Making internal ratings work

Bob Mark and Michel Crouhy of CIBC discuss the practicalities of implementing the reformed Basle Capital Accord

The Basle Committee on Banking Supervision's proposals for reforming bank capital adequacy rules assumed a more definite shape on January 16, with the publication of the Committee's second-round consultative paper. The consultative process continues, and not all the flesh will be on the bones till the end of the year. But the implications for banks that intend to take full advantage of the new "Basle II" regime are becoming clearer.

The biggest breakthrough is that some banks will be allowed to use the ratings they assign to counterparties – their internal ratings – to calculate the minimum required regulatory capital they must set aside for credit risk. CIBC, like many banks in its peer group, will apply to regulators for permission to use this "internal ratings based" approach.

The new approach is attractive because it's likely to bring CIBC's regulatory capital requirement more closely in line with the economic capital we already assign to risk positions. It's also likely to reduce the amount of regulatory capital we are required to set against certain credit risky transactions and portfolios as compared to the standardised approach – new or old version.

That means the IRB approach will often reduce the cost of holding these positions, although the new rules won't necessarily reduce the total amount of capital the bank has to hold, as the regulators are introducing a new charge against operational risk. But they have put some sticks, as well as carrots, into their proposals, and these are likely to shape the way many banks build out and improve their risk rating systems in the next couple of years.

Sticks and carrots

The regulators have made it clear that banks will have to fulfil certain conditions if they are to calculate their capital using internal ratings. One of the simpler requirements is that there must be enough credit grades in a bank's own internal ratings scheme to differentiate the default risk of the various counterparties.

The January 16 paper and its supplements suggest that "qualifying risk rating systems must have a minimum of six to nine grades for performing borrowers and a minimum of two grades for non-performing borrowers".

At CIBC we currently have a credit ratings system with 13 grades, which we will enhance by increasing the number of grades to 19 in the next year. Some other sophisticated banks have more than 20 credit gradations.

Banks such as CIBC that already use relatively finely graded systems will probably not need to re-engineer the number of rating grades to comply with Basle. Our incentive to increase the number of gradations comes, among other things, from a desire to price credit risk more appropriately as well as to fine-tune our approach to economic (as opposed to regulatory) capital.

But ambitious banks that use fewer grades at present – those in the single digits, for example – will need to make changes. It's not just a question of dividing any existing grades into two. The regulators have said they will want to check that there's a "meaningful distribution of exposure across grades" and that each grade does not exceed a specified gross percentage of credit exposure, probably 30%.

It's likely that if backtesting based on internal data is to be effective, a certain number of viable ratings will have had to exist for some time prior to any attempt to gain regulatory approval.

Backtesting an internal ratings system

Under the new scheme, each internal risk rating will have to be associated with a particular probability of default over a one-year time horizon. This probability of default is what defines the objective risk characteristics of the rating, and underpins the attribution of regulatory capital. It will also allow the backtesting of a bank's rating system by comparing the actual default performance of entities in a particular grade to the rate of defaults predicted by the bank rating.

A. January 16 paper: the pivotal role of credit risk data

THE JANUARY 16 paper states that banks using the IRB approach will be:

"Required to collect and store substantial historical data on borrower defaults, rating decisions, rating histories, rating migration, information used to assign the ratings, the party/model that assigned the ratings, PD [probability of default] estimate histories, key borrower characteristics and facility information. The data collection and IT system requirements serve a number of purposes:

- Improve the bank's internally developed data for PD estimation and validation;
- Provide an audit trail to check compliance with rating criteria;
- Enhance the predictive power of the rating system;
- Modify risk rating definitions to address more accurately the observed drivers of credit risk; and
- Provide accurate and meaningful internal and external disclosure of the bank's credit risk profile."

Point 226, The Internal Ratings-Based Approach, *Supporting Document to the New Basle Capital Accord, January 2001.*

Backtesting bank risk systems has been a key component of regulatory approaches to internal models since banks were first permitted to use internal models for calculating regulatory capital for market risks in the trading book, in the 1996 amendment to the Capital Accord (implemented from 1998).

The backtesting of internal risk ratings will probably not achieve the same degree of accuracy as market risk backtesting, in the eyes of regulators, because the data on default that is available inside and outside the bank is much sparser than for market risk. For this reason, the regulators refrained in the January 16 paper from suggesting any quantitative thresholds for "passing" or "failing" an internal rating.

But it's clear that backtesting against internal data, and benchmarking the performance of internal ratings systems against external ratings systems, will be a key part of the general verification process. As the regulators said in the January 16 paper, the probability of default estimates associated with a rating grade "must be grounded in historical experience and empirical evidence".

CIBC has utilised its internal risk ratings to measure credit risk for some nine years. Our approach has evolved over that period, but we have nine years' worth of internal data with which to backtest the system and prove to ourselves, and others, that it works. We already perform certain backtesting and benchmarking procedures as part of our efforts to validate and improve our internal credit rating system.

We do this by associating a default probability "bucket" with each obligor rating. We then backtest these default frequencies based on the bank's actual experience of default within portfolios. We also backtest two other critical risk statistics: loss given default (LGD) and exposure at default (EAD).

Our experience suggests that some practical issues await banks hoping to take advantage of the Basle reforms. Most particularly, it will not be enough to implement a well-designed internal risk ratings system around the time that the reforms are implemented. Any improved internal risk rating system is likely to have to operate for some considerable time before either the bank or the regulators can amass the data needed to backtest the system and gain confidence in it.

It's difficult to specify how long a bank needs to run an internal ratings system before it can both iron out any wrinkles and collect enough data to do a minimum level of backtesting. But, aside from any regulatory criteria, we would guess two or three years would be a reasonable minimum.

As Box A shows, the January 16 paper makes it clear that data – internal and external – will be important in validating a bank's approach. This is no surprise, as the regulators have been signalling their push for ratings consistency, linked to historical loss data, for some time. William Treacy, a member of the models task force of the Basle Committee and a senior analyst with the US Federal Reserve Board, said last year: "Banks seeking eligibility for the IRB approach should move to develop and warehouse their own historical loss experience data by borrower/facility grade, collateral type, and other key characteristics."

Internal transition matrices

There are many reasons why banks will need time to bed down their internal risk ratings system. For example, we have found it useful to construct robust transition matrices from our internal risk ratings.

These transition frequencies are a critical input in our credit value-at-risk, or CVaR model, which we use to assess the credit risk of loan and bond portfolios. Our internal transi-

tion matrices are similar, in principle, to the transition matrices published by the ratings agencies such as Standard & Poor's. They show the likelihood that a rating of a particular risk grade will decay to another grade over a particular period. But they are derived using our internal information on CIBC's borrowers, ranked by industries and countries.

These internal transition matrices are more appropriate than averages over a broad class of obligors/industries, as such averages are not always relevant to the composition of our particular risk portfolio.

The matrices are useful to us for several reasons, but in particular they offer one way to compare the performance of our internal ratings to the ratings published by external agencies. (Interestingly, in the present downturn of credit quality, our internal ratings system seems to be bearing up quite well compared with those of external vendors and rating agencies.)

Similarly, we continually compare the success of our internal risk ratings system to the data produced by firms such as KMV Corporation, who use an option-type methodology to track the default probability of quoted companies. If we spot a discrepancy, we look for the underlying reason. This might be some special knowledge that we have about a company or, conceivably, a fault in our internal rating system.

While many of our peers in the banking system boast internal risk ratings systems that seem likely to live up to regulatory expectations, this is not the case for all such banks, or for many – perhaps most – smaller banks. This became clear during the regulatory process itself, with the publication of a survey conducted for the Basle Committee last year that examined the quality and consistency of bank rating systems.

In order to set up and test a sophisticated internal credit risk ratings system, our experience at CIBC suggests that a considerable amount of effort must be expended to collect all the data necessary to map internal ratings to default probabilities (and therefore external ratings) and to backtest the system.

We are lucky enough to have a system whereby the ratings data automatically flows to a central risk management department – partly because at CIBC, corporate loans are approved by the risk management function. We therefore have relatively easy access to the kind of credit information we need to validate our internal ratings system. Other banks, with more decentralised credit approval processes, are likely to find that gathering all the necessary data is a significant challenge.

Data strategy and the loss given default

Those outside the banking industry understand that predicting the probability of default is a complex business. But they often assume that a bank has excellent records of the amount it has lost in any particular incidence of default.

This is not so. Getting hold of robust information about rates of loss after a default event is one of the most intractable problems that many banks face in improving their credit risk management calculations. As one regulator has pointed out: "Surveys and other information suggest that even sophisticated banks in the Group of Ten countries often do not have reliable, empirically based LGD [loss given default] or EAD [exposure at default] data." (Treacey, 2000).

The January 16 paper lists some factors that make LGD calculations, and data handling, so tricky. "Borrower characteristics include asset size, country of incorporation, industry sector and whether the corporate is a holding or operating company. Transaction-specific characteristics include the seniority of the transaction, the amount and nature of any collateral taken and loan covenants."

But data quality is also affected by the fact that the process of default is protracted and complex, and involves many supplementary costs. Its financial effects can spread over a number of years. Meanwhile, the loss statistics can become complicated by the application of discounts to cashflows associated with the position, the swapping of debt for equity during workout, and many other issues.

As the position evolves, information about the financial fallout of the default often begins to move around between bank divisions, further complicating the collection of LGD data. A loan exposure at the moment of default might be translated into an equity position during the workout period, and then begin to make money for the bank as the corporation recovers after the restructuring. At the extreme, the "loss given default" can even turn into a profit.

The LGD statistic is an important component of the new capital adequacy proposals. Luckily for many banks, the regulators have

B. Why is clarity so important for banks considering the IRB approach?

IN THE JANUARY 16 paper, the regulators sum up the benefits of the internal ratings based (IRB) approach, and make clear the importance of a clear distinction between the key concepts of probability of default (PD), loss given default (LGD), maturity (M) and exposure at default (EAD):

"In the standardised approach, borrowers are assigned to one of five risk weights (0%, 20%, 50%, 100%, 150%) on the basis of supervisory standard treatments or assessments provided by external credit assessment institutions. The IRB approach provides for a finer differentiation of risk, in that estimates of PD, LGD and M are developed separately and then used as inputs to produce corresponding risk weights. Given this additional sensitivity, the risk weights reflect the full spectrum of credit quality through use of a continuous function of risk weights in the place of the five discrete risk buckets of the standardised approach. Thus, under the IRB framework, different sets of risk inputs will generally produce a different risk weight. In this way, exposures to borrowers where PD, LGD and in some cases M combine to produce a very low level of risk will tend to have risk weights which are below their equivalents in the standardised approach. By the same token, exposures to counterparties where PD, LGD and maturity combine to produce a significant degree of risk will tend to attract risk weights which are higher than those contemplated in the standardised approach."

"To calculate risk-weighted assets, the bank will multiply the risk weights by a measure of exposure, here the estimate of EAD, and add the resulting amounts across the portfolio. Finally, an adjustment factor, in the form of a standard supervisory index, is then applied to the total risk weighted assets to reflect the granularity of the bank's non-retail portfolio."

Points 31 and 32, The Internal Ratings-Based Approach, *Supporting Document to the New Basle Capital Accord, January 2001*

recognised the data problem and will offer a set of standard LGD numbers for banks that qualify for the "Foundation" (or simplest) internal ratings based approach.

But these are likely to err, very heavily, on the side of conservatism. This suggests that many banks need to start building robust internal records of loss given default, so that they can shift to what the regulators have called the "Advanced IRB" approach (one that uses internal data on risk factors such as LGD) as soon as possible. Again, this has considerable implications for bank data gathering and systems initiatives.

The problem of clarity and consistency

So far, we've made this sound as if the practical problems for banks in improving credit risk ratings systems will be largely solved by better data gathering systems and a bit of backtesting. But a lot of the practical and managerial problems for banks will arise out of the need for conceptual clarity and consistency (see Box B).

For example, in assigning an internal risk-rating grade to an obligor, banks will be able to use a mix of financial ratios and judgement, as they do today. But to satisfy the regulators, credit officers might have to link the financial ratio for a particular grade to a "target ratio" wherever the risk factor they are using is quantitative in nature.

Where the risk factor is qualitative in nature, they will have to be able to explain its input in a way that regulators have suggested should be clear and meaningful to an outsider. Similarly, the bank's credit policies will have to make clear how all the various risk factors are combined to award a particular credit grade.

All this sounds like reasonable stuff, and we like to think it's how we operate at CIBC. In Table 1 we list the steps that might be involved in creating an obligor rating in a best-practice risk rating system.

1. Consistent steps to an obligor rating

Step 1: Financial assessment of borrower (initial obligor rating);
Step 2: Analysis of managerial capability of borrower;
Step 3: Borrower's absolute and relative position within industry;
Step 4: Review of quality financial information;
Step 5: Review of country risk.

Step 1, for example, might typically involve:

- earnings and cashflow ratios such as earnings before interest and tax/interest expense and earnings before interest, tax, depreciation and amortisation/interest expense;
- leverage ratios such as current assets/current liabilities, and debt-to-net-worth ratios such as total/liability/equity, or total liabilities and short-term debt versus equity;
- various measures of financial size, financial flexibility and debt capacity.

Step 1 might seem the most important step in producing the obligor rating, but only by applying all the steps in Table 1 to each rating can the bank be sure that all credits are objectively rated using a consistent process. We describe the steps in more detail in our recent book, *Risk Management* (Crouhy, Galai & Mark, 2000).

As part of a distinct process, additional steps can be then be followed to rate a specific credit-risky facility. For example, the bank might examine third-party support, look at the maturity of a particular transaction, review how strongly the transaction is structured or assess the amount and type of collateral.

The importance of distinguishing between the obligor rating and the facility rating in even the Foundation IRB approach, is apparent in the 16 January consultative paper. Banks that hope to move on to the Advanced IRB approach will need to relate their data clearly to other

regulator-sensitive risk factors, especially exposure at default (EAD) and Maturity (M) – the factor for adjusting a facility risk according to the profile of payments through time.

Banks are likely to be drawn to the Advanced approach not only by the chance to use their internal risk statistics in calculations, but also because permission to use the Advanced approach seems likely to be linked by the regulators to more sophisticated considerations of risk mitigation instruments such as credit derivatives and guarantees. (The Foundation IRB approach, on the other hand, will probably be similar to the non-IRB Standardised approach with respect to many of these important details.)

The steps in Table 1, and the distinction between an obligor and a facility rating, will be familiar territory to credit officers at most banks. But have such steps been laid out clearly, and followed consistently, throughout the various divisions and business lines of the bank? Can they be related easily to the regulatory definitions that have taken shape in the January 16 paper? Where is the data stored and is it easily aggregated?

Only clarity and consistency in implementation will allow the bank to relate its relative credit scores to objective loss statistics, and convince the regulator that its internal ratings system is suitable for calculating regulatory capital.

Implications for the future

At CIBC we believe the construction and validation of a robust internal credit risk ratings system is a first step toward sophisticated credit risk management, rather than an end in itself. Sophisticated banks are already building CVaR models for their portfolios that will allow them to capture portfolio effects such as credit correlations and diversification strategies in their risk calculations – and in their calculations for economic risk capital.

It also seems clear, from the pronouncements of regulators during the reform process, and from the second-round consultation document itself, that for the Basle Committee the development of internal ratings paves the way for the adoption of internal CVaR models for regulatory capital calculation, albeit some years into the future.

At CIBC, we are already using a CVaR model to measure the credit risk of our positions in the "large corporate" market. Later this year, we plan to extend this approach to our mid-market credit portfolios. Before long, we would hope to be applying the measure to all of CIBC's major portfolios of credit risk including our retail portfolios.

Our reason for developing the approach, in advance of reform of the rules for regulatory capital, is that we found that we needed a sophisticated measure to allocate economic capital to our credit portfolios. This helps us in our management decisions and in strategies such as securitisation, loan sales and use of credit derivatives. We also use the measure to assess the performance of our loan portfolio.

Summary

So where does this take us in terms of the practical implications of Basle? It seems to us that banks might wish to:

- ensure the basic structure of their internal risk ratings scheme is compliant with the final proposals for amending the Capital Accord. The January 16 second-round consultative document is likely to prove adequate for planning purposes;
- ensure their internal ratings scheme is based on the clear terminology and concepts, and is consistently applied across the bank;
- begin gathering default data, including loss given default and exposure at default data, so that internal ratings and other key risk factors can be backtested; and
- bear in mind that, for an ambitious bank, the type of internal ratings scheme promoted by Basle II is likely to form a platform for more sophisticated measures and portfolio management practices. ■

Other resources

If you are viewing online, you can click through the hyperlinks

Basle Committee on Banking Supervision, "The Internal Ratings-Based Approach", Supporting Document to the New Basel Capital Accord, January 16, 2001, available at www.bis.org/wnew.htm.

Basle Committee on Banking Supervision, Range of Practice in Bank Rating Systems, Models Task Force of the Basle Committee, January 2000, available at www.bis.org, under Press Releases.

Michel Crouhy, Dan Galai and Robert Mark, 2000, *Risk Management*, McGraw-Hill. (Available from Amazon.com).

Federal Reserve, SR letter 98-25, September 1998, [describing Federal Reserve's examination guidance in internal ratings systems at large commercial banks], available at www.federalreserve.gov.

William Treacy, 2000, "Supervisory Standards for Internal Rating Systems", *RMA Journal*.