Abstract

The main objective of this paper is to introduce the methodology for the recognition of collateral for retail lending which is Basel II compliant. Basel II for the retail segment offers two possible approaches: the standardized approach and the Internal Ratings-Based (IRB) Approach. The standardized approach is relatively easy to apply and defines standard risk weights, whereas the IRB approach requires internal estimates of risk components in determining the capital requirement for a given exposure. The risk components include measures of the probability of default (PD), loss given default (LGD) and the exposure at default (EAD) and serve as inputs to the risk weight functions that have been developed for separate asset classes.

Keywords: Basel II, Credit Risk Mitigation, Standardised Approach, Internal Ratings-Based Approach

1. Introduction

In June 2004, the Basel Committee on Banking Supervision issued a revised framework on International Convergence of Capital Measurement and Capital Standards (hereafter “Basel II” or the “revised Framework”). When following the “internal ratings-based” (IRB) approach to Basel II, banking institutions will be allowed to use their own internal measures for key drivers of credit risk as primary inputs to their minimum regulatory capital calculation, subject to meeting certain conditions and to explicit supervisory approval. In light of the need under Basel II for banks and their supervisors to assess the soundness and appropriateness of internal credit risk measurement and management systems, the development of methodologies for validating external and internal rating systems is clearly an important issue. More specifically, there is a need to develop means for validating the systems used to generate the parameters (such as PD, LGD, EAD and the underlying risk ratings) that serve as inputs to the IRB approach to credit risk. In this context, validation comprises a range of approaches and tools used to assess the soundness of these elements of IRB systems. In
anticipation of the need for more knowledge regarding validation methodologies, in 2002 the Research Task Force (RTF) formed a subgroup (the Validation Group) to review and develop research on the validation of rating systems that would be useful to banks and supervisors as they consider options for implementing Basel II. The work of the Validation Group collected in this volume of studies addresses a number of topics on rating system validation, with a particular focus on empirical validation methods. The Validation Group consists of representatives from eleven countries. The main objectives of the project have been:

- to classify rating systems and their dynamic properties, and to develop a common terminology for validation purposes;
- to review validation methodologies that are currently applied in bank practice, and
- to analyse validation methodologies for the three key risk components probability of default (PD), loss given default (LGD) and exposure at default (EAD) from a theoretical perspective.

Although validation is foremost the responsibility of banks, both bank risk managers and bank supervisors need to develop a thorough understanding of validation methods. Supervisors will need to review banks’ validation processes, and may also need to employ validation methods in evaluating whether banks’ rating systems comply with the operating standards set forth by Basel II. Some validation methods, such as benchmarking risk parameters across banks, may be more practical for supervisors to implement than banks. The focus of the research in this collection has been on validation methods in general, without regard to whether those methods are implemented by banks or their supervisors.

2. Credit Risk Mitigation

Credit Risk Mitigation is “a technique used by a credit institution to reduce the credit risk associated with an exposure or exposures which the credit institution continues to hold”\(^1\). A collateralised transaction is a transaction where the credit exposure or potential credit exposure of the credit institution to a counterparty is hedged – in whole or in part – by collateral posted by the counterparty or by a third party on behalf of the counterparty.

Collateralised credit exposures must have a risk-weighted exposure amount lower than the same credit exposure without credit protection.  

It must be differentiated between two types of CRM techniques:

- under “funded credit protection” (e.g. real estate, financial instruments) is to be understood a CRM technique where the reduction of the credit risk exposure of a credit institution derives from the right of the credit institution in case of default to:
  a) liquidate or retain, at least for a certain period of time, certain assets or amounts;
  b) obtain transfer or appropriation of certain assets or amounts;
  c) retain certain assets or amounts;
  d) reduce the amount of the exposure that has defaulted through the realisation of the collateral. The claim of the institution on the whole exposure is then reduced to the difference between the total amount of the exposure and the claim of the institution that was covered by the realisation of the collateral;
  e) replace the amount of the exposure that has defaulted through the realisation of the collateral. The new exposure of the debtor to the credit institution is the difference between the amount of the former exposure and the amount of the collateral. Due to this replacement of the former exposure of the client by the new one, the credit institution can consider the new account as a re-structured one with losses on irrecoverable debts.

- “unfunded credit protection” (such as guarantee) is a CRM technique where the reduction of the credit risk exposure of a credit institution derives from the undertaking of a third party to pay an amount in the event of a default of the borrower or on the occurrence of other specified events.

According to the EU Directive, credit institutions using the Standardised Approach or the IRB Approach with supervisory loss parameters are allowed to recognise CRM for the calculation of risk-weighted exposures as described under Annex VIII. However, for credit

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3 EU Directive 2006/48/EC, Article 4(31). Points d) and e) mean that the credit institution can minder its losses to the difference between the exposure and the value of the collateral when it realises (e.g. sells) the collateral.
5 This concerns only non-retail exposures that are treated under the Foundation IRB Approach. For retail exposures, the Advanced IRB Approach must be used and there is no possibility to use supervisory loss parameters under the IRB Approach. Credit institutions have to make their own estimates of loss parameters for retail exposures.
institutions under the IRB Approach, this is only valid if they are not using their own estimates of LGD and of CCF to obtain CRM effects.\(^6\) For credit institutions using their own estimates of LGD and of CCF (Advanced IRB for retail exposures), the eligibility criteria and minimum recognition requirements set under the Annex VIII of the European Directive 2006/48/EC are applicable, the calculation of CRM effects on RWA will take place according to Annex VII of the aforesaid Directive.

### 2.1 General requirements for Credit Risk Mitigation

CRM may be recognised by supervisors as long as the techniques or collaterals used are eligible. The eligibility of the collaterals used in the context of CRM techniques depends on the approach used under Basel II to calculate the risk-weighted exposures (Standardised Approach or IRB Approach).\(^7\) In addition, under the Standardised Approach, bank has the possibility to choose between two methods to valuate its financial collaterals. Consequently, it must be further differentiated between the Financial Collateral Simple Method and the Financial Collateral Comprehensive Method regarding financial collaterals.

The following table presents an overview of main differences between the Standardised Approach and the IRB Approach concerning eligibility, valuation frequency and risk-weights used.

In order to determine if the collaterals can be recognised for credit protection in the bank, following steps must be realised:

Picture 1 Steps for calculation of the CRM effects

Source: Internal Sources

1st step: Fulfilment of operational and risk management requirements

In order to be allowed to use CRM techniques, each unit bank must be able to prove to the competent authorities that it has adequate risk management processes to control the risks it is exposed to in the collateralised transaction. This includes that:

1) each unit of the bank possesses efficient procedures for the eligibility determination and recognition of collaterals under the approach chosen;

2) each unit of the bank must regularly check the effectiveness of the credit protection and assess all risks related to the collateralised transaction. This includes for example:

- a regular check (e.g. once a year) that there is a market for the collaterals in order to receive the proper value of the collateral;

- a regular check of the actual state and conditions of the collateral if it is a real estate property since the value can be influenced by new constructions.

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Consequently, processes assessing the CRM must be included in the credit risk management processes of the bank, i.e. each unit of the bank must have defined and documented procedures concerning valuation methods and valuation frequency of each type of collaterals.⁹

2nd step: Checking of the collateral eligibility

In order to be eligible, collaterals must principally fulfil following requirements:

1) sufficient liquidity and stable value over time for funded protection.

Assets recognised for funded credit protection must be sufficiently liquid (i.e. there exists an efficient and legal market for the collateral) and their value over time should be sufficiently stable to provide appropriate certainty as to the achieved credit protection, depending on the approach chosen under Basel II and on the degree of recognition allowed. The value of the collateral must not depend on the creditworthiness of the obligor in a too important way.¹⁰,¹¹

2) sufficient reliability of guarantors and legal effectiveness of unfunded credit protection.

Guarantors recognised for unfunded credit protection must be sufficiently reliable (e.g. the guarantor has a reputation of fulfilling his / her commitments in similar contracts or the guarantor has a sufficient financial standing) and the protection agreement must be legally effective in the relevant jurisdictions. By fulfilling strict requirements concerning the legal effectiveness, the protection agreement provides appropriate certainty and thus can be recognised as credit protection under the approach chosen under Basel II. The certainty of the involvement of the guarantor must also be assessed with regards to the degree of recognition of the collateralisation, i.e. the probability with which the guarantor is going to hold his / her engagement regarding the unfunded credit protection.¹²

3rd step: Checking the legal certainty of the collaterals

When the bank has fulfilled the first two steps, it is allowed to use collaterals, however, only under the condition that the legal certainty of each collateral is generally

¹⁰ EU Directive 2006/48/EC, Article 92(3) and 92(4).
¹¹ This means, for example, that equities emitted by the debtor are no eligible collaterals. However, further concretisation of this phrase still have to be done by FMA.
assured. The legal certainty of the collaterals involved in the transaction covers at least\textsuperscript{13} the four criteria listed below:

1) legal effectiveness and enforceability in all relevant jurisdictions, i.e. jurisdictions of all countries involved in the transaction.

In order to fulfil these requirements, the legal certainty of the credit protection must cover the actions (including filing up and registration of the collateral contract), the steps taken, the procedures and policies implemented by each unit of the bank.\textsuperscript{14} The checking of the legal certainty of the collaterals can be performed either internally or can be outsourced by each unit of the bank (e.g. law firm). If the bank decides to check the legal certainty of the collateral internally, it must define standards and processes in order to ensure the legal enforceability on a regular basis for the length of the contract (e.g. regular involvement of legal advisors). Internal concepts documenting standards and processes chosen by the bank must cover at least the following two topics:

- internal / outsourced continuous monitoring of legal framework development in countries implied in collateralised transactions;

- identification of contracts that are concerned by changes of the legal framework.

The requirements regarding legal enforceability concerns standard contracts as well as individual ones. For individual contracts, each one must be checked regarding its legal enforceability in the concerned jurisdictions. For standard contracts, the checking has to take place only once, before the contract is in use. The legal enforceability of each contract must be checked if laws concerning this type of contracts are changed.

2) sufficient level of risk reduction.

Eligible credit protection is to be recognised by supervisors when reduction in the level of credit risk on the exposure as a result of the CRM is sufficiently certain, e.g. the contract setting the collateral to the transaction cannot be changed unilaterally or the realisation of the collateral can be led in a defined timeframe. Therefore, each bank must possess efficient processes for the realisation of its collaterals.

\textsuperscript{13} For all collateral types, the EU Directive defines stronger requirements to check their legal certainty. The concerned requirements will be defined in corresponding sections of this document.

\textsuperscript{14} EU Directive 2006/48/EC, Article 92(1).
In addition, each bank requires that the collateral is realisable in cash within reasonable time, proven by a favourable track record of the jurisdiction in the concerned country. Each unit of the bank must especially pay attention not to take collateral items which could lead to reputation damage in case of its effective realisation. E.g. the bank takes a mortgage on a hospital building and if the debtor defaults, it is not realistic that the credit institution will use this collateral since it could damage its reputation. This is also valid for buildings having a strategic importance, the realisation of which could lead to political or reputation problems for the bank.

Regarding funded protection, the legal rights of the bank must be enforceable in case of the default, insolvency or bankruptcy of the counterparty or of the custodian of the collateral. If the transaction documentation mentions additional specified credit events relating to the counterparty or of the custodian, this right may be used as well.\(^{15}\)

For all collaterals, the contestation risk needs to be assessed and taken into account while estimating the legal certainty and effectiveness of the collateral.

**4\(^{th}\) step: Additional requirements depending on the approach chosen**

Once the legal certainty of collaterals has been checked, further requirements set by the EU Directive must be fulfilled. These requirements concern operational systems of the bank and characteristics of collaterals (stronger requirements for legal certainty, eligibility and recognition).

**5\(^{th}\) step: Identification of “maturity mismatch”**

“Maturity mismatch” means that the residual maturity of the protected exposure concerned is longer than the residual maturity of the credit protection involved.

If there is a maturity mismatch, the credit protection cannot be recognised according to the EU Directive in the following cases:\(^{16}\)

a) the residual maturity of the credit protection is less than three months;\(^{17}\)

b) the original maturity is less than one year.\(^{18}\)

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\(^{15}\) EU Directive 2006/48/EC, Article 4(31).

\(^{16}\) Maturity mismatch is not allowed for financial collaterals under the Financial Collaterals Simplified Approach. The definition and restrictions given here concerned other collaterals under the Standardised Approach and financial collaterals under the Financial Collateral Comprehensive Method and the IRB Approach.


Currency mismatch

“Currency mismatch” means that the credit protection is labelled in a currency different from the currency of the exposure.\(^{19}\) Currency mismatches are allowed according to the EU Directive 2006/48/EC under the Standardised and IRB Approach.\(^{20}\)

6\(^{th}\) step: Determination of the CRM effects

After determining which collaterals can be used by the bank as such, the risk mitigation on the exposure must be calculated according to the approach chosen under Basel II.

The CRM has effect only on the part of the exposure that is covered by the credit protection, as valuated according to the regulatory requirements. If the amount collateralised or guaranteed is lower than the amount of the exposure and the secured and unsecured portions are of equal seniority (i.e. the bank and the guarantor share losses on a pro-rata basis), capital relief be performed on a proportional basis. This means that the protected part of the exposure will receive the treatment applicable to the collateral or counterparty, while the remaining part of the exposure (not collateralised) will be treated as unsecured.

2.2 Credit Risk Mitigation for Retail Exposures under the Standardised Approach

Banks use a number of techniques to mitigate the credit risks to which they are exposed. Exposure may be collateralized in whole or in part with cash or securities, or a loan exposure may be guaranteed by a third party. No transaction in which CRM techniques are used should receive a higher capital requirement than an otherwise identical transaction where such techniques are not used.

The effects of CRM will not be double counted. Therefore, no additional supervisory recognition of CRM for regulatory capital purposes will be granted on claims for which an issue-specific rating is used that already reflects that CRM. Principal-only ratings will also not be allowed within the framework of CRM. Although banks use CRM techniques to reduce their credit risk, these techniques give rise to risks (residual risks) which may render the overall risk reduction less effective. Where these risks are not adequately controlled, supervisors may impose additional capital charges or take other supervisory actions as detailed in Pillar 2.

\(^{20}\) Currency mismatches for collaterals are allowed under the Standardised Approach under certain restrictions.
While the use of CRM techniques reduces or transfers credit risk, it simultaneously may increase other risks to the bank, such as legal, operational, liquidity and market risks. Therefore, it is imperative that banks employ robust procedures and processes to control these risks, including strategy; consideration of the underlying credit; valuation; policies and procedures; systems; control of roll-off risks; and management of concentration risk arising from the bank’s use of CRM techniques and its interaction with the bank’s overall credit risk profile.

The Pillar 3 requirements must also be observed for banks to obtain capital relief in respect of any CRM techniques.

2.2.1 Qualitative requirements for the Standardised Approach

The rules set out in this section are applicable to the banking book retail exposures under the Standardised Approach.

Specific operational requirements must be fulfilled by each unit of the bank under the Standardised Approach in order to fulfil the minimum requirements for recognition of their collaterals:21

a) a proper documentation of the collateralised transactions;

This includes a clear identification of the credit institution, the debtor (name, address, etc.) and of the collateral(s) involved in the transaction (location in case of physical collateral, owner, value, etc.). Moreover, each unit of bank must check whether the relevant jurisdictions are already mentioned in the documentation of a transaction. The documentation must also be stored during at least the whole duration of the collateralised transaction.

b) clear and robust procedures for the timely liquidation of the collateral;

This means that each unit of the bank must possess a handbook for the liquidation for each type of collaterals, determining the different steps of the liquidation (contact with lawyers if necessary, experts for the valuation, etc.) as well as trained persons responsible for the liquidation.

c) strong procedures and processes for the risk management;

The risk management must especially cover the control of risks arising out of collateralisation (failure or reduction of the credit protection), the valuation of the

continuous risks and of the risks associated with the termination of the credit protection. This means that, for each type of collaterals, the bank must possess a handbook defining procedures for risk assessment, risk monitoring and “limits” from which the reduction of the credit protection must have to be tracked by a regular monitoring (early-warning system).

The risk management process also covers the determination of concentration risks and their effects on the risk profile of the bank. Thus for each type of products, the bank must check that diversified collaterals are used to collateralise exposures (e.g. real estate must at least have a different geographical location).

d) documented policies and practices concerning the types and amounts of collaterals accepted;

e) a regular valuation system of the financial collateral at market value (at least every six months or when a significant decrease of its market value might have occurred);

Real estates are submitted to different treatments: Residential Real Estates (RRE) must be valued at least every three years, whereas Commercial Real Estates (CRE) must be valued at least once a year.

In case of important changes in the valuation conditions of a real estate, the valuation must be more frequent.

f) processes to check that custodians strictly separate the collaterals from their own assets.

2.3. Credit Risk Mitigation for Retail Exposures under the IRB Approach

In the present section differences between the Standardised and the IRB Approaches for the treatment and utilisation of CRM techniques will be analysed. Compared to the Standardised Approach, CRM techniques under the IRB Approach introduces new types of collaterals to be recognised as eligible and new requirements for the collateral types already recognised under the Standardised Approach. However, the main difference between CRM under those two approaches is in the way capital requirements are calculated. Namely CRM under the IRB Approach operates through modelling of the LGD parameter whereas the CRM under the Standardised Approach is based on a substitution of the risk-weight of the debtor by
the risk-weight of the protection provider. Credit institutions are authorised to derive their LGD own estimates from realised losses and appropriate estimates of PDs.²²

Rating systems are a cornerstone for the calculation of banks’ regulatory capital charge in the internal ratings-based (IRB) approach of the revised Framework (Basel II) because they are the basis for the determination of a borrower’s probability of default (PD). The PD and the other two risk components, loss given default (LGD) and exposure at default (EAD), are key input parameters to the regulatory capital calculation. As a consequence, validation of these three parameters and the underlying rating system is a key component of the supervisory review process.

Explicit requirements in the revised Framework underline the need to validate internal rating systems. Banks must demonstrate to their supervisor that they can assess the performance of their internal ratings and their risk estimation systems consistently and meaningfully. More detailed requirements demand, for example, that realised default rates have to be within an expected range, that banks must use different quantitative validation tools and that wellarticulated internal standards must exist for situations where significant deviations occur between observed values of the three risk components and their estimates.

The design of a validation methodology depends on the type of rating system. Rating systems can differ in various ways, depending on the borrower type, the materiality of the exposure, the dynamic properties of the rating methodology (e.g. point-in-time vs. through-the-cycle), and the availability of default data and external credit-quality assessments (external ratings, vendor models). As a consequence, validation is a relatively complex issue and requires a good understanding of the rating system and its properties.

The following part summarises the work of the Validation Group. This group was formed by the Research Task Force to explore validation methodologies for rating systems from a theoretical perspective and to assess current validation practices in the banking industry.

The Validation Group has explored a broad range of qualitative and quantitative validation techniques. It has considered contributions from the literature and the results from a bank survey in order to understand how validation is treated in academia as well as in the banking industry.

The validation project has progressed in three stages. The first stage began with a literature survey on validation methods and their performance in banking practice. This was important for developing a common terminology and for a classification of rating systems.

A key result of the first stage was that statistical tests are less meaningful to validate PD estimation than they are in the case of internal market risk models. Therefore, backtesting based on statistical tests is generally not powerful enough to determine if an internal rating system is acceptable. Consequently, the focus of the project was extended to benchmarking.

**Key components of validation**

An important issue at the outset of the project was to describe the key components of validation as a concept. The validation process involves the examination of the rating system and the estimation process and methods for the risk components PD, LGD and EAD. It also requires verification of the minimum requirements for the IRB approach. The application of validation methods is closely linked to the type of rating system and its underlying data basis. E.g., ratings for small business lending will typically be of a more quantitative nature, based on a rather large quantity of data. Sovereign ratings instead will typically lay more emphasis on qualitative aspects because these borrowers are more opaque and default data are scarce. Picture 3 shows key components of a validation methodology:

**Picture 2 Validation components**

![Validation Components Diagram]

*Source: Internal Sources*

Individual banks undertake validation as a means of ensuring that the output produced by internal rating systems is suitable for internal uses and to verify compliance with the use test as defined in the revised Framework. In an examination, supervisors evaluate the
validation conducted by the individual bank. As a result, supervisors may use some of the same validation techniques as the banks.

Validation by a banking institution consists of two main components: validation of the rating system and the estimates of the risk components (PD, LGD, and EAD), and validation of the rating process, focusing on how the rating system is implemented.

The validation of the rating system can be further broken down into two components, the evaluation of the rating system design or model design and an assessment of the estimates of the risk components. In both cases, qualitative and quantitative methods can be applied.

In the case of a model-based rating system, the validation of the model design should include, for example, a qualitative review of the statistical model building technique, the relevance of the data used to build the model for the bank’s specific business segment, the way the risk factors that are the key inputs to the models were selected, and whether they are economically meaningful.

In the analysis of the estimates of the model parameters PD, LGD and EAD we differentiate between backtesting and benchmarking.

- **Backtesting** means the use of statistical methods to compare estimates of the three risk components to realised outcomes. This differs from the traditional backtesting of market risk models in an important way. Whereas for market risk models backtesting involves the whole model, for internal rating systems only the risk components (model inputs) are tested and the “model” is provided by the supervisor in the shape of the risk-weight functions.

- **Benchmarking** refers to a comparison of internal estimates across banks and/or with external benchmarks (e.g. external ratings, vendor models, or models developed by supervisory authorities).

In addition to an evaluation of the rating system, validation comprises an evaluation of the rating process. This involves important issues like data quality, the internal reporting, how problems are handled and how the rating system is used by the credit officers. It also entails the training of credit officers and a uniform application of the rating system across different branches. Although quantitative techniques are useful, especially for the assessment of data quality, the validation of the rating process is mainly qualitative in nature and should rely on the skills and experience of typical banking supervisors.
2.3.1 Validation of PD, LGD and EAD

Estimation and validation methodologies for PD are significantly more advanced than those for LGD and EAD. For all three risk components, the use of statistical tests for backtesting is severely limited by data constraints. Therefore, a key issue for the near future is the building of consistent data sets in banks. Initiatives to pool data that have been started by private banking associations may be an important step forward in this direction, especially for smaller banks.

For the validation of PDs, we differentiate between two stages: validation of the discriminatory power of a rating system and validation of the accuracy of the PD quantification (calibration). Numerous methods exist for the assessment of the discriminatory power. The most common techniques are the cumulative accuracy profile (CAP) and the accuracy ratio, which condenses the information of the CAP into a single number. Portfolio dependent confidence intervals that allow statistical inference from the accuracy ratio are given in the report.

Compared with the evaluation of the discriminatory power, methods for validating calibration are at a much earlier stage. However, stimulated by the progress of Basel II, such methods have attracted considerable interest in academic research. A major obstacle to backtesting of PDs is the scarcity of data, caused by the infrequency of default events and the impact of default correlation. Even if the final minimum requirements of the revised Framework for the length of time series for PDs (five years) are met, the explanatory power of statistical tests will still be limited. Due to correlation between defaults in a portfolio, observed default rates can systematically exceed the critical PD values if these are determined under the assumption of independence of the default events. This can happen easily for otherwise well-calibrated rating systems. As a consequence, on the one hand, all tests based on the independence assumption are rather conservative, with even well-behaved rating systems performing poorly in these tests. On the other hand, tests that take into account correlation between defaults will only allow the detection of relatively obvious cases of rating system miscalibration. Therefore, statistical tests alone will be insufficient to adequately validate an internal rating system. Nevertheless, banks should be expected to use various quantitative validation techniques, as they are still valuable tools for detecting weaknesses in rating systems.

Due to the limitations of using statistical tests to verify the accuracy of the calibration, benchmarking can be a valuable complementary tool for the validation of estimates for the
risk components PD, LGD and EAD. Benchmarking involves the comparison of a bank’s ratings or estimates to results from alternative sources. It is quite flexible in the sense that it gives banks and supervisors latitude to select appropriate benchmarks. An important technical issue is the design of the mapping from an individual bank’s estimates to the benchmark. If benchmarking is carried out by the bank, its supervisory authority may choose to focus primarily on assessing the quality of the benchmark and the quality of the mapping. A dynamic approach to benchmarking seems to be promising, and would allow supervisors to make inferences about the characteristics of the internal rating system. Despite the usefulness of benchmarking, it should be used as a complement to, not a substitute for, statistical validation methods.

Compared to PD, much less is known about what drives LGD. Therefore, the studies concentrate more on issues that affect the estimation of LGD than on validation methods.

In general, four methods are available for the estimation of LGDs: a workout LGD based on the discounted cash flows after default; a market LGD based on prices of traded defaulted loans; an implied market LGD that is derived from non-defaulted bond prices by means of an asset pricing model; and (in the special case of a retail portfolio) an implied historical LGD based on the experience of total losses and PD estimates. The studies in this volume focus on workout LGDs because they appear likely to be a common methodological choice of banks attempting to meet the IRB minimum requirements. Several critical issues for the estimation of workout LGDs are highlighted in the studies, including how to measure recoveries, how to allocate workout costs, and how to select an appropriate discount factor. Other important issues for estimation include consistency between the definitions of default used for PD and LGD, and the precise definition of losses (for instance whether the observed losses are censored by forcing them to be non-negative).

The obstacles that impede the validation of LGD are also present when EAD is estimated and validated. The key problem here is to determine the potential future draw-down of unused commitments. Literature on the estimation and validation of EADs is virtually nonexistent and data constraints are even more severe than for LGDs, where at least one can draw some inferences from publicly available bond data.

2.3.2 Qualitative requirements for the IRB Approach

In comparison to the Standardised Approach, additional collateral types are eligible under the IRB Approach. In addition, credit institutions using the IRB Approach must fulfil
requirements concerning rating systems such as capturing all relevant characteristics of the debtor or of the transaction and ensuring that this information is taken into account while assigning the debtor and the exposure to a credit pool. The taking into account of collaterals is performed through the modelling of LGD. Consequently, credit institutions must possess enough data in order to make their own estimates. For the utilisation of the CRM under the IRB Approach special attention has to be paid to the data storing. These requirements concerning data storing will not be detailed in the present document since they are covered by the Data Quality Management Framework.

Currency mismatches between the underlying obligation and the collateral are allowed under the IRB Approach and shall be treated conservatively in the institution’s assessment of LGD.

Other qualitative requirements concerning documentation, procedures, valuation frequency, risk management processes and policies correspond to the specific requirements under the Standardised Approach.

2.3.3 Modelling Loss Given Default (LGD)

\[ \text{LGD} = 100\% - \text{Recovery Rate }\% + \text{Economic Cost Rate }\% \]

In detail:

\[ A_{qi} = \text{Sum of all recoveries within the recovery period (see later) referring to defaults occurred in a pool in a defined measurement period (e.g. one quarter - } q_i) \]

\[ B_{qi} = \text{Sum of all costs related to collections within the recovery period referring to the recoveries included in } A_{qi} \]

\[ C_{qi} = \text{Sum of all amounts defaulted in the given measurement period (sum of EADs of defaulted exposures)} \]

I suggest a measurement period of one quarter \( q_i \). Then the LGD per quarter and pool is defined as follows:

\[ \text{LGD}_{qi} = 100\% - \left( \frac{A_{qi} - B_{qi}}{C_{qi}} \right) \]

Recoveries must belong to the respective default accounts in the given 5 year period.

Recoveries from realising collateral (e.g. mortgage) might begin to show only after 2-3 years, depending on the legal situation. This implies an understated recovery rate. For that
reason is suggested estimating recoveries for products with a long recovery period (greater than one year) based on a default weighted average of at least 2 years real recovery % data.

Note:
1) The number of years necessary to know what is the recovery rate of a defaulted account will be product and country dependent.
2) LGD should include cost of funding.
3) Future cost (e.g., collection costs) and incomes (e.g., recoveries) should be calculated as Net Present Values.

So $A_{qi}$ would cover the amount recoveries in white and green area corresponding to recovery % data – see picture.

**Picture 3 Recovery – Vintage – Analysis**

$\text{LGD}_{\text{pool}} = \left( \frac{1}{\sum_{i=1}^{20} d_{qi}} \right) * \sum_{i=1}^{20} (\text{LGD}_{qi} * d_{qi} * w_{qi})$, \hspace{1cm} (1)

$\sum_{q=1 \text{ to } 20} w_q = 1$ \hspace{1cm} (2)

Where:

$d_{qi}$: number of defaults in quarter $q_i$

$w_{qi}$: defines the weight a bank assigns to a quarter $q_i$

$LGD_{qi}$: Loss given default in quarter $q_i$
Note:

1) Provided that sufficient data is available, for best risk management practices, banks should compute LGD at individual exposure level (rather than pool level) using scoring models. As a result, better credit decisions can be made using Expected Loss Rate (ELR = PD * LGD) rather than expected bad rate alone (i.e., PD). This will fulfil the Basel II “use test” requirement in helping banks to better:

- Accept applicants
- Set credit limit
- Prioritise collections
- Define Pricing
- Set Provisions

2) Recoveries since default; this will mostly be recoveries after 90 days past due. Collected fees from defaulted borrowers, including fees for late payment, may be treated as recoveries for the purpose of the bank’s LGD estimation. Unpaid late fees, to the extent that they have been capitalized in the bank’s income statement, must be added to the bank’s measure of exposure or loss.

3) Economic cost since default; e.g. legal costs, total operational costs of the function related to collections of defaulted accounts. If a country outsources 90+ collections to an agency and this agency would gain a percentage of x% of the recovered amount, this percentage would also be found in the ‘Economic Cost Rate’.

5) It will be up to the countries to develop a LGD scorecard based on defaulted accounts covering demographic, collateral, behavioural data and measured ‘real’ LGD on account level.

3. Conclusion

Analysis of a stylised model of rating systems indicates that the default probability assigned to each obligor rating grade and its dynamics strongly depend on the type of rating methodology and quantification techniques employed. Therefore, banks and supervisors should take into account differences in rating assignment methods and quantification approaches when applying a validation methodology.
The dynamics of default probabilities assigned to rating grades are explored by analysing the properties of stylised rating systems of the types often described as point-in-time and through-the-cycle. The impact of using idealised stressed rather than unstressed obligorspecific PDs to determine the pooled PD for a risk “bucket” (such as an internal obligor grade) is also considered. The analysis of these stylised rating systems provides some interesting insights into the impact of using the approaches outlined in the revised Framework (i.e. the historical default experience approach, the statistical model approach or the external mapping approach) for PD estimation in different rating systems.

The results of this analysis suggest that the pooled default probability assigned to each rating grade and its dynamics strongly depend on the type of rating system and the PD estimation method. The estimation from historical default rates is most meaningful when the pooled PDs are unstressed, which means that they are unbiased estimates of the likelihood of default in the following year. Furthermore, the analysis suggests that the long-run average default frequency for a through-the-cycle bucket will not provide a good approximation of that bucket’s unstressed pooled PD. The reason is that the unstressed pooled PD will tend to be lower than the long-run average default frequency during cyclical peaks and higher than the long-run average default frequency during cyclical troughs.

The statistical models approach is potentially more flexible, but is only as accurate as the underlying statistical models used to estimate obligor-specific PDs.

In the case of external mapping, the analysis suggests that if there are differences in the dynamics of a bank’s internal rating system and the external rating system used to quantify pooled PDs, then one might expect the mapping between internal and external grades to change from year to year. Only if a bank’s approach to setting internal ratings is the same as that used in setting the external ratings can one expect the mapping between the two systems to remain stable over time.
References


