

# Regulatory Issues on Credit Ratings

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## Introduction

A persistent criticism of the 1988 Basel Capital Accord relates to serious inconsistency between required capital amounts and the true economic risk of the associated assets. In 1999, in response to this criticism, the Basel Committee on Banking Supervision proposed to revise the rules. Two rounds of consultative papers have been issued. These, in turn, have generated extensive feedback from financial institutions, industry associations, consultants, vendors, academics and national regulators. Several issues have emerged:

- ❑ A successful revision with minimal unintended consequences will be far more complicated than first imagined.
- ❑ A fully risk-sensitive framework would be too complex to implement for all but the most sophisticated internationally active banks.
- ❑ Ignoring some common forms of risk mitigation within the capital rules will arouse serious political opposition in certain countries.
- ❑ Different rules for different institutions can lead to regulatory arbitrage opportunities.

This chapter reviews the history and current status of the proposed revision, highlights a number of criticisms and offers some thoughts on likely future developments.

## PROPOSED REVISION OF THE 1988 BASEL CAPITAL ACCORD

Several modifications to the 1988 Basel Capital Accord have been instituted over the years. These include credit treatment for commodity and equity transactions and, most significantly, the 1996 amendment to impose regulatory capital requirements for market risk.<sup>1</sup> Despite these revisions, the current Capital Accord continues to be widely criticised by the banking industry as well as by academics and others. One drawback of the prevailing regime is its one-size-fits-all approach to capital adequacy. It also produces paradoxical incentives resulting in regulatory capital arbitrage.<sup>2</sup> Largely in reaction to these persistent concerns, the Basel Committee on Banking Supervision (the Basel Committee) released for comment a consultative paper in June 1999 that introduced proposals for a new Capital Adequacy Framework.<sup>3</sup> As stated in the 1999 release, the proposed regulatory capital requirements should more accurately reflect the underlying risk. In addition, a particular focus should be given to financial innovations that have developed since the introduction of the original Accord in 1988.

In January 2001, the Basel Committee released the second proposal for the new Capital Accord (known as Consultative Paper No. 2 or CP 2).<sup>4</sup> It modified and

substantially expanded the earlier version of June 1999. Again, the Committee received over 200 comments focusing on potential impacts and incentives. The comments have highlighted many complex and unsolved issues surrounding the proposed revision and underlined the need for another round of consultation.<sup>5</sup> To accommodate this, the Committee first delayed the target implementation date from January 1, 2004 to January 1, 2005 and subsequently pushed it back further to sometime in 2006.

The proposed framework builds on three pillars to assess a financial institution's capital adequacy as shown in Figure 1:

1. *Minimum regulatory capital standards* that are more risk-sensitive than those in the original Basel Accord of 1988 (Basel I);
2. An effective *supervisory review process*; and
3. More effective use of *market discipline* through enhanced public disclosure.

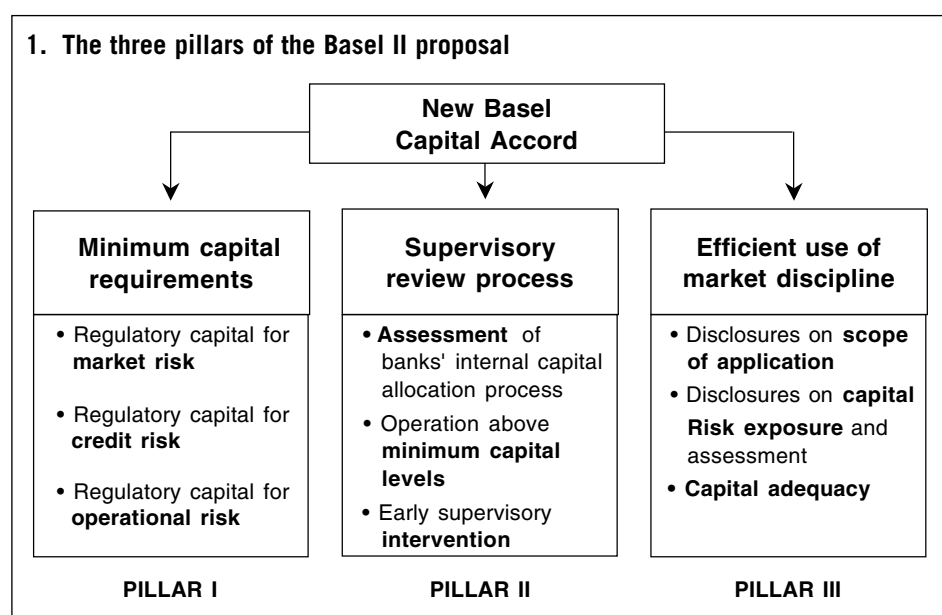
The following sections will focus primarily on Pillar I and the proposed internal ratings-based (IRB) approach to calculating regulatory capital.

#### MINIMUM CAPITAL REQUIREMENTS IN PILLAR I

Pillar I defines the minimum regulatory capital for three different risk categories. Apart from credit risk, which will be treated in a more sophisticated way, and market risk whose treatment remains unchanged, the new Accord proposes a capital requirement for operational risk. For these three risk categories, the existing definition of capital and the minimum requirement of 8% of capital to risk-weighted assets will be applied.<sup>6</sup> The major changes relate to the measurement of the underlying risk itself. Under the 1988 Accord, uniform risk weights are assigned according to the institution type and the country of the borrower. This includes a distinction between corporates, sovereigns and banks. Within these categories, risk weights vary according to membership of the Organisation for Economic Co-operation and Development (OECD) and the maturity of the claim. Under the new framework, the treatment of the various sources of risk is more sophisticated and allows banks to use one of three alternate approaches as shown in Panel 1.

#### OBJECTIVES OF THE IRB APPROACH

The IRB approach is driven by two key objectives. As stated by the Basel Committee, the first objective is additional risk-sensitivity. This is the primary deficiency in the



## 2. Minimum capital requirements under Pillar 1

**Pillar I: Minimum capital requirements****Capital requirements for market risk (unchanged since 1996)**

- Standard approach
- Internal model approach

**Capital requirements for credit risk**

- Standardised approach (modern version of existing approach)
- Foundation IRB approach (new)
- Advanced IRB approach (new)

**Capital requirements for operational risk (new)**

- Basic indicator approach
- Standardised approach
- Advanced measurement approaches (AMA)

**PANEL 1****PILLAR 1 IN THE BASEL II PROPOSAL**

For credit risk, the standardised approach is a modified version of the existing requirement under Basel I. As in Basel I, the risk weights for individual claims are determined by the category of the borrower (sovereign, bank or corporate). However, the determination of sovereign risk weights based on membership in the OECD has been abandoned. Instead, the risk weights are based on external credit ratings.

The second and more sophisticated approach for the treatment of credit risk is the internal ratings-based (IRB) approach.<sup>1</sup> For credit risk, it represents a “fundamental shift in the Committee’s thinking on regulatory capital.”<sup>2</sup> On the other hand, it is a logical extension of the earlier precedent allowing the use of internal models for determining market risk capital requirements. In order to qualify for the IRB approach, several minimum requirements need to be met. Depending on the methods used to evaluate credit quality, banks may choose between two proposed IRB approaches. In both cases the following input figures are needed for risk assessment and capital determination:

- ❑ the *probability of default* (PD) of a borrower or group of borrowers (the key concept on which the IRB approach is built);
- ❑ the *exposure at default* (EAD), which may be a result of borrower decisions or external conditions in the case of market-driven exposures;
- ❑ the *loss given default* (LGD) (expressed as a percentage of the exposure) is an estimate of the proportion of any exposure that will be lost given the borrower’s default; and
- ❑ the *maturity* (M) of exposures.

The first alternative, known as the “foundation approach”, gives more weight to supervisory parameters that are carried over from the standardised approach and less weight to the bank’s own parameters. While the PD is estimated by the bank itself, other inputs would be provided by the national supervisor. If a bank chooses the

second or advanced IRB approach, it determines the whole set of input data. Accordingly, the required standards regarding the assessment of competency and process control are stricter.

For the foundation approach, the exposure at default, the loss severity – also known as the loss given default (LGD) – and the remaining maturity are provided through the application of standardised supervisory rules. Only the PD is determined internally by the financial institution. In the advanced IRB approach, banks provide internal assessments for all four input parameters. The process and methods used to determine these parameters would be subject to supervisory review and validation.

The PD input is calculated by a translation of a bank's internal credit quality rating for the borrower. All such rating systems differentiate between:

- a) good quality assets; and
- b) exposures that show potential weaknesses (however defined).

Both categories are usually sub-divided according to the quality of the borrower or facility on the one hand, and the degree of risk of actually losing money on the other. Basel's "Range of Practice" paper indicated that, across the banks surveyed, the number of grades for performing loans was on average ten, the number for impaired loans was about three, although it has to be noted that in both cases there was wide diversity across banks.<sup>3</sup>

A potential issue is that existing rating schemes often confuse the PD with LGD. The Basel Committee has been quite explicit in its demand that these two aspects of potential loss estimation be kept distinct and separately identifiable.

Essential to the process of estimating a PD are the balance sheets, income statement, and cashflow performance of the borrower. Sometimes formal industry and peer group analysis also plays a significant role in this assessment. Such analysis is provided by internal economic analysis units and/or outside vendors. Other considerations are ownership structure, reputation, quality of financial information and in some instances, the presence of environmental or other liability claims against the borrower. Country risk is almost universally considered for cross-border lending.

All banks take into account facility characteristics such as the purpose of the loan, third party guarantees, collateral and seniority/subordination of the obligation in the decision making process. Guarantees are generally allowed to affect the rating by effectively transferring the risk to the guarantor. In the context of Basel II, these factors primarily affect the LGD. In some cases, where default of a given obligation may be segregated from default of the primary borrower, facility specific factors also may affect the PD. This is where extreme care is needed to avoid a mixing up of the estimate of PD with factors affecting LGD.

Considering the set of minimum requirements to qualify for one of the IRB approaches, the Committee initially expected that upon implementation of Basel II the majority of banks would operate under the modified standardised approach. In addition to the most sophisticated international banks, it is assumed that an increasing number of financial institutions will change to the IRB approach over time. In order to promote this process, the Committee has introduced explicit and implicit incentives in the more sophisticated approaches, especially potential reductions in required capital. Indeed, following consultations, the Committee has revised its estimate of how many major banks are likely to be in a position to adopt the IRB approach by the time the Accord is implemented. Needless to say, their expectations in this regard also have been influenced by the delays in the required implementation date.

Compared to the revised standardised approach, both IRB approaches allow for more far-reaching differentiation among debtors and produce more diverse risk weights. This is intended to produce a substantial increase in risk-sensitivity. On the other hand, banks and supervisors will have to employ sophisticated systems and

methods to support this more flexible approach. Banks implementing an IRB approach will be subject to recurring evaluation and validation by their supervisors in terms of the methods used and the internal controls applied. Supervisors will continue to make a separate assessment of whether the capital charge generated by the IRB approach is commensurate with the bank's risk profile.

In order to reflect financial market innovations, the Basel Committee also proposed special treatment for asset securitisation and credit risk mitigation (ie, risk reduction through collateralisation, guarantees, credit derivatives and netting arrangements).

<sup>1</sup> See Basel Committee on Banking Supervision (2001e), or Basel Committee on Banking Supervision (2001a).

<sup>2</sup> See Spillenkothen (2001), p. 3.

<sup>3</sup> See Basel Committee on Banking Supervision (2000a).

current framework and one of the main causes of regulatory capital arbitrage. The goal is to make regulatory capital requirements based on internal ratings more sensitive to the real drivers of credit risk and economic loss in a bank's portfolio. The second objective is the incentive aspect. The idea is that regulatory capital requirements should encourage banks to strive for continuous improvement of their internal risk management practices.

These objectives support the more general goals of the Capital Adequacy Framework such as safety and soundness of the financial system (minimising the economic and social cost of bank failures) and avoiding misallocation of credit availability due to regulatory rules.

It is clear that the Basel Committee's proposed new standards for calculating minimum capital requirements have the potential to improve substantially the underlying risk-sensitivity. It cannot be guaranteed, however, that financial engineering will not find innovations to undermine the new rules. In particular, the phenomenon of shifting risky positions to more lightly regulated sectors will not disappear.

#### FUNDAMENTAL REQUIREMENTS OF THE IRB APPROACH

A bank becomes eligible to use the IRB approach if it can demonstrate the ability to meet the minimum requirements set by the regulator. These include both the assessment and validation of the inputs provided and the robustness of the banks' internal rating system and the overall credit risk management process. Establishing a framework for credit risk capital requirements that relies on a bank's internal assessment of risk poses a challenge for both banks and supervisors. It is especially important to insure that estimates of risk are meaningful and robust. In this regard, bank and supervisory practices for validation are critical to the successful implementation of the IRB approach. The Basel Committee also notes that market discipline will play a key role in this respect. Specific disclosure requirements are intended to allow market participants to assess key pieces of information on the capital, risk exposures, assessment and management processes, and capital adequacy of banks under the IRB Approach. In summary, the Basel Committee explicitly defines nine broad categories of minimum requirements to qualify for use of the IRB approach. These are described in Panel 2.<sup>7</sup>

#### RELATIONSHIP OF IRB TO THE CREDIT RISK CAPITAL CHARGE

The risk weight for a specific claim under the IRB approach will be a function of the PD, the LGD and the maturity of the credit facility. So far, however, there is no pre-defined formula for calculating the required capital. It can be assumed that minimum capital requirements will be tied to (eg, be a multiple of) the expected loss (EL)

## PANEL 2

**SUMMARY OF MINIMUM REQUIREMENTS TO  
QUALIFY FOR THE FOUNDATION IRB APPROACH**

- 1) Criteria to ensure meaningful differentiation of risk
  - ❑ Banks' rating systems must have two dimensions: the first dimension addresses the risk of borrower default (*counterparty rating*). In addition, a separate and distinct dimension takes into account specific facility factors (*transaction rating*).
  - ❑ Banks' rating systems have a minimum of six to nine borrower grades for performing loans and a minimum of two grades for non-performing loans.
  
- 2) Completeness and integrity of rating assignments
  - ❑ Each borrower within a given portfolio must be assigned a rating before any loan is originated.
  - ❑ Each individual rating assignment must be subject to review or approval by an independent person or a unit.
  
- 3) Oversight of the rating system and process
  - ❑ All essential aspects of the rating and the PD estimation process must be approved internally by the board of directors and senior management.
  - ❑ The bank's internal rating system must be reviewed by the internal audit and the credit risk control groups on a regular basis. Areas of review include adherence to all applicable minimum requirements.
  - ❑ Credit review function: the bank should have an independent credit risk control group that is responsible for the design, implementation and performance of the bank's internal rating system.
  - ❑ Quality of staff: management must allocate sufficient skilled and competent resources to manage and perform these functions.
  
- 4) Criteria and orientation of the rating system
  - ❑ A specific IT-system for rating credit exposures is required. All aspects of the rating system need be thoroughly documented.
  - ❑ A bank also must have a specific process and well-defined criteria for assigning exposures to each given grade. A bank's assessment of risk should be conservative, especially if the borrower's profile suggests uncertainty.
  
- 5) Minimum requirements for the estimation of the PD
  - ❑ For the IRB Approach, banks must be able to estimate one-year PDs for each of their internal rating grades. The estimate of PD must reflect a conservative view of a long-run average PD for the borrower grade. At the same time these estimates are supposed to be forward-looking.
  - ❑ Banks may need to incorporate adjustments on the estimated PDs. Whenever such adjustments are made they must be based on a well-developed and well-documented thought process and analysis. Furthermore, empirical evidence and other historical information such as material change in default frequencies or in the key drivers of future default are essential. Any adjustment must be applied in a conservative and consistent manner.
  - ❑ For the estimation of the PD the Basel Committee proposes three specific techniques:
    - a) internal measurement of default frequency;
    - b) mapping of internal ratings to external data (ie, agency defaults); and
    - c) statistical default models (from external providers).

It is not required that banks use all three techniques at any one time. More than one technique may be applied, however, for credit segments where data quality and depth are poor.

- ❑ In many cases banks will need to use external default data by mapping their internal ratings to agency grades. This implies a number of methodological problems. For instance, the rating criteria may differ in many ways and/or the ratings scales may not be proportional and therefore not comparable.
- ❑ It becomes clear that judgmental considerations can become significant in this process. In order to limit the potential sources of errors, the estimation must meet the following requirements:

- a) banks need to assure that the population of borrowers in the external portfolios used for the estimation remain comparable to those of the contemplated portfolio over time;
- b) in the same way, in building their evolving portfolios of exposures, banks must maintain principles of underwriting and lending that are strongly comparable to those reflected in the external data source;
- c) in addition, the economic or market conditions covering the historical experience must be demonstrably relevant to the current state and to the foreseeable future; and finally,
- d) the number of the loans in the sample and the data period used for estimation are statistically sufficient.

- ❑ Most of these minimum requirements should also be applied for statistical default models. Finally, the Committee states that a time-series of five years is considered as the minimum historical horizon.

#### 6) Data collection and IT systems

- ❑ As the PD is at least in part endogenous, banks need to collect historical data on borrower defaults, rating decisions, rating histories, rating migration and information used to assign the ratings.
- ❑ In addition, it may be valuable to preserve the party/model that assigned the ratings, PD estimate histories, key borrower characteristics and facility information. A solid data model for the capturing and archiving of these inputs is required.

#### 7) Use of internal ratings

- ❑ The Committee states that it does not want banks to develop and use internal rating systems exclusively for capital requirement calculations. A wider application for internal risk management and risk control purposes is expected.

#### 8) Internal validation

- ❑ Internal validation of the rating process and the estimation of PDs is crucial for the application of the IRB approach. It will therefore be a focus of supervisory review. Even if the Committee is not expecting a statistical significance comparable to market risk, the requirements will be rigorous.

#### 9) Disclosure requirements

- ❑ In order to be eligible for the IRB approach, banks must meet the disclosure requirements for the foundation IRB approach set out in Pillar 3. These are minimum requirements and failure to meet them will render banks ineligible to use the IRB approach.

concept. Finally, the bank's capital requirements will also depend on the concentration of a bank's exposures to single borrowers or groups of closely related borrowers. A lack of *granularity* is seen as an important driver of credit risk. As a result, the Basel Committee intends to include a granularity adjustment (G) in the IRB Approach by means of a standard formula applied to all non-retail exposures under IRB treatment.

The determination of risk weights is dependent upon the treatment of unexpected losses (UL). There is a prominent argument that banks should set capital against unexpected losses, while expected loss should be off-set by the pricing of loans in combination with some amount of loan loss provision. However, to take full account of losses arising from unexpected credit events (ie, losses exceeding aggregate EL) banks will have to implement credit portfolio models. Because of the inherent complexity of such models and due to lack of data, the Basel Committee has argued that internal credit portfolio models cannot be used for regulatory capital purposes at this early stage.<sup>8</sup> In the proposed 2001 framework, corporate risk weights are based on calibrating to assessments of EL plus UL.<sup>9</sup> The latter is approximated at a given confidence level by a multiple of EL. The Committee states, however, that developments in portfolio credit risk modelling will be closely monitored to assess its possible use in regulatory capital calculations. A more detailed view of the relationship of ratings to the credit capital charge is given in Panel 3.

#### SCOPE OF APPLICATION: BANK LOANS, SME, RETAIL, CREDIT CARDS

The scope of internal rating systems typically covers corporate exposures as a first priority. Depending on an institution's business lines, however, inclusion of additional categories of exposure may be essential. The work undertaken by the Basel Committee also highlights the basic issues surrounding retail exposures (ie, credit cards, installment loans, revolving credits, residential mortgages and small business facilities). In contrast to corporate exposures, the assessment of the risk of retail transactions need not be based primarily on a traditional rating grade structure. Rather, retail exposures are to be divided into pools of borrowers or transactions with similar risk characteristics supported by a separate risk assessment for each pool. The number and characteristics of a bank's retail segments are therefore seen as more flexible than the borrower (and facility) grades applied to its corporate exposures. Even if no discrete rating of each borrower and assessment of each facility is performed, such segmentation techniques are viewed as consistent with the broad orientation of the IRB framework. Especially for European banks, application of such segment-oriented IRB approaches to small business lending activity will be essential.

The proposals of the January 2001 consultative paper have caused an ongoing discussion on the appropriate treatment of SME (small and medium-sized enterprise) loans under the IRB approach. In June 2001 the Basel Committee announced that further efforts were needed to revise the capital requirements for SME borrowers. As a result of this, in July 2002 the Basel Committee reached agreement on this important issue allowing banks to separately distinguish loans to SME borrowers (defined as those with less than €50 million in annual sales) from those to larger firms.<sup>10</sup> This implies a potential reduction in the required amount of capital by 20%, depending on the size of the borrower. Across an entire portfolio of SME borrowers in the IRB framework for corporate loans, an average reduction of roughly 10% is expected as a result.

Apart from this general reduction of required capital, the national supervisors have received the option to exempt smaller domestic firms (defined as those with less than €500 million in consolidated assets) from the maturity adjustments with respect to the advanced IRB approach or where there is an explicit maturity adjustment in the foundation IRB approach. If the exemption is applied at the national level, exposures to qualifying smaller domestic firms will by assumption have an average maturity of 2.5 years.

## PANEL 3

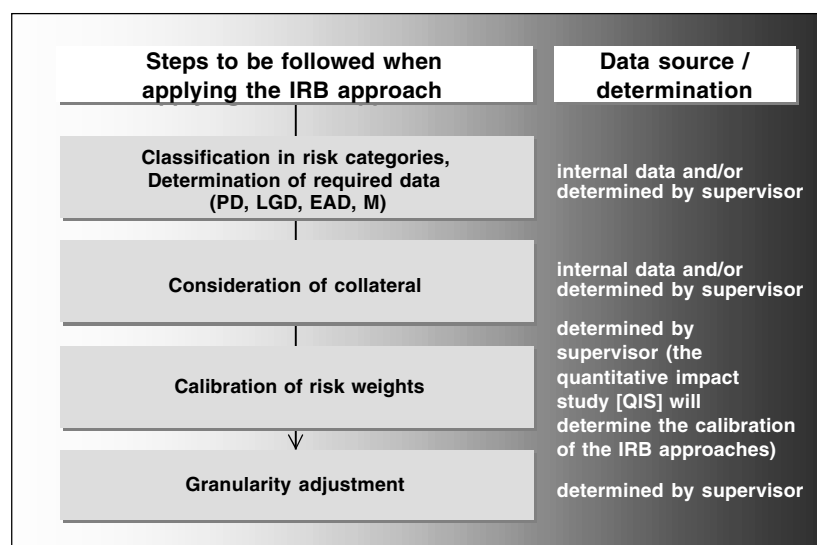
MAPPING OF INTERNAL RISK RATINGS TO  
REGULATORY RISK WEIGHTS

As stated previously, one of the major goals of the Basel II initiative is the introduction of a more risk-sensitive Capital Adequacy Framework to the banking industry. Therefore, the IRB approach is intended to reduce the discrepancy between regulatory capital requirements and the economic capital allocation for credit risk exposures. This idea also implies that the IRB approach should be consistent with well-developed risk management systems currently being used internally by banks to assess their credit risk profile and their respective economic capital level both on a *transaction* and on a *portfolio level*.

Banks' internal measures of credit risk are usually based on assessments of the risk characteristics of both the *borrower* and the *specific type of transaction*. The rating process implies that both the risk of the borrower and characteristics of the facility's structure are being considered. In appraising the borrower, a bank gathers information about its quantitative and qualitative characteristics, compares that information with the standard for each grade, and finally judges on the borrower's creditworthiness by choosing a borrower grade. Alternatively, a comparative process is often applied whereby the rater looks for existing loans with characteristics close to those of the loan being rated and then the rating is set to the grade already assigned to such borrowers.<sup>1</sup>

The previously mentioned components PD, LGD, EAD, and M are the basic inputs to the IRB approach, and therefore will be decisive to calculating capital requirements. When introducing the IRB approach, supervisors are committed to ensure that the key elements of the IRB framework are clearly identifiable, measurable and capable of being verified by both banks and supervisors.<sup>2</sup> Figure a illustrates the required steps to be followed when applying the IRB approach.

## a. Practical application of the IRB approach



When applying the IRB approach, estimates of PD, LGD and in some cases maturity (M) will be mapped into a schedule of *regulatory capital risk weights*. By contrast, in the standardised approach borrowers are assigned to one of five risk weight buckets (0%, 20%, 50%, 100%, 150%) on the basis of standard supervisory treatments taking

into account assessments provided by external rating agencies. The IRB approach provides for a much 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 instead of five discrete risk buckets implied in the standardised approach.<sup>3</sup>

With the introduction of a flexible and risk-sensitive Capital Adequacy Framework, the idea is to give the banks *incentives* to use more sophisticated methods like the IRB approaches. Such an incentive could be a lower capital requirement for a bank's credit portfolio compared to the situation where the standardised approach is being applied. This would compensate the bank for higher costs to develop and maintain a sound and professional rating system and for setting up the environment in which the system is embedded. Therefore, since the introduction of the new capital adequacy framework in 1999, three quantitative impact studies (QIS 1, QIS 2 and QIS 2.5) have been undertaken by the Basel Committee in order to collect bank's position and rating data to calibrate the IRB approaches. This should lead to proper incentives for banks to establish sound risk management practices.

One should keep in mind, however, that designing regulatory approaches to capital adequacy represents a classical trade-off problem: *risk-sensitivity vs simplicity*. While the IRB approach is thought to be more *risk-sensitive*, aligning capital requirements closer to the intrinsic value of credit risk, it will inevitably lead to increased *complexity* (more demanding systems and models, special know-how required, various conceptual and data issues to be addressed, to name a few). On the other side, the standardised approach is thought to be applicable to practically every bank, no matter how small it is or how limited its financial or human resources are. This also has a logical implication: lower risk-sensitivity. Therefore, with respect to the question of incentives, the conclusion must be that no matter how the IRB approaches are calibrated in the end, the final Accord will imply one of two possible outcomes as detailed below.

1. Let us assume that a bank holds credit positions against borrowers with a very good rating and fulfills high standards with respect to the credit risk environment. In this case, an accurate calibration of the IRB approach should lead to significant capital incentives compared to the standardised approach. The more risk-sensitive IRB approach will reflect the bank's moderate level of credit risk and the bank will benefit by having to meet lower capital requirements. Technically speaking, the input parameters (PD, LGD) for the bank's exposures will reflect a low level of risk and will result in risk weights that are *below their equivalents* in the standardised approach.
2. Alternatively, if the bank's counterparties or borrowers have a low creditworthiness (eg below investment grade ratings) then the more risk-sensitive IRB approach will reflect this situation to the disadvantage of the bank (resulting in higher capital requirements) while the standardised approach (because of its limited linkage to risk) will seem to be the more opportunistic choice. In such a case, however, the standardised approach can seriously underestimate the true credit risk of the bank. This may result in not having enough capital to withstand possible defaults, especially during an economic downturn. Again, in the technical sense, the main parameters of the IRB approach (PD, LGD) would reflect a high degree of risk and the resulting risk weights would be higher than those specified in the standardised approach.

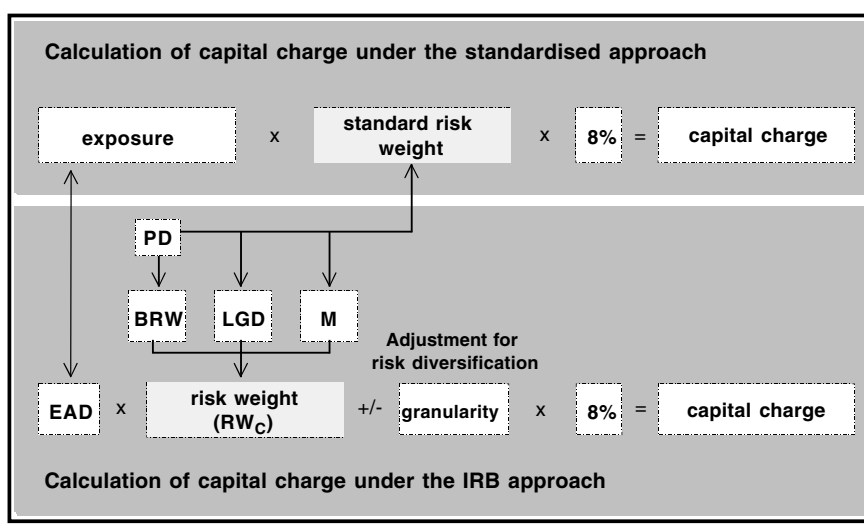
IRB risk weights are based on a specific classification of exposure (corporate, retail, etc) and are derived from a separate continuous function. A risk-weighted asset (RWA) is defined as the risk weight of a transaction multiplied by a measure of exposure for

that transaction. Total risk weighted assets are the sum of individual RWA across all transactions.

The calculation of total RWA for non-retail exposures under the IRB approach follows a two-step process (see also Figure b):<sup>4</sup>

1. The bank computes a *base level of RWA* for the non-retail portfolio. This baseline level is calculated by summing the individual exposures multiplied by their respective IRB risk weights which, in turn, depend on each instrument's PD, LGD, and, where applicable, M.
2. Then the bank's total RWA for the non-retail portfolio is calculated by adding to this base level the *granularity adjustment*, which may be positive or negative, reflecting the degree of single-borrower risk concentrations within the portfolio.

### b. Comparison of standardised and IRB approach

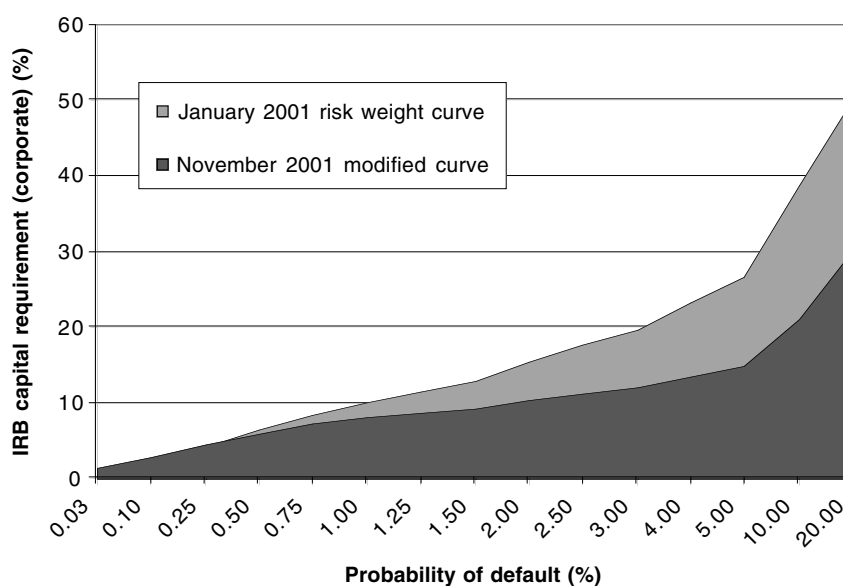


If there is no explicit maturity dimension in the foundation approach, corporate exposures will receive a risk weight (called  $RW_C$  for risk weight, corporate) that depends on PD and LGD (after recognising any credit enhancements from collateral, guarantees or credit derivatives). The average maturity of all exposures will be assumed to be three years. A benchmark risk weight for such corporate exposures ( $BRW_C$ ) will be determined on the basis of this three-year maturity assumption.<sup>5</sup>

In November 2001, the Basel Committee released a paper on potential modifications to the January 2001 proposals.<sup>6</sup> Based on the conclusions drawn from Qualitative Impact Study 2 (QIS 2) (see next section) the Committee introduced a modified risk weight curve for all corporate, sovereign and interbank portfolios. The new modified risk weight curve is generally lower and less steep compared to the January 2001 curve. Figure c illustrates the IRB capital requirement that would be applied to a senior unsecured loan based on the January 2001 risk weight curve and the modified November 2001 curve, respectively.

The level of regulatory capital for each bank will ultimately be determined by the calibration of the IRB approaches. The goal of calibration is to map internal risk ratings to regulatory risk weights in a way that is consistent with the overall goals such as improved risk-sensitivity and incentives for banks to move from the standardised to the IRB approach, *without changing the aggregate capital required for the banking system as a whole*. Therefore, in April 2001 the Basel Committee initiated a quantitative impact study (QIS 2) involving 138 banks from 25 countries across the G10 and beyond. The objective of the study was to gather the data necessary to allow the Committee to gauge the impact of the proposals for capital requirements set out in the

c. Comparison of the original risk weight curve (January 2001) for exposures to corporates and the modified curve (November 2001)



January 2001 consultative paper (CP 2). An earlier, more limited study (QIS 1) had been carried out in 2000. The main results of QIS 2 are shown below and do not include any charge for operational risk:<sup>7</sup>

- ❑ QIS 2 has indicated that the CP 2 proposals for credit risk would lead to an increase in capital requirements for all groups under both the standardised and IRB foundation approaches. According to these findings, the foundation approach would generate higher capital requirements than the standardised, which is contrary to what has been set as a goal to create desired incentives. Therefore, the IRB risk weight curve for all corporate, sovereign, and interbank portfolios has been potentially modified, as discussed in the previous section.
- ❑ Across the G10, minimum capital requirements under the standardised approach for Group One banks would be 6% higher on average than under the Basel I rules.<sup>8</sup> Under the IRB foundation approach, minimum requirements would be 14% higher. Requirements seem likely to be lower under the IRB advanced approach with an average change of -5%.
- ❑ For G10 Group Two banks which would be more likely to use the standardised approach, the average increase in capital would be 1% relative to the Basel I rules.<sup>9</sup>
- ❑ EU banks are similar with increases of 6% and 10% under the standardised and IRB foundation approaches, respectively, but with a smaller change of -1% under the IRB advanced approach. For banks outside the G10 and the EU, the increase under the standardised approach was 5% on average.

Some structural comments help to put these results into perspective:

- ❑ The general increase in credit risk capital requirements under the standardised approach reveals that the proportion of loans in the higher quality rating bands, which benefit from the lower weights, is fairly modest. *For countries outside the US, (eg, Switzerland) the proportion of all companies that are externally rated is quite low.* This leads to the conclusion that many banks will not be able to benefit from the introduction of lower risk weights that are linked to external investment-grade ratings.

- ❑ Under the foundation IRB approach, most of the increase in capital requirements (for G10 Group One banks) comes from the corporate portfolio where requirements increase by 22%. Many of the participating banks attributed this to the steepness of the IRB risk weight curve.
- ❑ In QIS 2, 22 banks provided information on the effect of the IRB advanced approach. Most of these banks reported a decrease in capital requirements. Even here, however, a small number of banks found that capital requirements would increase.

Following up on the results of QIS 2, the Basel Committee has already considered a number of potential modifications to the Capital Adequacy Framework as set out in CP 2. Among these are:<sup>10</sup>

- ❑ Modifications related to the coverage of EL such as allowing use of excess general provisions, specific provisions and margin income (under certain circumstances) to offset IRB capital requirements.
- ❑ Modifications to the proposed treatment of operational risk, including the introduction of advanced measurement approaches (AMA) and the reduction in the proposed target of operational risk capital as a percentage of current minimum capital requirements from 20% to 12% (with a further reduction potentially available under the AMA).
- ❑ Possible modification of the credit risk mitigation framework to address residual risk through Pillar II while eliminating the so-called “w” factor from Pillar I. This factor imposes a minimum proportion of an exposure that must be assigned the risk weight of the original obligor even when the exposure is fully covered by a guarantee or credit derivative written by a more favourably rated entity. The January 2001 proposal did not require this w factor in the advanced IRB approach.
- ❑ Possible introduction of a modified risk weight curve for all corporate, sovereign, and interbank portfolios (as discussed).
- ❑ Greater recognition of less liquid collateral such as physical property and receivables.
- ❑ Modified risk weight curves for both residential mortgage exposures and for other retail exposures.

In November 2001, the Basel Committee conducted a limited quantitative impact study (QIS 2.5) to assess the effect of those potential modifications on the amount of regulatory capital that banks would have to hold under the foundation IRB approach. Given the results of QIS 2, and in light of the objective to ensure that the foundation IRB approach provides a capital incentive relative to current capital requirements, banks were asked to calculate the IRB capital requirements considering the potential modifications discussed above. Among these is also the possible elimination of the granularity adjustment under the IRB Approach.

The most important findings of the QIS 2.5 were:<sup>11</sup>

- ❑ On average across the 38 banks sampled, the credit risk capital requirements for the core portfolios (ie, corporate, sovereign, interbank and retail) declined relative to the current Accord, when the potential modifications are made to the CP 2 proposals.
- ❑ Compared to total current requirements, the relative contribution of each portfolio (corporate: -4%, sovereign: +2%, interbank: +4% and retail -9%) resulted in an overall change in capital requirements amounting to -8% under the IRB foundation approach. This result differs significantly from the conclusions made after QIS 2, with a relative contribution of all portfolios amounting to +14% compared to the total current requirements (portfolio contributions in QIS 2 were: corporate: +14%, sovereign: +3%, interbank: +4% and retail: -7%).

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- ❑ The decrease in capital requirements caused by the possible modifications to the CP 2 proposals was mainly driven by the reductions in corporate portfolio charges. Using the modified corporate risk weight curve (see Figure c), the corporate portfolio contributed a decrease of –4% to the overall result. This makes quite a difference compared to the +14% effect seen under the CP 2 proposals in QIS 2. The capital decrease on the retail portfolios was also significant contributing –9% to the overall capital requirement.
- ❑ For the purpose of illustrating the potential impact of the operational risk capital charge, 10% of current minimum regulatory capital has been assumed to cover operational risk. After including this operational risk charge, overall capital requirements (based on QIS 2.5) are 2% higher compared to the current Accord while this equivalent percentage change under CP 2 (QIS 2) was as high as 24%.

The Basel Committee plans to launch a further quantitative impact study (QIS 3), which will start on October 1, 2002. QIS 3 will allow the Committee to assess the impact of various proposals, before a third consultation paper (CP 3) is published the following year. The survey will involve banks in the G10 and non-G10; including both large, internationally active, diversified institutions as well as smaller more specialised banks. It will encompass results on all three approaches proposed by the Committee – standardised, foundation IRB and advanced IRB – and will analyse the effects of those proposals on all portfolios.<sup>12</sup>

According to the timetable that is available at the time of writing, CP 3 will be issued in the second quarter of 2003. The final Capital Accord could be published in the fourth quarter of 2003, which implies that the Accord will probably be implemented in all involved countries at year-end 2006. During this three-year period banks and their supervisors are expected to develop adequate systems and processes that meet the requirements set by the new Basel Accord.<sup>13</sup>

<sup>1</sup> See Treacy and Carey (1998), p. 905.

<sup>2</sup> See Basel Committee on Banking Supervision (2001e), p. 4.

<sup>3</sup> See Basel Committee on Banking Supervision (2001e), p. 7.

<sup>4</sup> See Basel Committee on Banking Supervision (2001e), p. 31.

<sup>5</sup> See Basel Committee on Banking Supervision (2001e), p. 36.

<sup>6</sup> See Basel Committee on Banking Supervision (2001i).

<sup>7</sup> See Basel Committee on Banking Supervision (2001k), pp. 2–3.

<sup>8</sup> In QIS 2 the so-called Group One banks have been defined as diversified, internationally active banks with Tier 1 capital of at least €3 billion.

<sup>9</sup> Group Two banks are smaller or more specialised banks compared to Group One.

<sup>10</sup> See Basel Committee on Banking Supervision (2001i), pp. 1–2.

<sup>11</sup> See Basel Committee on Banking Supervision (2001m), pp. 2–4.

<sup>12</sup> See Basel Committee on Banking Supervision (2002), pp. 1–2.

<sup>13</sup> See Basel Committee on Banking Supervision (2002), p. 2.

### SUPERVISORY VALIDATION OF BANK'S INTERNAL RATING SYSTEMS AND THE SHARED NATIONAL CREDITS PROGRAM

To be eligible to use the IRB approach a bank must demonstrate to the satisfaction of its supervisor that it meets all the requisite minimum requirements. These requirements fall into nine broad categories, each relevant to a different aspect of the rating and risk measurement process.<sup>14</sup> They are relevant to both the foundation and the advanced IRB approaches. We summarise these nine categories (as seen in Table 1) as follows:

1. meaningful differentiation of credit risk;
2. completeness and integrity of rating assignments;
3. oversight of the rating system and process;

**Table 1. Qualitative and quantitative minimum requirements for foundation and advanced IRB approaches**

	Minimum requirement category	Contents of each requirement category
Foundation IRB approach	1. Meaningful differentiation of credit risk	<input type="checkbox"/> Separate assessment of borrower (or counterparty) and transaction characteristics <input type="checkbox"/> A minimum of six to nine borrower grades for performing loans; <input type="checkbox"/> A minimum of two grades for non-performing loans <input type="checkbox"/> No more than 30% of the gross exposures should fall in any single borrower grade
	2. Completeness and integrity of rating assignments	<input type="checkbox"/> Each borrower must be assigned a rating before any loan is originated <input type="checkbox"/> Each separate legal entity should be separately rated <input type="checkbox"/> Independent review of each individual rating <input type="checkbox"/> Re-rating/review on at least an annual basis <input type="checkbox"/> Effective process to obtain and update relevant information <input type="checkbox"/> Procedure to update rating within 90 days; weak or deteriorating borrowers should be updated within 30 days
	3. Oversight of the rating system and process	<input type="checkbox"/> All material aspects must be approved by the board of directors and the senior management <input type="checkbox"/> Ensure that the rating process, criteria and outcomes are comprehensively documented <input type="checkbox"/> Continuing review to ensure proper operation of the rating system <input type="checkbox"/> Review by internal and external auditors <input type="checkbox"/> Independent credit review function
	4. Criteria of rating system	<input type="checkbox"/> Specific rating criteria for different classes and grades of borrowers <input type="checkbox"/> Conservative assessment of risk <input type="checkbox"/> Taking into account all relevant information <input type="checkbox"/> Variables used in a model must have statistical power and the model should capture all significant variables
	5. Estimation of PD	<input type="checkbox"/> One-year PD <input type="checkbox"/> Use of regulatory reference definition of default <input type="checkbox"/> Documentation of mapping to external data <input type="checkbox"/> Documentation of the use of pooled data <input type="checkbox"/> Length of the underlying historical observation period used must be at least five years
	6. Data collection and IT systems	<input type="checkbox"/> Collection of data in respect to the assignment of borrowers to grades and loss estimates associated with grades <input type="checkbox"/> Rating history <input type="checkbox"/> PD associated with rating grades <input type="checkbox"/> Migration of borrowers through grades over time <input type="checkbox"/> History of estimated PD and default rates <input type="checkbox"/> Key borrower characteristics
	7. Use of internal ratings	<input type="checkbox"/> Internal ratings and quantitative information as integral part of daily credit risk measurement <input type="checkbox"/> Internal rating's essential role in the credit approval process <input type="checkbox"/> Rating must be used within the pricing of credit risk <input type="checkbox"/> Setting of internal limits must be linked to internal ratings <input type="checkbox"/> Internal ratings must be considered in the process of reserving and stress-testing <input type="checkbox"/> Bank must demonstrate that it has been using a compliant rating system for at least three years
	8. Internal validation	<input type="checkbox"/> Robust system to validate accuracy and consistency of rating systems, processes and estimation of PD <input type="checkbox"/> Ongoing periodic monitoring of model performance <input type="checkbox"/> Periodic testing of model outputs against outcomes <input type="checkbox"/> Rigorous change control process <input type="checkbox"/> Banks must demonstrate that the quantitative testing methods and data are consistent over time
	9. Disclosure requirements	<input type="checkbox"/> Disclosure requirements set out in Pillar 3 <input type="checkbox"/> Failure to meet the minimum requirements will render banks ineligible to use the IRB approach
	10. Own estimates of LGD	<input type="checkbox"/> Banks must have several distinct LGD grades which provide for a meaningful differentiation of loss rates <input type="checkbox"/> Criteria for estimation and assignment of LGD grades <input type="checkbox"/> Minimum data observation period of at least seven years <input type="checkbox"/> Adequate consideration of collateral
	11. Minimum requirements for use of own EAD estimates	<input type="checkbox"/> A bank must assign an estimate of EAD for each facility. An estimate of EAD must be forward-looking, but must have some historical grounding <input type="checkbox"/> Criteria by which estimates of EAD are derived must be plausible and intuitive <input type="checkbox"/> Minimum data observation period of at least seven years
	12. Minimum requirements for assessment of guarantors and sellers of credit derivatives	<input type="checkbox"/> Both the borrower and the guarantor must be assigned a rating <input type="checkbox"/> Borrower's risk weight for the exposure may be substituted by the risk weight for the guarantor at its best <input type="checkbox"/> No restrictions with respect to possible guarantors

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4. criteria of rating system;
5. estimation of PD;
6. data collection and IT systems;
7. use of internal ratings;
8. internal validation; and
9. disclosure requirements in support of Pillar 3: market discipline.

Additionally, there are three specific requirements for banks that intend to apply the advanced IRB approach:

10. own estimates of LGD;
11. minimum requirements for use of own EAD estimates; and
12. minimum requirements for assessment of guarantors and sellers of credit derivatives.

Table 1 gives further details concerning each minimum requirement category for the foundation and advanced IRB approaches.

The certification process would be facilitated by supervisory access to independent ratings by various banks of common obligations. At first glance, it would appear that such data have existed in the US for 25 years as a result of what is known as the Shared National Credits Program or SNC (see Panel 4 for details). Unfortunately, on closer examination, the data from this program are not nearly as promising as one might think.

### PANEL 4

## THE SHARED NATIONAL CREDIT PROGRAM

The Shared National Credit Program (SNC) traces its origins to the multiple regulatory agencies that are part of the US financial structure. There are three largely independent agencies at the federal level with responsibility for supervising different banks depending on their charters and other characteristics. These agencies are the Board of Governors of the Federal Reserve System, the Office of the Comptroller of the Currency and the Federal Deposit Insurance Corporation.<sup>1</sup>

The Program's initial purpose was inter-agency coordination to assure that these different supervisors were rating credits consistently, with no one agency being obviously stricter or more lenient in this regard. Another use of the survey that has grown in importance over the years has been to provide consistent time-series of information about the relative strength of commercial banking portfolios in the US. As such, it is a valuable source of macro-economic information.

The Program was established in 1977 and involves an annual survey of loans and other formal credit commitments shared among multiple supervised institutions. Since 1999, the survey has included credits that:

- have an aggregate initial amount of at least US\$20 million; and
- are shared among at least three unaffiliated supervised institutions.<sup>2</sup>

"Supervised institutions" encompass:

- all FDIC-insured banks, their branches, subsidiaries and affiliates;
- both federally licensed and state-licensed US branches and agencies of foreign banks; and
- bank holding companies and their non-bank subsidiaries and affiliates.

Not included in the Program are representative or loan origination offices of foreign banks and foreign offices of US banks.

Among other data, agent banks for shared credits are required to submit their internal credit rating for the facility. The responses are in terms of each bank's own rating scale, but over the years most banks have come to classify their poorer credits in line with the categories defined in the Uniform Agreement On The Classification Of Assets And Appraisal Of Securities Held By Banks.<sup>3</sup> According to these definitions, "classified" loans are those with some condition indicating impairment of the value and reduced likelihood of eventual repayment. These are further divided into the following sub-categories as defined in the instructions:

- ❑ *substandard* – "A substandard asset is inadequately protected by the current sound worth and paying capacity of the obligor or of the collateral pledged, if any. Assets so classified must have a well-defined weakness or weaknesses that jeopardise the liquidation of the debt. They are characterised by the distinct possibility that the bank will sustain some loss if the deficiencies are not corrected."
- ❑ *doubtful* – "An asset classified Doubtful has all the weaknesses inherent in those classified Substandard with the added characteristic that the weaknesses make collection or liquidation in full, on the basis of currently known facts, conditions and values, highly questionable and improbable."
- ❑ *loss* – "Assets classified Loss are considered uncollectible and of such little value that their continuance as bankable assets is not warranted. This classification does not mean that the asset has absolutely no recovery or salvage value, but rather that it is not practical or desirable to defer writing off a basically worthless asset even though partial recovery may be effected in the future."

Credits not designated as "classified", may be defined as falling into a "special mention" category. (This is sometimes referred to as "other assets especially mentioned".) These are defined as "loans that have potential weaknesses that may, if not checked or corrected, weaken the asset or inadequately protect the bank's credit position at some future date". Assets that do not fall into any of the above categories are designated "pass".

<sup>1</sup> Banks with a national charter are automatically members of the Federal Reserve System and are regulated by the Office of the Comptroller of the Currency (OCC). Banks with a charter from one of the 50 states may or may not be members of the Federal Reserve System. The members are regulated by the Board of Governors of the Federal Reserve System. State chartered banks that are not members of the Federal Reserve but that carry Federal Deposit Insurance are regulated by the Federal Deposit Insurance Corporation. A small number of banks are not federally insured and are regulated by supervisory agencies in the state of their charters.

<sup>2</sup> Prior to 1999 the survey also included credits with original amount of at least US\$20 million shared by only two supervised institutions.

<sup>3</sup> See Office of the Comptroller of the Currency (1991), p. 1 of the attachment.

Supervisors can and do compare the internal ratings of agent banks as reported to the SNC Program with the ratings agreed to by the three supervisory agencies. An excessive frequency of misses, or misses for an unusually high proportion of total exposure, will trigger further review of the subject bank's internal credit rating process and methodology.

The most disappointing aspect of the SNC Program is that only the agent banks provide their internal rating for a shared facility. The other participant banks do not do so. It certainly would be possible, in the context of an examination, for a supervisor to pull up the ratings of the subject bank for facilities in which they are participants and compare these to the ratings of the respective agent banks. There is,

however, no systematic record of these participant banks' ratings in the SNC database because they are not reported. The authors also understand from informal sources that there are administrative problems with assembling a consistent authoritative database of the SNC data that are reported. This is largely the result of inter-agency jealousy and lack of effective cooperation.

Clearly, an expansion of the SNC Program to include reporting of participant banks' ratings of shared facilities would greatly enhance the value of the data. Assuming some form of an internal ratings-based approach is ultimately permitted for calculation of regulatory capital, this type of enhanced comparative rating information would be a powerful resource for supervisors. It would serve as a continuing and objective basis for monitoring the rating behaviour of reporting institutions and would very likely play an important role in the review and certification process for internal ratings-based approaches to regulatory capital calculation. Such use of the data also would tend to improve their quality, as respondents began to realise that inputs were being subjected to a systematic review process. Perhaps even more importantly, it would strengthen the ability of supervisors to spot developing problems in a bank's credit culture and force some re-evaluation in a timely manner.

#### IS THIS THE END OF REGULATORY ARBITRAGE?

The crude and risk insensitive character of the current rules has provided many widely discussed opportunities for regulatory arbitrage. These arise when the true economic risk is inconsistent with the regulatory capital charge. This encourages banks to undertake actions that minimise regulatory capital even though they make little or no economic sense. Despite its weaknesses, however, the current regime is simple enough to be applied quite consistently across all institutions. This consistency of the rules has limited opportunities for cross-institutional arbitrage.

In trying to introduce improved risk-sensitivity into the regulatory capital calculation, a significant challenge faced by the Basel Committee is the wide disparity of sophistication and expertise across banks subject to the capital rules. The Committee's understandable response, as we have seen, has been to propose three alternative approaches ranging in sophistication from the standardised approach to the advanced IRB approach. Unfortunately, by providing these alternative methods the January 2001 version of Basel II includes anomalies that do not exist in Basel I. These actually create some dramatic increases in opportunities for regulatory arbitrage that do not exist in the current regime.

The most obvious of these arbitrage opportunities relates to the treatment of non-investment-grade credits under the standardised approach vs the foundation or advanced IRB approach. In the standardised approach the risk weight is either 150% for assets below B- or 100% for assets that are unrated.<sup>12</sup> Under the IRB approach this weight can run as high as 625%.<sup>13</sup> In this case, there is an incentive to shift such low quality assets from institutions using the IRB approach to those using the standardised approach, since the latter will incur a lower regulatory capital charge than the former. This occurs despite the likelihood that the bank using the standardised approach will be less sophisticated and less able to manage the risk or absorb the loss of the low quality asset. Some provision to limit the most serious opportunities for regulatory arbitrage between institutions appears to be necessary before the new rules take effect.

1 See *Basel Committee on Banking Supervision (1996)*.

2 See *Wall and Peterson (1996)*, pp. 1–17.

3 See *Basel Committee on Banking Supervision (1999b)*.

4 See *Basel Committee on Banking Supervision (2001c)*.

5 Downloadable versions of the full text of all comments received by early June of 2001 can be found at <http://www.bis.org/bcbs/cacomments.htm>.

6 See *Basel Committee on Banking Supervision (1988)*, p. 3. As in the past for market risk, operational risk will generate an imputed risk-adjusted asset amount equal to 12.5 times the regulatory capital amount arrived at by other means. Then applying an 8% ratio to these assets results in the original capital requirement.

7 See *Basel Committee on Banking Supervision (2001e)*.

8 For a survey of credit risk models see *Basel Committee on Banking Supervision (1999a)*. For the principles of credit risk management see *Basel Committee on Banking Supervision (1999c)*.

9 See *Basel Committee on Banking Supervision (2001e)*, pp. 40–41.

10 See *Basel Committee on Banking Supervision (2002)*.

11 See *Basel Committee on Banking Supervision (2001c)*, pp. 46–69.

12 See *Basel Committee on Banking Supervision (2001d)*, p. 8.

13 See *Basel Committee on Banking Supervision (2001e)*, p. 33.

#### BIBLIOGRAPHY

**Basel Committee on Banking Supervision**, 1988, “International Convergence on Capital Measurement and Capital Standards” (Basel: BIS).

**Basel Committee on Banking Supervision**, 1996, “Amendment to the Capital Accord to Incorporate Market Risk” (Basel: BIS).

**Basel Committee on Banking Supervision**, 1998a, “Enhancing Bank Transparency – Public Disclosure and Supervisory Information that Promote Safety and Soundness in Banking Systems” (Basel: BIS).

**Basel Committee on Banking Supervision**, 1998b, “Framework for Internal Control Systems in Banking Organisations” (Basel: BIS).

**Basel Committee on Banking Supervision**, 1999a, “Credit Risk Modelling: Current Practices and Applications” (Basel: BIS).

**Basel Committee on Banking Supervision**, 1999b, “A New Capital Adequacy Framework”, Consultative Paper (Basel: BIS).

**Basel Committee on Banking Supervision**, 1999c, “Principles for the Management of Credit Risk” (Basel: BIS).

**Basel Committee on Banking Supervision**, 1999d, “Best Practices for Credit Risk Disclosure”, Consultative Paper (Basel: BIS).

**Basel Committee on Banking Supervision**, 2000a, “Range of Practice in Banks’ Internal Rating Systems”, Discussion Paper (Basel: BIS).

**Basel Committee on Banking Supervision**, 2000b, “A New Capital Adequacy Framework, Pillar 3: Market Discipline”, Consultative Paper (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001a, “The New Basel Capital Accord: An Explanatory Note” (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001b, “Overview of The New Basel Capital Accord”, Consultative Document (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001c, “The New Basel Capital Accord”, Consultative Document (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001d, “The Standardised Approach to Credit Risk”, Consultative Document (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001e, “The Internal Ratings-Based Approach”, Consultative Document (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001f, “Asset Securitisation”, Consultative Document (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001g, “Operational Risk”, Consultative Document (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001h, “Pillar 2 (Supervisory Review Process)”, Consultative Document (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001i, “Principles for the Management and Supervision of Interest Rate Risk”, Consultative Document (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001j, “Pillar 3 (Market Discipline)”, Consultative Document (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001k, “Results of the Second Quantitative Impact Study” (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001l, “Potential Modifications to the Committee’s Proposals” (Basel: BIS).

**Basel Committee on Banking Supervision**, 2001m, “Results of Quantitative Impact Study 2.5” (Basel: BIS).

**Basel Committee on Banking Supervision**, 2002, “Basel Committee Reaches Agreement on New Capital Accord Issues” (Basel: BIS).

**Board of Governors of the Federal Reserve System**, 1991, “Federal Deposit Insurance Corporation Improvement Act”, Washington.

**Estrella, A., S. Park and S. Peristiani**, 2000, “Capital Ratios as Predictors of Bank Failure”, Federal Reserve Bank of New York, Economic Policy Review, July, pp. 33–52.

**European Commission**, 1999, “A Review of Regulatory Capital Requirements for EU Credit Institutions and Investment Firms”, Consultation Document, Brussels.

**Federal Reserve Bank of New York**, 2001, “A Payment Gone Awry: The Example of Bankhaus Herstatt, General Information”, New York (also available at: [www.ny.frb.org/bankinfo/payments/gi\\_part5.html](http://www.ny.frb.org/bankinfo/payments/gi_part5.html)).

**Jones, D.**, 2000, “Emerging Problems with the Basel Capital Accord: Regulatory Capital Arbitrage and Related Issues”, *Journal of Banking and Finance*, No. 1 / 2, pp. 35–58.

**Office of the Comptroller of the Currency**, 1991, “Uniform Agreement On The Classification Of Assets And Appraisal Of Securities Held By Banks”, Banking Circular – 127, Revised April 26.

**Spillenkothen, R.**, 2001, “Summary of the Basel Committee’s ‘The New Basel Capital Accord’, attachment to letter of Richard Spillenkothen”, Board of Governors of the Federal Reserve System, January 23.

**Treacy, W. F., and M. S. Carey**, 1998, “Credit Risk Ratings at Large U.S. Banks”, Federal Reserve Bulletin, Federal Reserve Board, November, pp. 897–921.

**Wall, L. D., and P. P. Peterson**, 1996, “Banks’ Responses to Binding Capital Regulatory Requirements”, Federal Reserve Bank of Atlanta, *Economic Review*, March/April, pp. 1–17.