Risk Integrated

Practical Advice for Embedding Risk Models in Project Finance

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Quantitative models have been used increasingly over the last few decades for the risk assessment and deal structuring of new assets and complete portfolios. The technique was first started by options traders then migrated to modeling consumer and corporate debt. Today it has been adopted for managing highly complex assets such as commercial real estate and project finance.

According to **Duncan Martin**, Head of Wholesale Credit Modeling at the **Royal Bank of Scotland**, and **Chris Marrison**, CEO of **Risk Integrated**, the trend has its foundation in banks' competitiveness to exploit every available tool to assess, structure and price new deals, and then accelerated in recent years by the Basel II legislation.

However, the practicalities of embedding risk models in a bank's day-to-day business are tricky, particularly for complex asset classes like as project finance (PF).

This article describes several strategies for handling the implementation issues, outlining the advantages and disadvantages of four options, and offering a suggested path for introducing risk models into the daily workflow of assessing PF assets and portfolios.

Uniqueness of PF Deals

The difficulty in modeling the risk of PF deals comes from the customised nature of each project. Some, such as the Channel Tunnel, are fundamentally unique. Others, such as power stations, may be similar in their underlying technology and construction, but will often have unique or esoteric financial structures.

The traditional approach to risk assessment for PF has been to create an individual cashflow projection model for each asset in the deal, stress each one under several scenarios, and then overlay a qualitative assessment consisting of a dozen or so factors to end up with a risk grade.

This approach has worked reasonably well, but is lacking in three significant ways:

1. Cashflow models only test a small number of subjective, possible, scenarios.
2. They do not provide estimates of risk statistics such as the probability of default, loss given default, economic capital or the risk-adjusted return on capital.
3. Cashflow models become unwieldy when trying to merge results from multiple models into a single consistent framework to get a comprehensive portfolio view. It is very complicated, for example, to determine the impact of scenarios such as what would happen to the portfolio if interest rates were to rise 3%? Or, what is the effect on the entire portfolio if oil prices rise to $200 or fall to $50/barrel?

However, these issues can be fully addressed by using cashflow simulation for risk quantification and by using standardized models to assess all assets within a single framework.

Although this is straightforward at a conceptual level, there are significant practical problems when it comes to implementation. In particular, there are difficulties in obtaining and maintaining all relevant data.

For example, if a power plant is to be built in a developing country with no existing electricity market, how do you model electricity prices?

Four Good Implementation Options

Broadly-speaking there are four options for implementing simulation models:

1. Add simulation modules to existing cash flow models.
2. Build a simplified cashflow model to capture only the main characteristics of each deal.
3. Use the cashflow simulation models to create quantitative scorecards that are applied in the day-to-day business.
4. Invest in a full-blown cashflow model (or, better, one per sector) that is sophisticated and flexible enough to handle virtually every financial structure.

Option one, adding simulation components to existing cashflow models, has the advantage that there is never the need to reconcile two sets of cashflow models. Also, the models need not be dumbed down; they can capture every unique characteristic of each deal to maximize their use in deal structuring and pricing.

The most obvious disadvantage is, though, that this adds a significant modeling challenge at the onset of each new deal, and someone needs to make sure there is consistency from one deal to the next.

A less obvious problem is that a significant ongoing effort is required to update the data in the model for portfolio modeling. These practical implications mean that complete deal-specific simulation models are only applicable for sophisticated users and for large projects, where the additional risk insight is worth the additional work.

Using a cashflow simulation model that can cover most of the common deal features, but where inputs are kept at a minimum (option two), has the advantage of being relatively easy to use. This means that the model can properly compute all of the non-linear and time varying dependencies that occur throughout the life of the deal, while only requiring a slightly more complex level of data input than a typical scorecard.

The main disadvantage is that many of the approximations and missing features must be treated as qualitative factors, such as text descriptions that notch upward or downward the grade generated by the model, or as qualitative inputs to the model, for instance, that would decrease the randomness of construction costs if there were additional guarantees put into place.

The third option is not to put the simulation models into production, but only to use them to develop scorecards which are what is then used in the day-to-day business. The advantage here is simplicity from the user's perspective and that no special technology is required to implement the production model.

However, the process of calibrating the scorecard to the cashflow model is complex and the scorecard does not attempt to capture all the possible interactions that occur within the range of PF deals.

It is also possible, as option four lists, to build a single cashflow model with the flexibility to take into account virtually every financial structure. Here, every deal can be modeled in a standard framework. The model is available from the onset of negotiations for each deal. The detail in each unique financial structure is captured and a complete picture of the risk profile of the portfolio can be obtained by running the models together.

This strategy does, however, require a stable of sophisticated, well-trained users to fit deal details into the model. A significant amount of time from experienced staff is required on an ongoing basis to keep the model inputs updated.

How to Choose?

The most suitable option for a bank will depend on its strategy and priorities. If a bank is a large player in PF, then a more sophisticated (and expensive) approach is warranted. However, if PF is not a significant or strategic asset class for the bank, and the priority is merely to quantify the risk at a portfolio level and to comply with Basel's capital calculation requirements, then simpler models would be more applicable.

In general, an evolutionary approach is likely to be the most effective: starting with more quantitative scorecards, moving up to cashflow models with limited inputs, and then steadily expanding the inputs and sophistication to include those factors that have most commonly required over-rides.

With such an evolutionary approach it becomes practical to improve the extent to which PF risks are quantified and communicated, thereby improving deal structures and improving the transparency of PF assets for portfolio management and the secondary markets. ■