Enterprise Risk Management

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Presentation at Queen's University, Belfast

25 February 2014

Enterprise Risk Management

- What is Enterprise Risk Management (ERM)?
- ERM within Solvency II and other regulatory regimes
- Resources for those studying or applying ERM
- Actuaries, ERM and CERA

Malcolm Kemp

- Elected to IFoA Council in 2009. Ex-chair of its ERM PEC / Board
- 2009-now: Managing Director, Nematrian, and Adjunct Professor, Imperial College Business School where he teaches ERM
- 1996-2009: Head of Quantitative Research, Threadneedle Asset Management
  - Responsible for Threadneedle's derivatives, investment risk management, performance measurement, LDI and other quantitative investment activities. Director of two of Threadneedle's hedge funds and of its insurance subsidiary, Threadneedle Pensions Limited (TPEN)
  - Still Actuarial Function Holder of TPEN (and now AFH of Mobius Life)
- Before 1996: Partner in investment practice of Bacon & Woodrow

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Definition of ERM

- Lam (2003) defines ERM as:
  - "*ERM is all about integration: ... an integrated risk organisation; ... the integration of risk transfer strategies; ... the integration of risk management into the business processes of a company*"
- Kemp and Patel (2011) define ERM as:
  - *A framework, using risk as the core building block, to enable key business decisions to be aligned with inherent risk. Involves holistic ('enterprise'-wide, i.e. 'entity'-wide) management of risk and (usually) management of business/portfolio as an 'enterprise'*
- Sweeting (2011) indicates:
  - Key concept is "*the management of all risks on a holistic basis, not just individual management of each risk*"

Definition of ERM in flowchart form

- COSO (2004): "*Enterprise risk management is a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within the risk appetite, to provide reasonable assurance regarding achievement of entity objectives*"

Adapted from Chapman (2006)

Differentiators / key enablers vs. other types of RM

Differentiators

- Considers all risks
- Applied across whole business
- Risk embedded into decision-making processes

Key enablers

- Commitment and leadership from the top
- Risk owned by business
- Supporting risk management function
- Effective communication to all stakeholders of how risk is managed

ERM is about upside as well as downside

- *Enterprise* in ERM has two potential connotations:
  - Holistic ('enterprise'-wide, i.e. 'entity'-wide) management of risk
  - Management of business/portfolio as an 'enterprise' (for profit)
- Usually both, particularly for management consultants!
- But not all entities are 'for profit'. Concepts may then need adapting
  - See e.g. Kemp and Patel (2011) *ERM for pension funds*, since DB pension funds do not exist solely to make money for shareholders

Upside versus downside: the risk management team

- ERM implementation usually includes establishment of a centralised risk management function (employing risk managers)
  - E.g. Walker Review (2010), financial services firms
- Should this team be:
  - Front line – helping to decide which risks to take/hedge?
  - Second line – helping others to manage risk, focusing more on downside and maybe on risks that are not well captured/handled by customer-facing business units?

ERM and corporate governance

- Risk benefits or harms different *stakeholders* differently
  - Traders may benefit more from upside risk than they suffer from downside risk
  - Equity-holders often have limited liability and debt holders and/or regulators/governments/industry wide protection arrangements may lose if firm suffers large losses
- Often focus is on *principals* trying to control *agents* ('agency problems')
  - Non-academic way of describing these issues is corporate governance, e.g. Cadbury report: "*corporate governance is the system by which businesses are directed and controlled*"
  - Financial firms typically consist of hierarchies of such delegations, from shareholders to managers to dealers etc. whose interests may be misaligned
  - ERM disciplines are an essential part of mitigating agency risk

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ERM within Solvency II and other regulatory regimes

- Modern regulatory frameworks typically have 3 components or ‘Pillars’ (e.g. Basel II/III, Solvency II, proposed IORP Directive, UK insurance regulatory approach, …)

  Pillar 1: Minimum (regulatory) capital requirements

  Pillar 2: Supervisory review process – *regulators* (*supervisors*) review how *firms* themselves assess they have adequate capital

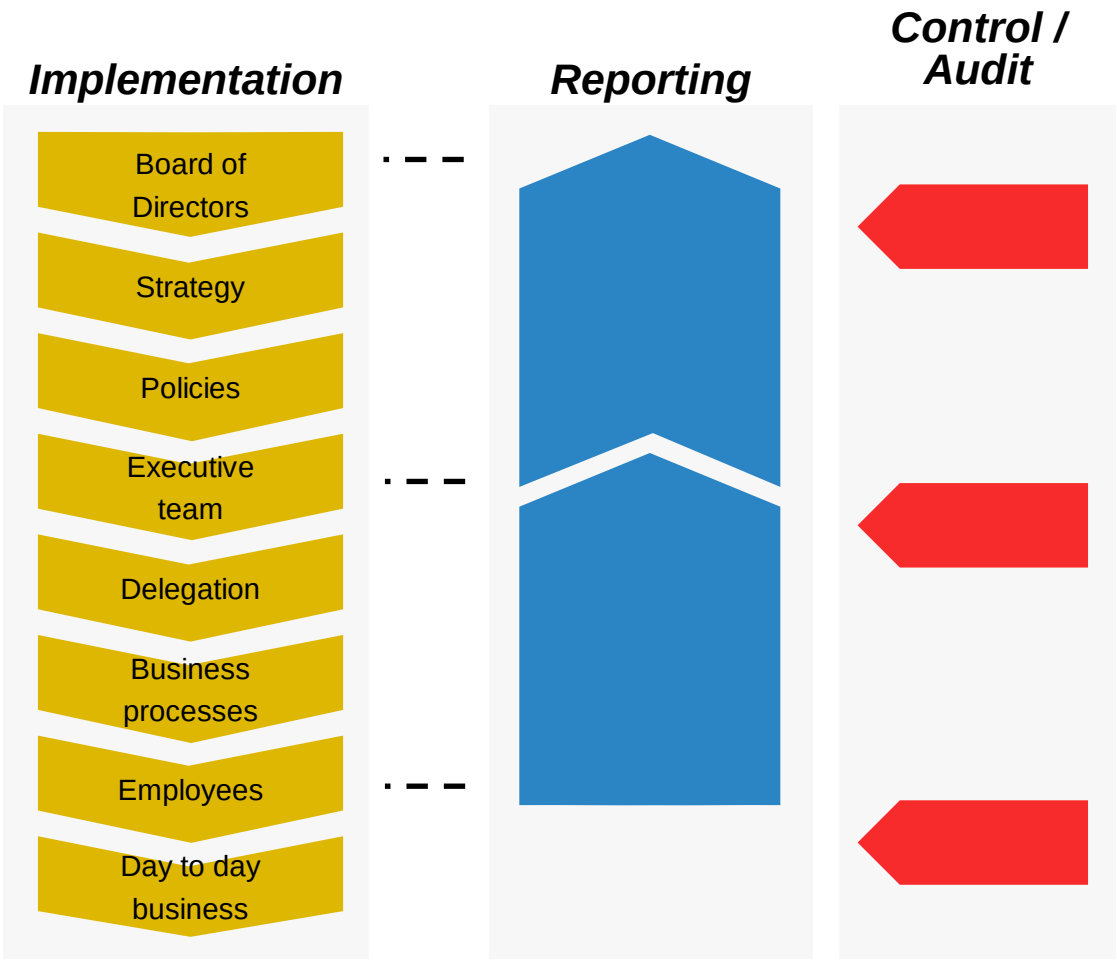
  Pillar 3: Market discipline – firms have to disclose information on (amongst other things) adequacy of their capitalisation

Solvency II and the ORSA

- Solvency II is “not just about risk measurement and quantification, rather it is about effective governance and risk management” (source: CEIOPS)
- Its Pillar 2 focuses on:
  - Supervisory authorities – how they should review companies they supervise
  - Own Risk and Solvency Assessment (ORSA) and other governance elements
- ORSA: aims to ensure that undertakings identify and assess all risks that they are (or could be) exposed to, maintain sufficient capital to face these risks, and develop and better use risk management techniques in monitoring and managing these risks

ORSA – starts from the top

- Firm needs:
  - Adequate capital
  - Employees ‘fit’ to carry out its business activities
  - A process for achieving a complete and holistic risk understanding of the business
- An ideal ORSA connects full risk picture with governance and internal control system



ORSA (according to Gabriel Bernardino)

- Are people running the firm using common sense and prudence?
  - Do they have a comprehensive overview of firm's risks and solvency needs?
- The ORSA should be key for all persons effectively running the firm
- It is an ongoing task that includes:
  - Keeping the persons effectively running the firm aware of the impact of own risks on overall solvency needs at all times
  - Identifying strengths and weaknesses in governance and organisation
  - Facilitating decisions on how mitigate risks by capital, reinsurance, organisational actions and other risk mitigating activities

The ORSA

- **Is** a process for an overall and holistic risk understanding, viewed from the management and/or supervisory body
- **Provides** a comprehensive picture of the firm's risks
- **Gives** the supervisor insight into the level of quality of the management's and Board's risk understanding
- **Links** the risk picture with the firm's risk management system and internal control system
- **Captures** risks before they are quantifiable
- **Is** a process that should include unquantifiable knowledge about risks (so should not focus just on risks that are quantifiable)

The ORSA

- **Is not** a new rules-based solvency calculation
- **Is not** a pre-defined process. The firm needs to develop its own (efficient) self-assessment process
- **Is not** a process (key function) which as a starting point can be outsourced
- **Is not** a process with one concrete number as output

ORSA inputs

- Risks based on the firm's business model and its assets and liabilities within a perspective of, say, 3 – 5 years, or that might emerge during this planning horizon e.g.:
  - Risks included in SCR
  - Insufficient capital for business needs
  - Loss of staff, utilisation of employees with wrong/low competencies
  - Poorly functioning systems, lack of control systems
  - Reputational risks
  - Risks arising from joint and several liability (e.g. via relationships with others) or off balance sheet guarantees
- Including risk that risk assessment ability might be inadequate

Possible ORSA outcomes could include

- Management actions for future scenarios
  - Developing risk awareness and contingency planning on a regular basis
- Assessment of overall solvency needs
  - In both quantitative and qualitative terms
- Review of applicability of existing SCR calculation methodology being used by the firm
- Review of business strategy / model and control and governance frameworks

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Resources for those studying or applying ERM

- Narrative material available (at low cost) from many sources, e.g.
  - Resources (and qualifications!) available from professional bodies, e.g. IFoA, PRMIA, IRM, …
  - Thought pieces produced by the above or by consultants
  - Regulators, e.g. guidance and/or consultation responses (EIOPA, EBA, ESMA, PRA, PRA, IAIS, …)
  - Books, articles, papers on many different ERM topics
  - IAA is considering developing an ERM Knowledge Base
- Relevant quantitative tools are more challenging to source (at low cost)
  - Risk measurement techniques span a wide range of quantitative discipline

Is (Enterprise) Risk Management quantitative or qualitative?

Quantitative?	Qualitative?
Risk measures, hedging, pricing, ...	Governance, culture, disciplines, policies, ...
Value-at-risk, TVaR, Probability of default, expected/unexpected loss, maximum loss, volatility, RAROC, economic capital, mathematical techniques	Risk appetite statements, risk challenge, misalignment of interests, Board engagement, risk capture and ranking, workshops, processes, ...

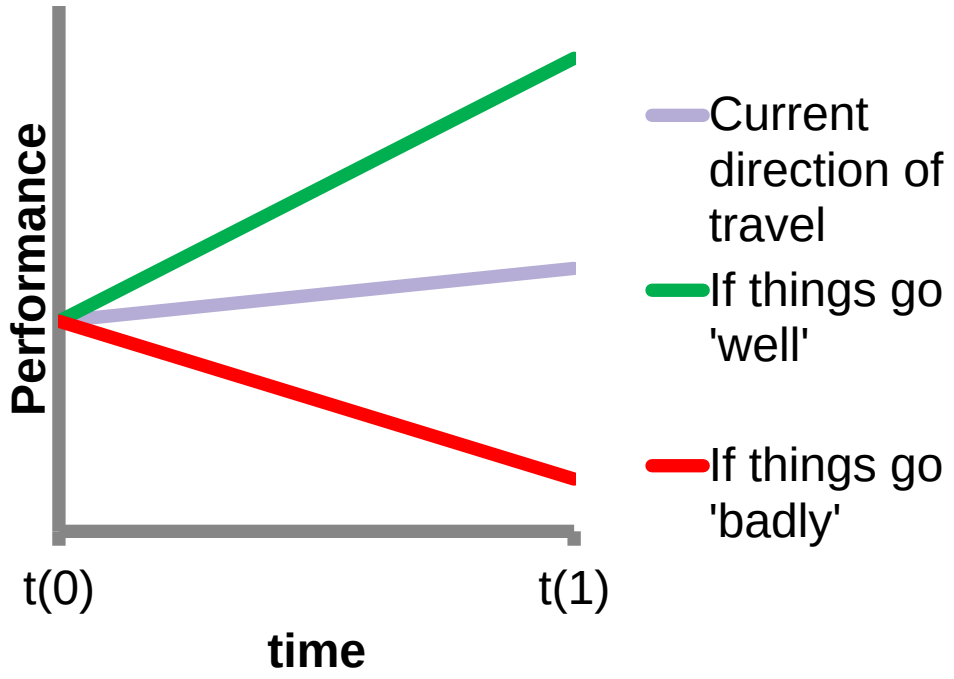
- Answer: both
- Maybe for actuaries the quantitative aspects could be relatively more important

What types of ‘risk’ are measurable?

- Some risks can be quantified, others cannot, usually shades of grey
- Firms with the best risk management disciplines/frameworks often use multiple models for valuation and risk purposes
- Knight (1921): *Risk, Uncertainty and Profit*
  - Explored role of entrepreneur, highlighted that some risks inherently uncertain
  - Incidentally viewed ‘actuarial’ methodologies as techniques for quantifying risk when it can be ‘intrinsically’ quantified (he wasn’t an actuary)
    - Either via law of averages or via valid comparability through time
    - Many business risks are not (fully) analysable in this manner!
    - C.f. known unknowns, unknown unknowns, black swans

Measuring risk: quantification typically needs

- A measure of ‘performance’
- A central value (mean, median)
- A range around this ‘expected value’ (the more extreme the outcomes being considered the wider the range)
- Mathematically this combination involves a *probability distribution*, highlighting that (quantitative) risk measurement has a strong statistical component



Risk quantification

- Problem can often be decomposed into two parts
  - *Likelihood* and *Impact*
- E.g. Default risk: *Loss Given Default* (LGD) x *Probability of Default* (PD)
- Impact might only be quantifiable in a relatively imprecise manner
- Likewise occurrence probabilities might only be assessable approximately
  - Or might be defined in this manner to make the analysis simpler for boards / senior management / others to understand
  - Particularly if outcomes only loosely quantifiable

Imprecise impacts, e.g.

Business objective	Event impact description	5 Worst Case	4 Severe	3 Major	2 Moderate	1 Minor
Financial	Net income shortfall (after tax in one year	>$150m	$75m-$150m	$25m-$75m	$5m-$25m	<$5m
Reputation	Negative media attention, opinion leader and public criticism	International media attention; nearly unanimous public criticism	National media attention; most publicly critical	Provincial profile; several opinion publicly critical	Local profile	Letter to government or senior mgmt

Based on Hydro One case study, used in Imperial Advanced ERM Course

Imprecise occurrence likelihoods, e.g.

Score	Rating	Description
5	Virtually Certain	95% probability that event will occur in the next 5 years
4	Very Likely	75% probability that event will occur in the next 5 years
3	Even Odds	50% probability that event will occur in the next 5 years
2	Unlikely	25% probability that event will occur in the next 5 years
1	Remote	5% probability that event will occur in the next 5 years

Based on Hydro One case study, used in Imperial Advanced ERM Course

But other risks may be quantified more precisely

- E.g. to mitigate a risk we might buy a derivative or equivalent to hedge against it
- So a good understanding of (derivative) pricing theory, techniques and potential weaknesses can be very useful for ERM experts
- These and similar quantification skills may be particularly relevant for actuaries
  - What are the ‘unique selling points’ (USPs) of actuaries?

ERM resources available through the Nematrian website

- Narrative material
  - Abridged lecture slides coving most CERA syllabus topics
  - Relevant research articles, ERM glossary and other supporting material
  - Targeted custom searches of other relevant websites
- Quantitative tools
  - Online toolkit, currently free to use in moderation
  - c. 500+ functions covering many different quantitative areas including many relevant to risk measurement (e.g. c. 40 generic functions covering statistical aspects of c. 60 different probability distributions)
  - Accessible through spreadsheets, other programming environments, interactive forms and expression evaluation tools

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Actuaries, ERM and CERA

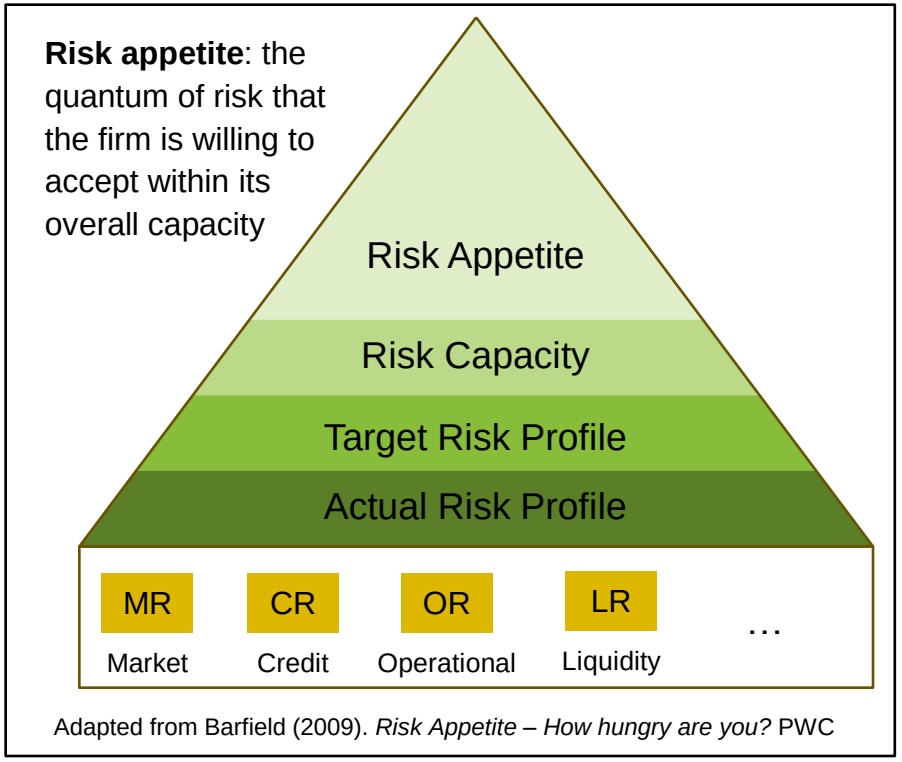
- Across the financial sector and across industry more generally:
  - Continued focus on improving risk management disciplines, e.g. Walker Review, fall out from 2007-09 credit crisis, Basel III, Solvency II, IORP II, Deepwater Horizon, …
- Nascent trend towards Actuarial Function Holder reporting to Chief Risk Officer?
- Actuarial response
  - Develop market and business aware actuaries, build brand recognition, facilitate networking, align internally around risk management, capture thought leadership
  - Roll out CERA designation in context of competition from other professional bodies
  - Align other aspects of actuarial training and CPD to needs of actuaries wishing to specialise in ERM?

CERA

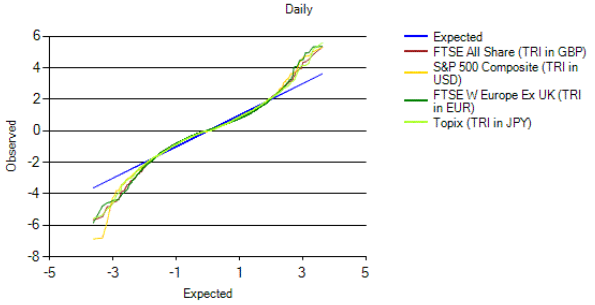
- Chartered Enterprise Risk Actuary / Analyst
  - Qualification provided by CERA Global, see http://ceraglobal.org
  - c. 2000 individuals across the globe have the CERA credential
  - The CERA Enterprise Risk Management credential "*is the most comprehensive and rigorous globally-recognised Enterprise Risk Management (ERM) designation and is supported by 13 member associations in 12 countries worldwide*".
  - The CERA credential "*combines a robust and forward-looking curriculum underpinned by actuarial science with a strong code of professional conduct and continuing professional development requirements, making it the most advanced and rigorous ERM credential in the world. Businesses that rely on CERAs can make smarter decisions based on sound analysis and understanding of their risks.*"
- IFoA qualified actuaries who have passed ST9 are eligible for CERA

Skills that are useful

- ERM is both **qualitative** and **quantitative**
  - Governance as well as modelling
  - Hence mixture of material on ERM on the www.nematrian.com website
- CERA emphasises 'higher-order' skills
  - Should help when interacting with senior management / Boards
- Most individuals in ERM space or above are not actuaries
  - Most are not very quantitative (nor are most actuaries versus outright quants)



Adapted from Barfield (2009). *Risk Appetite – How hungry are you?* PWC



Source: Nematrian

Advice for building a career in ERM

- Develop strong market / business awareness
- Be prepared to think laterally
- Remember ERM is qualitative as well as quantitative
- Seize opportunities and be entrepreneurial if you want to rise to the top
- Adjust expectations, plans, effort applied and career management, just as you would do if you were applying ERM in a business context
- Whatever role you are in, leverage your competitive advantage

Summary

- **ERM**: widely applicable across industry and finance (and society more widely)
- **Regulatory regimes**: increasingly focusing on risk management, e.g. ORSA within Solvency II
- **Resources**: have a look around the Nematrian website for further insights
- **Actuaries and ERM**
  - IFoA keen to support actuaries in this field
  - E.g. by promoting CERA
  - But you'll need to seize opportunities and be entrepreneurial if you want to rise to the top

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