Agenda

Introduction

Materiality of credit risk

Internal models – criterion for assessing a model

Granularity and the FSA IMAP letter

Different types of model

Practical issues in implementing and calibrating the model

Use test

Introduction

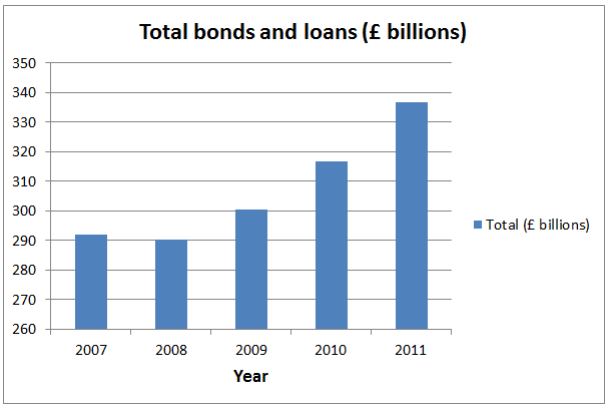
What is spread risk?

QIS 5 states:

"Spread risk results from the sensitivity of the value of assets, liabilities and financial instruments to changes in the level or in the volatility of credit spreads over the risk-free interest rate term structure."

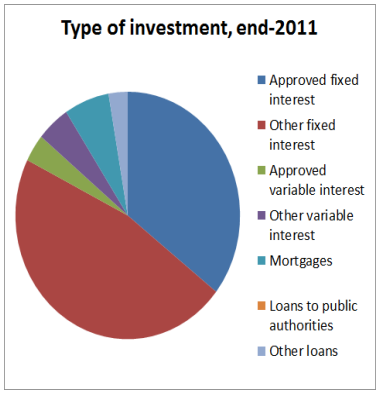
- This definition leaves some questions open over scope and technical details

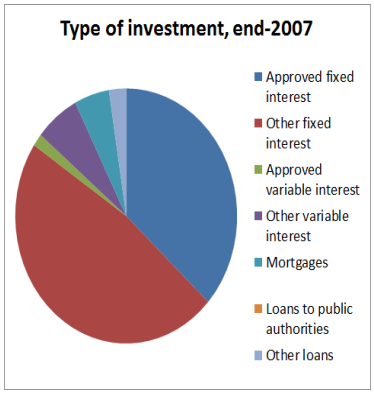
Exposure to credit spreads – UK insurers



Source: FSA returns

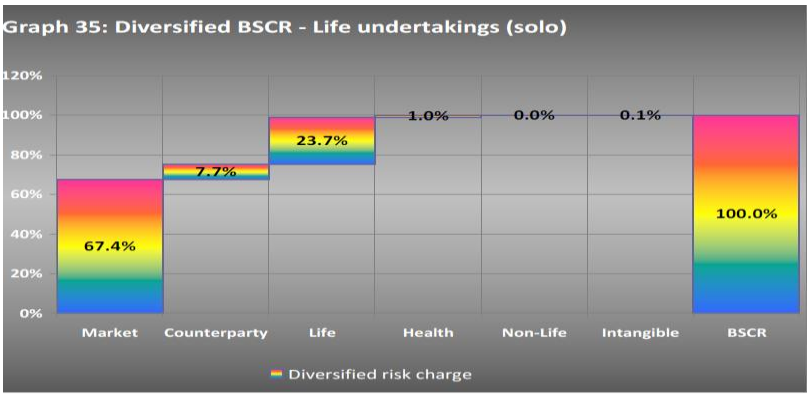
Exposure to credit spreads





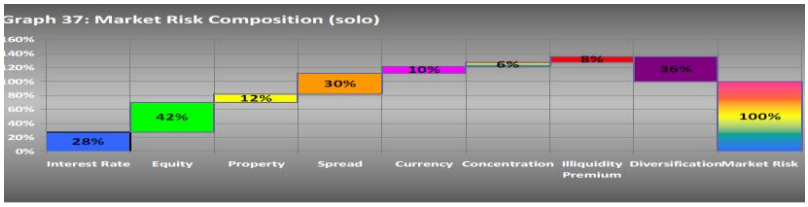
Source: FSA returns

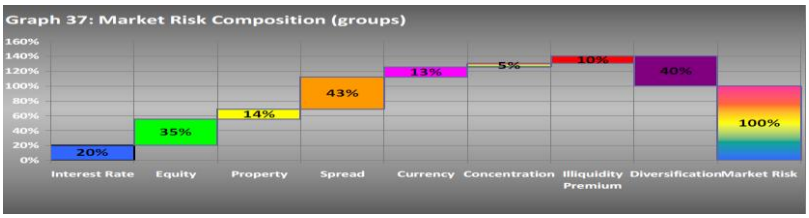
Materiality: QIS 5 results



Source: EIOPA

Materiality: QIS 5 results





Source: EIOPA

Extreme events Working Party criterion

General criterion	Detailed points
Probability distribution	Fat tailed
	Stochastic
Transparent	Knowledge in company of model
Detailed	
Parsimonious	
Robust	
Sensitive	

Extreme events Working Party criterion

General criterion	Detailed points
Key assumptions and data	Market derived or judgement?
Ease of flexing assumption	
Key areas of expert judgement	
Diversification between counterparties	Granularity of model
Risk and default covered	

Additional criteria

General description	Detailed point
Comprehensible	Use test
Granularity	
Term structure	Distressed companies typically have higher yields
TTC/PIT	Stability of capital position
Default/Premium split	
Investment Management / Asset Allocation	Use test
Implementation Lapsed Time days	
Cost	
Immediate Peers SII	
Credit Managers / Risk Manager Peers	

FSA IMAP feedback May 2012

Financial Services Authority

FSA

14 May 2012

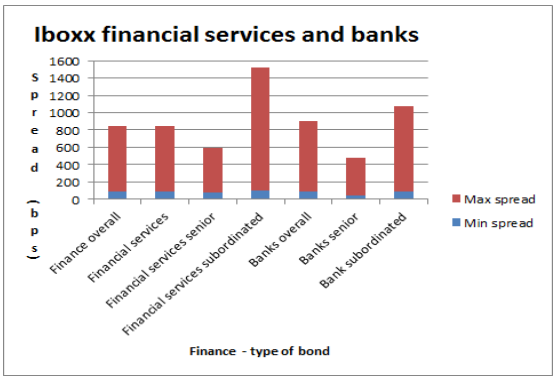
Dear Firm

Feedback from our IMAP work to date

"Firms did not do enough work to ensure check that their modelling was at a sufficient level of granularity to reflect their risk profile. Examples include corporate bonds with material special features being modelled in the same way as bonds without such features."

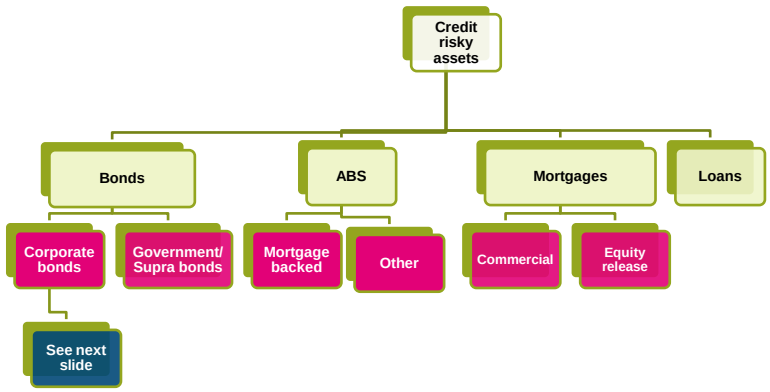
Granularity discussion

What is a "material special feature"?
One plan is to investigate past data to see materiality of possible risk drivers. For example:

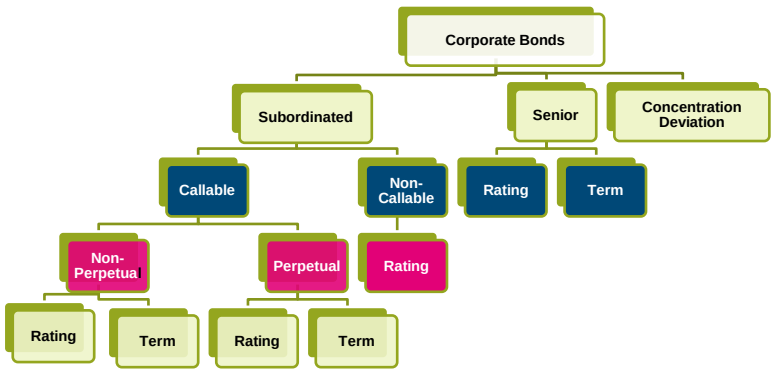


Source: Iboxx, 2007 to 2011 monthly returns

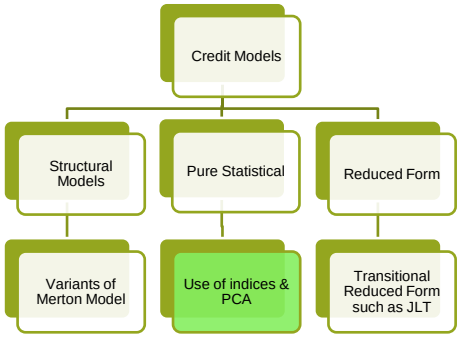
Possible Granularity Scheme



Possible Granularity Scheme - bonds



Different approaches to model credit risk



Structural models

- Structural models are based on economic reasoning, that is, credit risk associated with a bond depends on the level of debt and the amount of assets of the issuer of the bond.
- Structural models seeks to establish a relationship between default risk and the capital structure of a firm. A company defaults if the assets of the firm are less than the debt of the firm when they become due.
- The equity of the firm is assumed to be a call option on the underlying assets of the firm.
- The Merton model is the most widely known example of the structural model. There are different variants of the Merton Model. However, in its simplest form, it assumes that a firm defaults, if at a time when a repayment of debt is due, the amount of assets of the firm is less than the amount of debt.
- The Black – Cox model is another example of a structural credit model, in which, default occurs when the assets of a firm falls below a threshold.
- Merton modelled the market value of a firm as a lognormal process and assumed that the firm defaults, if the asset value falls below a certain default boundary.
- The default was allowed at only one point in time.

Reduced form models

- The reduced form models assumes the default probability is a function of variables that cannot be directly observed.
- There are no intuitive economic explanations for these variables, however they are mathematically tractable.
- A key difference between structural models and reduced form models is that, structural models assumes complete knowledge about the firm, level of debt, amount of assets etc.
- Reduced form models assumes significantly less knowledge about the firm, i.e. only the knowledge of the firm that is readily available in the market.
- JLT and Hull-White are the most common examples of reduced form models.
- Reduced form models seeks to estimate the likelihood of default from publicly available data such as past spreads data, past transition data etc.

Pure Statistical models

- This approach involves the following:
  - Selecting a historic series of past credit spreads data that allows for the features of the credit portfolio of the firm;
  - Manipulating that data to ensure the data is stationary or more tractable;
  - Fitting an appropriate statistical distribution or a time series model to the data
- The main difficulty with this approach finding historic data that is granular enough and is representative of our portfolio.
- Pure statistical approaches are often used in conjunction with dimension reduction technique such as principal component analysis.
- This is mainly because credit spreads is multi dimensional data and the dimensions of the data exhibit significant correlations.

Practical issues in implementing approach

Structural Model:

- The structural model assumes complete knowledge about the firm. Data required include:
  - Market value of firm (not the equity value such as market capitalisation)
  - Total debt of the firm(this may not be published)
  - The volatility of the value of the firm
- Different uses of model such as:
  - Point in time
  - Through the cycle
  - Investment decisions
- Allowing for Matching adjustment
- Back testing

Practical issues in implementing approach

Reduced form:

- Making economic sense of the models
- Very good in-sample fits but may give bad out of sample fits
- Different uses of model such as:
  - Point in time
  - Through the cycle
  - Investment decisions
- Allowing for Matching adjustment

Practical issues in implementing approach

Statistical:

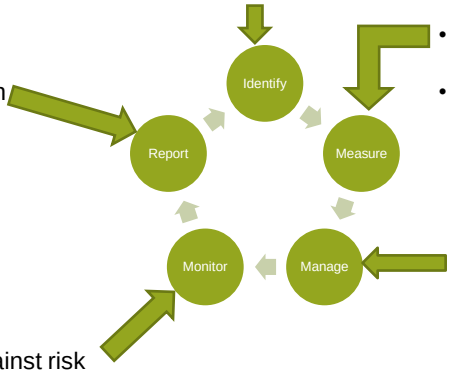
- Lack of data (credible and long-dated)
- Obtaining past data that captures features of the portfolio
- Appropriate fitting (giving how the features of the data)
- Capturing features of the model
- Allowing for Matching adjustment

Satisfying use test

- Trends
- Historical and projected risk profile
- Risk register
- Concentration risk
- Risk versus appetite
- Management action effectiveness

- Loss data
- Risk maps

- Economic capital
- Stress and scenario testing
- Reverse stress tests
- KRI



- Accept risk
- Mitigate risk – CDS?
- Transfer risk
- Avoid risk
- Strategic asset allocation

- Position against risk appetite
- Risk indicators
- On-going stress tests

Questions?

Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

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