

# Modelling Best Practices

October 2009

By Michael Rees  
[mrees@palisade.com](mailto:mrees@palisade.com)

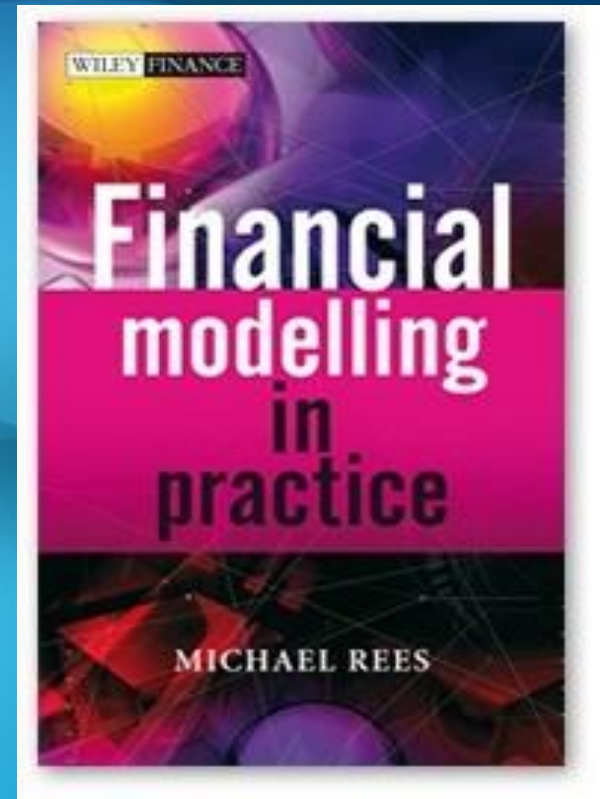
# Michael Rees

## Professional Experience

- » 20 years
  - Strategy consultant
  - Equity analyst
  - Independent consultant
- » Palisade Director of Training and Consulting

## Qualifications

- » B.A. in Mathematics and D.Phil. in Mathematical Modeling from Oxford
- » MBA from INSEAD
- » Certificate in Quantitative Finance
- » *Financial Modelling in Practice* (John Wiley & Sons, October) [see Wiley.com for free .pdf of Ch 1; without the models]



# The Two Schools of Everything

## Alan Greenspan

- » “I guess I should warn you ... if I turn out to be particularly clear ... you've probably misunderstood what I've said”

## Einstein

- » “Everything should be made as simple as possible, but no simpler”

# What is a good model?

- » Objectives-driven: Suitable for decision-making
  - Allows scenarios and sensitivities that align with “mind-set/thought-processes” of decision-makers
  - Appropriate logical flow (definition of outputs versus inputs!)
  - Appropriate level of detail: one that decision-makers relate to
- » Requires minimal time to understand
  - Clear logical flow (e.g. left-to-right, top-to-bottom)
  - Modular structure, and with input values separate to calculations
  - Compact (related items close together, total “audit path” through is minimized, as few worksheets as possible)
  - Use of formatting (borders, colours, bold, underline) to create transparency of structure and flow
  - Avoids unnecessary complexity (macros, circular references etc)
- » Error-free
  - Correct base level calculations/formulae
  - Correct calculations as inputs are varied
  - No unacceptable “implicit” assumptions

# Hot controversies

- » Circular references
- » Multiple worksheets (workbooks)
- » Named ranges
- » Global/local placement of inputs/modularity issues
- » Macros/user-defined functions

# Key Theme: “Sensitivity Analysis Thinking” (SAT)

- » Selection of appropriate variables
- » Appropriate level of model detail
- » Building robust formulae
- » Error-checking

# Using SAT to Build Robust Formulae and Error-checking

## Basic Methods

- » Robust formulae:
  - Test a “trial” formula through the full range of values, and modify as necessary
- » Error-checking:
  - Calculate same quantity in two or more ways
  - Build the difference as an error
  - Apply conditional format to highlight if non-zero
  - Sometimes, group these error cells together to get quick overview

## Using sensitivity analysis

- » Excel
  - Manual approach
  - DataTables
  - RANDs in place of fixed inputs
- » DTS
  - TopRank to quickly vary all relevant inputs individually
  - @RISK to vary input combinations

# @RISK Models: Robust ranges and relationships

## Distributions

- » See other talk!!!

## Relationships

- » Independence
- » Parameter dependence (semi-dependence)
- » Correlated sampling
- » Variations
  - Parameter linkage through lookup functions
  - Correlated time series
  - Contextual dependencies (e.g. continuous uncertainty within discrete scenarios)

# Summary

## Model Design

- » Objectives-driven:
  - Clear view of key decisions to be made, and their information and sensitivity-analysis requirements
  - “As simple as possible, but no simpler”
- » Designed around “sensitivity analysis thinking”
  - Selection of variables
  - Logical flow and dependencies
  - Level of detail

## Model Implementation

- » Error-checks
  - Dual calculation routes
  - Sensitivity analysis (Excel, TopRank and @RISK)
  - Conditional formatting of error cells
- » Compact
  - As few worksheets as possible (no linked workbooks ideally)
  - Modular structure, clear logical flow
  - Related calculations together
- » Clear formulae
  - Either numbers or calculations
  - Short, transparent calculation steps
- » Formatting >50% of modelling time!
- » Named ranges: selective use
- » Avoid: circular references and macros as far as possible



**PALISADĒ**

*PALISADE.COM*