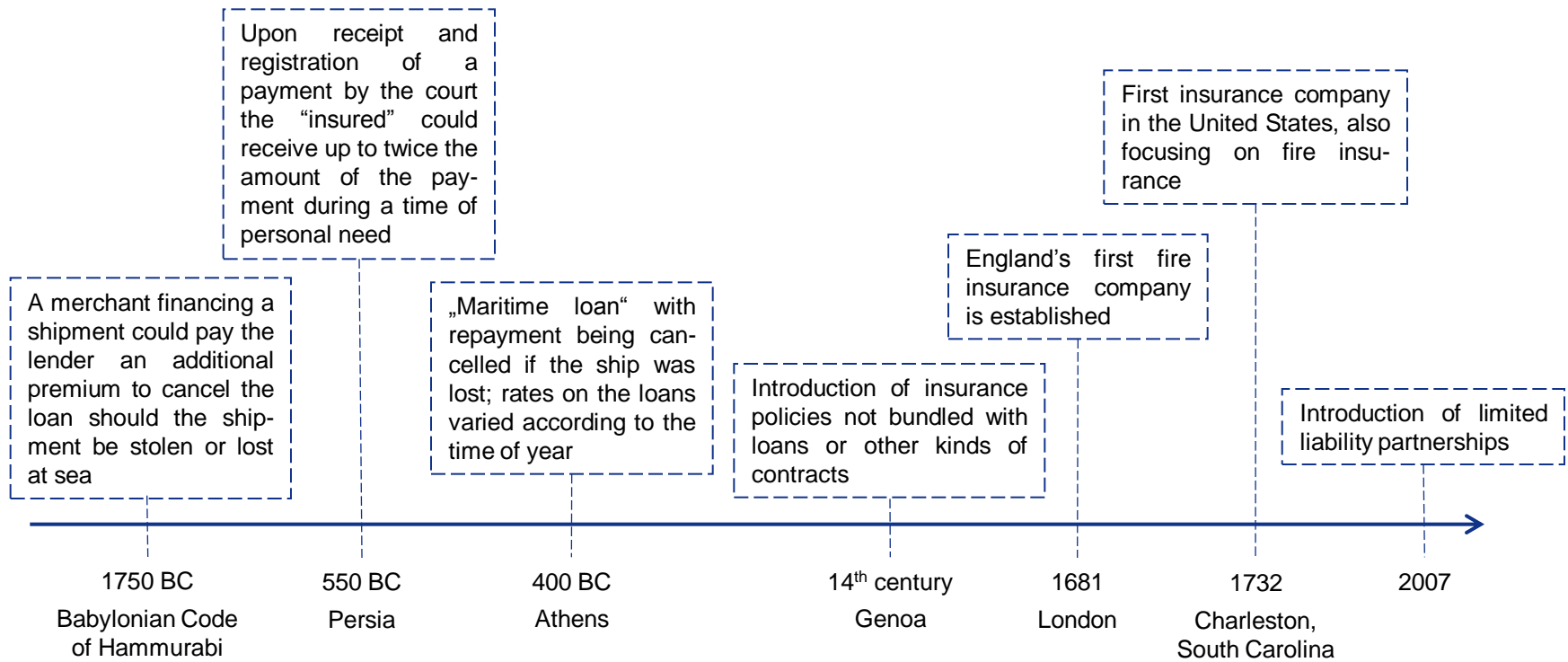
# Contents

## 1. PC Insurance

- a) History and economic rational
- b) From Principles to Rules of the game
- c) Valuing a PC Insurer

## 2. LH Insurance

# History of PC insurance



# Definition of insurable risks

## 1) Risks which diversify to some extent when pooled with similar or other insurable risks

- In order for diversification through risk pooling to be effective, the ratio of aggregate loss uncertainty to expected loss of the portfolio has to be reduced as additional risk exposures are added to the portfolio
- Typical examples: homeowners' or automobile property coverage where individual loss events (e.g. fire, theft, damage, etc.) are largely independent of one another
- Caveat: losses triggered by natural catastrophes such as earthquakes, floods, hail storm, etc., which can simultaneously affect many automobiles or homes in the same portfolio

## 2) Loss to the policy holder which can be calculated and which are definite in terms of time, place and cause

- Insurance indemnifies the policy holder for losses, implying that the policy holder is directly impacted by the loss. The contrary would be gambling.

## 3) Loss which is accidental or which is outside of the control of the policy holder

- An insurable risk should not be influenced by the insured as this would present moral hazard.
- There are mechanisms for limiting the effects of moral hazard, for example through deductibles, co-insurance, policy limits, etc.

## 4) Meaningful or material loss from the perspective of the policy holder, understood by the insurer

- The loss can be covered at a premium which is deemed by the policy holder to be an acceptable substitute for self-insurance.
- However, the loss must be understood by the insurer and not unlimited (e.g. terrorism, blood product / nuclear liability, etc.)

# Benefits

## To policy holders:

- Protection against potential loss at a premium which seems reasonable given the individual's risk aversion

## To shareholders:

- The insurance company benefits if it charges an appropriate premium for the policy's specific risk characteristics, not only in terms of its expected claims burden but also its contribution to the overall portfolio of risks and capital requirements.
- The aggregate portfolio benefits from diversification because the individual risks are not perfectly correlated.
  - The ratio of the loss uncertainty relative to the expected loss burden for the portfolio will be lower than the ratio for each individual policy.

## To society:

- Society more broadly also benefits if private insurance reduces the negative externalities associated with insurable events, e.g. third party damage caused by a traffic accident.
- Private insurance aligns the cost of coverage with the benefits of the coverage.

***A PC insurance company creates value for its shareholders, policy holders and society by appropriately underwriting, pricing, absorbing, diversifying and managing insurable risks.***

# Principles and core skills required

## Generic value drivers and required capabilities

**Superior execution:** Operating skills which can bring a higher valuation multiple to the invested capital:

- Sales and distribution capabilities driving top-line growth, combined with
- Superior underwriting skills and
- Rigorous expense management to drive bottom-line profitability

**Preservation of capital:**

- Though it may seem a paradox, invested capital can earn a premium while “sitting in the sun”
- Taking more financial market risk is an unwise strategy if the insurer is actively managing its capital

**Follow the cash:** The majority of the premium and claims cash flows in any given year are tied to the underwriting activities during the year, with the rest of the claims emerging after only a few more years:

- underwriting performance becomes clear very quickly
- it is more difficult to fool oneself by using accounting gimmicks
- shareholders like to see cash, and dividends that can be paid by cash  Core skills

	Growth	Operating Efficiency	Underwriting Effectiveness	Capital Efficiency	Financial Market Alpha
PC Insurance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
KPIs	<ul style="list-style-type: none"> <li>• Premium growth</li> </ul>	<ul style="list-style-type: none"> <li>• Expense ratio (discounted)</li> </ul>	<ul style="list-style-type: none"> <li>• Loss Ratio (discounted)</li> <li>• Economic Capital Intensity</li> </ul>	<ul style="list-style-type: none"> <li>• Capital Efficiency Ratio</li> </ul>	



# Rules of the Game for PC Insurers

## 1. Focus on risk-adjusted, profitable growth

- Grow the top-line through *superior sales & distribution capabilities*
- Convert top-line into excess bottom-line returns: Keep the combined ratio below 100% and ensure a positive New Business Economic Profit (EP), through
  - Operating efficiency / expense management
  - Underwriting excellence
  - Claims management

## 2. Preserve capital resources so that you can continue to underwrite profitably

- Hold reserves and capital appropriate for the risk of your portfolio;
- Invest assets backing reserves and capital in low risk assets which closely match the duration and liquidity characteristics of your liabilities

## 3. Manage your capital efficiently

- Minimize uneconomic capital or reserve requirements through balance sheet management
- Invest as much free capital as possible in profitable growth opportunities, returning excess capital to shareholders if retained earnings are in excess of profitable growth opportunities

# Valuing a PC insurer

## Step 1: Determine the current Net Asset Value

Balance sheet items	Generic adjustments
+ Assets	<ul style="list-style-type: none"><li>• Adjust assets to fair- or market-value</li><li>• Deduct non-tangible assets, e.g. goodwill, capitalized deferred acquisition costs (DAC) or value of business acquired (VOBA)</li></ul>
- Liabilities	<ul style="list-style-type: none"><li>• Assess reserve adequacy relative to best estimate, ultimate reserve requirements and adjust as necessary. This can be especially challenging for long-tail liability lines such as product liability or workers compensation coverage which can be materially impacted by changing litigation precedents and the late emergence of latent developments.</li><li>• Discount the best estimate, ultimate reserves to a fair value basis, offset by an appropriate Market Value Margin reflecting the cost of capital needed to support the portfolio in run-off.</li></ul>
+/- Off-balance sheet commitments	<ul style="list-style-type: none"><li>• Deduct any underfunded pension obligations</li><li>• Deduct the value of guarantees or other off-balance sheet commitments</li></ul>
= Tangible Net Asset Value	

# Valuing a PC insurer

## Step 2: Determine the Franchise Value: The value of one period's new business

Driver		Description	Comments
<b>Growth</b>	[P x (1 -	<i>New business premium</i>	Adjust projected new business premium for the point in the economic cycle and expected GDP growth, for business mix, etc.
<b>Operating efficiency</b>	ER -	<i>Normalized Expense Ratio</i>	Adjust the expense ratio as appropriate, e.g. for expected efficiency gains, business mix, channel mix (e.g. tied agents, direct, bancassurance, etc.)  Except for the discounting effect, a normalized accident year ratio will be a good proxy in a steady state
<b>Underwriting effectiveness</b>	CR)	<i>Normalized Claims Ratio</i>	Adjust the loss ratio as appropriate, e.g. <ul style="list-style-type: none"> <li>• By replacing actual catastrophe losses with a normalized level of nat cat losses,</li> <li>• For anticipated changes in business mix, and</li> <li>• For cyclical pricing effects</li> </ul> Except for the discounting effect, a normalized accident year ratio will be a good proxy in a steady state
<b>Investment returns</b>	+ I ]	<i>Normalized investment returns</i>	<ul style="list-style-type: none"> <li>• Remove any capital gains / losses</li> <li>• Alternatively, replace investment income with a rolling average "risk free" return consistent with the duration of reserves times the average capital and reserve level.</li> <li>• Represents the discount effect for expense and claims ratio as well as the capital benefit in a steady state</li> </ul>
<b>Taxes</b>	x (1-t)	<i>Normalized taxes</i>	Adjust tax rate as appropriate
	= NI	<i>Normalized net income contribution before cost of capital</i>	
<b>Underwriting effectiveness and Capital efficiency</b>	- CoC x  ECI	<i>Cost of Capital</i>  <i>Economic Capital Intensity</i>	<ul style="list-style-type: none"> <li>• Adjust the firm's cost of capital for leverage, if significant</li> <li>• In a steady state, undiscounted capital intensity is estimated by dividing calendar year premium by the actual capital held <ul style="list-style-type: none"> <li>○ Adjust attributed capital if CER is greater than one, e.g. actual capital = P*ECI*CER, attributed capital = P*ECI but only if management is able and committed to becoming more capital efficient</li> <li>○ Adjust ECI to reflect historical growth (e.g. ECI will be underestimated for fast growing books)</li> </ul> </li> </ul>
<b>PC Economic Profit</b>		= PC.EP	

# Valuing a PC insurer

## Step 2: Determine the Franchise Value: Future business

The Franchise Value of the firm represents the present value of all future new business. Under a steady state assumption in perpetuity, it can be written as:

$$Franchise\ Value = \frac{PC \cdot EP}{CoC - g}$$

g ~ assumed steady state growth rate  
CoC ~ Cost of Capital

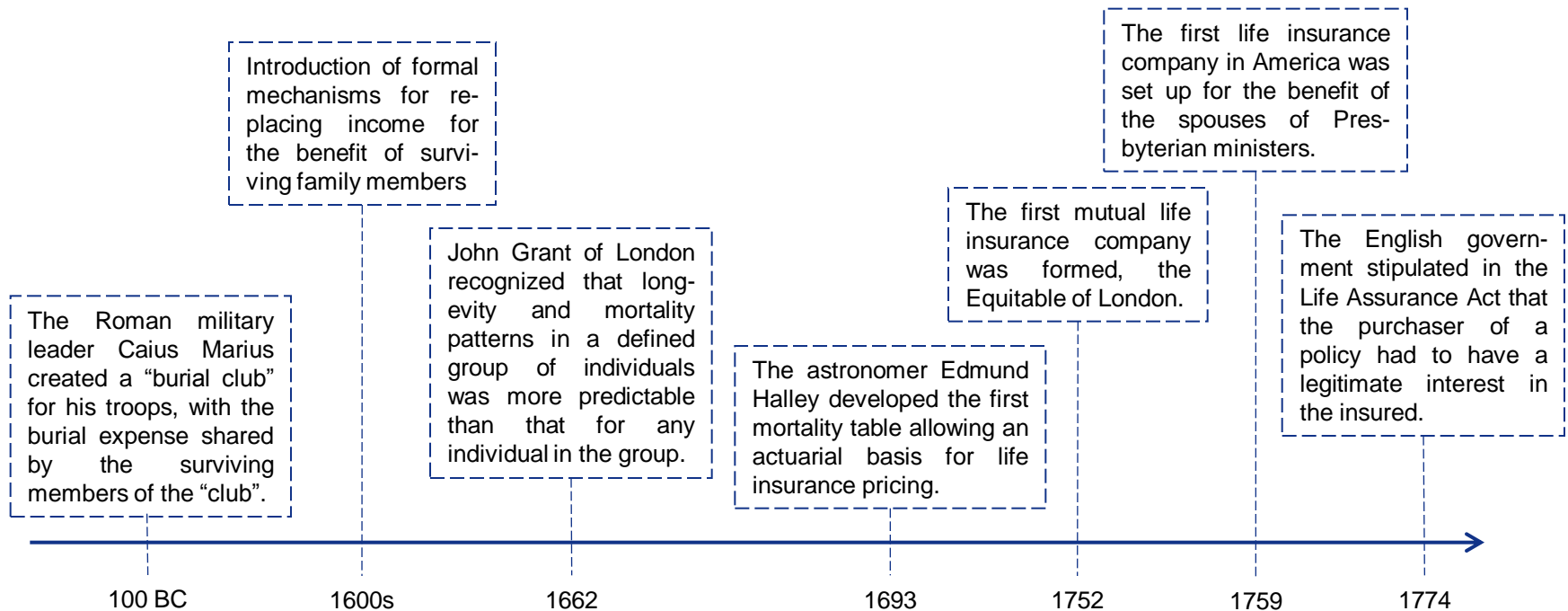
Non-steady state: The VNBs need to be projected for different periods into the future using assumptions regarding operating performance which are appropriate for the forecast period. Common practice is to divide the future into an explicit projection period, for example the next 10 years, with an associated terminal value determined by steady state assumptions, e.g.

$$Franchise\ Value = \sum_{t=1}^T \frac{PC \cdot EP_t}{(1 + CoC)^t} + \frac{1}{(1 + CoC)^{T+1}} \frac{PC \cdot EP_T}{CoC - g}$$

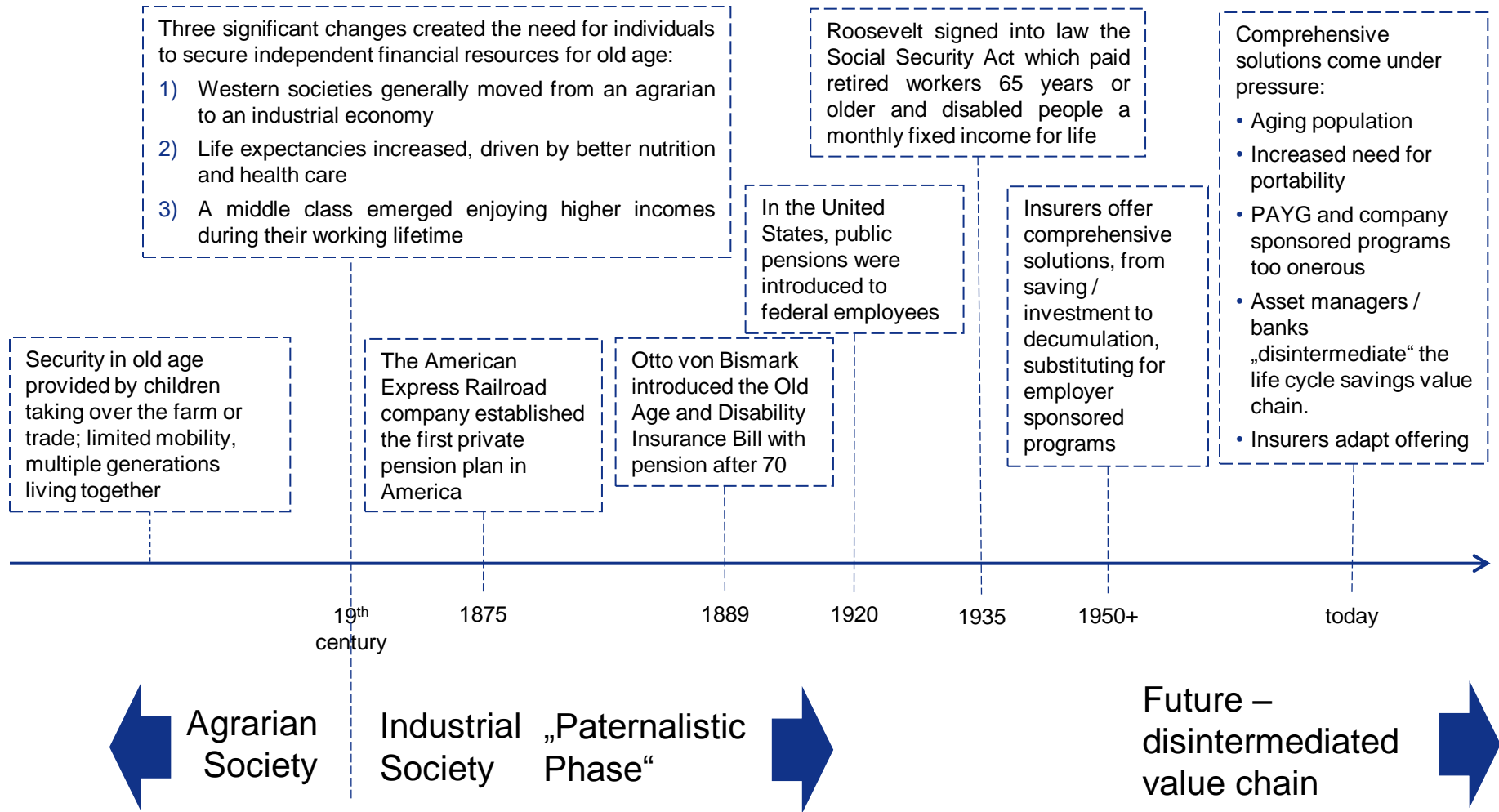
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2. LH Insurance
  - a) History and economic rational
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  - c) Valuing a LH Insurer
  - d) Managing capital and earnings in LH

# History of LH insurance: Protection products



# History of LH insurance: Retirement products



# Economic rational – The insured's perspective

## 1. Protection products

- LH insurance offers a payment following the premature death (mortality), disability (morbidity) or illness (health) of an individual, helping to defray expenses and replace lost income.
- The policy holders receive this protection against a premium they deem reasonable based on their risk aversion.

## 2. Asset accumulation and Retirement products

- The primary reason for purchasing asset accumulation products is to **save for the future** and the primary reason to purchase decumulation products is to provide **predictable income throughout retirement**
- Despite the existing similarities, there are three primary reasons why customers might prefer a LH insurance product to a banking or asset management product:
  1. there are often **tax benefits** from saving with an insurance or retirement product relative to a bank deposit or mutual fund
  2. insurance savings and retirement products often offer **guarantees**, providing greater certainty in financial planning
  3. insurance products also offer **protection benefits** linked to longevity, mortality, morbidity and health, including for example death benefits, health care riders, etc. This is also often a requirement in order for a savings product to be eligible for beneficial tax treatment.



# Economic rational – The insurer’s perspective

## 1. Protection products

- Generating profits by appropriately underwriting and pricing the mortality, health, morbidity and longevity risk embedded in the contract or sold as riders to the base contract.
- Success in LH protection businesses requires similar skills as those required to be successful in PC insurance where underwriting excellence, expense and distribution management are critical.

## 2. “Asset management”-like products

- Predictable fees and low capital intensity by generating a fixed margin on assets under management (AUM) and from expense management fees, especially for “capital light” savings and investment products. Examples: unit linked policies without guarantees

## 3. Financial intermediation products

- The insurance company may be compensated by participating in any investment returns above the guaranteed rate generated by the invested assets
  - Examples: most general account products including universal and whole of life products, endowments, annuities, etc.
- Three levels of risk and capital
  - Limited capital – products explicitly designed to be hedged such as FIA, VA typically require limited capital in spite of the fact that they may contain complex embedded derivatives.
  - More capital – spread products: e.g. GICs, matched participating products
  - Most capital – structural mismatches and “chasing market returns” / participating products

# Principles and core skills required

## Clear strategy, focus on capital and cash generation

### ➤ **Underlying principles for LH insurance challenging to summarize**

- LH insurance comprises three very different businesses – protection, asset management and guaranteed products – each requires specific skills to create value and specific metrics to measure value creations.
- Difficult to separate earnings from value creation for products which rely on investment margins, can lead to muddled strategy and the sacrifice of value for earnings.

### ➤ **General principles which guide the “rules of the game”:**

- Have a clear strategy and build differentiated skills for each of the protection, asset management and guaranteed product segments;
- Remain brutally objective and value-oriented when deciding how to participate in the savings and retirement profit pool, balancing asset management and guaranteed products;
- For long-term, capital intensive products, focus on capital investment and cash generation, not earnings;
- Manage the in-force book of business, ensuring that the returns expected at the time of sale actually emerge.

### ➤ **Focus on capital and cash, not on earnings:**

- Heavy investment (acquisition expense, capital strain), long lock-in periods with earnings emerging years / decades later, all dependent on assumptions.
- “We believe that static earnings analysis is of limited use in differentiating (between insurers). Looking at multiples of free cash flow generated is more useful... based on ‘Three Cs’ – cash flow, capex and capital flexibility. We prefer composites that i) generate strong cash flow, after deducting ‘maintenance capex’, ii) have high growth capex that supports future earnings and iii) have high levels of surplus cash generation, driving financial flexibility and the ability to redeploy capital for growth”.

Morgan Stanley (2011)

- “Investors have the right to understand how the capital being generated is spent each year. In principle, we are supportive of investment in new business provided the business being written is generating adequate returns, i.e. IRRs above the company’s cost of capital and with reasonable payback periods. As a way of example, writing business at or sub 9% IRRs which takes 9 years to break even...is not a viable source of value for shareholders, in our view.”

Barclays (2011)

# Principles and core skills required

## LH New Business RAPM and core skills

☑ Core skills

	New Business EP				Investment EP
	Growth	Operating Efficiency	Underwriting Effectiveness	Capital Efficiency	Financial Market Alpha
Protection Asset Mgmt Guaranteed	☑ ☑ ☑	☑ ☑ ☑	☑	☑  ☑	☑
KPIs	• Premium growth	• Expense ratio (discounted)	• Loss Ratio (discounted) • Economic Capital Intensity	• Capital Efficiency Ratio	• Investment alpha

# Rules of the Game for LH Insurers

## 1. Focus on risk-adjusted, profitable growth

- *Grow the new business top-line* through strong sales & distribution;
- Have a *clear strategy for tapping the savings and retirement profit pool*:
  - Set the primary focus on “capital light” asset management and protection products;
  - Offer limited “capital intensive” guaranteed products, and then only if designed and priced to be actually hedged.
- *Convert new business top-line into attractive risk-adjusted returns*
  - Ensure positive LH New Business EP;
  - Reduce economic capital intensity and payback periods, putting more focus on the cash investment requirements and future cash generation;
  - Develop *underwriting excellence* for protection products;
  - Drive lower costs through *operating efficiency* for all products.

## 2. Manage the *back-book* so that the profits expected to emerge at time of sale actually do emerge

- Rigorously match “capital intensive” guaranteed products to lock-in a stable profit margins promised at the time of underwriting;
- Ensure that the crediting strategy is optimal from a shareholder’s perspective and represented accurately when considering new business profitability.

## 3. Manage your capital

- Make the sources of capital generation and investment transparent to shareholders and management, applying a return on capital perspective rigorously
- Invest as much free capital as possible in profitable organic or inorganic growth, returning any remaining capital to shareholders

# Valuing a LH Insurer – Using MCEV information

## Step 1: Determine the current Market Value Surplus (MVS) of the LH insurer

Embedded value reporting	Generic adjustments
+ MCEV	
+ adjustments to MCEV	<p>Remove non-economic elements of MCEV, e.g. the impact of the</p> <ul style="list-style-type: none"> <li>• Illiquidity Premium, Volatility Adjuster or Matching Adjustment based on published sensitivities</li> <li>• Yield curve anchoring to an Ultimate Forward Rate based on published sensitivities</li> </ul>
= Market Value Surplus	

## Step 2: Determine the normalized value of new business for next period

New Business Economic Profit	Generic adjustments
+ VNB	<p>As the Sidebar later in the Chapter illustrates, reported MCEV Value of New Business (VNB) will be “close” to LH New Business Economic Profit, with the only differences being in</p> <ul style="list-style-type: none"> <li>• Non-economic assumptions, which can be material</li> <li>• The frictional cost of non-hedgable risk, which is less material</li> </ul>
+ Adjustments to VNB	<p>Remove non-economic elements impacting VNB</p> <ul style="list-style-type: none"> <li>• Illiquidity Premium, Volatility Adjuster or Matching Adjustment based on published sensitivities</li> <li>• Yield curve anchoring to an Ultimate Forward Rate based on published sensitivities</li> <li>• Less critical, the Frictional cost of required capital (FCReC)</li> </ul> <p>Normalize historic reported VNB</p> <ul style="list-style-type: none"> <li>• Adjust NBM to reflect expected levels under current market conditions, including the effects of any re-pricing or product changes;</li> <li>• Adjust for predictable changes in product and geographic mix</li> </ul>
= adjusted LH.EP	

## Step 3: Project VNB into the future and discount to today

➤ Steady state: 
$$Franchise\ Value = \frac{adjLH.EP}{CoC - g}$$

➤ Non-steady state: 
$$Franchise\ Value = \sum_{t=1}^T \frac{adjLH.EP_t}{(1 + CoC)^t} + \frac{1}{(1 + CoC)^{T+1}} \frac{adjLH.EP_T}{CoC - g}$$

# Valuing a LH Insurer – Using accounting information

## Three Steps:

1. Define the valuation basis
2. Determine the normalized excess returns
3. Project excess returns into the future and discount to today

	Total Portfolio	Guaranteed Products	Protection & Health Products	Unit linked w/o Guarantee
<b>1) Attributed capital</b>				
<b>2) Normalized excess returns</b>				
+ Loadings & fees			Adjust for changes in product pricing and mix, predictable expense improvements, etc.	
+ Technical margins				
+ Investment margin				
- Expenses				
= <b>Operating profit before DAC</b>				
+ Change in DAC				
= <b>Operating profit</b>				
- Taxes				
= <b>Net operating income</b>				
- <b>Cost of Capital</b>				
= <b>Normalized excess returns</b>				
<b>3) Implied multiple</b>				
Growth				
Cost of capital				
<b>PV excess book returns</b>				

➤ **Steady state:**  $AdditionalValue = \frac{ExcessReturns}{CoC - g}$

➤ **Non-steady state:**

$$AdditionalValue = \sum_{t=1}^T \frac{ExcessReturns_t}{(1 + CoC)^t} + \frac{1}{(1 + CoC)^{T+1}} \frac{ExcessReturns_T}{CoC - g}$$

This can be converted into a theoretical market to book value (or embedded value) ratio using the following formula,

$$\frac{M}{BV} = \frac{BV + AdditionalValue}{BV}$$

# Technical earnings, capital and value

## Technical VNB / NBM

Technical.VNB =

$$E^Q \left[ \sum_{t=0}^T \left( \frac{P_t - E_t - CL_t + r_{f,t} C^{uw}_t}{\prod_{j=0}^t (1 + r_{f,t})} \right) - \sum_{t=0}^T \left( \frac{C^{uw}_t}{\prod_{j=0}^t (1 + r_{f,t})} \right) CoC^{uw} \right]$$

Technical.NBM =

$$Technical.VNB / E^Q \left[ \sum_{t=0}^T \left( \frac{P_t}{\prod_{j=0}^t (1 + r_{f,t})} \right) \right]$$

## Technical RAPM reflecting ECI

Technical.RAPM =

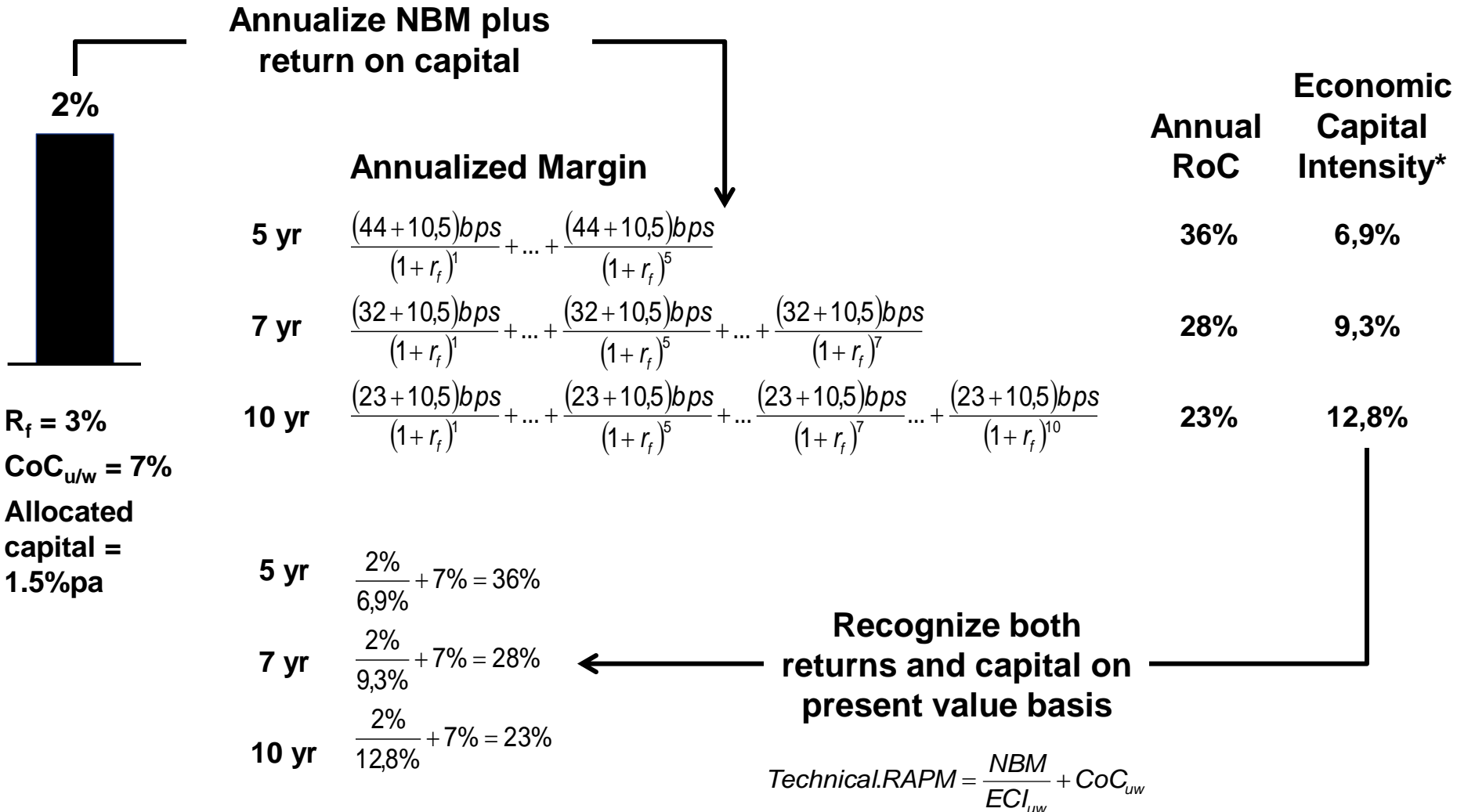
$$\frac{E^Q \left[ \sum_{t=0}^T \left( \frac{P_t - E_t - CL_t + r_{f,t} C^{uw}_t}{\prod_{j=0}^t (1 + r_{f,t})} \right) \right]}{E^Q \left[ \sum_{t=0}^T \left( \frac{C^{uw}_t}{\prod_{j=0}^t (1 + r_{f,t})} \right) \right]} \geq CoC^{uw}$$

Technical.ECI =

$$E^Q \left[ \sum_{t=0}^T \left( \frac{C^{uw}_t}{\prod_{j=0}^t (1 + r_{f,t})} \right) \right] / E^Q \left[ \sum_{t=0}^T \left( \frac{P_t}{\prod_{j=0}^t (1 + r_{f,t})} \right) \right]$$

$$Technical.RAPM = \frac{Technical.NBM}{Technical.ECI^{uw}} + CoC^{uw}$$

# NBM vs LH New Business RAPM – Unit Linked Product





# On the importance of Real World Earnings

<b>2014 Allianz MCEV Analysis of Earnings</b>	
<b>Adj. opening value</b>	31,364
<b>VNB at point of sale</b>	1,378
<b>Existing business contribution</b>	2,308
<i>At reference rate</i>	958
<i>Excess of reference rate</i>	1,350
<b>Operating variances</b>	172
<b>Operating MCEV Earnings</b>	3,859
<b>Economic variances</b>	-5,847
<b>Other non-operating</b>	-708
<b>Total MCEV earnings</b>	-2,696
<b>Net capital / dividends</b>	-1,872
<b>Closing value</b>	26,796

Source: Allianz 2014 MCEV Report

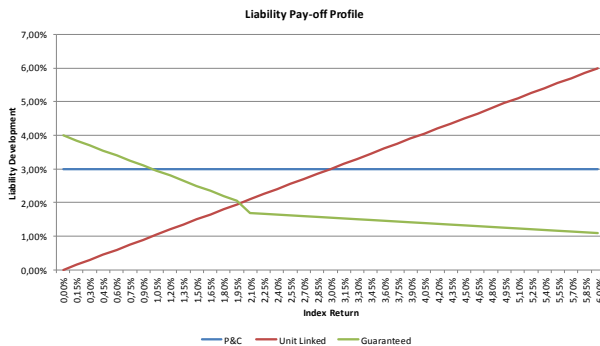
# Real world earnings, capital and value

## Real World VNB

$$\text{Total.VNB} = \text{Technical.VNB} + \text{InvestmentVNB}$$

InvestmentVNB =

$$\left[ \begin{array}{l} + (\bar{r}^A - \bar{r}^R) \\ - \frac{\partial L}{\partial r} \Big|_{r^R} (\bar{r}^A - \bar{r}^R) \\ - \frac{1}{2} \frac{\partial^2 L}{\partial r^2} \Big|_{r^R} (\sigma_{wr}^2 - \sigma_{w^Rr}^2 + (w\bar{r} - w^R\bar{r})) \\ - (\text{CoC}^m - r_f) C^m \end{array} \right] \Big/ (1 + \text{CoC}^m)$$



Sensitivities	Liability		
	Asset	"Delta"	"Gamma"
PC	1	0	0
UL	0	1	0
Guaranteed	1	-0,15	31,06576

$(\bar{r}^A - \bar{r}^R)$	Additional expected <u>asset</u> returns generated by deviating from the replicating portfolio where $\bar{r}^A$ is the expected return from the actual asset portfolio and $\bar{r}^R$ is the expected return from the risk free replicating portfolio.
$\frac{\partial L}{\partial r} \Big _{r^R} (\bar{r}^A - \bar{r}^R)$	Liability sensitivity or "delta" to additional expected returns generated by deviating from the replicating portfolio ("delta" = $\frac{\partial L}{\partial r} \Big _{r^R}$ ).
$\frac{1}{2} \frac{\partial^2 L}{\partial r^2} \Big _{r^R} (\sigma_{r^A}^2 - \sigma_{r^R}^2 + (\bar{r}^A - \bar{r}^R))$	Liability "convexity" adjustment for the value of guarantees from taking additional risk, measured in relative variances of the ("convexity" = $\frac{\partial^2 L}{\partial r^2} \Big _{r^R}$ ).
$(\text{CoC}^m - r_f) C^m$	The cost of capital to cover the additional financial market risks.

# On the appropriate cost of capital: Compensating for leverage and optimism

PC Investment VNB / RAPM

		<b>Capital requirement</b>				
		10%	15%	20%	25%	30%
		<b>Implied leverage</b>				
		10,00	6,67	5,00	4,00	3,33
<b>Expected return on notional investment</b>	<b>Levered return on notional investment</b>	<b>Levered return on capital</b>				
$E(R^m)$	$E(R^m)-r_f$	$[E(Rm)-rf]/C^m$				
5%	2%	20,0%	13,3%	10,0%	8,0%	6,7%
6%	3%	30,0%	20,0%	15,0%	12,0%	10,0%
7%	4%	40,0%	26,7%	20,0%	16,0%	13,3%
8%	5%	50,0%	33,3%	25,0%	20,0%	16,7%
9%	6%	60,0%	40,0%	30,0%	24,0%	20,0%
10%	7%	70,0%	46,7%	35,0%	28,0%	23,3%

# NBM vs LH Real World RAPM – Unit Linked with Guarantee, no alpha

Annualize NBM & Alpha, plus return on capital

NBM  
2%

„Alpha“

Annualized Margin  
First year contribution

Annual  
RoC

Economic  
Capital  
Intensity\*



$R_f = 3\%$   
 $CoC_{u/w} = 7\%$   
 Allocated capital = 1.5% pa

$CoC_m = 7\%$   
 Allocated capital = 5% pa

	Total	From U/W	From Invest
5 yr	$\frac{99,5bps}{(1+r_f)^1}$	$\left[ \frac{(44+10,5)bps}{(1+r_f)^1} \right]$	$\left[ \frac{(0+35)bps}{(1+r_f)^1} \right]$
7 yr	$\frac{77,5bps}{(1+r_f)^1}$	$\left[ \frac{(32+10,5)bps}{(1+r_f)^1} \right]$	$\left[ \frac{(0+35)bps}{(1+r_f)^1} \right]$
10 yr	$\frac{68,5bps}{(1+r_f)^1}$	$\left[ \frac{(23+10,5)bps}{(1+r_f)^1} \right]$	$\left[ \frac{(0+35)bps}{(1+r_f)^1} \right]$

Total	U/W	Invest
14%	36%	7%
12%	28%	7%
11%	23%	7%

Total	U/W	Invest
30%	7%	23%
41%	9%	31%
55%	13%	43%

5 yr  $\frac{2\%}{30\%} + 7\% = 14\%$

7 yr  $\frac{2\%}{41\%} + 7\% = 12\%$

10 yr  $\frac{2\%}{55\%} + 7\% = 11\%$

Recognize both returns and capital on present value basis

$$LH.InvestmentMargin.RAPM = \frac{NBM_{u/w} + NBM_{alpha}}{ECI_{combined}} + CoC_{Combined}$$

$$ECI_{combined} = \phi C_{combined} \sum \frac{1}{(1+r_f)^t}$$

\* Alpha = excess investment returns above the risk-appropriate benchmark / cost of capital  
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# NBM vs LH Investment Margin RAPM – Unit Linked with Guarantee, with alpha

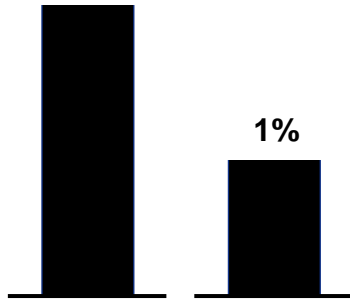
Annualize NBM & Alpha, plus return on capital

NBM 2% „Alpha“ 1%

Annualized Margin First year contribution

Annual RoC

Economic Capital Intensity\*



	Total	From U/W	From Invest
5 yr	$\frac{121,5bps}{(1+r_f)^1}$	$\left[ \frac{(44+10,5)bps}{(1+r_f)^1} \right]$	$\left[ \frac{(22+35)bps}{(1+r_f)^1} \right]$
7 yr	$\frac{93,5bps}{(1+r_f)^1}$	$\left[ \frac{(32+10,5)bps}{(1+r_f)^1} \right]$	$\left[ \frac{(16+35)bps}{(1+r_f)^1} \right]$
10 yr	$\frac{80,5bps}{(1+r_f)^1}$	$\left[ \frac{(23+10,5)bps}{(1+r_f)^1} \right]$	$\left[ \frac{(12+35)bps}{(1+r_f)^1} \right]$

Total	U/W	Invest
17%	36%	11%
14%	28%	10%
12%	23%	9%

Total	U/W	Invest
30%	7%	23%
41%	9%	31%
55%	13%	43%

$R_f = 3\%$   
 $CoC_{u/w} = 7\%$   
 Allocated capital = 1.5% pa

„Alpha“  
 $CoC_m = 7\%$   
 Allocated capital = 5% pa

5 yr  $\frac{3\%}{30\%} + 7\% = 17\%$

7 yr  $\frac{3\%}{41\%} + 7\% = 14\%$

10 yr  $\frac{3\%}{55\%} + 7\% = 12\%$

Recognize both returns and capital on present value basis

$$LH.InvestmentMargin.RAPM = \frac{NBM_{u/w} + NBM_{alpha}}{ECI_{combined}} + CoC_{Combined}$$

$$ECI_{combined} = \phi c_{combined} \sum \frac{1}{(1+r_f)^t}$$

\* Alpha = excess investment returns above the risk-appropriate benchmark / cost of capital

# LH Profitability indicators

Profitability Indicators	Description
<b>LH New Business RAPM</b>	<p>Represents the ratio between the present value of future profits from underwriting to the present value of capital tied up in the product where profits and capital are measured as if no financial market risk is taken. Represents the majority of earnings for protection and asset management products.</p> <p>This metric is preferred over NBM for protection and asset management products because it explicitly recognizes the capital intensity of the product. Under specific assumptions (described in earlier sidebar), LH New Business RAPM can be expressed as a function of MVEC-NBM, e.g.</p> $RAPM_{u/w} = \left( \frac{NBM}{ECI_{uw}} + CoC_{uw} \right)$
<b>LH Investment Margin RAPM</b>	<p>Represents the ratio between the present value of future profits from all sources to the present value of all capital tied up in the product, where profits and capital are measured including financial market risk is taken. Represents the majority of earnings and capital requirements for long-term, guaranteed retirement and savings products.</p> <p>This metric is preferred over NBM and New Business RAPM because it explicitly recognizes the capital intensity of the product, including the capital tied up in financial market risks (which are excluded from MCEV-NBMs and the LH New Business RAPM). Under specific assumptions (described in the earlier Sidebar), LH Investment Margin RAPM can be expressed as a function of NBM and the NBM “alpha” or financial market outperformance expected to be earned, e.g.</p> $RAPM_{combined} = \left( \frac{NBM_{u/w} + NBM_{alpha}}{ECI_{combined}} + CoC_{combined} \right)$
<b>MCEV New Business Margin (NBM)</b>	<p>Represents the ratio between the present value of future excess profits to shareholders (after deducting the cost of underwriting capital) divided by the present value of future premium, where profits are measured as if no financial market risk is taken. Represents the majority of earnings for protection and asset management products. It is a less useful measure for managing capital as it is broadly insensitive to the capital intensity of the product and substantially underrepresents the earnings and capital strain of guaranteed products which rely on financial market returns.</p>
<b>Internal Rate of Return (IRR)</b>	<p>A measure of the expected return on invested capital (including upfront capital and expense strain) under “real world” financial market assumptions. It does not reflect value creation unless an appropriate cost of financial market risk capital is used: in general, higher expected financial market returns will increase the IRR and also the appropriate cost of capital simultaneously; the appropriate cost of capital needs to be increased in lock step if the company does not create “alpha” and the benchmark returns can be replicated in the market by shareholders and investors directly.</p>
<b>Payback period</b>	<p>The expected time required to recoup the capital and expense strain of new business under real world return assumptions</p>
<b>Economic Capital Intensity ratio (ECI)</b>	<p>Used in RAPM, a measure of the initial capital and expense strain relative to the PVNBP. ECI is defined as the present value of all future capital requirements divided by the present value of new business premium, e.g.</p> $ECI = \frac{\sum C_t / (1 + r_f)^t}{\sum P_t / (1 + r_f)^t}$
<b>Investment intensity</b>	<p>Analysts occasionally calculate an intensity ratio based on public disclosures. For example, some analysts calculate the ratio of net investment (acquisition and capital strain) relative to premium or value, e.g.</p> $Intensity = \frac{Capital \& Expense Strain}{PVNBP} \text{ or } \frac{Capital \& Expense Strain}{VNB}$