Range of Practice in Banks' Internal Ratings Systems

**A discussion paper by the
Basel Committee on Banking Supervision**

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Table of contents

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Executive Summary

Range of Practice in Banks' Internal Rating Systems

1.   Purpose of this Report

In its recent *Consultative Paper on a New Capital Adequacy Framework*, the Basel Committee stated that development of an internal-ratings based approach ("IRB approach") to regulatory capital would be a key element in the multi-track effort to revise the Accord. In particular, the Committee noted that a capital regime based on internal ratings can prove to be more sensitive to the level of risk in a bank's portfolio, and can provide incentives for industry-wide improvements in risk management practices, consistent with the objectives set forward for the reform of the Accord. The Committee also noted that internal ratings may incorporate supplementary customer information which is usually out of the reach of an external credit assessment institutions; thus, in offering a parallel alternative to the standardised approach based on internal ratings, the Committee hopes that banks will further refine internal credit risk management and measurement techniques.

In spring 1999, the Committee's Models Task Force received a mandate to embark on a study of banks' internal rating systems and processes, and to evaluate the options for relating internal ratings to a regulatory scheme. (An internal *rating* refers to a summary indicator of the risk inherent in an individual credit. Ratings typically embody an assessment of the risk of loss due to failure by a given borrower to pay as promised, based on consideration of relevant counterparty and facility characteristics. A rating *system* includes the conceptual methodology, management processes, and systems that play a role in the assignment of a rating.) The Models Task Force is currently working towards this effort, consistent with the objectives noted above, by developing an evolutionary structure that moves rapidly toward basing credit risk capital requirements on a bank's internal ratings to the extent that current bank and supervisory practice will allow. The approach further allows for greater risk sensitivity across banks and over time through a series of incremental improvements - to be developed now or in the future - designed to reflect enhancements in banks' risk management practices. This report presents the preliminary findings of the Models Task Force's recent efforts in developing this evolutionary approach – an assessment of the current state of practice in rating systems and processes, and (of equal importance) the range of practices across institutions.

Since receiving its mandate, the Models Task Force has been actively engaged in gathering information about banks' internal rating systems, and assessing both the "best practice" and overall sound practice in this area. As part of its information gathering, in the spring the Models Task Force undertook a survey of around thirty institutions across the G-10, identified by respective national supervisors as having well-developed internal rating systems. The findings of this survey were supplemented by a series of in-depth presentations from banks and other industry practitioners in September and October, and continuing work by individual Models Task Force members.

These findings will clearly guide the Models Task Force's thinking on its further work regarding how an IRB approach to capital requirements might be structured, and the accompanying sound practice standards and guidelines banks will be expected to follow in

order to qualify for the IRB approach.[1] In addition, the Committee believes that these findings have an important bearing on sound practice in credit risk management and on the desirable course of evolution in this field.

The Committee has therefore decided to publish this document at this stage to seek the industry's comments on whether the range of practice identified in the report is truly representative of behaviour, across both banks and countries. In particular, the Committee would welcome feedback on:

- the extent to which the range of practice identified represents "best" or "sound" practice,

- whether important elements of a bank's rating process have been omitted or are given insufficient attention, and

- whether the Models Task Force's preliminary conclusions in respect of some of the elements – for example, the data constraints encountered by many banks in quantifying loss-given-default - are fair and reasonable.

Comments on the report should be sent to the Basel Committee Secretariat, Bank for International Settlements, Basel, Switzerland, CH 4002, by 31 March 2000.

2.   Summary of Findings

The efforts of the Models Task Force have highlighted both the similarities and differences in the structure, methodology, and application of internal rating systems at banking institutions. In particular, while it appears that there is presently no *single* standard for the design and operation of an internal rating system, a small number of alternative approaches emerged from the survey and presentations. In the report, we do not aim to judge the merits of each type of approach, but attempt to evaluate their key elements, and discuss how these processes may, over time, evolve into a well-defined range of sound practices.

The banks covered in our analysis tended to be large, diversified international banks; however, a small number of more specialised institutions was also included. This sample was selected with a view to uncovering the range of potential policy issues and considerations in constructing an IRB approach, such as the range of structures of rating systems, the various extents to which they have developed, the use to which the rating information is put, the type of portfolio rated, and the degree of reliance on expert judgement versus statistical models in assigning ratings. To a considerable extent, these decisions were guided by bank-specific rather than country-specific considerations.

In the following paragraphs, we provide a brief overview of our initial findings on the architecture of the rating systems at these banks:

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[1]   The purpose of this paper is to give a snapshot view of the current state of practice in mid-1999. The Models Task Force recognises that advances in this field are occurring at a fast pace, and , as such, will continue to monitor developments in rating systems and processes in developing and refining the IRB approach to regulatory capital.

- The survey highlighted a considerable number of common elements among rating systems. These include the following: (a) Banks appear to consider similar *types* of risk factors - such as the borrower's balance sheet, income statement, and cash flow performance - when assigning a rating. However, the relative importance of these factors, and the *mix* between quantitative and qualitative considerations, differed between the banks surveyed, and in some cases, between different borrower types within the same bank; (b) regardless of whether banks assign ratings to borrowers, facilities, or both, the vast majority of banks surveyed assign these ratings based on assessment of the counterparty. Those banks assigning grades to individual facilities also consider the degree of risk contributed by the specific characteristics of the transaction being rated, while some institutions assigning only borrower grades appear to be considering facility characteristics when allocating economic capital for credit risk; (c) the information gleaned from ratings is utilised (or expected to be utilised) in broadly similar processes at the banks surveyed, including management reporting, pricing and limit setting.

- While there does not appear to be a *single* standard for the structure and operation of internal rating systems, the survey highlighted a few alternative approaches. These can be viewed as points on a continuum with, at one extreme, systems focussed on the judgement of expert personnel, and at the other, those based solely on statistical models.

- The survey has also highlighted a number of other areas where divergence in bank practice appeared more distinct. These include banks' methods for quantifying loss characteristics per grade. Data constraints also remain a challenge, both to banks' efforts to quantify risk, and, ultimately, to supervisors' efforts to validate banks' internal grades (the survey does suggest, however, that some banks are making progress in collecting and analysing internal data for certain market segments covering the past few years).

3. Key Issues

Based on the information gathered thus far by the Models Task Force, further work and understanding is needed on a number of key issues that have emerged as potentially important in developing an IRB approach to regulatory capital.

- Key measurement uncertainties, together with the differing techniques and data sources used by banks in quantifying loss characteristics, represent a not insignificant source of measurement inconsistency and/or measurement error that will need to be considered explicitly in an IRB framework.

- There appears to be a relatively limited set of data sources and techniques available to banks for use in estimating loss characteristics (e.g., the likelihood that a borrower in a given grade will default on their obligations, the economic loss likely to be experienced should such a default occur, and associated parameters such as the likely level of exposure to that borrower at the time of such default). Moreover, these data sources appear to have potentially quite significant inconsistencies with each other. In particular, it seems clear that differing sources and institutions utilise differing

definitions of "default" and "loss" when recording raw data used to derive measures of the probability of default ("PD") and loss-given-default ("LGD").

- Banks in general appear to have greater difficulty in attributing LGD estimates to their exposures than in assessing the PD of the counterparty. While approximately half of the banks surveyed note that they explicitly consider the risk of the transaction (through a single facility dimension, which reflects both obligor and transaction-specific characteristics, or a two-dimensional rating system that includes both an obligor and facility grade), among those banks, only a small number of institutions appear to have developed a separate LGD rating which explicitly evaluates likely recovery rates for each transaction in the event that a default were to occur.

- Although banks in general take the same set of issues into account in assigning internal ratings, the broadly different approaches used by banks in doing so will probably require different approaches to supervisory review and validation.

- While a number of the banks surveyed have clearly developed advanced risk measurement capabilities, it is less clear in some cases whether the information emerging from these measurement systems is genuinely integral to the risk management of the bank at this time.

4.   Possible Architecture of The Internal Ratings Based Approach

As noted above, the findings in this report will clearly guide the Models Task Force's thinking on its further work in respect of how an internal ratings based approach to capital requirements might be structured, and the accompanying sound practice standards and guidelines it will expect banks to meet in order to qualify for the IRB approach. It is well beyond the purpose of this report to provide details of how such a framework would operate, and indeed proposals for addressing such details are still under development by the Models Task Force and the Committee. Nonetheless, to provide a proper context for the information contained in this report, it is useful to reduce the IRB approach to its basic elements. Based on our current analysis of bank practice, we envisage that the foundation of this architecture would include the following elements:

- A bank's assessment of the risk of default in a borrower, as embodied in its internal rating and the measurable risk characteristics associated with these ratings;

- a system for slotting those exposures within a given bank grade into a regulatory capital bucket based – for most portfolios - on the bank's quantifiable concept of borrower default, as well as loss-given-default and potentially other asset characteristics (which may be estimated by banks or parameterised by supervisors);

- development of a capital charge associated with each regulatory capital bucket based on estimates of its relative riskiness;

- minimum standards and sound practice guidelines for key elements of the rating process, including key characteristics of the rating system and process, and

- a supervisory process for validating this approach, including ways of ensuring that a rating reflects all relevant information on the underlying risk of an exposure, that the process by which it is assigned ensures its integrity, and that the underlying measures of loss are consistent and comparable across banking institutions, countries, and over time.

We intend to build on this foundation to introduce additional features and refinements. Although it may not be possible to introduce all these refinements within the Committee's timeframe for an initial IRB proposal, they could be incorporated over time as bank and supervisory practices allow. Furthermore, some of these elements could be built into the initial structure and process so that as a bank improved its practices, it would become eligible for greater supervisory recognition of these practices. These elements could include:

- increasing the number of dimensions in the architecture to incorporate other asset characteristics;

- breaking the units of measurement in each dimension into finer gradations;

- extending the degree of bank discretion in estimating key inputs as banks demonstrate the adequacy in their data collection and quality, and

- introducing additional refinements for the treatment of complex instruments.

The framework outlined above provides for a progressive, evolutionary approach to capital requirements, similar in nature to the Market Risk Amendment and other aspects of a revised Accord. In formulating an initial approach that acknowledges the current limitations on banks and supervisors, but contemplates recognition of more sophisticated forms of analysing credit risk – both across banks at a given time and through time for a given bank - the Committee believes that this framework will provide incentives for banks to further improve credit risk measurement and management practices. Furthermore, the Models Task Force will pay close attention to ensuring that the structure and requirements of the IRB approach do not impinge upon banks' own well-established lending and credit risk management practices. The Models Task Force believes that would have many undesirable implications, including the risk of reducing internal credit risk management discipline, reducing the incentives for innovation in risk measurement and management, and potentially increasing incentives for regulatory capital arbitrage.

5. Structure of Report

This remainder of the report is structured as follows:

- Part 1 introduces key concepts behind an internal credit risk rating process, and briefly describes possible components for an internal ratings-based (IRB) approach to capital for credit risk;

- Part 2 discusses the range of practice in rating system structure among the banks surveyed, including: (a) the number of rating grades; (b) the focus of the system on the borrower, the facility, or both; (c) the process and methodology by which ratings are assigned, including the degree of reliance on quantitative and qualitative factors,

the use of statistical tools such as scorecards, and the incorporation of credit risk mitigation techniques into the rating process;

- Part 3 reviews the main methods by which banks characterise loss characteristics per grade;

- Part 4 discusses issues related to the consistency of the rating process, including the scope of application of internal ratings;

- Part 5 reviews the uses to which banks put internal ratings, including pricing, compensation, and risk adjusted performance measurement;

- Part 6 highlights key issues related to the oversight and control functions, and

- Part 7 concludes with a discussion of our future steps, and describes certain key issues that will need to be considered as we move forward in developing the details of a possible IRB capital framework.

Part 1: Introduction

1. Definition and uses of rating systems

Internal ratings are a key summary indicator of the risk inherent in an individual credit at the banks surveyed. Ratings typically embody an assessment of the risk of loss due to the default of a counterparty, based on consideration of relevant quantitative and qualitative information. Among surveyed banks, exposures in each internal grade are typically treated as having specific and measurable loss characteristics. Although approaches may vary, in general, these characteristics are:

- the borrower's probability of default (PD);

- the facility's loss given default, (LGD);

- the level of exposure at the time of default (EAD);

- the credit's expected loss (EL), which is a function of these three variables, and

- the unexpected loss (UL) associated with these and possibly other concepts and characteristics relating to borrowers and exposures.

A rating *system* comprises all of the elements that play a role in this process, including the conceptual measure of loss underpinning the system, the methodology for evaluating the risk of an exposure, the responsibilities of key personnel, and the internal uses of rating information.

The survey indicated that there does not appear to be a single or standard approach to credit risk rating systems in the industry. There appear to be a number of reasons that different banks may adopt differing approaches to rating systems, including:

- differing views on the appropriate degree of reliance on quantitative (i.e., measurable) as opposed to qualitative (i.e., difficult to measure) risk factors;

- the importance of each institution's individual credit culture and historical experience, in light of the close connection between rating systems and credit risk management processes more broadly;

- differing judgements regarding the complexity and opaqueness of the risks associated with each transaction;

- differing responses to the inherent difficulties associated with quantifying loss characteristics, and

- the differing risk management and other uses to which ratings information and risk measures are put.

It is our impression that over the past ten years, banks have made substantial progress in improving the architecture of these systems, and in measuring the loss characteristics of the component credits and grades. This information is now used in key areas of the risk management process, such as pricing, limit setting, and reserving decisions. The enhancements to the system architecture are also increasingly driven by attempts to improve risk-based performance management and economic capital allocation.

Based on these considerations, there appear to be several specific areas in which rating systems differ from each other, and that will be important to development of an IRB approach. First, banks may rely on either a one-dimensional rating system or a multi-dimensional system in which different elements of a transaction's risk are graded separately. In a two-dimensional rating system, for example, the underlying counterparty could receive an overall *borrower grade* reflecting its risk of defaulting on any of its obligations, while each loan to a counterparty would receive a *facility grade* based on a combination of borrower and transaction characteristics. Second, the internal process by which a rating is assigned could be oriented largely to broad and subjective criteria as judged by experienced credit staff, or alternatively to explicit and objective criteria such as target levels for specific financial ratios or aggregates. Third, even when specific and objective criteria are applied, these criteria may be implemented through traditional financial analysis or instead through some degree of reliance on formal statistical models.

These and other key considerations in the ratings process are shown in Chart 1. In the following chapters, we will elaborate on each of these key elements.

Chart 1
Risk Rating Processes

Assignment of Ratings

Factors Considered In Rating

Financial Analysis

Industry Analysis

Quality of Financial Data

External Ratings

Analytical Tools/Models

Firm Size/Value

Management

Terms of Facility/LGD

Other Considerations

Ratings Criteria

Written/Formal Elements

Subjective/ Informal Elements (Cultural)

Rater's Own Experience and Judgement

Preliminary Rating Proposed for Loan Approval Process

Relationship Manager and/or Credit Staff

Approval Process (Per Policy) Assigns Final Rating

Risk Rating

Uses of Ratings

Quantitative Loss Characteristics

Portfolio Monitoring

Loan Loss Reserve Analysis

Loan/Business Line Pricing and Profitability analysis

Internal capital allocation Return on Capital Analysis

General Credit Quality Characteristics

Assessing attractiveness of customer relationship

Evaluation of Rater Effectiveness

Administrative and Monitoring Requirements

Frequency of Loan Review

Review Processes

Line/Credit Review

Ongoing review by initial rater

Periodic review of each customer relationship

Aimed at reviewing profitability/desirability as well as condition

Generally conducted by same authorities that approve loans

Watch Processes

Quarterly process focused on loans that exhibit current or prospective problems only

Aimed at identifying best path to improve or exit credit at lowest cost

Conducted by same authorities that approve loans, although others may participate as well (i.e., workout group)

Loan Review

Review of adequacy of underwriting and monitoring from random sample

Sample weighted toward higher-risk loans

Loan Review judgement is "final say"

Negative consequences for initial rater if consistent disagreements

Chart from "*Credit Risk Rating at Large U.S. Banks*," William Treacy and Marc Carey, Federal Reserve Board, November 1998.

11

2.   Basic Architecture of an internal ratings-based approach to capital

An IRB capital would need to draw upon the basic concepts and statistics underlying internal rating systems as described above in a way that is sensitive to variations in risk and is fully consistent with sound lending and credit risk management practices. It is well beyond the purpose of this report to provide details of how such a framework would operate, and indeed proposals for addressing such details are still under development by the Models Task Force. Nonetheless, to provide a proper context for the information contained in this report, it is useful to reduce an IRB approach to regulatory capital to its three most basic elements:

- In order to become eligible for the IRB approach, a bank would first need to demonstrate that its internal rating system and processes are in accordance with the minimum standards and sound practice guidelines which will be set forward by the Basel Committee. These guidelines would ensure the quality, usefulness, and integrity of the key statistics that would form the basis of the bank's capital requirements.

- If a bank's internal processes/systems meet these requirements, the bank would furthermore need to provide to supervisors exposure amounts and estimates of some or all of the key loss statistics associated with these exposures (such as PD) by internal rating grade. Such exposures would include both outstanding balances and (most likely) some percentage of committed but undrawn amounts. Banks would provide information based on their own rating systems, in concordance with minimum standards and sound practice guidelines that would be set forward by the Basel Committee.

- Based on the bank's estimate of the probability of default, as well as estimates of the loss given default and other potential asset characteristics (which may be estimated by supervisors or by banks), a bank's exposures would be assigned to capital "buckets". Each bucket would have an associated risk weight that incorporates the unexpected loss associated with estimates of PD and LGD, and possibly other risk characteristics. The risk weights would be developed by supervisors with the objectives of reflecting the intrinsic risk of the asset or exposure, while at the same time minimising incentives for banks to bias the assignment of internal ratings, or to engage in capital arbitrage.

Part 2: Range of Practice in Rating System Structure

1. Structure of the rating system:

The structure of an internal rating system is influenced by a broad range of factors, including the uses to which the rating information is put, and the bank's policy towards the treatment of impaired assets. Below, we discuss several of the key elements of this structure. We also note that much of the focus of the survey, and the resulting analysis below, reflects our understanding of corporate lending rating schemes. In the coming months, we will build on our understanding of the practices and specific issues that arise in consideration of other portfolios.

Number of Grades for Performing Assets

The survey asked banks to differentiate between *good quality* exposures, as discussed above, and *impaired* exposures, which were defined as assets with potential weaknesses that deserve management's close attention. The answers to these questions are difficult to evaluate, however, as banks appear to have widely varying ideas as to what constitutes potential weaknesses.[2] The average number of grades reported by the banks as covering non-impaired corporate loans is 10, including "auxiliary" grades, that is, "+" or "-" modifiers on some or all grades. The range fell between 2 and 20. In some cases the bank reported that the number of gradations was chosen to facilitate comparison with external rating agency scales, such as those of public rating agencies.[3] The distribution of non-problem grades across the banks is shown in Chart 2:


Chart 2
Number of Non-Impaired Grades

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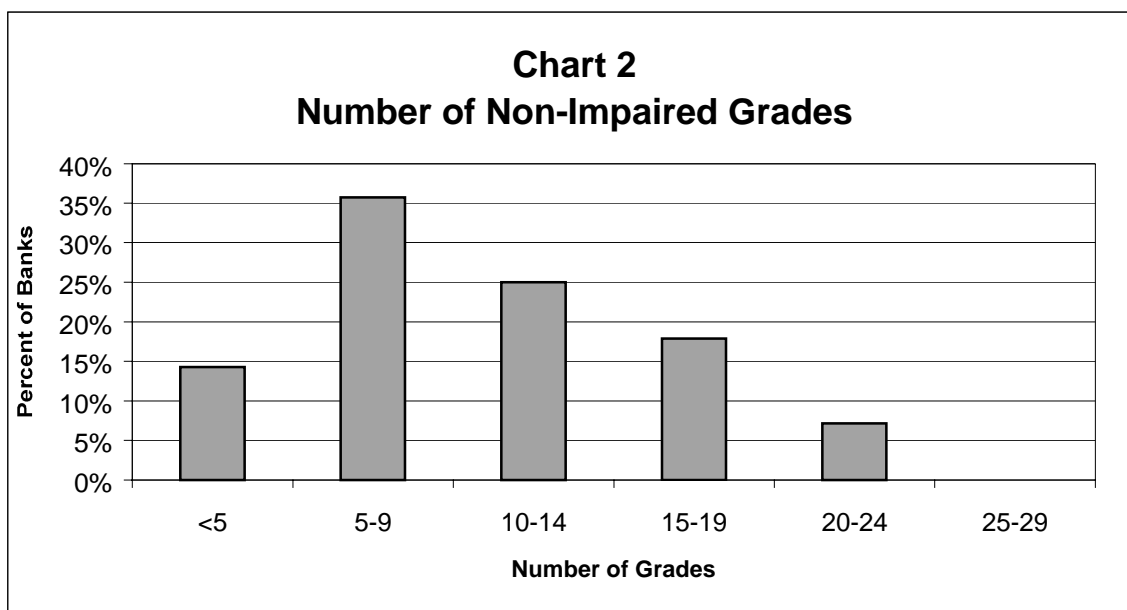
[2] The Basel Committee's Accounting Task Force will be considering these issues in greater detail going forward.

[3] One leading consulting firm advises its clients to adopt a cardinal master scale of at least 10 "performing" grades, and preferably 15-20.
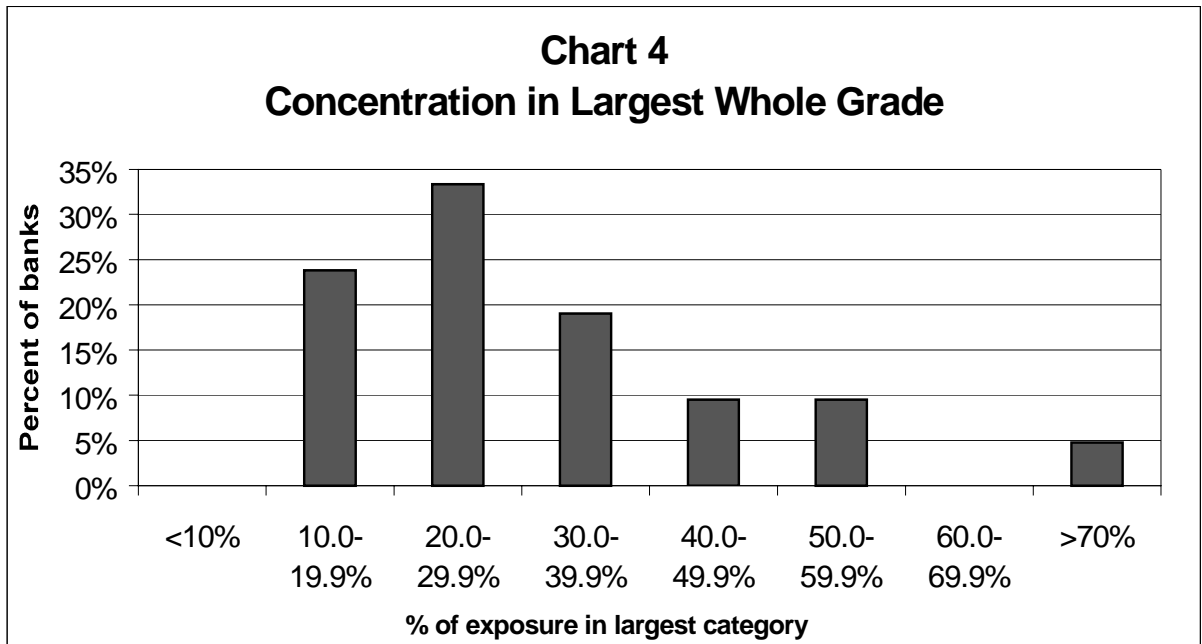
Number of impaired asset grades

Within the surveyed banks, the average number of problem grades was reported to be about 3, ranging from a high of 6 to a low (as reported in the survey) of zero. The distribution is shown in Chart 3 below.

Chart 3
Number of Impaired Grades

(note: one bank indicated it had no problem grades).
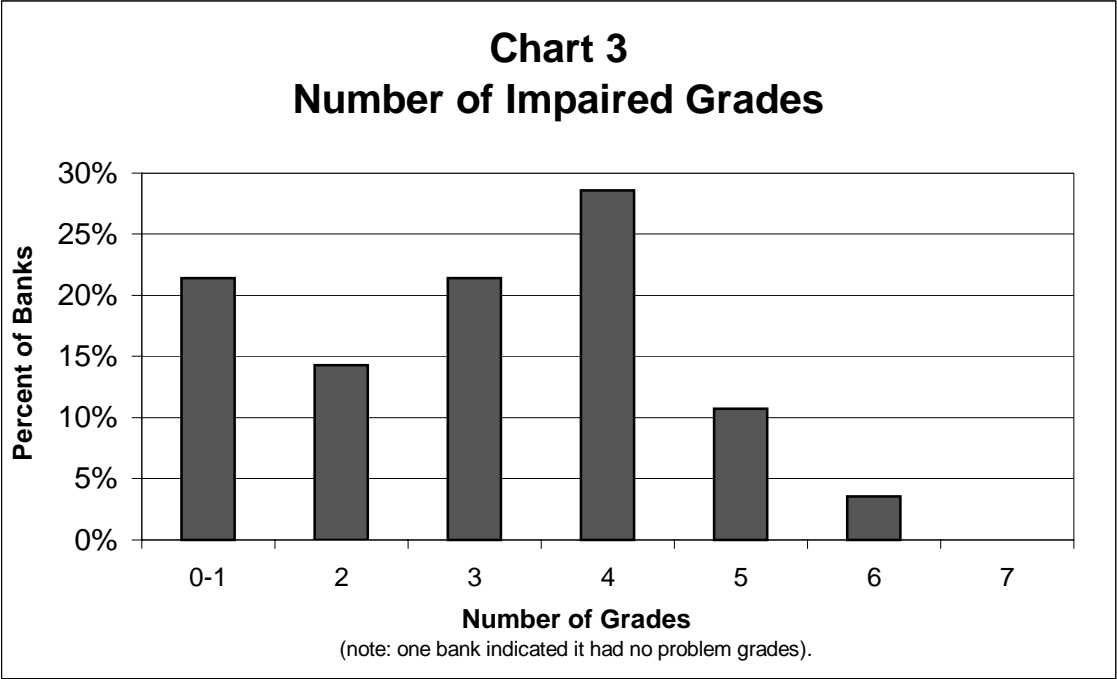
Distribution of exposures among grades

One indication of how well-functioning rating systems differentiate risk within a loan portfolio is the largest percentage of total rated exposures falling in a single grade or grades. On average, the banks surveyed have roughly a maximum of 30% of rated exposure within a single grade. This value ranges from a high of 70% to a low of about 16%, as shown in Chart 4. In most cases banks reported exposure for whole grades only (i.e., not including +/- modifiers). Thus, for the sake of comparability, all banks are shown on this basis.

One can conclude from this information that the majority of banks believe their rating systems are capable of differentiating adequately between risks. Typically, banks with the greatest degree of differentiation appeared to be those using ratings comprehensively in pricing decisions. However, the "appropriate" distribution of exposures among grades for a given bank depends on many factors, including the structure of the loan portfolio, the nature of the exposures in that portfolio and the uses to which ratings are put within the institution's risk management and business processes.

Chart 4
Concentration in Largest Whole Grade

A bar chart titled "Chart 4 — Concentration in Largest Whole Grade." The vertical axis is labeled "Percent of banks" ranging from 0% to 35% in 5% increments. The horizontal axis is labeled "% of exposure in largest category" with categories: <10%, 10.0-19.9%, 20.0-29.9%, 30.0-39.9%, 40.0-49.9%, 50.0-59.9%, 60.0-69.9%, >70%. Bars: <10% (0%), 10.0-19.9% (~24%), 20.0-29.9% (~33%), 30.0-39.9% (~19%), 40.0-49.9% (~9.5%), 50.0-59.9% (~9.5%), 60.0-69.9% (0%), >70% (~5%).

Obligor versus Facility Ratings

A key element of a bank's ratings system structure is to what extent the rating is focused on the characteristics of the borrower (the obligor) as opposed to the specific details of the transaction, or alternatively is intended as a summary indication of risk that incorporates both borrower and transaction characteristics. The decisions a bank has made in this regard are most notably reflected in the type of rating dimensions it has adopted. In some cases, banks may choose to adopt multiple rating dimensions; in such cases, the same loan or exposure might receive a rating for each of the dimensions. These decisions on dimensions in turn guide the institution's selection of specific rating criteria used to assign a grade, which are discussed later in this document.

The overwhelming majority of the banks surveyed have adopted an explicit obligor dimension, that is, they assign a rating that is meant to reflect primarily the risk that the borrower will default on any of its obligations. One-half of the banks surveyed explicitly consider the risk of the transaction. This can be effected through a single facility dimension, which reflects both obligor and transaction-specific characteristics. A small but not insignificant (roughly 20 %) of the banks surveyed had such a system in place.

Alternatively, about one-third of the banks utilise a two-dimensional rating system that includes both an obligor and a facility grade. Under this architecture, facility grades for different loans to the same obligor could differ based, for example, on differences in the collateral taken, seniority, or other structural attributes of these loans. In some cases, surveyed banks indicated that facility grades were based on the relevant obligor grade, adjusted explicitly or implicitly by "notching" the grade higher or lower to reflect the attributes of the transaction in question.

Among those banks with two-dimensional rating systems, a small number appear to assign an obligor rating and a second "LGD" rating that explicitly evaluates likely recovery rates for each transaction in the event that a default were to occur. The remaining banks with two-dimensional systems, and all of the banks with facility-grade-only systems, assign facility

grades based on the overall risk of loss with consideration of both obligor and transaction characteristics.

However, the number of rating dimensions formally used by the bank may not completely reflect actual practice. For example, some banks that claim to assign facility ratings may actually rely primarily on assessment of the borrower, and then evaluate the risk of a transaction only in a fairly mechanistic manner. On the other hand, anecdotal evidence suggests that some banks that claim only to rate the counterparty may implicitly take into consideration the riskiness of the facility for the purposes of pricing, profitability analysis, and in the allocation of economic capital; in such cases, facility-specific LGD is mechanically derived based on the type of loan, the presence and type of collateral, and possibly other factors, in effect, outside of the rating system. Thus, in light of such practices, it appears that only a small minority of banks take no consideration of facility characteristics in their grading processes.

2.   Process of Evaluating Risk

Categories of the Rating Process

The Models Task Force identified three main categories of rating processes: Statistical-based processes, constrained expert judgement-based processes, and expert judgement-based processes. These categories can be viewed as different points along a continuum defined by the degree of reliance on quantitative techniques (such as scoring models), on the one hand, and reliance on the personal experience and expertise of loan and credit officers, on the other hand. As one progresses along this continuum, different risk factors may be considered and different supporting controls and processes appear to be required to maintain the integrity of ratings. These differences do not appear to depend on whether the rating system is oriented solely to the borrower or alternatively considers facility characteristics.

The distinctions between these three categories may be less precise in practice, however, for three key reasons:

- Even in systems in which models drive the assignment of ratings, it is our impression that personal experience plays a role, for example, in the ability of credit assessment or loan review officers to override the assigned ratings. Moreover, personal expertise was presumably a factor in developing and implementing these models, and in constructing their inputs.

- It also appears that banks often use a different mix of these techniques in different market segments (e.g., corporate versus retail).

- The distinction between qualitative and quantitative risk factors, and their importance in each of these three categories, is also not clear-cut in practice. Of the banks surveyed, those characterising the relative importance of qualitative versus quantitative factors fell into a wide range, with reliance on qualitative factors ranging from 60% or more in some cases to very minor in others. However, our impression is that the " true" range is much narrower, suggesting different perceptions of what represents a qualitative versus quantitative factor. For example, in those cases where

survey responses elaborated on this distinction, factors which banks identified as "qualitative" were often in fact measurable quantities, e.g., payment history, management age/experience, industry sector, or geographic location.[4] Furthermore, such "qualitative" factors were, at times, also factors to which a grade or score is assigned (e.g., management capability); these grades are then used as an input to a statistical model such as a scorecard. In general, however, survey responses did not indicate precisely how or to what extent such factors were incorporated into models.

Statistical-based processes

At a small number of banks, a default probability model or other quantitative tool is essentially the sole basis for determining a rating for counterparties/exposures within certain portfolios. Such models may be developed internally or by vendors, and typically include both quantitative (e.g., financial ratios) and some qualitative but standardised (e.g., industry, payment history/credit report) factors. Of the banks surveyed, a small number appear to rely on such tools for their large corporate exposures, while a few appear to rely on such tools for middle market or small business customers.

An example of this is the use of credit scoring models (for our purpose, we include in this category "scorecards", default models, and vendor or consultant models such as those used by KMV CreditMonitor[TM].) These models appeared to comprise a key element in the risk assessment processes at a number of institutions. To construct a model, a bank first identifies the financial variables that appear to provide information about probability of default. Using historical data, the bank estimates the influence of each of these variables on the incidence of default across a sample of loans considered. These estimated coefficients are then applied to data for current loans to arrive at a score that is indicative of the probability of default; the score is then converted into a rating grade. (Note that the actual inputs to these models may be very similar to the quantitative risk factors analysed by a rater in a more judgmentally-based process).

In general, it appears that the statistically-based approaches have a more prominent role in small corporate lending than for middle market or large corporates. The Models Task Force plans to continue its analysis of the structure, assumptions, and conceptual foundations of these models.

Constrained expert judgement-based processes

In contrast to a purely mechanical process, some of the surveyed institutions base their ratings primarily on statistical default/credit scoring models or specified objective financial analysis, but allow those assigning a rating to adjust that rating to an explicitly limited degree based on judgmental factors. In one variant of this approach, a scorecard determines the grade but raters may adjust the final grade up or down by no more than one or two gradations based on judgement. In another variant, quantitative and judgmental factors are explicitly assigned a

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[4] Other examples of qualitative factors include evaluation of future business plans and management competence, while quantitative factors include the ratio of capital to assets. For additional examples of qualitative factors, see Standard and Poor's *"Corporate Rating Criteria"*.

maximum number of "points", thereby effectively limiting the influence of judgmental considerations on the final rating. Around 20% of the banks use this approach for their large corporates, while a similar number reported its use for their middle market and smaller corporates. Although generally not specified in bank survey responses, it is our impression that the constraints on judgement are more severe when such judgement calls for an upgrade to the rating rather than a downgrade; however, it is not clear from the responses how closely these institutions adhere to such constraints.

Processes based on expert judgement

Most of the institutions surveyed reported that ratings are assigned using considerable judgmental elements, where the relative importance given to such elements is not formally constrained. Over half of the banks reported this kind of a process for large corporates, and a similar number noted its use for both middle market and small corporates. Nonetheless, the relative role of statistical models varied widely even across these institutions. A few banks reported that they use no statistical models at all, while several others reported that the statistical model provided a "baseline" rating that can be overridden by raters. Still others reported that tools were only one consideration among many in assigning grades. In all cases based on unconstrained expert judgement, however, the rater has discretion to significantly deviate from statistical model indications in assigning a grade.

3.   Risk Factors considered in assigning grades

Main considerations in assessing borrowers

All banks surveyed consider balance sheet (including liquidity), income statement, and cash flow performance of borrowers in determining a rating. Those banks relying heavily on statistical default models use specific types of financial data (e.g., specific ratios that described leverage, debt service coverage, and the like), while those banks relying on more judgmental analysis may leave much discretion to the rater in how these data are analysed. In a small number of cases, it is clear that even judgmentally-oriented banks have attempted to introduce some standardisation by including explicit guidance ratios in their formal rating criteria.

It is our impression that all banks with largely judgmental systems make use of historical and trend data to some extent in their analysis. A few explicitly stated that three or more years of data are used. In general, those banks relying heavily on models did not describe the extent to which historical (i.e., non-current) financial data on the borrower is incorporated into the default score, although such tools conventionally utilise only the most current observation of each financial piece of information.

Several judgmentally-oriented banks reported that formal industry and peer group analysis play a significant role in assigning ratings. Supporting industry analysis is provided by internal economic analysis units or outside vendors, so that different raters within the same institution would tend to incorporate a common view of the industry's outlook across all borrowers.

Management experience and competence were cited as important considerations by all judgmentally-oriented banks. Those banks relying heavily on models but allowing raters to

override them based on judgmental considerations generally cited management as a key potential basis for such overrides. Other considerations cited by judgmentally-oriented banks were ownership structure, reputation, quality of financial information provided, the purpose of the loan in question, and in some instances the presence of environmental or other liability claims against the borrower. Finally, country risk was almost universally considered using a "sovereign ceiling" rule (where the rating of the counterparty cannot exceed the rating of the sovereign in which it is incorporated or has its principal place of business). In a very small number of cases, banks reported that country (transfer) risk is not considered at all in the rating process.

Main consideration in assessing facilities

All banks take into account facility characteristics in making lending decisions and more generally in their credit risk management processes. Moreover, as noted earlier, nearly all of the banks surveyed explicitly consider facility characteristics (at least to some extent) in assigning a grade to an exposure and/or analysing internal profitability or capital allocations. Facility-specific characteristics so considered by the surveyed banks typically include third-party guarantees, collateral, and seniority/subordination of the obligation.

When facility characteristics are considered, most banks allow guarantees to affect the rating by effectively transferring the risk to the guarantor or, alternatively, using the more favourable of the borrower or guarantor rating (implicitly, assuming a default correlation between parties of one). Collateral is generally also considered as an input in reducing the severity of the loss and thus in improving facility ratings, although in a few cases it reduces the exposure rather than altering the rating. The survey revealed that banks take account of a wide range of both financial (e.g. marketable securities) and physical (e.g. real estate) forms of security. Banks providing facility grades generally did not consider the liquidity of the instrument being rated in assigning that grade, although in some cases the liquidity of collateral (and implications for its value) was considered explicitly.

At a number of banks, the decision to take a provision for loan losses is also considered explicitly as a factor in assigning facility ratings.[5] Separately, most banks noted that they did not take into consideration the variability of loss, or the correlation of risk factors, in assigning ratings. Other factors, such as the maturity of the facility, were not explicitly cited as considerations in the assignment of ratings. However, maturity was often considered in the process of allocating of economic capital for credit risk.

Use of statistical default models

The vast majority of the banks surveyed use a statistical model as part of the rating system or as a tool for monitoring changes in borrower conditions and rating accuracy. As noted earlier, the relative importance of the output derived from such tools versus the importance of expert judgement varies widely across banks. It is our impression that these models rely on similar *inputs* to those described above – i.e., balance sheet ratios, trend analysis, etc. Among banks using internally-developed models, the modelling technique was most often described as

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[5]   In contrast, at a number of other banks, the rating actually dictates the decision to take provisions.

discriminant, logit-based, or based on classic credit scoring techniques. Banks generally reported that these models were constructed using internal data, although in a small number of cases the models were constructed to emulate the decision process of rating agencies such as Standard and Poor's or Moody's. Among vendor-provided models, KMV's CreditMonitor^{TM} was often cited, being used primarily for large corporate and international borrowers. Some banks also referred to the use of other public databases such as the Teikoku Databank in Japan.

Use of external ratings

Essentially all banks indicated that external ratings are considered in assigning internal grades, to the extent that such a rating is available for the borrower in question. Many banks with judgmentally-based systems rely very heavily on these ratings in setting internal ratings: the external rating may either dominate the internal rating or simply serve as the starting point. In one case, the sole exception to a scorecard-based rating rule was if the external rating (or KMV score) was not consistent with the scorecard result: in this case, the external rating would prevail.

Banks indicated that such ratings were rarely available for borrowers other than large corporates and financial institutions, and some banks mentioned that ratings were not as widely available outside North America or the U.K. A small number of other banks indicated that external ratings are becoming somewhat less prominent in the rating process, generally citing the advent of KMV's CreditMonitor^{TM} and other tools as becoming more prominent.

4.   Time Horizon

We asked banks to describe the "time horizon" over which a rating is expected to be valid (i.e., the forecast horizon of the rating). Although the majority of banks described the time horizon as one year, nearly as many characterised this period as extending anywhere from 3 to 7 years, or the maturity of the transaction in question. Those citing one year report that their choice was based on annual financial reporting cycles (bank and borrower), frequency of internal review of the rating, and in some cases the uncertainties of projected performance beyond one year. Those citing longer periods referred to relationship ties with the customer and the need to analyse the full period of the transaction. Several banks described the horizon as ambiguous, or alternatively allow raters to determine the horizon on a case-by-case basis.

When asked to characterise their orientation as " point-in-time" or " through-the-cycle", banks responded in many different ways. In a point-in-time process, an internal rating reflects an assessment of the borrower's current condition and/or most likely future condition over the course of the chosen time horizon. As such, the internal rating changes as the borrower's condition changes over the course of the credit/business cycle. In contrast, a " through-the-cycle" process requires assessment of the borrower's riskiness based on a worst-case, "bottom of the cycle scenario", i.e., its condition under stress. In this case, a borrower's rating would tend to stay the same over the course of the credit/business cycle.

Rating agencies typically claim to utilise a through-the-cycle process, though it is not clear to what extent this is achieved in practice. One major rating agency described its approach as taking a weighted average of various possible scenarios. With respect to bank practice, our assessment of survey responses indicates that bank rating systems generally evaluate the risk

of a borrower or facility on a point in time basis. However, in certain cases, the interaction between the time horizon over which this risk is assessed and quantified, and the technique used, was difficult to establish from survey results. This result probably indicates that banks generally assign a rating on the basis of all relevant information. In particular, they are likely to take into account longer-term negative prospects and unlikely to rely very heavily on long-term projections of improvement in a borrower's ability to repay as a basis for assigning a favourable internal rating. Such a perspective is wholly consistent with sound credit risk management.

Part 3: Measuring Loss Characteristics by Grade

1. Overview

Banks attempt to estimate, or test after the event, the loss characteristics of internal rating grades for a number of reasons, including:

- allowing for more accurate pricing, profitability, and performance analysis;

- monitoring the structure and migration of the loan portfolio;

- assisting in the loan loss reserving process;

- providing an input to portfolio credit risk models and the economic capital allocation process, and

- evaluating the accuracy and consistency of rating criteria (i.e., to determine whether different assets in the same grade have the same loss characteristics).[6]

2. Methods for Estimating Loss Characteristics

Rating systems rely on criteria that are expected to provide information about a borrower's, or facility's, perceived riskiness or loss characteristics. As discussed earlier, the analysis that precedes the assignment of ratings can be based on a general sense of an obligor or facility's credit quality, or be explicitly guided by consideration of a quantifiable loss concept, such as the PD, LGD, or EL associated with a borrower/facility.

The process of inferring the loss characteristics of each rating grade and dimension requires information about borrower and asset characteristics, on the one-hand, and information about historical loss experience that can be used to associate loss characteristics to grades. These requirements can be met in two ways:

- Banks can analyse internal data on the loss experience of various asset classes over a sufficiently long period. It is our impression that banks relying more heavily on default probability and credit scoring models may have made greater progress in estimating loss characteristics based on internal data in the design of the model.

- If a bank has reconciled its own rating grades with those of an external credit assessment institution, such as a rating agency or credit register, then it can use that institution's published data on loss experience. A key consideration in relying on such external data is the comparability of such data to a bank's own portfolio. This is an issue for a number of reasons, including discrepancies between point-in-time and through-the-cycle ratings, differences in the composition of the bank's portfolio, and potential differences between the performance of publicly traded bonds and that of loans.

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[6] For a discussion of the validation of the rating process, please see Part 6.

3.   Survey Results on PD

Although most of the surveyed banks did not have sufficient internal data for specifying loss characteristics for all borrowers based on their own default history, a number relied on internal data for analysing the performance of certain borrower segments, in particular, retail or middle market customers. While the depth and breadth of such data varied, most banks appear to have initiated data gathering efforts over the past 3-5 years.[7] However, due to data constraints, the majority of banks surveyed relied either partially or fully on the data provided by the major rating agencies, public databanks such as national credit registries, or data from consulting companies.

Mapping to external data

As a first step in estimating loss characteristics using rating agency data, banks must assume correspondence between their rating grades and those of the external credit assessment institutions by "mapping" to the grades of the latter. In fact, a few banks appeared to rely on an internal rating scale that mirrors that of the rating agencies, and attempt to develop criteria that are consistent with that scale, in order to have the internal rating process replicate that of the agencies. In these cases, the internal grades could be expected to more closely follow the historical default experience of publicly rated bonds, allowing external default information to be used for the combined portfolio of both externally and internally rated counterparties.

The process of mapping to external rating agency data can be achieved in a number of ways, including comparison of the internal grades assigned to borrowers who have also issued publicly rated bonds, analysis of the financial characteristics of borrowers in internal grades to standard ratios which characterise the agency grades (such indicative data are typically published by rating agencies), and comparison of the definitions and criteria underpinning the internal rating grades to those of the agencies. The judgement of bank personnel also plays a critical role in this process.

Key Considerations in mapping to external data

Importantly, PDs quoted by external rating agencies are calculated as long-term averages for pools of bonds, largely based on the experience of U.S borrowers, but increasingly, those of other countries. The industrial composition of such borrowers too has changed. However, it is clear that factors such as industrial sector, domicile of the obligor and stage of the economic cycle can strongly influence default probability. Also, the historical experience of bonds may not be directly applicable for loans.

Banks were aware of the potential inconsistencies in mapping a rating achieved through a point-in-time analysis to a loss characteristic derived from through-the-cycle analysis. While a number of banks have attempted to adapt the loss characteristics they use to reflect the

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[7]   A number of banks provided information about the size of the samples used in inferring loss characteristics. However, it is difficult to draw conclusions about the adequacy of the sample size without information on the size of the relevant portfolio and on the accuracy of the sampling process. Some thought will need to be given as to what should constitute an adequate sample size and composition.

agencies' through-the-cycle approach, the details on these adjustments were not fully available.

Definition of default and loss

The survey revealed differences in banks' approaches towards the conceptual definitions of default and loss in assigning ratings. The differences in the definitions used in LGD estimates were at times more pronounced than in the definitions of default used in assigning EDF. With respect to the latter concept, differences in bank practice stem from different legal, accounting, and regulatory definitions, as well as bank-specific considerations. The Models Task Force will continue to analyse the degree to which the use of such different definitions of default and loss at banks, and in the data sources used to quantify the loss characteristics of each internal grade, affects the comparability of PD estimates within banks, as well as across banks and countries.

Other considerations

Over the past few years, a considerable number of the banks surveyed have also started to track the migration of loans between rating grades. The uses to which this information is currently put were fairly limited, although a few banks relied on this data in checking the calibration of PD and LGD, and validating the internal consistency of the rating process. One institution also noted the use of migration patterns derived from agency data in determining forward one-year PDs for use in their loan pricing model. Looking forward, a considerable number of banks planned to use these data more extensively.

Statistical default models

At some banks in the survey, estimates of average PDs for each internal grade are produced by taking an appropriate average of individual default-probability estimates for borrowers in a given grade using statistical default prediction models. Such models are built from databases of loss experience (i.e., national credit registers and balance sheet registers) that typically include borrower financial data and that identify which borrowers defaulted. The subsequent presentations suggested that the use of behavioural models, in addition to balance sheet models, might also be on the rise. These default probability models typically posit fixed relationships between relatively small numbers of independent variables and the likelihood of default. The survey indicated that nearly all surveyed banks make use of such models in assigning and/or reviewing the assignment of internal grades. However, a clear finding of the survey is that models play a much more central role in rating decisions in some banks than in others.

4.   Survey Results on LGD

Challenges in estimating LGD

In general, the survey results regarding the quantitative information banks had on LGD and its determinants yielded little detail on LGD estimates for loans of various types, and were

difficult to interpret. This difficulty in interpretation may have stemmed from some ambiguity inherent in the specific survey questions. It may also have reflected the rapidly evolving state of practice at leading-edge institutions.

Nonetheless, some clear findings did emerge from the survey. Only about one-third of banks indicated that they apply facility-specific LGD estimates to their exposures for use in internal capital allocation and/or profitability analysis systems. Included in this group is a relatively small number of banks that, as noted in Part 2, have facilitated such efforts by establishing an explicit LGD rating dimension or estimation model for each exposure.

Among the remaining majority of banks, however, many indicated that they did not at present estimate LGD, possibly because they do not at present operate capital allocation or profitability analysis systems that make use of LGD estimates. A handful of banks specifically indicated that they had attempted to estimate LGD, and LGD volatility, and, after reviewing their findings, placed little confidence in their results. Other banks made references to the potentially large variability of recovery rates as a source of concern in analysing historical data. It was also not clear from the survey results whether the resulting estimates are based on averages observed by banks, or whether considerable elements of professional judgement – as well as some measure of conservatism - are built into the estimates to take account of the limited data available and the inherent volatility which many banks seem to attribute to LGD.

Factors evaluated in estimating LGD

In general, factors noted as important to LGD estimates included:

- borrower attributes (such as the borrower's grade, country of incorporation, size, industrial sector, and other factors which may affect the unsecured value remaining in the defaulted borrower, whether it continues to operate after default or is in liquidation),

- facility characteristics (including the existence of credit risk mitigation techniques such as the seniority of the structure, the realisable value of any collateral taken, and the value of any other forms of credit risk mitigation such as third-party guarantees),

- bank specific characteristics (such as the internal policy towards recovery), and

- exogenous factors (such as the economic cycle).

With respect to secured facilities, banks use a variety of techniques and data sources to arrive at estimates of the value of both financial and physical forms of collateral. Some banks distinguished between 'normal' and 'forced sale' valuations, and one bank went even further, considering 'average' and 'worst-case' forced-sale values. Some banks also request, based on the term of the contract, additional collateral and/or other risk mitigants to maintain the expected recovery ratio. As noted earlier, most banks surveyed reflected the reduction in risk associated with a third-party guarantee by replacing the obligor grade of the underlying borrower with that of the guarantor. A few, however, indicated that they reflect the risk mitigation effects by adjusting the underlying facility's assumed LGD. For credit derivatives, the survey revealed little information about the use and treatment of these instruments in rating systems; the Models Task Force will continue to seek additional insight into this area.

Data and definitional considerations

As regards the data used to quantify LGD, nearly all banks considering LGD in some form rely entirely or in part on data from their own historical records. The time period covered by these data and studies appeared to vary widely across banks. Some banks supplement these internal data with data drawn from external sources, such as studies published by bond rating agencies. Among the external sources cited, most sources referred primarily to loss experience for U.S. or North American borrowers.

As in the case of the use of different definitions of default in quantifying PD, those banks seeking to estimate LGD also retain different definitions of what constitutes "default" as well as "loss", and relied on different assumptions about direct and indirect costs, and the time taken to ultimate workout. These differences stem from different legal and regulatory definitions, as well as different lending practices, such as banks' policy towards recovery. It was clear, however, that the majority of surveyed banks focus on an economic rather than an accounting definition of loss.

Future work

On the whole, the survey responses were insufficient for us to glean a consensus on a common framework or "right" LGD estimate for loans of various types. Over the coming months, we intend to work closely with the industry in developing our understanding, both conceptual and empirical, of the drivers of LGD and how these might best be captured in an IRB approach. Looking forward, we strongly urge banks to collect data on LGD as part of an overall approach to assessing and measuring more systematically the amount of credit risk to which they are exposed.

5. Survey results on EAD

Many of the interpretation issues that were experienced with questions on LGD also arose with respect to EAD. The survey revealed that explicit estimates of exposure at default (EAD) for facilities with uncertain drawdown , such as a standby line or commitment, were typically performed only by those banks using some form of economic capital allocation model. In these cases, EAD is equated to the sum of (1) balances actually drawn and (2) committed but undrawn exposure multiplied by a factor of "x". Key variables reported by banks as having a bearing on the EAD estimate included current outstandings (i.e., how much is drawn), committed funds (i.e., how much might be drawn), facility structure, and borrower ratings (which drive the likelihood of further drawings). In setting this conversion factor for instruments such as commitments, few if any banks seem to make distinctions in terms of maturity.[8]
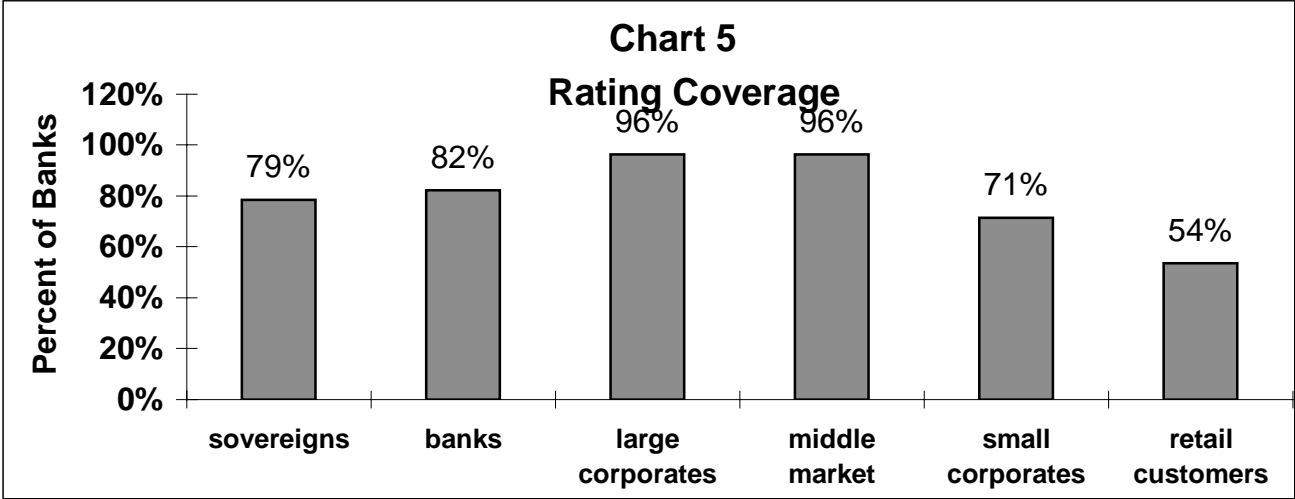
To an even greater degree than with LGD, banks rely heavily on internal data and studies based on their own historical experience in estimating EAD values, and very few external

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[8] Many banks take maturity effects into consideration in assessing the economic capital allocated against a given amount of loan (or loan-equivalent) exposures, rather in determining the conversion factor.

sources of data seem to be available. In many cases the survey responses failed to yield the percentage figures banks attach to certain facilities and counterparty grades, though where they did a range of estimates was revealed. Again, as with LGD, it is our impression that those banks that estimate a facility's EAD for use in internal capital allocation and profitability systems do so based only loosely on historical or statistical analysis, and incorporate substantial elements of business judgement and conservatism into these figures.

Part 4: Consistency

The survey suggested that rating systems are generally used throughout the banking institutions surveyed, including subsidiaries. The degree to which internal ratings were applied to different customer sub-portfolios varied among the institutions surveyed.[9] While the rating coverage of large corporates and banks was generally significant, the survey suggested that small businesses and retail customers were only partially covered by the rating systems. However, the presentations and other anecdotal evidence indicate that many banks do in fact have unique rating scales and systems for retail portfolios. For retail business, a number of banks explicitly reported the application of scorecards instead of other rating methods.[10] Several other banks stated that they rate consumers at an aggregate (e.g., sub-portfolio) level. Both scorecard-users and banks with aggregated retail business ratings are included in Chart 5:

Chart 5
Rating Coverage

Sub-portfolio	Percent of Banks
sovereigns	79%
banks	82%
large corporates	96%
middle market	96%
small corporates	71%
retail customers	54%

With respect to the rating methodology used, about one-third of the banks surveyed reported that they use identical rating methodologies for all sub-portfolios subject to rating. However, some of the banks admitted to specific applications for different customer groups. The rest relied on different methodologies for different books/sub-portfolios/customer groups/subsidiaries.

Even if the rating process differs across sub-portfolios, reconciliation of the outputs of these processes may be eased by the fact that the vast majority of banks state the use of a single internal scale, or the estimation of PDs to all rating categories. The risk quantification of rating categories using PDs has the potential to make diverging rating methodologies less relevant, as, in theory, a reconciliation would be possible using these PDs as a "common currency". However, the accuracy and consistency of the mapping process and of the resultant PDs must still be addressed.

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[9] As noted earlier, much of the discussion in this report is based on our understanding of rating practices in corporate lending portfolios. The Models Task Force is currently expanding on this analysis, and exploring issues related to rating systems and practices in other portfolios.

[10] The Working Group did not ask for specific comments about scorecard applications. It may therefore be that some of the other banks are also using scorecards for parts of their credit portfolio.

Part 5: Applications

Use of rating information

Most of the banks surveyed indicated that rating information is used widely in risk management, management reporting, and the setting of limits and provisions. Increasingly, ratings are also used as a basis for economic capital allocation decisions, and as inputs in more sophisticated performance measurement, portfolio management, and pricing applications.

Chart 6
Rating Usage
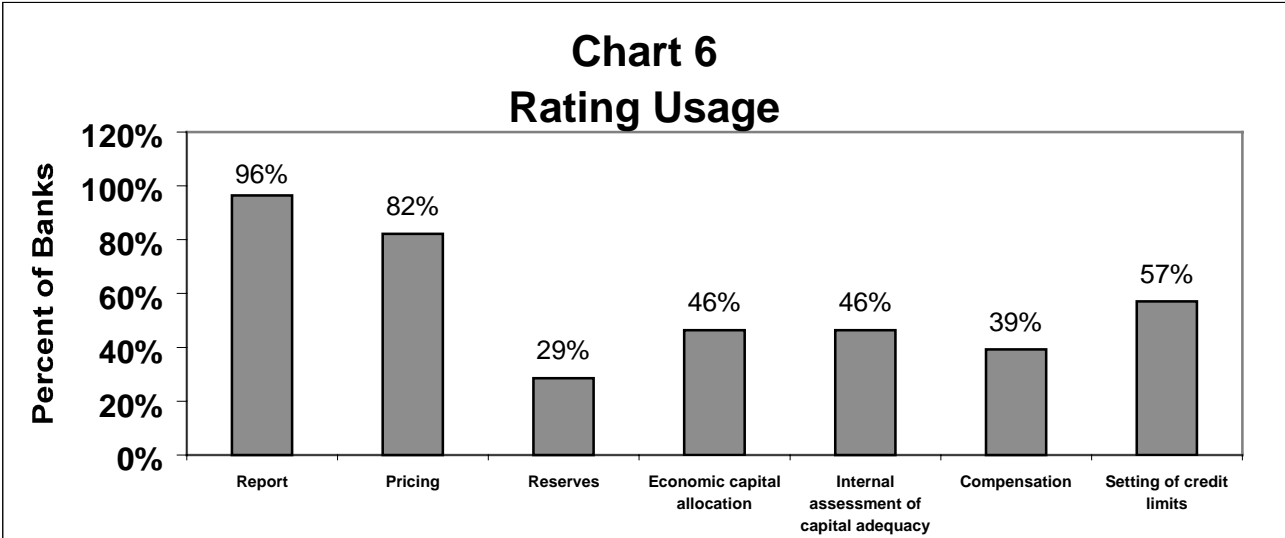
Management reporting

Almost all banks surveyed rely on ratings to construct a summary report to senior management, for the purposes of monitoring the risk composition of the rated portfolios. Such reports typically contain the aggregated exposure for all rating classes and the limits assigned. Furthermore, in some banks, the report contains borrower-specific information, such as major shifts in rating classes for a single customer. This report may also form the basis for decisions regarding the allocation of capital.

Pricing

The vast majority of banks uses rating information for pricing analysis purposes. The types of applications ranged from calculating the cost of funds to assigning grade-specific risk premiums.[11] At some of the more sophisticated institutions, the cost of capital is explicitly considered in pricing decisions. In all cases, these banks calculate the cost of funds and assign grade specific premiums.

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[11] In markets in which banks do not have a leading presence, and therefore display price-taking behaviour, they may be constrained in their use of internal ratings information for pricing purposes.

Decisions on reserve levels

Around one-third of the banks reported that they directly relate the level of reserves to the rating classes. It is our impression that a considerable number of the remaining banks implicitly consider the rating information when determining reserves.

Economic capital allocation

Approximately half of the banks surveyed use rating information for attributing economic capital to products or business lines. Additional risk characteristics beyond those embodied explicitly in the internal rating are also included in the economic capital allocation process: For example, a number of the surveyed banks took into consideration the maturity of the exposure, and the level of concentration in the portfolio, as key factors in allocating economic capital and reporting to management.

At the banks with economic capital allocation systems, exposures in riskier grades (and portfolios with greater overall risk) would typically be associated with a higher cost of capital; this risk adjusted return on economic capital is then considered in the decision to extend an exposure, and in the pricing of the product – i.e., in determining whether products and business lines have achieved corporate return on equity hurdles. Banks also indicated that they consider the sum of this allocated capital in assessing overall capital adequacy; however, it was not clear whether this process was conducted in a systematic manner. The frequency of the calculation is illustrated in Chart 7:

Chart 7
Calculation of internal capital estimates
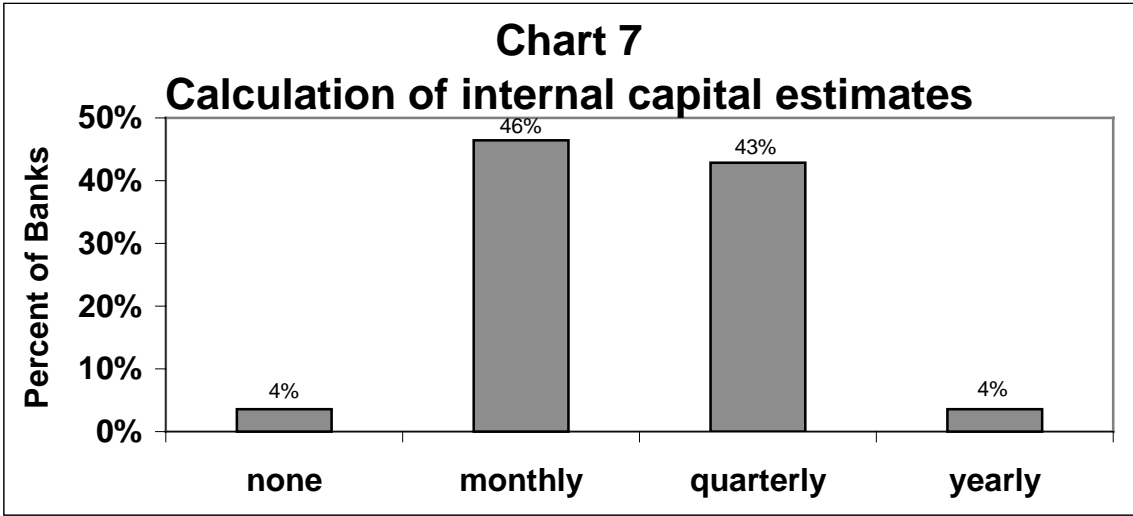
Compensation

The compensation for relationship managers is explicitly based on ratings at around a third of the banks surveyed. A number of banks which calculate risk adjusted return on economic capital on rating information also noted that they base incentive-based compensation on this measure.

Setting of credit limits

More than half of the banks indicated that limits are set based on rating categories. Furthermore, the rating process appears to be well integrated into the credit authorisation process at most of the banks surveyed; in particular, a few banks explicitly noted that loan approval authority is tied to rating categories.

Part 6: Oversight and Control

1. Overview

The questions asked in the survey were, by and large, oriented to the kinds of processes and controls typically required for a rating system that relies heavily on subjective and judgmental evaluation of risk. The key participants in this type of ratings process are relationship managers, credit staff, and loan review staff. As used here, the term "relationship managers" refers to staff who market bank services to customers and are typically compensated in some fashion based on the profitability of those relationships. Credit staff is primarily responsible for approving loans and assigning ratings at the origination of transactions and periodically thereafter. The loan review function (sometimes referred to as credit audit or credit control) is responsible for reviewing loans throughout the portfolio for adherence to bank policies including accurate assignment of ratings.

2. Division of responsibilities

At the banks surveyed, primary responsibility for initially proposing ratings varies widely, often depending on the type of counterparty involved. At all banks surveyed, ratings for large corporates must be approved by credit staff, although the rating may be initially proposed by relationship managers at half of these banks. (Those banks that allow relationship managers to assign grades did not specifically discuss any incentive conflicts this practice may create). For middle market or smaller exposures, it was more common for initial ratings to be proposed by relationship managers, but again in all cases credit staff must approve the ratings. Nearly all banks indicated that credit culture was very important in ensuring accuracy and consistency of rating assignments. All banks indicated that decisions were documented adequately, although few details were provided.

Banks in general provided little information on their loan review units, although a small number of banks indicated that loan review staff reviewed loans on a sampling basis. In these cases, loans were generally drawn more heavily from riskier grades and growing areas of lending concentration. It is our impression that the role of loan review and similar functions might be quite different for those banks relying more heavily on credit scoring models in their rating processes.

Essentially all banks conduct a formal review of each risk rating at least once a year, although it was often not clear who conducted this review. Several indicated that the frequency of review depends on the riskiness of the loan and the collateral. One bank noted it formally reviews loans in higher-quality grades only once every two years. At the other extreme, several indicated that riskier grades are continuously monitored. In addition to formal reviews, many utilise credit scoring models as a monitoring tool to identify exposures whose riskiness may be increasing and thus potentially prompt further review.

3. System development and enhancement

Nearly all banks reported that their systems had been developed internally. Several were developed in co-operation with outside consultants, although in many cases they were

subsequently modified internally. One bank indicated that it had purchased a system from another bank.

Most banks reported recent changes in their rating systems. These ranged from minor changes to significant revisions in the process and methodology behind the system, including the introduction of revised rating scales: in particular, a few banks had recently undergone mergers, causing upheavals in the systems and processes.

Many of the banks emphasised that their systems continue to undergo additional enhancements, and some reported plans to introduce system changes in the near future. These include the addition of new grades, and the adoption of a two-dimensional rating system which provides ratings to both the borrower and the facility. Finally, all banks indicated that their rating systems were extensively documented, and that this documentation was made available to relevant staff.

4.   Validation of Rating Process

Several banks discussed using external sources of data to assist in maintaining the accuracy and consistency of each grade's loss characteristics (PD and/or EL), including historical bond performance by agency grade, PDs provided by vendor models, and other databases of default frequencies. About a third of the banks claimed to perform some degree of backtesting, but provided little additional information on how that was conducted. To the extent that many of these banks conduct backtesting, they indicated that they use the results to modify either the rating process or the PDs associated with each grade; however, some acknowledged that the lack of data limits the statistical reliability of these evaluations.

A few banks described the use of Gini curves to indicate the power of their ratings to discriminate between "good" and "bad" credits, but acknowledged the limitations of their short data histories. To supplement the limited available default data, one major consulting firm reported that it recommends to its clients the use of migration analysis. A number of banks mentioned that, for counterparties that have external ratings, comparisons of these with the banks' internal ratings can provide useful information (although the potential differences between internal and external ratings were acknowledged). Another institution, whose rating system was intended to reproduce the approach taken by an external agency, explained that it compares for its own portfolio the distribution of internal ratings one year prior to default, and the migration behaviour, with those for ratings provided by the external agency. This bank also conducted comparisons of its internal ratings with the outputs of publicly available models such as Alcar, Zeta, and KMV.

Validation of judgement-based processes, and of the judgement-based review processes surrounding the use of statistical models, will need to be oriented to the specificity and completeness of rating criteria, the degree of independence of individuals making judgements from the results of the decision, the degree of independent review of rating decisions, and other such considerations. The Models Task Force will continue its work to understand better these judgmental-based systems and will develop and refine supervisory processes to validate them.

Those banks relying more heavily on credit scoring models often offered little information on the controls and supporting processes in place to maintain rating integrity in this context. In the few cases where such information was provided, banks provided a limited description of

the statistical techniques and data used to develop the models, comparisons of model results with historical default experience reported by rating agencies, and use of model stability testing. Given that these models appear to comprise a key element in rating processes of a number of the banks surveyed, the Models Task Force plans to further explore their structure, inputs, and usage, as well as the role of human intervention and monitoring in assuring the quality of these models.

Part 7: Future Steps

Overview

This survey has highlighted both the similarities and the differences in the structure of internal credit risk rating systems at over 30 predominantly large internationally active banking institutions. In particular, while it appears that there is presently no *single* standard for the design and operation of internal rating systems, a small number of alternative approaches emerged from the survey. Moreover, there appear to be certain elements for which standards and guidance could be developed in consultation with the industry.

In considering this topic, supervisors will need to consider four key policy issues and objectives:

- More closely aligning regulatory capital charges to underlying risk;

- Ensuring that the new supervisory standards provide incentives for banks to continue to refine risk measurement processes;

- Ensuring that banks do not move away from established sound credit management policies, and

- Addressing the degree of comparability of rating systems and their output.

Specific issues arising from the range of practice

The underlying risk factors in the credit arena (i.e., the quality of individual counterparties and their facilities) are, in comparison to those for market risk, particularly challenging to measure and to standardise. These differences stem from the lack of availability of credit risk data, the need for careful case-by-case assessment of individual credits, and the reliance on professional expertise. In order to provide a sound assessment of these considerations, and of the issues related to an IRB scheme, the challenges of the coming months will be to: (a) gain a deeper understanding of certain areas of bank practice; (b) identify the elements for sound practice, where possible, and (c) relate these elements to a regulatory scheme in a manner that ensures accuracy and consistency. Specifically, further work will be undertaken to address the following issues and practices identified in the survey.

- Key measurement uncertainties, together with the differing techniques and data sources used by banks in quantifying loss characteristics, represent a source of measurement inconsistency and/or measurement error that should be considered explicitly in an IRB framework.

- There appear to be a relatively limited set of data sources and techniques available to banks for use in estimating loss characteristics (PD, LGD, and associated parameters such as EAD). Moreover, these data sources may be inconsistent. In particular, it seems clear that data providers and banks utilise differing definitions of "default" and "loss" when recording raw data used to derive PD and LGD.

- Banks in general appear to have had greater difficulty in attributing LGD estimates to their exposures that they have for PD. Possibly reflecting that state of affairs, only a small number of surveyed institutions appear to have developed a separate facility

rating dimension that explicitly represents LGD rather than a crude representation of overall EL.

- Although banks in general take the same set of issues into account in assigning internal ratings, the broadly different approaches used by banks in doing so will probably require different approaches to supervisory review and validation. Market discipline and disclosure can play a role in this process, by bringing about greater consistency among bank practices and further promoting sound practices.

- While a number of the banks surveyed have clearly developed advanced risk measurement capabilities, it is not clear in some cases whether the information emerging from these measurement systems is genuinely integral to the risk management of the bank.