

The Actuarial Profession
making financial sense of the future

Life Conference and Exhibition 2012
Gabi Baumgartner and Martin Cowie, Deloitte and Laura Hewitt, LV=

E2: A review of credit risk modelling approaches

4-6 November 2012

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Credit Risk Modelling Introduction and Welcome

- **We would like to:**
 - Provide an overview of credit risk modelling
 - Share some insights from our work in the industry
 - Provide some context for model choices
- **We do not intend to go in to methodology detail – but we are happy to.**

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1

Our experience

Our survey

- **Our survey includes:**
 - 10 UK firms
 - Mix of size and business
 - Survey of Solvency II credit risk model calibration details
 - An informal view of capital models.

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2

Data: Practical challenges

Suitability of data source



Data ↔ **Model**

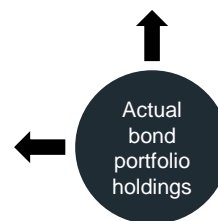
Spread Trends - Moody's US Long Term Bonds



Source: Modelling extreme credit events. Extreme Events Working Party, 2011

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	Merrill Lynch	Moody's	iBoxx
Currency	USD, GBP, EUR, Asia	USD	USD, GBP, EUR, Asia
Investment grade	✓	✓	✓
Sub-invest. grade	USD, EUR	×	EUR
Term structure	✓	×	✓
Sectors	✓	×	✓
History	~ 20 years	~ 90 years	~ 20 years

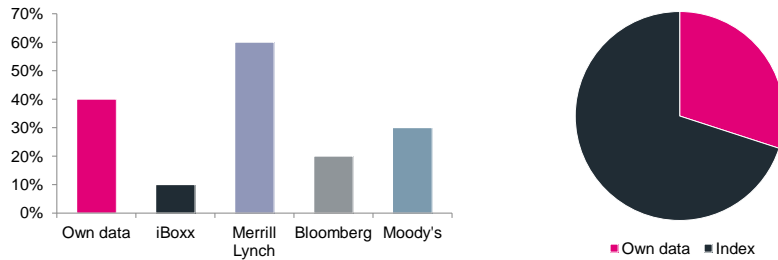


3

Survey results

Calibration data source

Question: What data do you use for your credit risk model calibration?



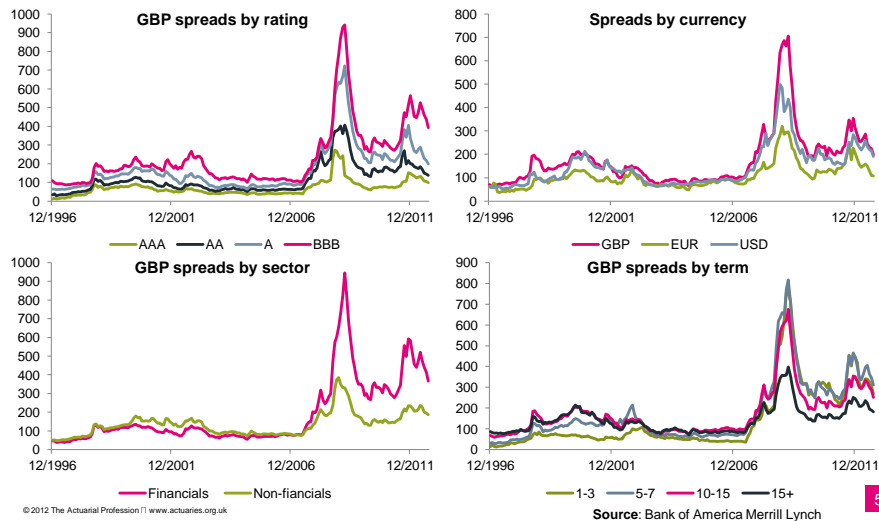
Question: What data do you use for your starting spreads?

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4

Data: Practical challenges

Balancing granularity and reliability



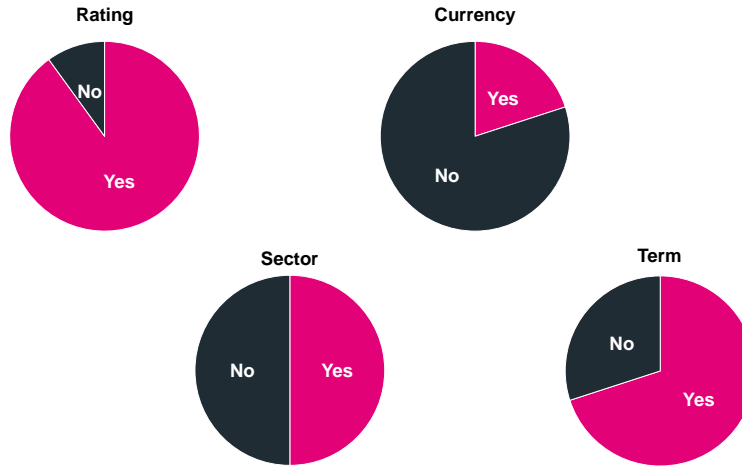
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5

Survey results

Spread risk data granularity

Question: do you analyse spread risk data by...?

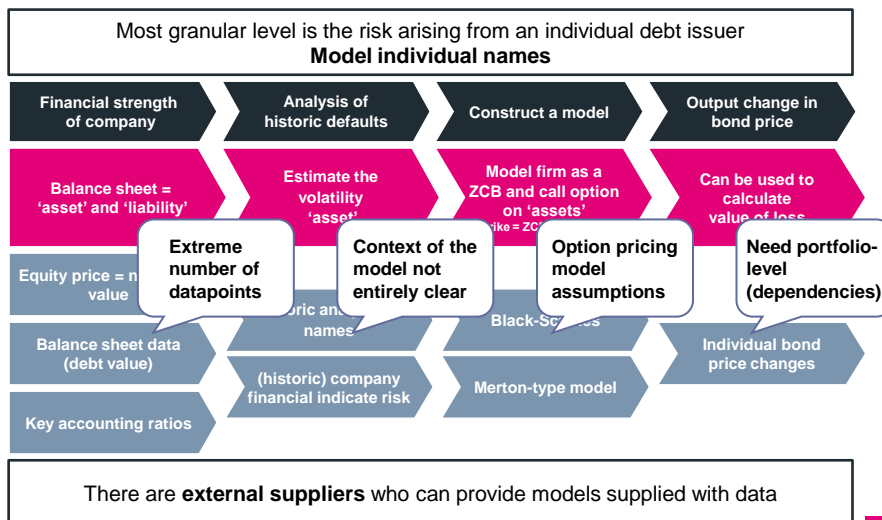


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6

An introduction to a Structural Model

The key aspects of a structural model



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7

Embedded credit risk modelling assumptions

The assumptions made in the structural model



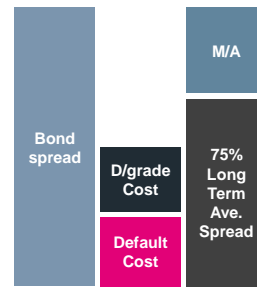
Point In Time or Through The Cycle

A **Point In Time** calibration describes the risk at a specific point in the economic cycle

A **Through The Cycle** calibration describes the risk in 'average' economic conditions

• Considerations in the business' view of credit risk:

- Definition of capital
- Valuation of liabilities: the matching adjustment
- Asset investment strategy & management
- Setting premium rates
- Reinsurance
- Volatility in results



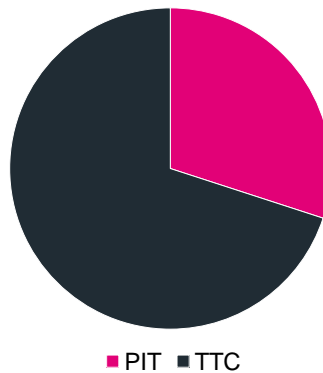
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8

Survey results

Interpretation of spread risk

Question: do you calibrate to a point in time or through the cycle?

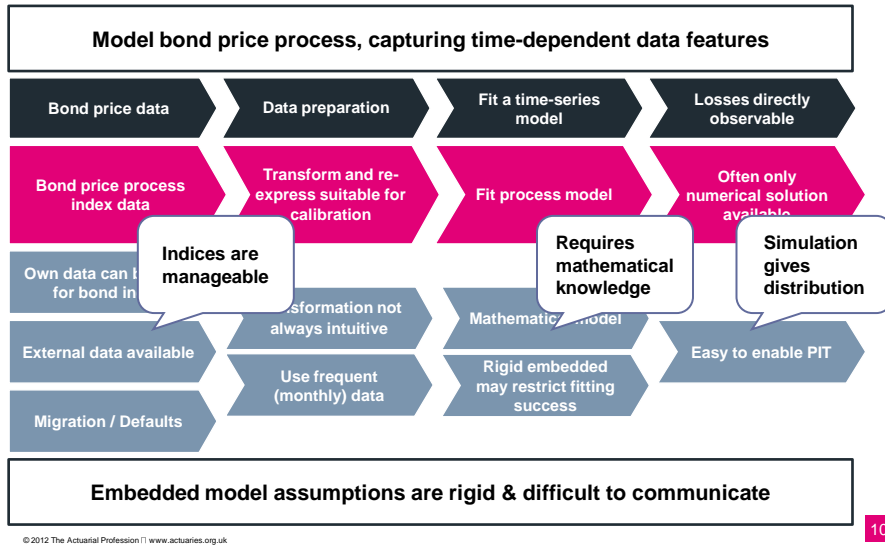


■ PIT ■ TTC

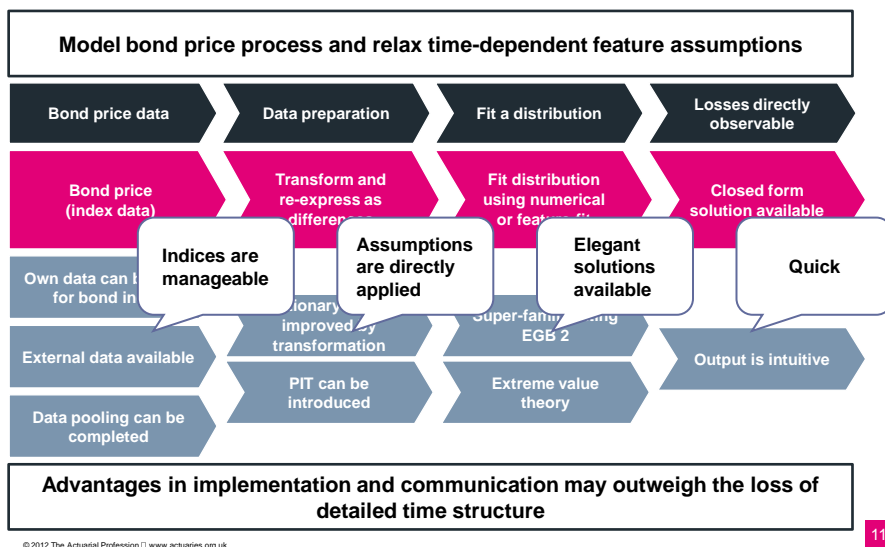
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9

Model two: A time-series model (A reduced form model)



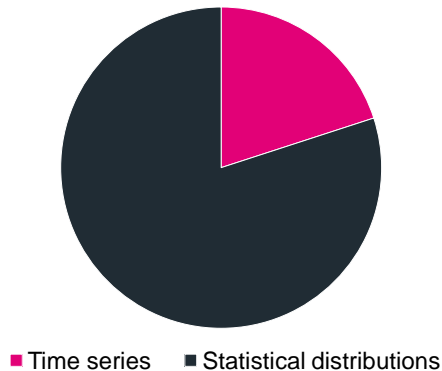
Model three: Statistical distribution model (A reduced form model)



Survey results

Choice of reduced form spread risk model

Question: if you use a reduced form model, which model type do you use?



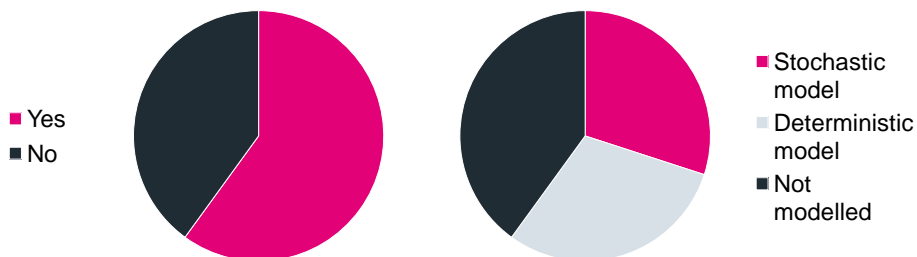
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12

Survey results

Credit rating migration modelling

Question: do you explicitly model credit rating migrations; and if so, how?



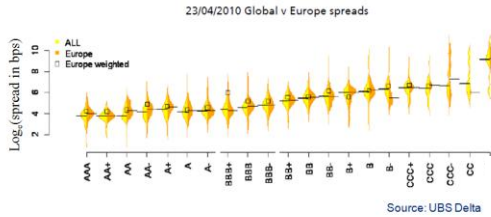
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13

Modelling credit rating transitions

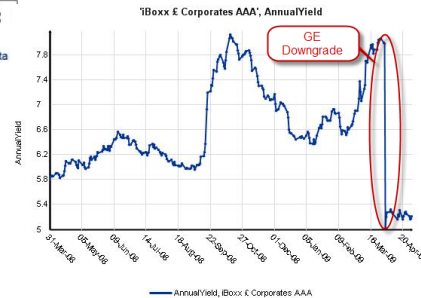
Do we need to?

Spread distributions: Global Market v Europe



Migrations already
in data?

What is a
transition?



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14

Pros and cons of different models

Overview of the three main models we have seen

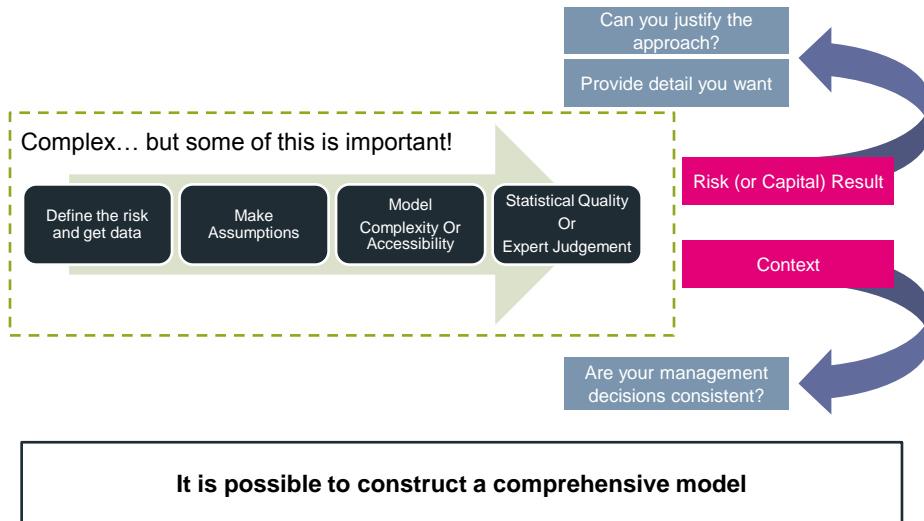
Structural
<ul style="list-style-type: none"> Logistically difficult Extreme data requirements Assumptions deeply embedded
Reduced Form: Time-Series
<ul style="list-style-type: none"> Mathematically complex Difficult to communicate to stakeholders Rigid embedded assumptions
Reduced Form: Statistical Distribution
<ul style="list-style-type: none"> May be perceived to be simplistic Further work required for multi time-steps Less transparent PIT application

Structural
<ul style="list-style-type: none"> Intuitive economic link to causes of default Access to most granular risk information No reliance on credit rating agencies
Reduced Form: Time-Series
<ul style="list-style-type: none"> Multi time-step calibration possible Can introduce structural behaviours Can use more frequent calibration data
Reduced Form: Statistical Distribution
<ul style="list-style-type: none"> Intuitive and easy to communicate Easy to extend to other risks Clear link to 1 year time horizon

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15

So what...



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16

Questions

Happy to answer questions



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17