

**The Actuarial Profession**  
making financial sense of the future

Life Conference 2011  
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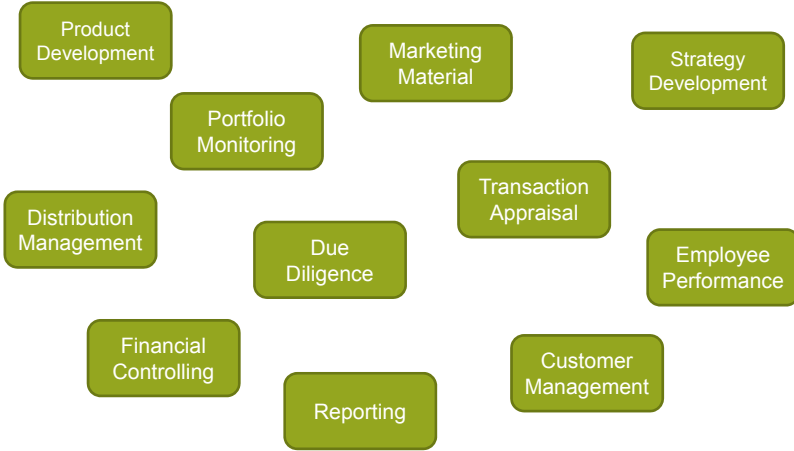
**Measure for Measure**  
Decision-Making in  
Life (Re)Insurance

21 November 2011

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**To Measure – What for?**



Source: PartnerRe

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## What makes a 'good' (Performance) Measure?

- **Adequacy**

Proper assessment of the transaction in the business context

## Adequacy

- Consideration of
  - Purpose of measurement
  - Characteristics of the transaction
  - Industry norms
  - Company context
  - Stakeholder interests



Source: PartnerRe

## What makes a 'good' (Performance) Measure?

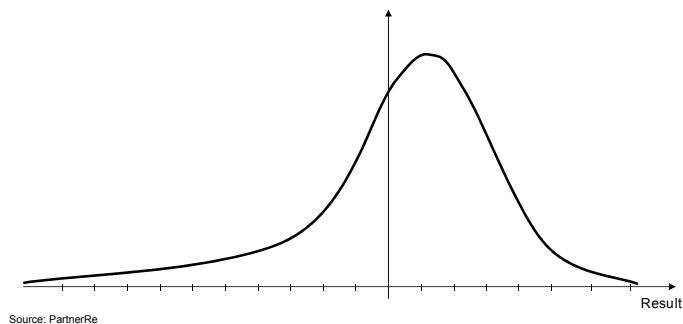
- **Adequacy**  
Proper assessment of the transaction in the business context
- **Comprehensiveness**  
'Information richness' of the measure

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## Comprehensiveness

- A transactions can be represented by its distribution of financial results
- A comprehensive measure captures a large amount of information about this distribution and its development over time.



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## What makes a 'good' (Performance) Measure?

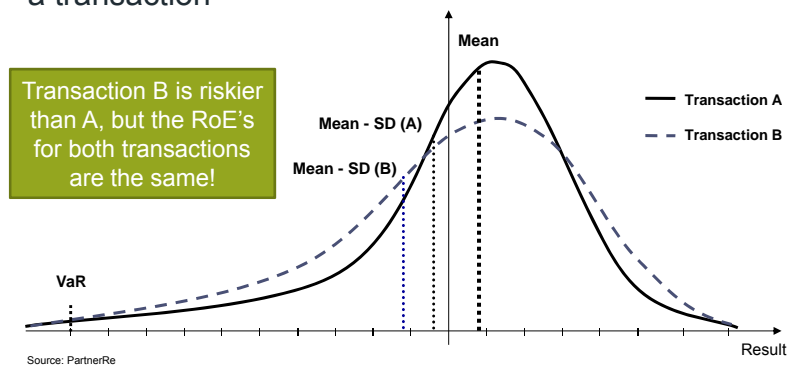
- **Adequacy**  
Proper assessment of the transaction in the business context
- **Comprehensiveness**  
'Information richness' of the measure
- **Consideration of Risk**  
Good reflection of the risk associated with a transaction

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## Consideration of Risk

- Often via risk-adjusted capital, but this is not necessarily the best way to reflect the riskiness of a transaction

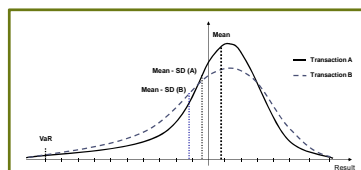


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## Consideration of Risk

- Often via risk-adjusted capital, but this is not necessarily the best way to reflect the riskiness of a transaction
- Other options:
  - Contingency margins
  - Differentiation of target rates
  - Risk-adjusted discounting
  - Transforms of distributions
  - Complementary risk measures



Source: PartnerRe

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## What makes a 'good' (Performance) Measure?

- **Adequacy**  
Proper assessment of the transaction in the business context
- **Comprehensiveness**  
'Information richness' of the measure
- **Consideration of Risk**  
Good reflection of the risk associated with a transaction
- **Applicability**  
Ease of implementation and interpretation

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## Applicability

- Implementation: Please consider complexity and robustness of calculation, availability of input data, ...
- Interpretation:
  - Not all stakeholders are equally important.
  - Explicit decision rule
  - Lessons from Behavioral Finance to be considered
    - Anchoring
    - Framing
    - Overconfidence
    - ...



Source: Mendelow

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## A Menu of Measures

- Payback Period
- Return on Revenues
- Return on Equity
- Net Present Value
- Internal Rate of Return
- Risk Coverage Ratio

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## Payback Period

- Aka Break Even Year
- Defined as first period when cumulated cash flow is non-negative
- Interpretation: How quickly is initial investment amortised?
- Rather indication of cash flow availability than performance
- More refined: Discounted PP

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## Payback Period

### When do I get my money back?

#### Adequacy

- Simplistic measure, should not be used on stand-alone basis
- Only suitable for transactions with constantly positive CF's after initial investment phase
- Useful for sanity checks and differing interest for lending and borrowing

#### Comprehensiveness

- Contains very little information about a transaction, e.g. no information about behaviour after amortisation
- Discounted PP takes time value of money into account

#### Risk Adjustment

- Prudence in calculation
- Different 'hurdle periods'
- Risk adjusted discounting for DPP
- RAC as initial investment?

#### Applicability

- Very easy to implement and to understand
- Decision Rule: Chose the transaction with shortest PP  
BUT: This rule can be completely misleading!

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## Return on Revenues

- Aka Profit Margin
- Defined as net profit divided by total revenues
- Interpretation: How much margin is in the transaction
- Operational definitions are critical
- Caution required if based on accounting terms  
(Cash is fact. Profit is opinion.)

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## Return on Revenues

### How much margin is in the deal?

#### Adequacy

- Needs to be modified to properly reflect long-term business
- Related measure in Non-life Reinsurance: Combined Ratio

#### Comprehensiveness

- Relatively unsophisticated measure
- Doesn't consider capital

#### Risk Adjustment

- Via hurdle rates and prudence in calculation
- Risk-adjusted discounting possible if modified for multi-year deals

#### Applicability

- Easy to calculate and to understand
- Robust measure
- Decision Rule: Chose the deal with the highest RoR above a certain hurdle rate

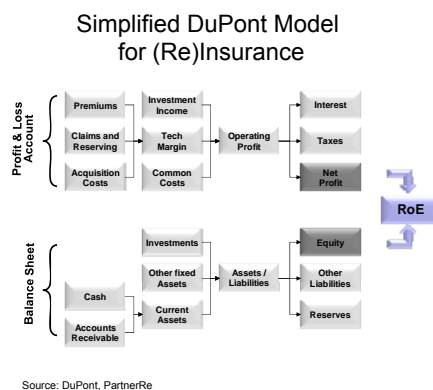
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## Return on Equity

- Aka RoC, RoRAC,...
- Defined as net profit divided by capital
- For long-term business PVI / PVC or time series of RoE's
- Relative profitability measure
- Operational definitions of profit and capital model critical



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## Return on Equity

### How hard does my money work?

#### Adequacy

- Designed for reporting and investment decision making
- Translates nicely into accounting language
- Needs to be modified for long-term business

#### Comprehensiveness

- Quite comprehensive
- Includes capital explicitly
- As relative profitability measure doesn't give an idea of volume (on a stand-alone basis)

#### Risk Adjustment

- All options available

#### Applicability

- Easy to understand (language of the CFO and investors)
- Decision Rule: Chose deals with highest RoE above Cost of Capital

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## Net Present Value

- Aka Value of new business, Embedded Value,...
- Defined as sum of discounted cash flows
- Measure of value creation in monetary units
- Extensive work towards market consistent calculation

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## Net Present Value

### How much is this deal worth?

#### Adequacy

- NPV concepts provide good reflection of long-term nature of life (re)insurance  
→ 'industry standard'

#### Comprehensiveness

- Comprehensive measure taking into account capital and time value of money

#### Risk Adjustment

- All options available

#### Applicability

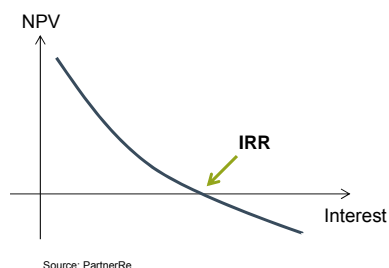
- Basic NPV easy to implement and to understand
- Market-consistent version much more complex (and volatile)
- Decision Rule: Chose deal with highest NPV above hurdle rate (zero if discounted at CoC)

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## Internal Rate of Return

- Aka yield to redemption
- Defined as level interest rate for which the NPV of CF is zero
- Proxy for 'average RoE' over lifetime of transaction
- Several theoretical issues associated with IRR
  - Multiple solutions
  - Reinvestment assumptions
  - Ranking of alternatives



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## Internal Rate of Return

Which interest rate makes the deal neutral?

### Adequacy

- Designed for assessment of long-term transactions

### Comprehensiveness

- Multiple period view
- Inclusion of capital as initial strain

### Risk Adjustment

- Prudence in assumption setting
- Hurdle rates
- RAC as initial 'investment'
- Not via risk-adjusted discounting

### Applicability

- Well established measure, relatively easy to implement and communicate
- Decision Rule: Chose deals with highest IRR above Cost of Capital  
BUT: IRR can rank mutually exclusive deals wrongly

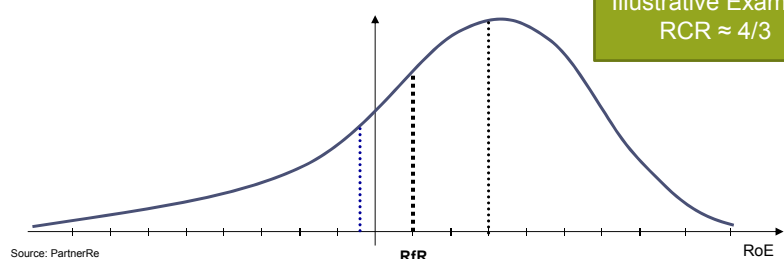
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## Risk Coverage Ratio

- Aka Return to Risk Ratio (R2R)
- Defined as 'Upside Potential' / 'Downside Risk'

$$RCR = \frac{E[RoE - RfR | RoE > RfR]}{E[RfR - RoE | RoE < RfR]}$$



Source: PartnerRe

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## Risk Coverage Ratio

What is my upside compared to the downside risk?

### Adequacy

- Sophisticated measure for risk-return profiles (resembling sharpe ratio)
- 'How often is my risk covered by my upside?'
- Needs to be adapted for multi-period transactions

### Comprehensiveness

- Provides information about whole distribution of outcomes in single measure

### Risk Adjustment

- Integrated risk assessment
- Relationship between RCR calculation and underlying capital model to be analysed

### Applicability

- Complex calculation, especially for long-term deals
- RCR has an intuitive meaning, but is it understood by decision-makers?
- Decision Rule: Chose deal with higher RCR above certain hurdle rate, but not per se clear what a suitable hurdle rate would be.

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## Summary

‘Some rise by sin, and some by virtue fall.’\*

	Adequacy	Comprehen- siveness	Risk Adjustment	Applicability
PP				
RoR				
RoE				
VNB				
IRR				
RCR				

Source: PartnerRe

No ‘one-size-fits-all’ measure

\* Shakespeare

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## Summary

‘Some rise by sin, and some by virtue fall.’\*

### Recommendations:

- Design a ‘Decision-Making Suite’ of measures that reflects the character of your business well
- Don’t neglect operational aspects
- Make sure it is well understood by the key stakeholders

	Adequacy	Comprehen- siveness	Risk Adjustment	Applicability
PP				
RoR				
RoE				
VNB				
IRR				
RCR				

Source: PartnerRe

\* Shakespeare

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## Questions or comments?

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The views expressed in this presentation are those of the presenter.

