

## Quizzing the Quants

It's easy for a divide to grow up between day-to-day users of credit portfolio models, such as the risk management group and senior management, and the mathematical 'quants' that develop the models, regardless of whether these quants are internal to the institution or external consultants and vendors.

Yet users need to be confident that the model they choose fully captures the bank's risks if they are to use the results for capital adequacy discussions and strategic decisions such as pricing, performance measurement, capital investments, and even compensation.

The good news is that users do not need to become experts on the technical aspects of credit portfolio models to gain this confidence. Instead, they should use their banking intuitions to quiz the quants about a model's basic capabilities and input parameters:

**1. Which criteria are used for grouping borrowers to determine joint-default behavior?** Models divide up borrowers into groups so that each group can be associated with particular correlations to the rest of the portfolio. Users should take a critical look at the type of information used to group and stratify borrowers to see if this accords with their banking instincts. For example, a commercial real estate portfolio should typically be stratified by region and property type because both these dimensions drive risk levels.

**2. What are the correlation numbers based on?** Users should question whether the type and amount of data used to estimate correlation parameters reflects the characteristics of the portfolio. For example, if the portfolio is dominated by small business loans, it can be problematic to parameterize correlations using equity market data describing much larger corporations.

Data periods that are too short will not accurately reflect a full economic cycle, while data from too long a period may capture now-irrelevant changes in market structure. Finally, users often know from experience which portfolio segments are the most volatile: have these been assigned the highest correlations?

**3. Does the model capture single-name concentration effects?** Certain models and applications, including the Basel II Pillar 1 formula for credit risk, assume that commercial bank portfolios do not contain single loans large enough to create a concentration risk. This may be true for large, highly diversified banks but it underestimates the risk for institutions with "lumpy" portfolios where a few loans make up a significant part of the portfolio. So does the portfolio model in question attribute more risk to a \$50m loan than to 10 otherwise identical \$5m loans?

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**4. Does the model incorporate loan maturity as a risk factor?** While most credit portfolio models calculate risk in terms of a one-year time horizon, this does not imply that loan maturity is irrelevant. Loans with longer maturities stand to lose more value if an economic downturn leads to an upward adjustment of expected future credit losses. So users should ask, how much more risk does the model attribute to a five-year loan compared with a one-year loan? The additional maturity risk should be higher for bullet loans than for amortizing loans.

**5. Does the model capture the way that recoveries fall as default rates soar?** This

phenomenon is most dramatic in commercial real estate (CRE) portfolios, but can be found across all lending types.

Credit portfolio models account for it either by estimating the correlation between Probability of Default (PD) and Loss Given Default (LGD), or by using adjusted LGD values to reflect a downturn scenario. The former approach is preferable as it includes the increase in expected LGD as a dynamic function of default rates. Either way, users should ensure that the effect is differentiated by product type to capture the stronger impact on CRE portfolios. Failure to do so may lead to significant overestimates of the portfolio performance in general, and of CRE lending in particular.

**6. Does the model allocate risk to individual loans?** Economic capital results should be available at both the portfolio as well as the facility level to support different kinds of decisions. Users must check that their model calculates the risk of individual loans in a way that reflects each loan's unique borrower and transaction risk factors. If the model offers only aggregate portfolio numbers, or allocates aggregate numbers to individual transactions using some averaging technique, the analysis will be of limited use for transaction pricing and detailed performance measurements (for example, at relationship or loan officer level).

One final test: credit portfolio models worth their salt will make it easy for quants to answer all these questions in simple terms, without rummaging through lines of code.

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