

The Significance of Basel 1 and Basel 2 for the Future of The Banking Industry with Special Emphasis on Credit Information

Abstract

This paper examines the significance of Basel 1 and Basle 2 for the future of the banking industry. Both accords promote safety and soundness in the financial system with Basel 2 utilize approaches to capital adequacy that are appropriately sensitive to the degree of risk involved in a banks' positions and activities. These approaches –and especially the one to measure credit risk- will require information from external credit assessment institution and information collected by banks about their borrowers creditworthiness.

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1. Introduction

The soundness of the banking system is one of the most important issues for the regulatory authorities. There are two main questions facing the regularity authorities regarding this issue: First, How should banking “soundness” be defined and measured? Second, What should be the minimum level of soundness set by regulators?

The soundness of a bank can be defined as the likelihood of a bank becoming insolvent (Greenspan 1998). The lower this likelihood the higher is the soundness of a bank.

Bank capital essentially provides a cushion against failure. If bank losses exceed bank capital the bank will become capital insolvent. Thus, the higher the bank capital the higher is the solvency of a bank. Up until the 1990s bank regulator based their capital adequacy policy principally on the simple leverage ratio defined as:

$$\text{Leverage Ratio} = \frac{\text{Capital}}{\text{Total Assets}} \quad (1)$$

The larger this ratio, the larger is the cushion against failure. The problem with the previous ratio is that it doesn't distinguish between the assets according to its risks. The asset risk of a bank can increase (increase the likelihood of insolvency) and the capital can stay the same if the bank satisfies the minimum leverage ratio. In another word the leverage ratio set *minimum capital ratio*, not a *maximum insolvency probability*.

In 1988 the Basel committee on banking supervision¹ introduced the **Basel 1** accord or the risk-based capital requirements to deal with the weaknesses in the leverage ratio as a measure for solvency. The 1988 Accord requires internationally active banks in

¹ The Basel Committee on Banking Supervision is a committee of banking supervisory authorizations, which was established by the central bank governors of the group of ten countries in 1975.

the G10 countries to hold capital equal to at least 8% of a basket of assets measured in different ways according to their riskiness. The definition of capital is set (broadly) in two tiers, Tier 1 being shareholders' equity and retained earnings and Tier 2 being additional internal and external resources available to the bank. The bank has to hold at least half of its measured capital in Tier 1 form.

A portfolio approach was taken to the measure of risk, with assets classified into four buckets (0%, 20%, 50% and 100%) according to the debtor category. This means that some assets (essentially bank holdings of government assets such as Treasury Bills and bonds) have no capital requirement, while claims on banks have a 20% weight, which translates into a capital charge of 1.6% of the value of the claim. However, virtually all claims on the non-bank private sector receive the standard 8% capital requirement. According to the Basel accord the risk-based capital ratio can be measured as:

$$\text{Risk - Based Capital Ratio} = \frac{\text{Capital}}{\text{Risk - Adjusted Assets}} \quad (2)$$

The 1988 Accord has been supplemented a number of times, with most changes dealing with the treatment of off-balance-sheet activities. A significant amendment was enacted in 1996, when the Committee introduced a measure whereby trading positions in bonds, equities, foreign exchange and commodities were removed from the credit risk framework and given explicit capital charges related to the bank's open position in each instrument Bank of International Settlement (BIS) (2001). Over time the accord has become internationally accepted with more than 100 countries applying the Basel framework to their banking system.

After ten years of implementation and taking in to consideration the rapid technological, financial, and institutional changes happened during this period, many weaknesses appear in the **Basel 1** accord. Because of a flat 8% charge for claims on the private sector, banks have an incentive to move high quality assets off the balance sheet (capital arbitrage) through securitization. Thus, reducing the average quality of bank loan portfolios. In addition to that the 1988 accord do not take into consideration the operational risk of banks, which become increasingly important with the increase in the complexity of bank activities. Also, the 1988 Accord does not sufficiently recognize credit risk mitigation techniques, such as collateral and guarantees. Because of that the Basel Committee decided to propose a more risk-sensitive framework in June 1999. The Objectives of the new accord (**Basel 2**) –as outlined by Basel committee- are:

- Promote safety and soundness in the financial system;
- Enhance competitive equality;
- Constitute a more comprehensive approach to addressing risks;
- Develop approaches to capital adequacy that are appropriately sensitive to the degree of risk involved in a banks' positions and activities; and
- Focus on internationally active banks, and at the same time keep the underlying principles suitable for application to banks of varying levels of complexity and sophistication.

To achieve these objectives the new accord measure the risk-based capital ratio according to the following relation:

$$\text{Risk - Based Capital Ratio} = \frac{\text{Capital}}{\text{Credit Risk} + \text{Market Risk} + \text{Operational Risk}} \quad (3)$$

with different ways to measure each kind of risks. The way the new accord is structured concentrate more in measuring risks face the bank and assessing the probability of insolvency. **Basel 1** Accord set a capital requirement simply in terms of credit risk (the principal risk for banks), though the overall capital requirement (i.e., the 8% minimum ratio) was intended to cover other risks as well². To introduce greater risk sensitivity, **Basel 2** introduces capital charge for operational risk (for example, the risk of loss from computer failures, poor documentation or fraud). Many major banks now allocate 20% or more of their internal capital to operational risk.

Under **Basel 1** individual risk weights depend on a board category of borrower. Under **Basel 2** the risk weights are to be refined by reference to *a rating provided by an external credit assessment institution (such as a rating agency) that meets strict standards* or by relying on *internal rating based (IRB) approaches* where the banks provide the inputs for the risk weights. Both the external credit risk assessment and the internal rating approaches require credit information and minimum requirement the banks have to fulfill it.

In addition to the differences between Basel 1 and Basel 2 in terms of defining and measuring risks, Basel 2 introduce two new pillars the *supervisory review process* and the *market discipline*.

The rest of this paper will be organized as follows: in the next section we will introduce the main characteristics of the new accord. In section three we will discuss the different approaches to measure the credit risk and the operational requirements for each approach. The conclusions and recommendations will be presented in the fourth section.

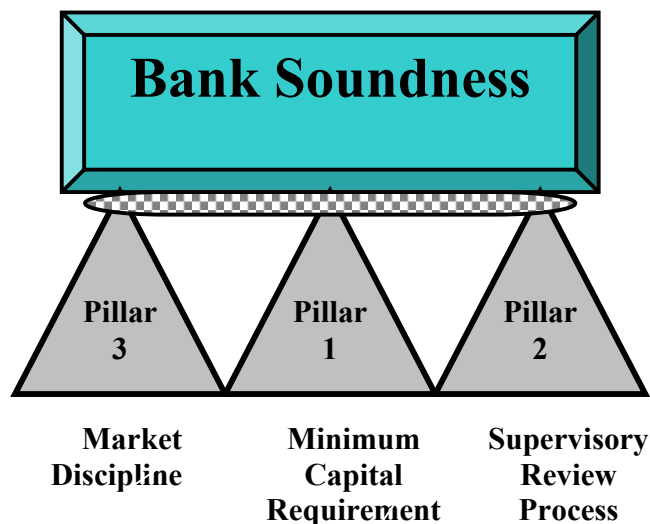
² In 1996, market risk exposures were removed and given separate capital charge

2. Main Characteristics of the New Accord Basel 2

The new accord (**Basel 2**) consists of three pillars:

1. Minimum capital requirement.
2. Supervisory review process.
3. Market discipline.

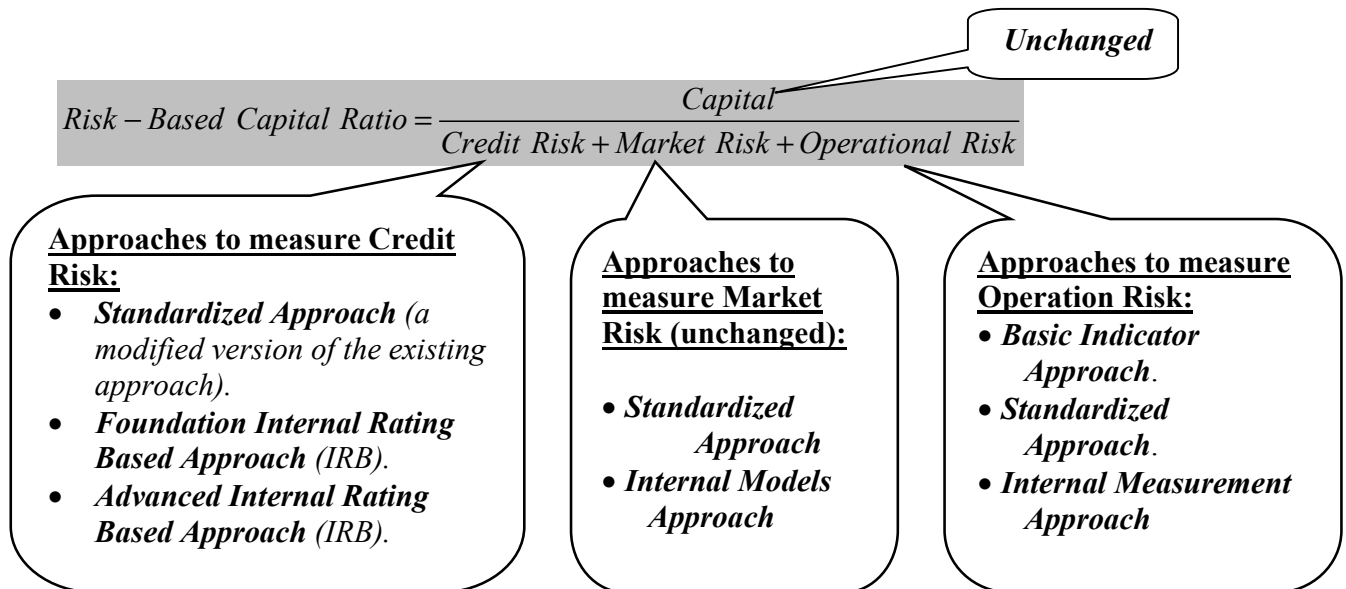
Taken together, the three pillars contribute to a higher level of safety and soundness in the financial system as characterized in the following diagram



2.1 The first Pillar: Minimum capital requirement

The definition of capital in Basel 2 will not modify and that the minimum ratios of capital to risk-weighted assets including operational and market risks will remain 8% for total capital. Tier 2 capital will continue to be limited to 100% of Tier 1 capital. The main changes will come from the inclusion of the operational risk and the approaches to

measure the different kinds of risks. The following diagram summarizes these approaches.



While there were no changes in the approaches to measure the market risk there were fundamental changes in the approaches to measure the credit risk, which we will discuss in section 3. Regarding the operational risk it is introduced for the first time in this accord.

In the standardized approach to credit risk, exposures to various types of counter parties, e.g. sovereigns, banks and corporates, will be assigned risk weights based on assessments by external credit assessment institutions. To make the approach more risk sensitive an additional risk bucket (50%) for corporate exposures will be included. Further, certain categories of assets have been identified for the higher risk bucket (150%).

The “foundation” approach to internal ratings incorporates in the capital calculation the banks’ own estimates of the probability of default associated with the obligor, subject to adherence to rigorous minimum supervisory requirements. Estimates

of additional risk factors to calculate the risk weights would be derived through the application of standardized supervisory rules. In the “advance” IRB approach, banks that meet even more rigorous minimum requirements will be able to use a broader set of internal risk measures for individual exposures.

2.2 The Second Pillar: Supervisory Review Process

In **Basel 1** the risk weight were fixed and the implementation of the accord was straightforward. In **Basel 2** the bank can choose from a menu of approaches to measure the credit, market and operational risks. This process of choosing the approach requires *the review* of the availability of the minimum requirements to implement the approach. In addition to that, in IRB approaches the risk weight is computed from inputs from the bank (like the probability of default). It is necessary in this case to make sure that the bank inputs are measured or estimated in an accurate and robust manner. Basel committee suggests four principles to govern the review process:

Principle 1: Banks should have a process for assessing their overall capital in relation to their risk profile and a strategy for maintaining their capital levels.

Principle 2: Supervisors should review and evaluate banks’ internal capital adequacy assessments and strategies, as well as their ability to monitor and ensure their compliance with regulatory capital ratios. Supervisors should take appropriate supervisory action if they are not satisfied with the results of this process.

Principle 3: Supervisors should expect banks to operate above the minimum regulatory capital ratios and should have the ability to require banks to hold capital in excess of the minimum.

Principle 4: Supervisors should seek to intervene at an early stage to prevent capital from falling below the minimum levels required to support the risk characteristics of a particular bank and should require rapid remedial action if capital is not maintained or restored.

2.3 The Third Pillar: Market Discipline

The third pillar in **Basel 2** aims to bolster market discipline through enhanced disclosure by banks. Effective disclosure is essential to ensure that market participants can better understand banks' risk profiles and the adequacy of their capital positions. The new framework sets out disclosure requirements and recommendations in several areas, including the way a bank calculates its capital adequacy and its risk assessment methods. The core set of disclosure recommendations applies to all banks, with more detailed requirements for supervisory recognition of internal methodologies for credit risk, mitigation techniques and asset securitization.

3. Measuring Credit Risk and Credit Information requirements

3.1 The Standardized approach for credit risk

The standardized approach is conceptually the same as the present Accord, but it is more risk sensitive. The bank allocates a risk-weight to each of its assets and off-balance-sheet positions and produces a sum of risk-weighted asset values. A risk weight of 100% means that an exposure is included in the calculation of risk weighted assets at

its full value, which translates into a capital charge equal to 8% of that value. Similarly, a risk weigh of 20% results in a capital charges of 1.6%. Because of its simplicity it is expected that it will be used by a large number of banks around the globe for calculating minimum capital requirements.

Under **Basel 1** individual risk weights depend on the board category of borrower (i.e. sovereigns, banks or corporates). Under **Basel 2** the risk weights are to be refined by reference to *a rating provided by an external credit assessment institution (such as a rating agency) that meets strict standards*. For example, for corporate lending, the existing Accord provides only one risk weigh category of 100% but the new Accord will provide four categories (20%, 50%, 100% and 150%)³. The following table illustrates the relation between the risk weights and credit assessment for corporate lending.

Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	Unrated
Risk Weights	20%	50%	100%	150%	100%

Banks' exposures to the lowest rated corporates are captured in the 150% risk-weight category. 150% risk-weight can be assigned for example to unsecured portions of assets that are past due for more than 90 days, net of specific provisions. Similar frameworks for sovereigns and banks credit risk weighs will be applied.

For bank's exposures to sovereigns⁴, the **Basel 2** proposes the use of published credit scores of export credit agencies (ECA) and developed a method for mapping such ratings to the standardized risk buckets.

³ In a suggested simple form for the foundation method one can use for corporate risk weight of 100% if the external credit assessment will not be available.

⁴The term "sovereigns" includes sovereign governments; central banks and public sector entities treated as sovereign governments by the nations supervisor.

3.1.1 Operational requirements for the standardized approach

In the standardized approach, national supervisors will not allow banks to assign risk weight based on external assessments in a mechanical fashion. Rather, supervisors and banks are responsible for evaluating the methodologies used by external credit assessment institutions (ECAI) and the quality of the ratings produced. The supervisors will use the following six criteria in recognizing ECAs as outlined by Basel committee:

- **Objectivity.** The methodology for assigning credit assessments must be rigorous, systematic, and subject to some form of validation based on historical experience. Moreover, assessments must be subject to ongoing review and responsive to changes in financial condition. *Before being recognized by supervisors, an assessment methodology for each market segment, including rigorous back testing, must have been established for at least one year and preferably three.*
- **Independence:** An ECAI should be independent and should not be subject to political or economic pressures that may influence the rating.
- **International access/Transparency:** The individual assessments should be available to both domestic and foreign institutions with legitimate interests and at equivalent terms. In addition, the general methodology used by the ECAI should be publicly available.
- **Disclosure:** An ECAI should disclose the following information: its assessment methodologies, including the definition of default, the time horizon

and the meaning of each rating; the actual default rates experienced in each assessment category; and the transitions of the assessments, e.g. the likelihood of AAA rating becoming AA over time.

- **Resources:** An ECAI should have sufficient resources to carry out high quality credit assessments.
- **Credibility:** To some extent, credibility is derived from the criteria above. In addition, the reliance on an ECAI's external credit assessments by independent parties (investors, insurers, trading partners) is evidence of the credibility of the assessments of an ECAI.

Banks may elect to use a subset of the ECAI assessments deemed eligible by their national supervisor, though the assessments must be applied consistently for both risk weighting and risk management purposes. The requirement is intended to limit the potential for external credit assessments to be used in a manner that results in reduced capital requirements but is inconsistent with sound risk management practices.

Basel 2 address also practical considerations, such as the use of multiple external credit assessments, issuer versus issue assessments, short-term versus long-term assessments and unsolicited assessments.

3.2 Internal ratings-based approach (IRB)

The IRB approach provides a similar treatment for corporate, bank and sovereign exposures, and a separate framework for retail, project finance and equity exposures. For each exposure class, the treatment is based on three main elements: *risk components*, where a bank may use either its own or standardized supervisory estimates; *a risk-weight*

function which converts the risk components into risk weight to be used by banks in calculating risk-weighted assets; and a set of *minimum requirements* that a bank must meet to be eligible for IRB treatment.

3.2.1 Risk Components

The IRB framework for *corporate, sovereign and bank exposures* builds on current best practices in credit risk measurement and management. The framework is based on the estimation of a number of key risk components and on assessments of borrower and transaction risk. Most banks base their rating methodologies on the risk of borrower default and typically assign a borrower to a rating grade. A bank would then estimate the probability of default (PD) associated with borrowers in each of these internal grades. This PD estimate must represent a conservative view of a long-run average (pooled) PD for borrowers assigned to the grade in question.

PD is not the only component of credit risk. Banks measure also how much they will lose should such an event of default occur. This will depend on two elements. First, how much per unit it is expected to recover from the borrower. If recoveries are insufficient to cover the bank's exposure, this gives rise to loss given the default (LGD) of the borrower (expressed as a percentage of the exposure). Secondly, loss depends on the bank's exposure to the borrower at the time of default, commonly expressed as Exposure at Default (EAD).

While many banks are able to produce measures of PD, fewer banks are able to provide reliable estimates of LGD, given data limitations and the bank-specific nature of this risk component. Because of that, in the foundation approach LGD values are set by supervisory rules. In the advanced approach, the bank will have the opportunity of

estimating the LGD of an exposure, subject to meeting additional, more rigorous minimum requirements for LGD estimation.

3.2.2 The Risk-Weight Function

IRB risk weights are expressed as a single continuous function of the PD, LGD and maturity (M), of an exposure. This function provides a mechanism by which the risk components outlined above are converted into regulatory risk weights. This approach does not rely on supervisory determined risk weight buckets as in the standardized approach. Instead, it allows for greater risk differentiation and accommodates the different rating grade structures of banking institutions.

The function of the risk weight can be defined as follows:

$$\text{Correlation (R)} = 0.10 \times (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50)) + 0.20 \times [1 - (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50))]$$

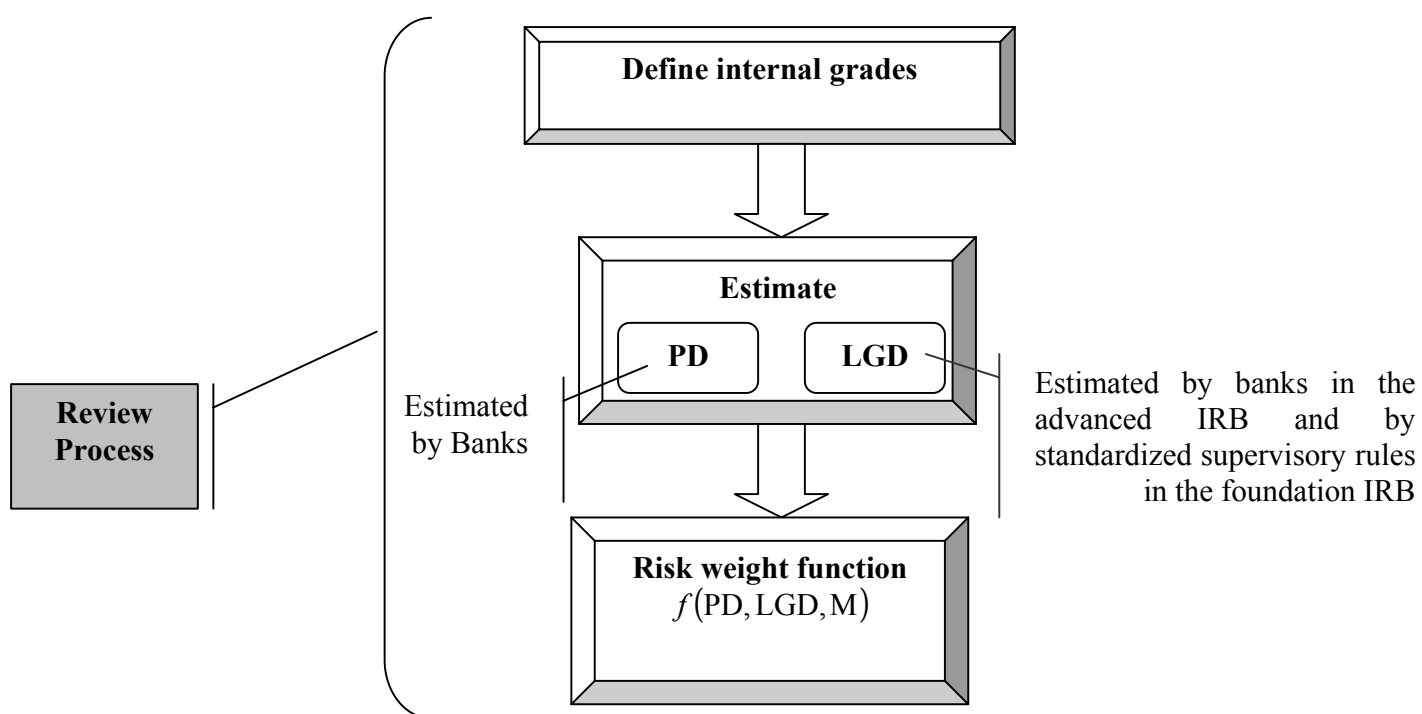
$$\text{Maturity factor (M)} = 1 + .047 \times ((1 - \text{PD}) / \text{PD})^{.44}$$

$$\text{Capital requirement (K)} = \text{LGD} \times \text{M} \times N \left[(1 - \text{R})^{-.5} \times G(\text{PD}) + (\text{R} / (1 - \text{R}))^5 \times G(.999) \right]$$

$$\text{Risk-weighted assets} = \text{K} \times 12.5$$

In the previous equations, EXP() stands for the natural exponential function, N() stands for the standard normal distribution function and G() stands for the inverse standard normal cumulative distribution function. The risk weight functions for retails are similar to the previous equations. To see how much capital requirements will be needed under deferent levels of PD The table in the appendix provide the risk weights according to previous equations assuming LGD=50%.

Thus, one can summarize the IRB approach by the following steps



3.2.3 Operational requirements for the IRB approach

The bank must demonstrate that its criteria in assigning ratings to a borrower cover all factors that are relevant to the analysis of borrower risk. These factors should demonstrate an ability to differentiate risk, have predictive and discriminatory power, and be both plausible and intuitive in order to ensure that ratings are designed to distinguish risk rather than to minimize regulatory capital requirements.

Banks should take all relevant information into account in assigning ratings to a borrower. This information should be current. The methodologies and data used in assigning ratings should be clearly specified and documented. As a minimum, a bank

should look at each of the following factors for each borrower as outlined by Basel committee:

- Historical and projected capacity to generate cash to repay its debts and support other cash requirements;
- Capital structure and the likelihood that unforeseen circumstances could exhaust its capital cushion and result in insolvency;
- Quality of earnings, that is, the degree to which its revenue and cash flow emanate from core business operations as opposed to unique and non-recurring sources;
- Quality and timeliness of information about the borrower, including the availability of audited financial statements, the applicable accounting standards and its conformity with the standards;
- Degree of operating leverage and the resulting impact that demand variability would have on its profitability and cash flow;
- Financial flexibility resulting from its access to the debt and equity markets to gain additional resources;
- Depth and skill of management to effectively respond to changing conditions and deploy resources, and its degree of aggressiveness vs. conservatism;
- Its position within the industry and future prospects; and
- The risk characteristics of the country it is operating in, and the impact on the borrower's ability to repay.

Regarding the requirements for PD⁵ estimation, which is the bank responsibility in the IRB approach, banks should consider all available information for estimating the average PD per grade, including three specific techniques (internal default experience, mapping to external data, and statistical default models). Banks may have a primary source of information, and use others as a point of comparison and potential adjustment to the initial PD estimate. In general the estimation must meet the following requirements:

- The population of borrowers represented in the data set is closely matched with or at least clearly comparable to those of the contemplated portfolio of the bank.
- The lending or underwriting standards used to generate the exposures in the data source are strongly comparable to the banks in building its current portfolio of exposures;
- Economic or market conditions under which the historical experience took place is relevant to current and foreseeable conditions; and
- The number of the loans in the sample and the data period used for quantification provide strong grounding in historical experience and, thus confidence in the accuracy and robustness of the default estimates and the underlying statistical analysis.

Irrespective of the data source employed (internal or external) PD should be developed using a minimum historical observation period of at least 5 years. This should be seen as a minimum and thus the more the data a bank has, the more would be the

⁵ There are three techniques to estimate PD ;internal default experience, mapping to external data (data come from similar data generating process) and statistical default models.

confidence in PD estimates. The data will include borrowers defaults, rating decisions, rating histories, PD estimate histories, key borrowers characteristics, and facility information. *Given that the minimum historical observation period of will be least 5 years and that the committee suggests transition period of three years after the implementation of the accord the banks must have a minimum of 2 years of data by the time of the implantation expected 2006.* These information requirements will be the same for the corporate and retail exposures.

4. Conclusions

The soundness of the banking system is one of the most important issues for the regulatory authorities and for the financial system stability. The new accord **Basel 2** introduce a new approaches to capital adequacy that are appropriately sensitive to the degree of risk involved in a banks' positions and activities and better measure the insolvency probability.

Basel 2 introduce also two new pillars; the review process and market discipline. The two new pillars are introduced to assess the availability of the minimum requirements to implement the new approaches suggested in the accord and to help market participants to better understand banks' risk profiles and the adequacy of their capital positions.

Banks should start the preparation process for the implementation of the new accord by reviewing the requirements it satisfy, the requirements need to attain based on the chosen approaches.

One important part of the banks preparation process is to assess the availability of information required for each approach and the cost associated with providing the unavailable information.

The new accord highlights the importance of the role that can be played by ECAIs. In the same time, it outlines the requirements that ECAIs have to fulfill to be deemed eligible by their national supervisor.

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Appendix

The risk weights according to potential modification of the Basel committee proposal assuming LGD=50%.
Source: Basel committee on banking supervision 5 November 2001

Probability of Default (PD)	IRB Capital Requirement (Corporate) %	IRB Capital Requirement (Residential mortgage) %	IRB Capital Requirement (Other retail) %
3 basis points (bp)	1.4	0.4	0.4
10 bp	2.7	1.0	0.9
25 bp	4.3	2.0	1.8
50 bp	5.9	3.4	2.8
75 bp	7.1	4.5	3.6
100 bp (1%)	8.0	5.5	4.2
1.25	8.7	6.4	4.7
1.50	9.3	7.3	5.1
2.00	10.3	8.8	5.7
2.50	11.1	10.2	6.2
3.00	11.9	11.5	6.6
4.00	13.4	13.7	7.1
5.00	14.8	15.7	7.4
10.00	21.0	23.2	8.5
20.00	30.0	32.5	10.6