Introduction

• Working Party objectives
• What is model risk?
• Model risk versus other risks
• Model risk culture
• Model risk management framework
• Benefits for model owners
• Real life examples
• Opportunity for your views and comments
Working party objectives

- Raise industry awareness and understanding of model risk
- Develop framework for measurement and management of model risk
- Foster good practice around governance and control of models
- Final output to be delivered to an Institute Sessional Meeting in Q1 2015

Model risk

- What is a model?
- Risk of adverse consequences from decisions based on incorrect or misused model outputs and reports
- Can lead to financial loss, poor business and strategic decision making, or damage to reputation
- Two main causes:
  - Model has fundamental errors and produces inaccurate outputs
  - Model may be used incorrectly or inappropriately
Model risk

Model risk versus other risks

- Model risk should be managed like any other risk:

  Identify → Assess → Control

  Monitor → Report → Integration
Model risk versus other risks

- Specific attributes that make it challenging to manage:
  - Quantitative risk, but hard to quantify!
  - ‘Use’ risk is unique to model risk
  - Already build in prudence into calculations
  - All models are wrong, so focus should be on fitness for (original) purpose
  - Range of models in use, even within a single organisation
  - Needs to be tailored to the organisation
  - Cannot eliminate model risk

Model risk culture

Confidence / low concern for model uncertainty

Perceived low legitimacy of modelling

Expert decision makers

Uncertainty avoiders

Conscientious modellers

Perceived high legitimacy of modelling

Confident model users

Diffidence / high concern for model uncertainty
Model risk management framework

Ownership

- Owner - model developer or the model user?
- Risk own the framework, but model owners responsible for managing their model risks
- Formal governance around model risk:
  - Clear committee structure
  - Regular reporting on the model risk profile
  - Cross over between financial and operational aspects
Inventory

- Log all models
- Capture key information
  - Owner, use, materiality assessment, changes, etc
  - Model hierarchy and dependencies
- Maintain log
- Will immaterial models become material in future?

Risk appetite

- The amount and type of risk that an organisation is willing to take in order to meet their strategic objectives
- Articulate appetite statements or tolerances:
  - Cumulative model errors
  - Model developments
  - Outstanding validation reports
  - Internal audit issues
Materiality

- Should consider all models across the business
- Practical limit on number of models
- How sensitive are results?
- Do results influence decision-makers?
- Criteria depends on the model:
  - reserves, capital, price, assets, liabilities, sales, premiums, etc

Risks

Model Risk Sources

- Model Use
- Model Methodology
- Data Quality
- Expert Judgements
- External Models/Data
- Model Validation
- Model Documentation
- Model Risk Governance
- External Triggers
- Model Changes
Governance standards

- Model risk policy
- Documentation standards
- Data quality requirements
- Expert judgement process
- Validation requirements
- Model change process
- Model understanding

Reporting

- All model owners assess how managing risks / operating controls on periodic basis
- Reporting presented to model governance committee:
  - Model risk profile against appetite
  - Model inventory monitoring
  - Material model developments (made and planned)
  - Objective model validation outcomes
  - Management actions to address prior breaches
  - Emerging model risks
Benefits for model owners

- Documented processes – understood and carried out more quickly
- More confidence in the model results due to governance surrounding:
  - Model changes, validation, overall model risk governance.
- Model results better used by the business
- Differences between the model and the real world identified more easily
- Feedback loops lead to improvements

Case Study 1

- Myron Scholes and Robert Merton were principal shareholders
- Federal Reserve Bailout
- Banks and Pension funds invested in LTCM moved close to Bankruptcy
- Financial system collapse was imminent
- Spectacular annual returns of 42.8% in 1995 and 40.8% in 1996
- Took on leveraged positions at too-high risk levels
- Russia defaulted on its bonds
- The U.S. stock market dropped 20%, while European markets fell 35%

Russia defaulted on its bonds

LTCM had 'too much risk to be sustainable'
Source: Risk.net (August 17, 2017)
Case Study 1 - Risks

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- External Triggers
- Model Changes

Case Study 2

Franchise initially awarded to FirstGroup

Virgin commissioned a judicial review of the decision

Incorrect Economic Assumptions

Errors in Risk Evaluation

Errors Only discovered during investigation

Virgin commissioned a judicial review of the decision

£50m Cost to Tax Payers

Botched bidding process

Questions over senior management and their levels of understanding

Huge embarrassment for Department for Transport

Sources: Accounting & Finance (8.11.13)

Rail franchising: Excel error strikes again
Case Study 2 - Risks

- Model Changes
- Model Use
- Model Methodology
- Data Quality
- Expert Judgements
- Model Risk Governance
- Model Validation
- Model Documentation
- External Models/Data
- External Triggers
- Model Risk Sources

Case Study 3

- CIO breached 5 of its critical risk controls, more than 330 times
- Claimed the jobs of several top executives
- Prompted an inquiry by the FBI
- Had to restate its earnings to reflect the over estimates
- Racked up trading losses – which now total more than $6bn
- Managers pressured traders to lowball losses by $660bn
- Instead of scaling back the risk, JPM changed how it measured it, by changing its VaR metric in Jan 2012, enabling traders to continue building big bets
- CEO withheld information from regulators on Bank’s daily losses

JPMorgan Faulted on Controls and Disclosure in Trading Loss
Source: Deal Book (March 14, 2013)
Case Study 3 - Risks

Recap

- Working Party objectives
- What is model risk?
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- Model risk culture
- Model risk management framework
- Benefits for model owners
- Real life examples
Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

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