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The Use of Risk Measurement Models in Specialised Finance

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No issue is more fundamental to project finance than risk and with Basel II about to come into effect, an understanding of offsetting project risks has rarely been more important.

Chris Marrison, founder and chief executive of consultancy Risk Integrated gives an overview of cutting edge risk models.

The adoption of quantitative pricing models by options traders in the 1980s led to the development of a whole new business and asset class around exotic options. Once options traders had understood how to quantify the risk in options, the quantification tools were used to create ever more complex options that matched client desires exactly, and attracted healthy margins.

The options that had previously been traded became standardized with thin margins. Since then, risk-pricing models have steadily been adopted throughout the financial industry and applied to many assets from credit cards to CDOs. One of the last areas to adopt quantitative risk measurement tools is specialised finance, an area which includes commercial real estate and project finance.

The main reason for the late adoption of risk models in specialised finance is the difficulty of quantifying the risk. The deal structures are complex, many factors, including market projections, are highly uncertain, and there is very little applicable historical default data because the terms are long and structures keep evolving. For example, there is no data on the default rate on 20 year old PFI deals.

However, advances in risk measurement methodologies have now made it possible to structure and quantify large portions of risk within each deal. Basel II has added to the competitive pressures for this risk quantification.

Basel II

Basel II requires that banks either 'slot' each asset into a risk class, or have models that quantify the asset's estimated probability of default (PD) and loss given default (LGD). Quantifying the PD and LGD allows the bank to qualify for the advance capital approach. This can dramatically lower the capital compared with using the 'slotting' approach.

In extreme cases it can make a difference of 50 basis points in the cost of funds, and therefore provides a great competitive advantage over those banks using slotting.

In a recent Infrastructure Journal article, one leading project finance bank said that they were being forced to securitise their assets away to other banks as their internal models were inadequate for Advanced Basel compliance and they could not afford to keep the assets. The competitive issues of not complying with the Advanced Approach were discussed recently by this author in the *Infrastructure Journal* (issue 40).

In this article we consider the different ways of becoming Advanced compliant and what this means for business units.

Faced with the goal of becoming Advanced-compliant, specialist banks who focus on specialised finance took the approach that they would implement risk models that were both Basel-compliant and improved the risk management capabilities of the lenders and portfolio managers. For more generalised banks, the specialised finance class was often too difficult to quantify given the resources available. Their approach was therefore to adopt models that would be adequate for Basel compliance, but would not add new risk assessment capabilities to the front office. The result was typically the implementation of scorecards which summarise the main characteristics that the lender looks at in pricing and structuring a deal. It makes some attempt, based on very limited default data, to link these characteristics to the PD and LGD.

These scorecards are filled as an administrative task, and give an estimate of risk statistics that may be acceptable for compliance with Basel, but do not add any more insights to help the lender's decision making. This misses out on the whole potential of using risk quantification models to guide competitive structuring.

Good risk quantification models can answer questions such as "if we add a cap at 7%, how many basis points of risk do we avoid?" or "what portion of risk is born by the senior loan versus the junior loan", or "what happens to the risk if we change the amortisation profile?"

The Use of Simulation Models by Specialised Finance Lenders

More advanced banks have adopted models such as cashflow simulation to quantify risk. Simulation allows the user to structure all the available information and give a detailed picture of the risk. These models are different from traditional cashflow models as they include the uncertainty of inputs, the full debt and default cascade, and are able to handle all possible deal structures. This ability to handle all deal structures is needed to give standardised, comparable results for the credit committee.

In many ways cashflow simulation can be seen as an extension of the 'what-if' analysis and stress testing that lenders currently conduct on potential deals. The difference is that stress testing does not include any estimation of the likelihood of the event occurring. In simulation, the scenarios are produced by looking at the probability distribution of outcomes in the past. For example, it is important to look at the volatility of past market variables relative to forecasts. Such market variables include interest rates, FX rates, inflation, commodity prices, property values and market rents.

Also, it is necessary to look at project-specific uncertainties such as construction costs, traffic volumes, rainfall, wind-velocity and service availability. For projects with construction, lease, supply and off-take agreements it is important to include reviews, counterparty creditworthiness, guarantees, and termination arrangements. Knowing the level of uncertainty and the correlation between each variable, possible scenarios can be produced into the future that have the same probability structure as historical market data.

This gives different possibilities for the future "state of the world," with the more extreme states being less likely. Each state of the world is then presented to the cashflow model to calculate the consequent state of the deal, including profit and loss to each participant. To guide detailed deal structuring, the full cashflow model allows the user to change details such as interest rate conditions, hedges, covenants, seniority slices, sweeps, sinking funds, reserves and termination agreements. Only after running thousands of possible future scenarios, can an estimate of the robustness of the deal and its ability to survive in many conditions be obtained.

The final results include the probability of default each year, the average and "worst-case" loss given default, the NPV of possible losses, the NPV of margin and equity income, and the likely recovery amount on each level of seniority. The user is able to identify the sources of risk and then try different deal structures, looking for the structure that will best minimise the risk whilst fulfilling the client's needs (and thereby maintaining margin). Each change in deal structure gives a change in the risk results, and therefore it is possible to quantify the required change in risk-margin for each change in structure.

Although simulation provides a framework to quantify the effects of all known and estimated data, it would of course be wrong to assume that a specialised finance business could be run on models in the same way that vanilla assets such as credit cards are run on models. There will always be qualitative elements such as the quality of project management or the probability of regulatory change that require the judgment and instinct of the lending officers. However, simulation models do provide a way of bringing together all known information such as market uncertainty and deal structure, allowing the lenders to concentrate on the qualitative variables that make this deal different. In this way, they act as the quantitative backbone to the lenders intuitive feel for the market, rather like the way option traders use their models.