

An Actuarial Approach to  
Enterprise Risk Management

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## Agenda

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- Why everyone is talking about Enterprise Risk Management (ERM)
- What is ERM
- ERM frameworks
- Actuarial skills and ERM skills
- Conclusion

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## The current interest in ERM

- Increased market volatility
- The global financial crisis...
- ...and its causes...
- ...although risk management frameworks were in place
- New frameworks

金融市場の不安定化 ⇒

export inflation (米 → 中国)

securitization

CMO = (credit risk ⇒ market risk)

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regulation

people risk.

liquidity risk.

## What is risk?

- First, need to think about risk
  - Not just uncertainty...
  - ...but the possibility of an adverse outcome
- There are also different types of risk
  - Events that have already happened, but where the outcome is unknown
  - Events that might happen in the future that are known about
  - Potential events that have not yet been identified
  - Events that cannot be quantified
- But ERM goes a little further

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## What is ERM?

- No single, agreed definition
- Common features
  - All risks assessed and modelled on a consistent, holistic basis
  - Concentrations and diversifications of risk allowed for
  - Presence of a central risk function (and chief risk officer)
- Central view also key
  - Ensures risks are not missed completely
  - Ensures consistency
- Consistency important
  - Avoids over-/under-statement of risk...
  - ...which might lead to inefficient capital allocation

全体編

interaction

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## Three lines of defence

- Helpful way of thinking of ERM and the central risk function
- 1<sup>st</sup> line
  - Risk management within business units...
  - ...implying that risk management should be built into the way a firm does business
- 2<sup>nd</sup> line
  - The central risk function...
  - ...which pulls together risk information from all departments...
  - ...giving consistent overview
- 3<sup>rd</sup> line
  - Internal and external audit...
  - ...which gives an *ex post* check on the effectiveness of systems

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## How do ERM and RM differ?

- The key difference is in the aggregation of risks...
  - ...rather than the assessment of individual risks
  - This requires a range of different skills
    - An ability to deal with the complex mathematics involved
    - A willingness to deal with unquantifiable risks
    - A familiarity with the nature of the risks being aggregated
- } Actuarial skills?
- This last point means that CROs cannot be "parachuted" into industries...
  - ...but must come up "through the ranks"

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## ERM Frameworks

- Useful way to look at the way ERM works in practice
  - Three types of framework
    - Proprietary
    - Statutory
    - Advisory
- credit rating agencies.*  
*credit rating agencies*
- A generic framework – basically the common components in advisory frameworks – is worth looking at further

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## Components of a generic ERM framework

- Context
- Risk taxonomy
- Identification
- Quantification
- Measuring risk
- Risk appetite
- Responses to risk

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## Risk management context

- In what context is the risk being managed?
- **Internal issues**
  - How is the organisation structured?
  - How is the board structured?
  - What is the culture of the organisation...
  - ...and of the board?
- **External issues**
  - Culture
  - Industry
  - Political economic and regulatory environment

*Chairman*  
*Chief Executive*

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name risks. (riskの名前を挙げる)

### Risk taxonomy

- Important to have consistent set of definitions...
- ...in use **throughout** the organisation
- More important that definitions exist...
- ...than what those definitions are
- Important to avoid ambiguity...
- ...as this can allow risk to develop unchecked

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### Identifying risk

- Which risks exist...
- ...and which affect a particular organisation?
- A range of tools and techniques exist to identify risks
- Tools
  - SWOT analysis, check lists, prompt lists, taxonomy, trigger questions, case studies, process analysis...
- Techniques
  - Brainstorming, independent group analysis, surveys, gap analysis, Delphi technique, interviews, working groups
- Once identified, should be entered into a risk register

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## Quantification

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- ERM may involve quantifying underlying risks...
- ...or at least understanding their quantification...
- ...but the key addition is in the way in which risks are aggregated
- This involves
  - Multivariate distributions...
  - ...or (better) copulas ←
- Copulas allow the shape of individual distributions and the relationship between them to be separated
- **But as clever as the maths is, remember: it is just a model**
- Scenario analysis also useful

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## Risk measures

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- Copulas, models, etc can give a distribution of expected outcomes...
- ...but how does this translate to risk?
- Important to use the right measure for the right purpose
  - Volatility, VaR, CVaR...

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## Risk appetite

- So far we have worked out how much risk we are taking...
- ...but how much risk should we take?
- Risk appetite consists of two factors
  - Risk tolerance
  - Risk capacity
- Usually, risk appetite is the lower of the two

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## Responses to risk

- Usually presented as four options...
- ...but we do not need to "shoehorn" every solution into one of these boxes:
  - Reduce (e.g. diversification)
  - Remove (e.g. stop taking the risk)
  - Transfer (using capital market or non-capital market solutions)
  - Accept

*securitization*

*insurance*

*Accept ≠ ignore*

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## Conclusion

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- The talk is entitled "an actuarial approach to ERM"...
- ...but we have looked at social science, finance, statistics...
- ...so what makes the approach discussed actuarial?
- I would argue that it is the fact that it is so broad ranging...
- ...and encompasses many disciplines...
- ...including professional oversight
- Actuaries are not the only ones that can manage risk...
- ...but something that uses such a diverse range of skills sounds, to me, actuarial

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