Ninth SFRA Colloquium, 21 April 2015

Conveying Information About Risk:
Use, Abuse and Misuse of Models

Colloquium Introduction

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Use, Abuse and Misuse of Models

- Models are indispensable tools for the communication of information about complex risks. But...

- George Box:

  all models are wrong, but some are useful.

- In financial risk management

  - good models *used wisely* shed light on the way the financial world functions;

  - bad models *used badly* deliver answers formulated in advance.

Questions and issues of interest

- How important are models for communicating information about risk?
- How should models outputs be communicated to users at different levels of an organisation?
- How are models embedded in risk management processes (use test)?
- Model risk and how to manage it
- The internal model validation process
- The regulatory model approval process
- Negative case studies for the misuse or abuse of models
- The ways in which models are misused to "game" risk controls

Aspects of Model Risk

Model risk $\Rightarrow$

- the risk of financial, reputational or other losses
- as a result of *decisions*
    - based on use of an "incorrect" model
    - having failed to acknowledge alternative models
    - based on inappropriate use of a model

Model Risk: the Statistical Perspective

- All models are wrong, but some are useful
- Model development requires many models to be tested and compared
- Acknowledging model risk means:
  - DO NOT base decisions solely on the "best" model
  - DO test decisions for robustness relative to choice of model
  - DO consider model averaging
  - DO carry out stress testing
- Beware of models that lack robustness
  - model (re)calibration
  - management decisions
- Don't forget *parameter uncertainty*

Aspects of Model Use: Operational Risk

- Model (mis)calibration
- Overconfidence in model + calibration
  $$\Rightarrow \text{ excessive leverage}$$
- Implementation errors (e.g. programming)
- Inadequate model validation process
- Inadequate model governance
- Inappropriate use of a model

Calibration

- Errors in calibration methodology
- What type of data?
  - Risk measurement $\Rightarrow$ historical data
  - Pricing $\Rightarrow$ current market price data
- How much data?
- How accurate is your data?
  - Mortality and population data
  - Financial data: e.g. LIBOR

Assumptions and Limitations: Communication

Model assumptions and limitations must be clearly communicated to users of model.

- Problem A: pricing and risk management for a simple product
  $\Rightarrow$ simple model A works well

- Problem B: a more complex product
  $\Rightarrow$ *model A might not be adequate*
  a more complex model B might be required

Hence: need constraints on model usage

Assumptions and Limitations: Communication

Risk:

Users mis-understand model and outputs leading to incorrect decisions.

Hence:

- Users need to understand a model and how to use its output
- Model owner needs to ensure users understand the model and its outputs

Negative case studies

Model abuse and misuse has arguably contributed to several financial disasters:

- Equitable Life
- LTCM
- Credit Crunch
- . . .

Summary

How to reduce operational and statistical model risks?

- Acknowledgement of other valid models
- Have you passed the use test?
- Strong model validation procedures
- Strong model governance framework
- Rigorous regulatory approval processes
- Strong programme of education and communication