Quantitative Approaches to Risk Assessment and Investment Transparency

Risk assessment of debt liabilities

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Outline

- Debt liabilities
- Risk assessment and monitoring
- Trasparency
- Risk based approach

Debt liabilities

Contingent liabilities are obligations that arise from a particular, discrete event(s) that may or may not occur.
Contingent liabilities can be explicit or implicit

Explicit liabilities

Legal obligation

- Guarantees and indemnities
- Deposit insurance and other government insurance schemes
- Uncalled capital

Implicit liabilities

Moral or political obligations:

- Liabilities of sub-national governments,
- social security funds,
- commercial banks,
- big investment banks, strategically important private firms
- Natural disasters

Why Explicit debt liabilities

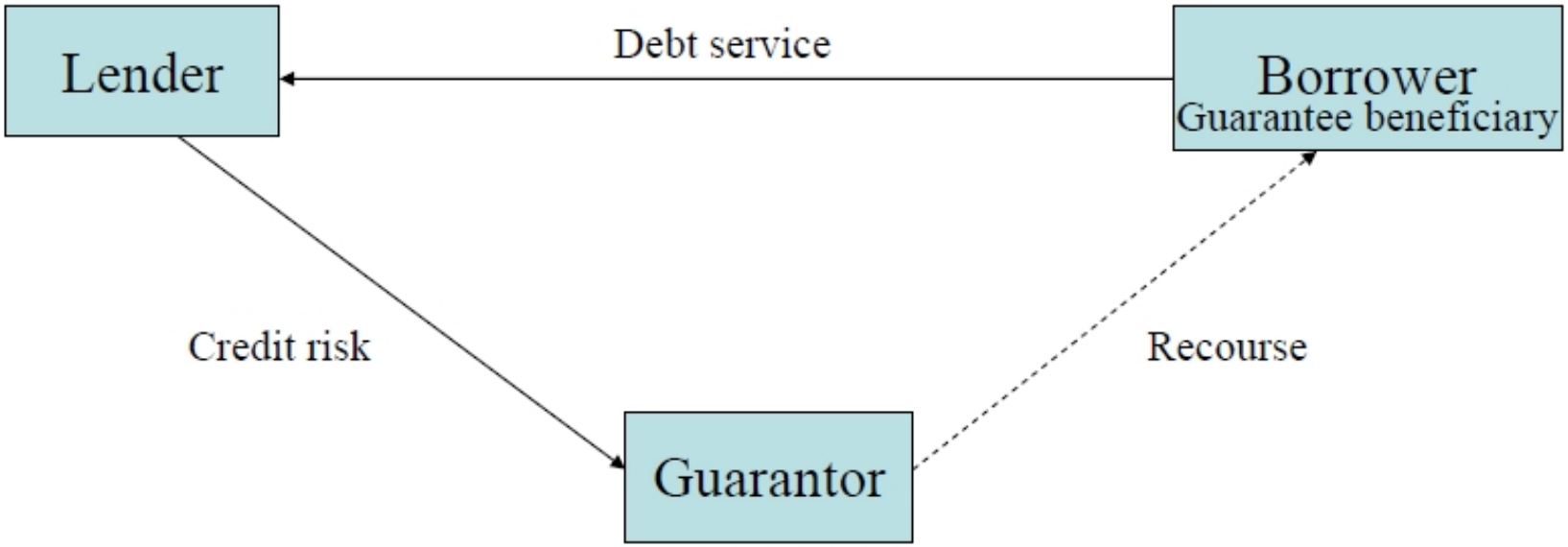
The market is not prepared to insure/finance a project on reasonable terms and conditions without government support:

- Large-scale projects that require long-term insurance/financing, involve appreciable political risks, and are difficult for the market to assess due to its lack of history or unique character
- Convenient political tool: No immediate effect on the budget; leave the eventualities for the future
- Might also be used as a hidden state aid

Guarantees as form of explicit liabilities

- Loan guarantees
  - Government guarantees debt service of the beneficiary (the borrower)
- Minimum revenue guarantees (MRG)
  - Government guarantees a certain minimum revenue flow from a project
- Balance sheet guarantees
  - Government guarantees that the equity capital of the beneficiary remains at a certain minimum level

Loan guarantee



Note the similarity to a put option:
The lender has the option to sell the guaranteed debt to the guarantor at an agreed-upon price if the borrower defaults.

Assessing and Monitoring risk

Key requisites of the debt liability entity:

- Keep updated and comprehensive records of the contingent liabilities
- Frequently and independently assess the risks, both the probability of a trigger event and the loss/budget impact in case of a trigger
- Continuously monitor the risks
- Recommend risk mitigating measures

Risk assessment: two major efforts

Two assessments are needed:

- Probability of the trigger event,
- the expected loss in case of the trigger

Different models are used

a) Traditional balance sheet and business risk analysis, and qualitative assessments

b) Relative pricing: Stand-alone ratings, and estimation of the implicit guarantee value

c) Risk-sharing with the market: How does the market price the risk?

d) Option models: In general, however, difficult to observe market data on volatility and asset value

e) Simulation models.

Need for risk assessment

The crisis has again highlighted the need for debt managers to revisit their approach to risk management to encompass a wider set of risk factors, including exposure to financial sector and insurance-type contingent claims. A flexible and tractable approach has to be used to assess the debt portfolio's exposures to an array of risks.

Risk assessment: three rules

According to the World Bank (T. I. Magnusson, 2008) risk should be assessed before the decision to enter into a contingent liability

- Better with a rough estimate than no estimate at all;
- Risk assessments increase risk awareness;
- Risk analysis and monitoring should be separate from risk taking

International concern on risk assessment

(11th IMF Consultations on Managing Sovereign Risk and Public Debt June 2011 Washington DC)
The crisis has underscored that there are no absolutely safe sovereigns and that credit analysis is as important as interest rate analysis for many sovereigns, including many advanced market economies (AM's). Given that

- sovereign credit risk enters investors' asset allocation strategies;
- the implications for funding and debt strategies in both AMs and EMs;
- specific debt instruments should be targeted at particular categories of investors.

International concern on risk assessment

A major task should therefore be to improve:

- debt sustainability analysis,
- proper risk assessment of contingent liabilities, and debt as well as sovereign balance sheet data gaps.
- adequate management of contingent liabilities may be realized only with a proper risk assessment and information trasparency

The key issue: trasparency of information

It is important to give retail customers crucial information to choose the investment they are looking for.
The inconsistencies between the information provided at offer and time of placement can be easily overcome.
It is necessary to look at the financial engineering of the product.
If the product is complex – containing one or more derivatives components or credit risk exposure – some key informations are relavamt to make an assessment:

- the minimum time within which, with reasonable certainty, allows to recover the costs that have been paid.
- the overall risk posed by the product
- the potential performance to compare it with the target rate of return.

The main assumptions

- Standard models based on Geometric Brownian Motion dynamics cannot be applied

- Specific dynamics have to be analyzed
- Unimodal probabilities in contingent liabilities ?
- Numerical procedure or non closed form solution models need yto be applied

The recipe

The information needed is provided via three interconnected synthetic indicators:

- the recommended investment time horizon;
- the degree of risk;
- the probabilistic performance scenarios.

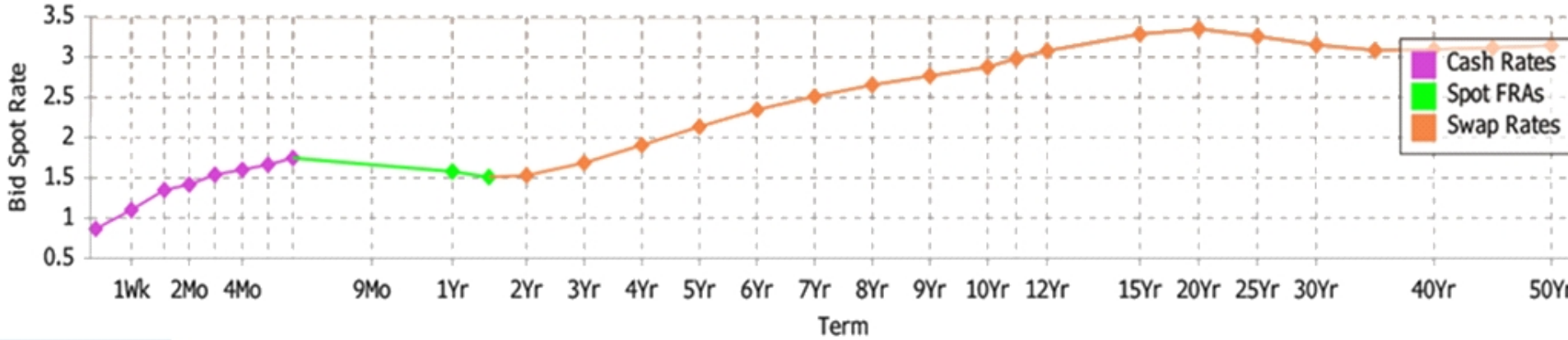
The risk based approach

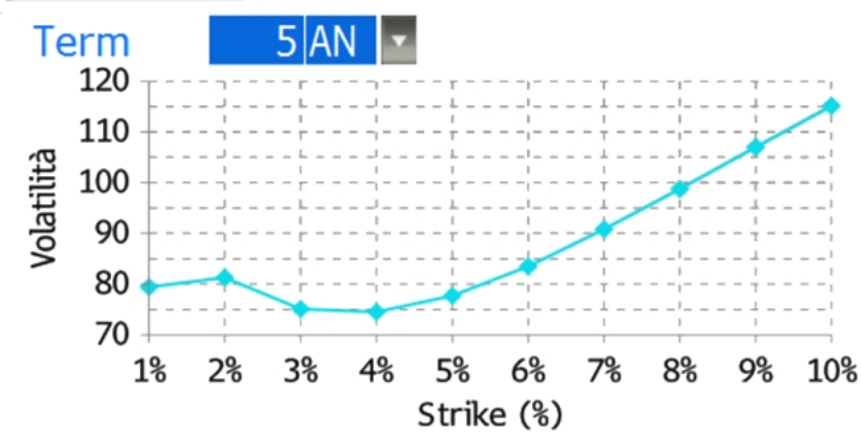
The analysis of implied probability distributions requires the estimate of all the relevant risk factors connected with the financial structure of each product

- defaultable bonds→Interest Rate Volatility; Significant exposure to credit risk;
- low risk bonds→Interest Rate Volatility Limited exposure to credit risk;
- VPPI products→Interest Rate Volatility Limited exposure to market risk;
- Index limited certificates→Interest Rate Volatility; Significant exposure to market risk;

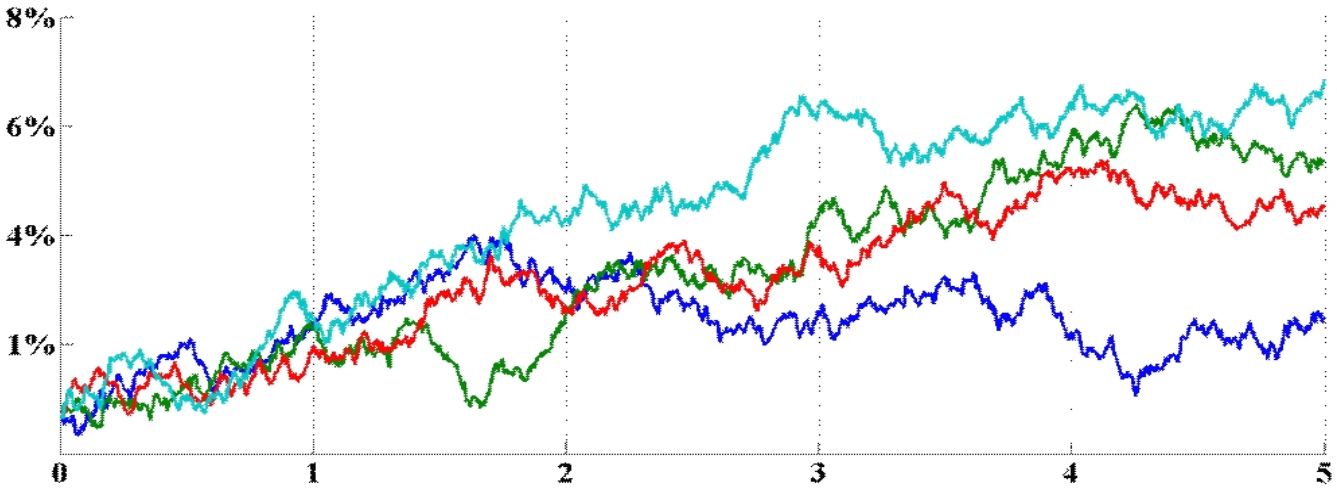
probabilistic scenarios: the crucial tool

Markets data are used to estimate the relevant risk factors connected with the financial structure of the product





The probabilistic scenario: crucial tool



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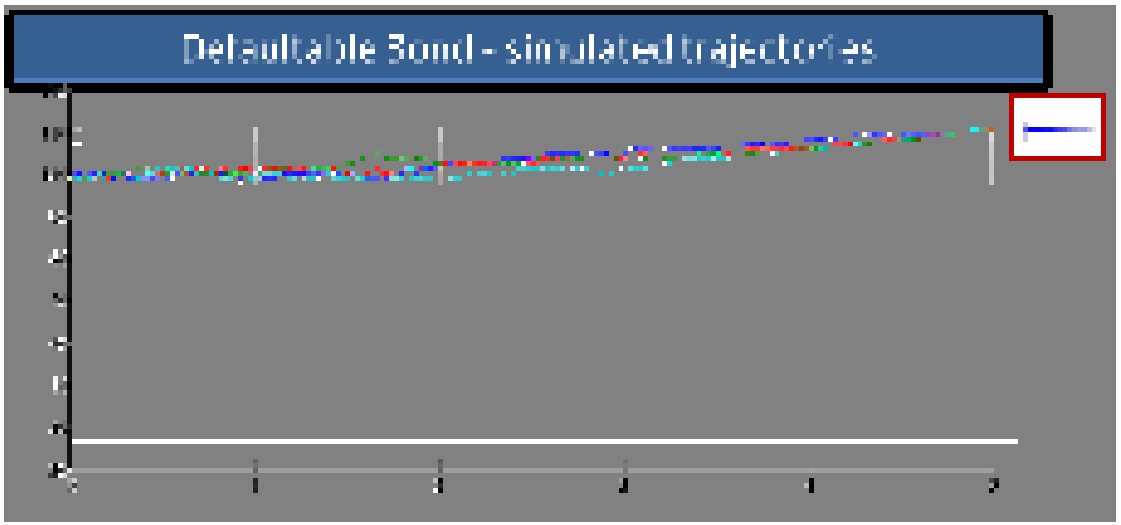
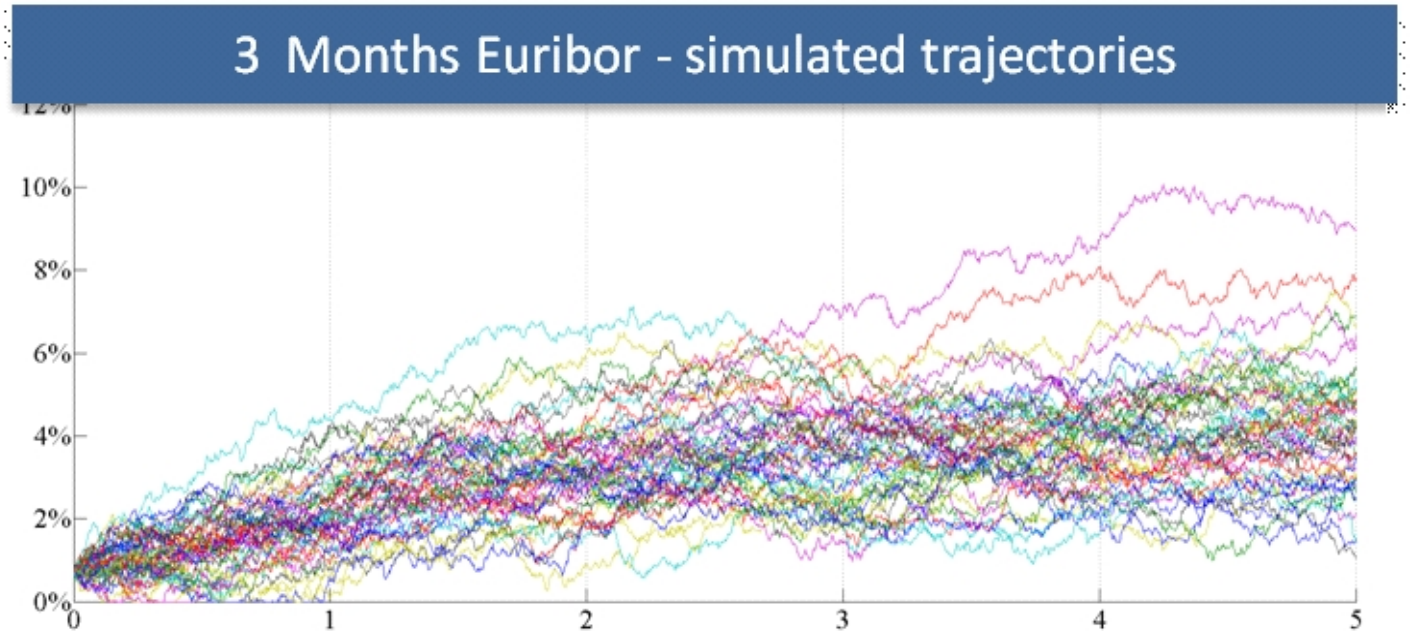
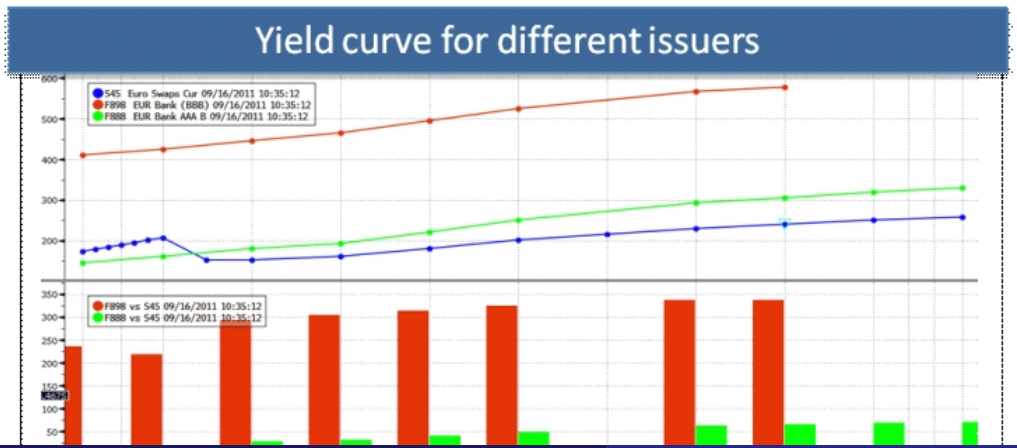


Risk factors

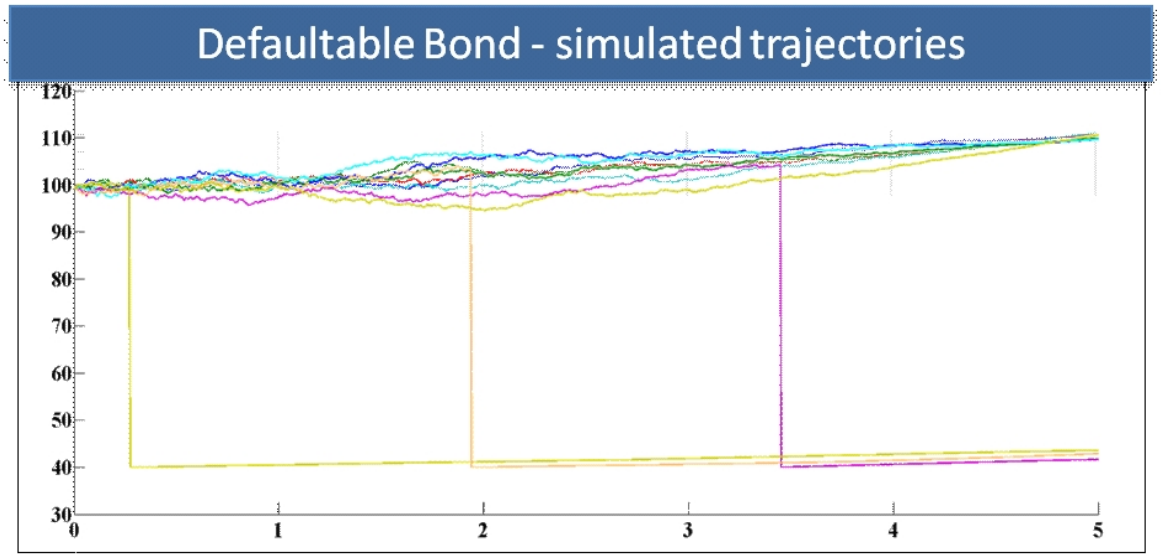
The risk factors define the product values over time and at expiry date can be measured





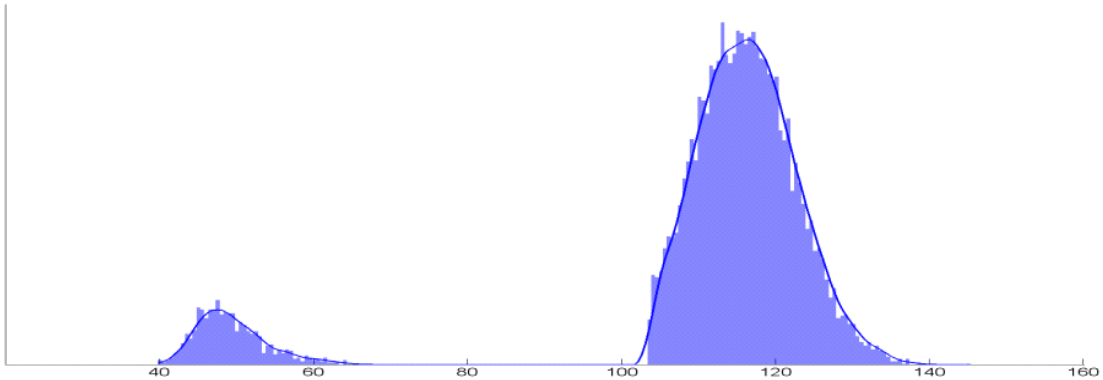
Risk measurement

Using the simulated trajectories for interest rates and information on credit quality the simulated trajectories for the defaultable bond may be obtained.



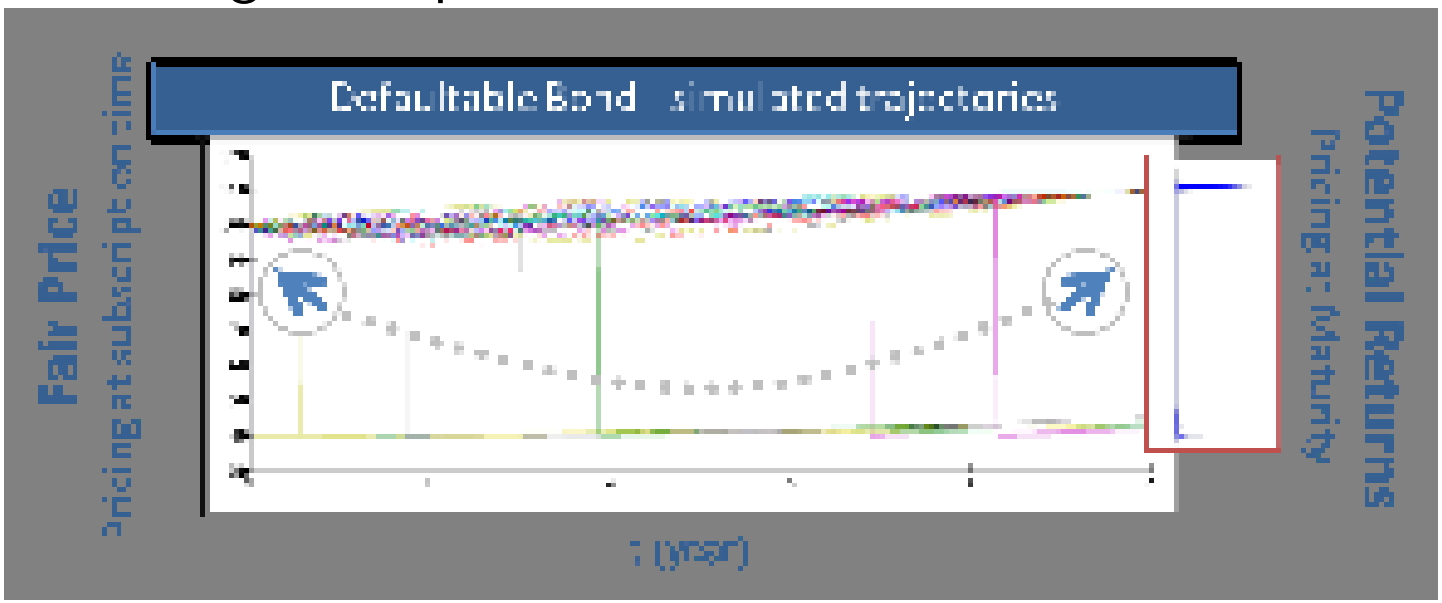
Risk trasparency

The final values of the product provide the probability distribution of the potential returns (so-called pricing at maturity)...



Risk trasparency

The "fair value" of the product at the issue date can be estimated by evaluating the expected discounted value of this distribution.



Conclusions

Informations are available on the market $\longrightarrow$ prices
Tools to estimate the implied probabilities are available and can easily be implemented
Trasparency is what has to be fostered
The crucial issue seems to be the right political choices (major concerns by International Institutions?).
Is it mainly a local/non local authority problem?

Thank you