Operational risk – A practical guide

Marcus Bowser
4 December 2006

Agenda

- What is operational risk?
- Why should we care about operational risk?
- How can we identify and measure our exposure to operational risks?
- How can it be mitigated - management actions, insurance or capital?
- How do we embed operational risk management into the business?

What is operational risk?

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What is operational risk?

BCBS defines operational risk as:

- "The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events"

PRU 1.2.32 defines operational risk as:

- "The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events"

It must be true!

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What is operational risk?

Some examples:

- Systems
- Processes
- People
- External

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What is operational risk?

Some examples:

- Systems
- Processes
- People
- External
- Interface risk
- Hardware/network risk
- Software risk
- Security risk

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What is operational risk?

Some examples:

- Systems
- Processes
- People
- External
- Data management risk
- Business management risk
- External relationship management risk
- Compliance and environment risk
- And hence misselling risks

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What is operational risk?

Some examples:

- Systems
- Processes
- People
- External
- Key person risk
- Skills/training risk
- Internal fraud/collusion risk
- Employment legislation risk
- Culture risk

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What is operational risk?

Some examples:

- Systems
- Processes
- People
- External
- Third party/outsourcing risk
- Physical asset risk
- Business disruption risk
- Infrastructure failure risk
- External fraud risk

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What is operational risk?

Some specific examples:

- Systems
- Processes
- People
- External

- My experience in the life industry
- Systems errors running into millions and even billions of pounds
- Material errors that nearly brought down the relevant institutions

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What is operational risk?

Some specific examples:

- Systems
- Processes
- People
- External

- Nick Leeson started by buying and selling futures pegged to the Nikkei 225
- Barings believed that it wasn't exposed because Nick Leeson claimed that he was executing purchase orders on behalf of a client
- Barings did not realise was that it was responsible for error account 88888, where Nick Leeson hid his losses

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What is operational risk?

Some specific examples:

- Systems
- Processes
- People
- External

- Barings fatal mistake was to allow Nick Leeson to remain Chief Trader while being responsible for settling his trades, a job that is usually split
- By the time that they realised that something was awry Nick Leeson had lost the bank £1.3b – more than the total capital of the bank
- Investors lost their savings and 1,200 employees lost their jobs

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What is operational risk?

Some specific examples:

- Systems
- Processes
- People
- External

- Robert Maxwell purchased British Printing Corporation in 1980 and renamed it Maxwell Communications Corporation
- He purchased Mirror Group Newspapers in 1984, but had to float the company in 1991 as the rest of the group was racing towards bankruptcy
- In order to keep the company afloat, Robert Maxwell had extracted funds from the company's pension scheme as part of an internal fraud not uncovered until after his death

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What is operational risk?

Some specific examples:

- Systems
- Processes
- People
- External

- Fraudulent claim on motor insurance policy for accidental damage
- Loss captured in the claims data
- September 11th, 2001
- Renewed focus on business continuity plans to minimise the cost to business from such external events

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Why should we care about operational risk?

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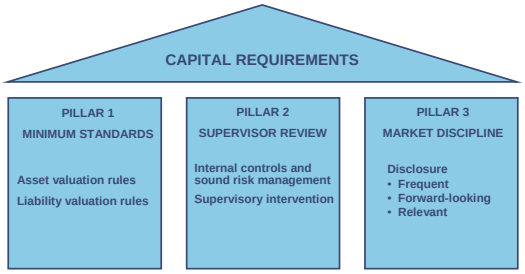
Why should we care about operational risk?



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Why should we care about operational risk?

Under Pillar II life insurers usually consider:

- Market risk
- Credit risk
- Insurance risk
- Operational risk
- Liquidity risk
- Group risk

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Why should we care about operational risk?

FSA Insurance Sector Briefing: ICAS – one year on:

- "Our assessment ... focuses on the processes the firm has used to derive its calculations."
- "We are looking for methodologies and models that are fit for purpose, and the appropriate involvement of management."

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Why should we care about operational risk?

FSA Insurance Sector Briefing: ICAS – one year on:

- "Operational risk poses one of the most difficult challenges in capital assessments,…, one of the least developed areas within firms' ICAs"
- Initially, 80% of ICGs for life offices included some guidance in respect of operational risk with a typical add on of 15% (on average)

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Why should we care about operational risk?

And as a percentage of capital?

- As low as 5% of the total capital requirement
- But possibly much higher

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Why should we care about operational risk?

And as a percentage of capital?

- As low as 5% of the total capital requirement
- But possibly much higher

In addition to the financial impact we should also consider:

- Reputational impact
- Regulatory impact
- Strategic impact

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Why should we care about operational risk?

Reasons to care:

- Regulatory pressure
- Significance of operational risks – fat tailed
- Ratings agencies
- Investor pressure
- Good management practice

Why should we care about operational risk?

Where do we use the analysis:

- Individual Capital Assessments
- European Embedded Value (in the risk discount rate)
- Rating agency assessments
- Experience investigations (so as to understand the operational loss component)
- Solvency II?

How can we identify and measure our exposure to operational risks?

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How can we identify and measure our exposure to operational risks?

At a high level there are two approaches:

- Bottom up approach
- Top down approach

How can we identify and measure our exposure to operational risks?

At a high level there are three approaches:

- Uplift factor approach
- Scenario analysis approach
- Historic loss data approach

- The final two can be considered bottom up approaches

How can we identify and measure our exposure to operational risks?

Uplift factor approach

- This approach involves scaling – eg 15% of capital for other risks employed
- Similar approaches based on scaling employed – eg 1.5% of total assets under management

How can we identify and measure our exposure to operational risks?

Historic loss data approach

- Obtain historic loss data – internal and external
- Fit distributions to the historic loss data
- Determine the aggregate loss distribution using Monte Carlo simulation
- Identify the 99.5th percentile (or other percentile) loss

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How can we identify and measure our exposure to operational risks?

But there are several pitfalls…

1. Most life offices have only recently started to collect historic loss data
2. Teething problems are to be expected
3. For example, there may be inconsistent reporting of losses and near misses
4. The full losses may not be captured
5. And the data is retrospective

But we can external data help?

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How can we identify and measure our exposure to operational risks?

Sources of external loss data

- ABI ORIC
- Fitch
- SAS
- BBA Gold

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How can we identify and measure our exposure to operational risks?

But there are still many pitfalls…

1. Most databases have only recently been established
2. Like in general insurance, there is a question regarding what is an appropriate exposure
3. There is a related issue regarding scalability
4. There is a question of applicability – could a reported loss actually happen to us?
5. The classification and granularity of the losses reported
6. The incompleteness of the data – eg unique losses
7. And again the data is retrospective

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How can we identify and measure our exposure to operational risks?

Scenario analysis approach – a four step approach

1. Obtain operational loss data – Collect internal and external loss data and collect scenario loss data
2. Select operational loss distributions – Fit distributions to the operational risks
3. Aggregate loss simulation – Determine the aggregate loss distribution using Monte Carlo simulation
4. Determine the capital requirement – Identify the 99.5^{th} percentile (or other percentile) loss and adjust for non-linearity and other approximations

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How can we identify and measure our exposure to operational risks?

Why might a scenario analysis approach better?

1. Addresses the lack of historical data
2. Forward looking and focused on day to day processes
3. Involves business experts responsible for those processes
4. And hence, is likely to achieve greater “buy in” from the business
5. Can be tied in with risk management’s current framework

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How can we identify and measure our exposure to operational risks?

But we must be aware of the pitfalls…

1. Likely bias to recent events
2. Possible gaming to present own business unit in a positive light or another business unit in a negative light
3. Potential double counting
4. Lack of experience

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Step 1 – Obtain operational loss data

Consider an example such as fire risk.

- Firstly obtain frequency of risk crystallisation
- We could ask an expert involved with business continuity planning how often fires are expected to occur – is it one every ten years or ten every year, for example?

Internal and external loss data may be able to inform decisions.

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Step 1 – Obtain operational loss data

Secondly obtain severity information

- We might then ask our expert “how bad could it be” type questions in order to understand the severity of the risks.

They might highlight that:

- the risk from a fire could be as minor as a small fire in a printer;
- the fire could involve moderate loss of information on someone’s internal hard drive;…; or
- the fire could involve severe destruction to the building and the implementation of the business’s business continuity plans.

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Step 1 – Obtain operational loss data

- We might then ask our expert "how much those scenario might cost" type questions in order to further understand the severity of the risks. They might highlight that:
- the risk from a fire could be as minor as a small fire in a printer **and cost around £500**;
- the fire could involve moderate loss of information on someone's internal hard drive **and cost around £10,000**;…; or
- the fire could involve severe destruction to the building and the implementation of the business's business continuity plans **and cost around £10,000,000**.

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Step 1 – Obtain operational loss data

- Finally, we might then ask our expert how many fires out of 1,000 are that severe with the total summing to 1,000. They might highlight that:
- **700 out of every 1,000** fires are minor such as a small fire in a printer;
- **200 out of every 1,000** fires are moderate such as the loss of information on someone's internal hard drive;…; or
- **1 out of every 1,000** fires are severe such as the destruction of the building and the implementation of the business's business continuity plans.

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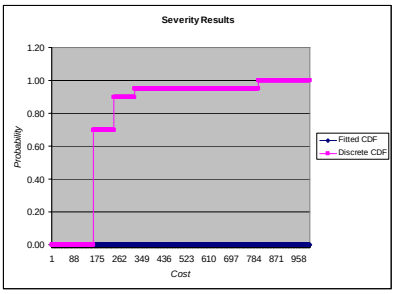
Step 1 – Obtain operational loss data



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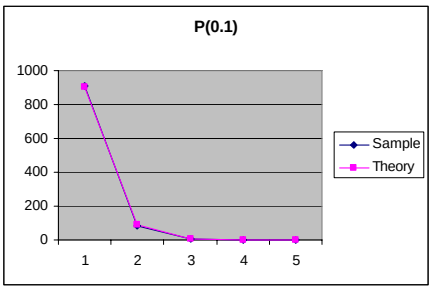
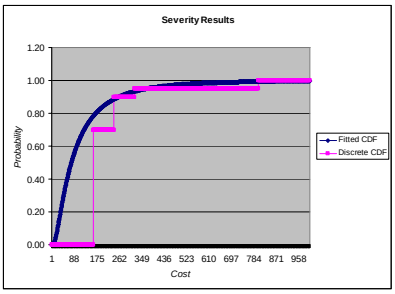
Step 2 – Select operational loss distributions

- With our frequency and severity loss data we can then fit distributions
- Discrete distributions such as the Poisson and Negative Binomial distributions could be employed for the frequency distribution
- Continuous distributions such as the Lognormal, Pareto and Weibull could be employed for the severity distribution

Step 2 – Select operational loss distributions



Step 2 – Select operational loss distributions



Step 3 – Aggregate loss simulation

- Use Monte Carlo simulation to aggregate the frequency and severity data

Example

- 50 (pseudo) operational risks
- 5,000 simulations
- Fitting of Poisson distribution to frequency
- Fitting of Lognormal distribution to severity

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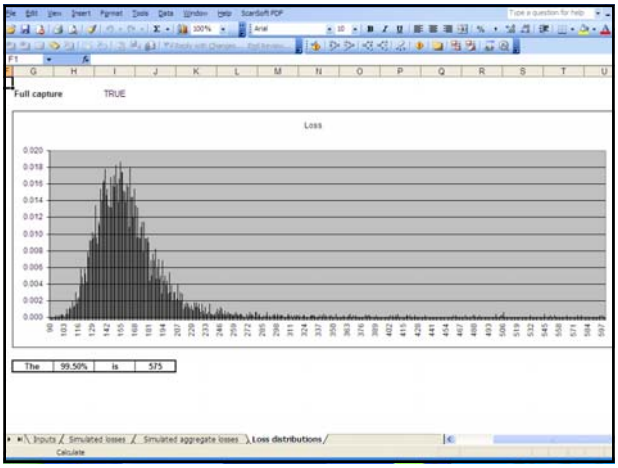

Step 4 – Determine the capital requirement

- Drill down into the results and analysis scenarios around the 99.5th percentile (or other percentile) loss
- Consider how the harshness of the aggregate scenarios compares with the scenarios derived from the top down approach
- Consider whether the aggregate scenarios may exhibit any non-linearity
- Consider whether the events exhibit any correlation and non-linearity with other non-operational risks

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Step 4 – Determine the capital requirement

Non-linearity

- 1 in 200 cost of market risk alone – £23m
- 1 in 200 cost of mortgage endowment complaints alone – £3m
- Cost of both market risk and mortgage endowment complaints combined – £40m

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Step 4 – Determine the capital requirement

- Finally, need to agree on any adjustments and set the operational risk capital requirement.

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How can we identify and measure our exposure to operational risks?

Top down approach

- This approach involves senior management assessing the key risks to the business
- Usually focuses on strategic risks as well as operational risks
- Usually involves focus on one particular event and its repercussions – eg outbreak of bird flu which increases claim rates on protection business, as well as reducing the available workforce and the reliability of service providers

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How can it be mitigated - management actions, insurance or capital?

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How can it be mitigated - management actions, insurance or capital?

Having identified the risks we can:

- Reinsure the risk – eg take out insurance in respect of damage to physical assets and business continuity risks
- Indemnify the risk – eg seek an indemnity from the seller of a block of business
- Transfer the risk – eg outsource operations
- Control the risk – eg enhance the framework of controls so as to reduce the number or severity of losses
- Put aside capital

How can it be mitigated - management actions, insurance or capital?

Generally, improving controls should lead to a reduction in capital

We could allow for controls by:

- Assessing both the inherent and residual risk (as above)
- Assessing the design and effectiveness of the controls
- Calculate a weighted average control score
- Calculate a weighted average operational loss

How do we embed operational risk management into the business?

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How do we embed operational risk management into the business?

- John Tiner – "the Board should not just be involved in sign-off of the ICA. Let me repeat that: the Board should not just be involved in sign-off of the ICA.

So how to embed?

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How do we embed operational risk management into the business?

Key points to consider are:

- Forward looking
- Business involvement
- Business buy in
- Consistent with risk management processes
- Significant senior management challenge at each stage of the process

But remember:

- You don't need to employ a best practice methodology – a simple approach may work just as well

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Further reading

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Further reading

Life working party paper
General working party paper
PwC operational risk quantification – ICBI Conference Geneva
PwC paper on Basel II AMA for operational risk