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Exposure at Default: IFRS 9 Ramifications

Under IFRS9 Framework, impairment assessment requires computation of Expected Credit Loss (ECL) that reflects a probability-weighted outcome, the time value of money and the best available forward-looking information. The ECL can be computed using cash shortfall approach or modular approach using risk parameters like PD, LGD, EAD and Maturity. Of these, we have discussed PD and LGD in detail in our previous blogs. In this blog we intend to touch upon Exposure at Default (EAD).

Exposure at Default (EAD) is an estimate of a financial institution's (FI) exposure to its counterparty at the time of default. While the relevance of EAD in assessing ECL is obvious, estimating EAD is less so. In practice, the estimation of EAD relates to payment terms, tenure of exposure and the point of time at which default is expected, or actually occurs. For defaulted accounts, EAD is simply the amount outstanding at the point of default. However, for performing accounts, the following elements are needed for computation of EAD under IFRS 9 at the instrument/facility level:

- Time horizon over which EAD needs to be estimated
- Projected cash flows till the estimated default point
- Residual maturity
- Deterministic or non-deterministic nature of the payment terms
- Forward looking macroeconomic scenarios

With shorter time horizon, the computation of EAD becomes relatively simpler, for example in case of Basel Advanced Internal Rating Based (AIRB) approach or Stage 1 under IFRS 9, where the EAD estimation time horizon is limited to 12 months. Also for facilities in which the cash flow strictly follows pre-determined payment terms, the computation of EAD simplifies further. However, for facilities maturing over a longer horizon and requiring forward-looking view, as in case of Stage 2 under IFRS 9, the computation of EAD requires consideration of residual maturity, cash flow uncertainty, default prediction- all simultaneously. The projection of cash flow for such facilities is subjected to uncertainty associated with prepayment, or possibility of a drawdown from undrawn portion under forward looking macroeconomic scenarios or idiosyncratic scenarios.

IFRS 9 guidelines suggest a need to incorporate forward-looking perspective for computation of ECL and EAD. The forward-looking factors – prepayment, drawdown factor or credit conversion factor (CCF) - vary as per facility type, and depends upon the contract terms as well as business practices of the financial Institution (FI). The uncertainty associated with prepayment and CCF also adds a layer of complexity around maturity of the facility, as the

prepayment reduces the effective maturity of the facility, and eventually the CCF impacts the payment term structures. This dependency can best be explained by considering examples of different facility types.

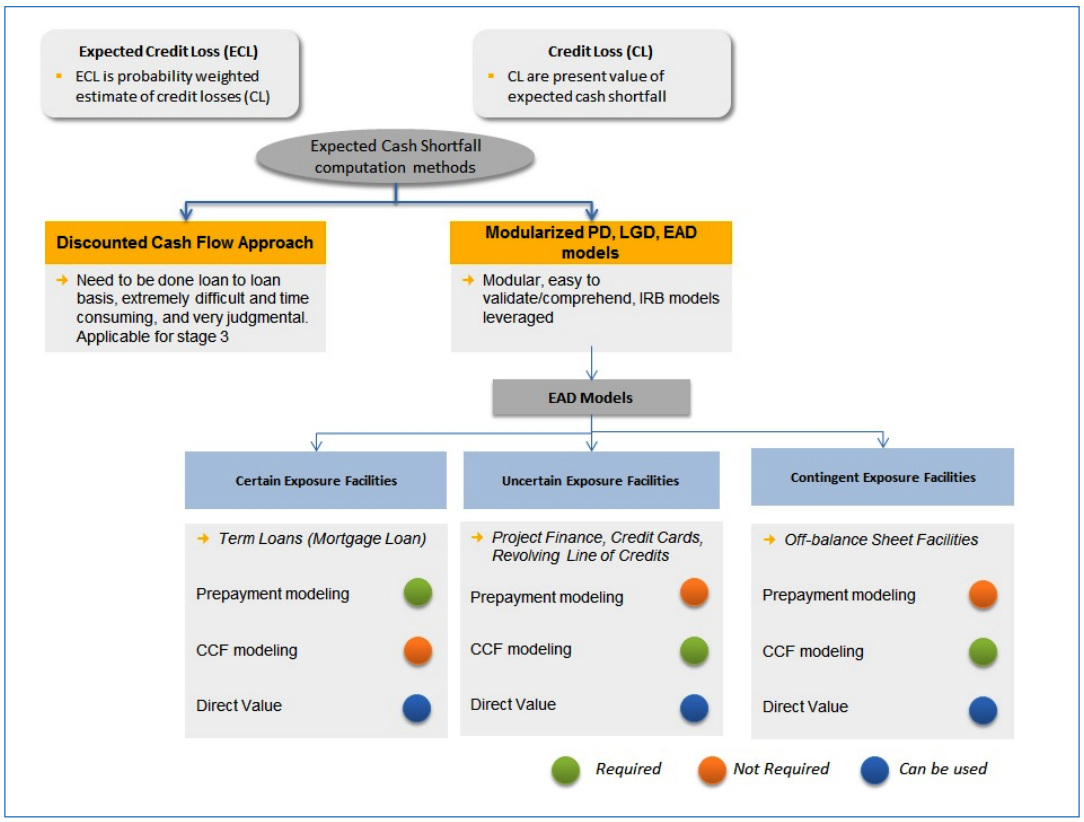
CCF and LEQ:

Loan Equivalent Exposure (LEQ) factor and CCF are two terms that are often used interchangeably. While approaches to model these two factors may be similar, there is marginal difference in definition of both factors. LEQ is defined as the change in the amount of drawn portion of exposure as a percentage of undrawn commitment. Thus, LEQ is a measure applied on entire off-balance sheet exposure. CCF is defined as the exposure including undrawn portion at the time of default as a percentage of current drawn portion of total exposure. Thus, CCF is a measure applied on on-balance sheet exposure. The LEQ factor varies from 0% to 100%, whereas CCF is generally closer to 100%.

EAD = Outstanding Exposure + LEQ x Undrawn Exposure …. *Equation (i)*
EAD = CCF x Outstanding Exposure …. *Equation (ii)*

Many FIs generally use CCF and LEQ interchangeably with equation (i) above. In our blog, we are following similar nomenclature as per equation (i)

The facility types can be broadly segmented into three categories: Certain Exposure Facilities, Uncertain Exposure Facilities and Contingent Exposure Facilities. The examples of each of these categories of facilities and complexities of EAD computations around each of them are highlighted in sections below.



A. 'Certain' Exposure Facilities:

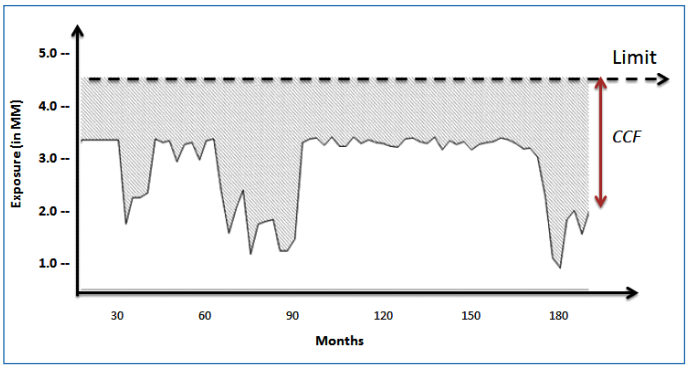
Under this category, future exposure to the facility is known, as the counterparty cannot increase its exposure beyond contractual drawdown schedule. All forms of term loans including amortizing loans, step-up/step-down loans, bullet loans fall under this category, provided there is no prepayment option. Most of the mortgage loans (a type of 'certain' exposure facility) come with prepayment option, making the exposure uncertain. For mortgage loans, prepayment depends upon the macroeconomic environment of the area where the mortgage is purchased and needs to be modeled to arrive at EAD. However, since drawdowns of these types of facilities are pre-defined, the need of CCF modeling is limited in most of the cases.

B. 'Uncertain' Exposure Facilities:

With an uncertain exposure facility, the counterparty has the explicit right to increase or decrease the exposure within a limit. The obvious examples in this category are overdraft facilities and credit cards, where the counterparty can

drawdown and repay continuously. Any other facilities however can also be an uncertain exposure facility if the financial institution follows an omnibus limit based approval framework, since the counterparty can e.g. take up term loans or issue Letter of Credits (L/Cs) as long as it stays within the limit. Experience has shown that as a counterparty approaches default, he tends to drawdown on all available sources of funds. The diagram below illustrates expected development of exposure from current time to the moment of default.

The value of expected drawdown (defined as CCF - K Factor) is dependent on the FI's ability to stop the counterparty from drawing down and counterparty's willingness and ability to do so. The FI's ability to stop the counterparty from drawing down will depend on the type of finance (bilateral, syndicated with decisive role, syndicated without decisive role), contractual terms and covenants. The counterparty's willingness and ability to drawdown is likely to be dependent on the type of facility. In case of overdrafts, the counterparty may easily drawdown, whereas in case of an LC facility, it is slightly more difficult for the counterparty to drawdown. Therefore the CCF-K factor for uncertain exposure is typically modeled at the facility level with adjustment for type of finance.



Retail - Credit Card:

Computation of EAD under revolving facilities like credit cards requires estimation of CCF on unutilized credit limit and definition of maturity of the facility.

Basel perspective on CCF:

"336. For retail exposures with uncertain future drawdown such as credit cards, banks must take into account their history and/or expectation of additional drawings prior to default in their overall calibration of loss estimates. In particular, where a bank does not reflect conversion factors for undrawn lines in its EAD estimates, it must reflect in its LGD estimates the likelihood of additional drawings prior to default. Conversely, if the bank does not incorporate the possibility of additional drawings in its LGD estimates, it must do so in its EAD estimates".

IFRS 9 perspective on CCF as interpreted by the Transition Resource Group (ITG) members for Impairment of Financial Instruments:

"ITG members discussed that because Bank A has the right to refuse each transaction at its discretion and on the assumption that Bank A actually exercises that right in practice, then:

(a) the contractual credit limit should be considered to be zero and consequently future drawdowns would not be taken into account; and furthermore

(b) the facility described would not fall within the scope of paragraph 5.5.20 of IFRS 9 because there would be no undrawn commitment component (ie there is no firm commitment to extend credit).

However, ITG members noted that their discussions focused on the very specific fact pattern presented by the submitter and observed that the conclusion could differ in other situations."

As observed from the Basel and IFRS 9 perspectives above, it may be noted that the Basel requires computation of CCF-K factor to include undrawn portion of exposure in EAD computation. Whereas IFRS 9 is flexible regarding inclusion of undrawn portion in EAD estimation, provided the FI has the right to refuse the transaction on undrawn portion, and the FI actually exercises that right, in the course of its normal business. Thus, whether computation of CCF- K factor is needed for inclusion of undrawn portion of exposure in EAD depends upon FIs' business practices around the right to restrict transactions and FIs' ability to justify the same for regulatory reporting.

Wholesale – Overdraft facilities / Revolving Line of Credit:

Overdrafts or Revolving Line of Credit facilities are fixed maturity contracts renewed periodically. However, in most cases, the FI's ability to discontinue the facility on maturity is limited, especially if the counterparty approaches default. Given this, FIs need to model the renewal patterns of these types of facilities to estimate the effective maturity. However, IFRS 9 has clarified this requirement and provided flexibility to the FIs in terms of usage of historical renewal experience for maturity computation. This is discussed in the box titled – *"Clarifications from IFRS 9 on EAD and Maturity"*.

Wholesale - Project Finance:

Project finance is a unique facility in which drawdowns are often linked to the completion of project milestones that are set at the time of contract, leading to uncertainty in drawdown amount and time.

Clarifications from IFRS 9 on EAD and Maturity:

"Some financial instruments include both a loan and an undrawn commitment component and the entity's contractual ability to demand repayment and cancel the undrawn commitment does not limit the entity's exposure to credit losses to the contractual notice period. For such financial instruments, and only those financial instruments, the entity shall measure expected credit losses over the period that the entity is exposed to credit risk and expected credit losses would not be mitigated by credit risk management actions, even if that period extends beyond the maximum contractual period."

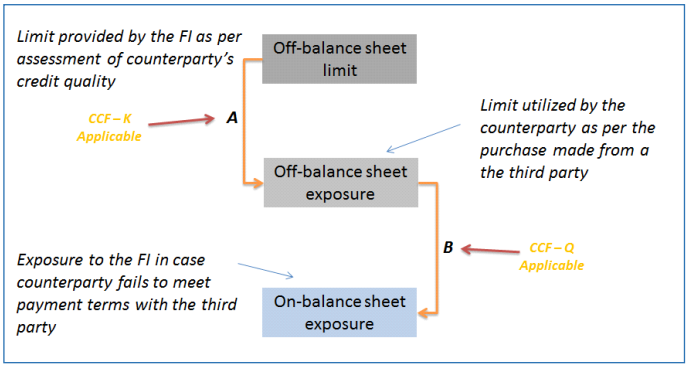
IFRS 9 highlights that the maximum period to consider as a lifetime while measuring ECL is the maximum contractual period defined for a facility. This is also for the facilities in which renewal is one of the factors. For such renewing facilities, FIs need not compute probability of renewal and need not account for the same in their maturity computation. FIs may simply take the maturity as per contracts. For certain exposure facilities, in which payment term structure is deterministic, this guideline is relatively simpler. For facilities with non-deterministic payment structures, prepayment and CCF should be considered in computation of EAD.

For example, for a mortgage loan, the prepayment option will shorten the maturity of the facility. In such case, minimum of contractual maturity and effective maturity derived after accounting for prepayment should be considered. This emphasizes requirement to accurately predict prepayment factor, as even a little variation in estimated life of the facility may have significant impact on EAD and by extension on ECL.

IFRS 9 has also stated that whenever a FI uses its right to restrict transactions on the undrawn portion in business practice, the computation of CCF may not be needed. For example, if a FI can restrict transaction on undrawn portion of credit card loans, then EAD computed for this case would be an outstanding amount on the credit card at a particular point of time and need not include off-balance sheet exposure that includes CCF on undrawn portion.

C. Contingent Exposure Facilities:

Contrary to other two exposures types which involve two parties (FI and counterparty), contingent exposure facilities (e.g. Letter of Credit, Letter of Guarantee) involve three parties. The FI counterparty has entered in an agreement with a third party, whereby it has received a commitment from FI to pay if it does not meet the agreement obligations. An exposure to FI arises only when the FI counterparty fails to fulfill the obligation and the third party claims payment from FI. Only then the FI makes a disbursement. After the payment from FI to the third party, FI has a claim on the original FI counterparty.



Mostly the contingent exposure facilities will have two levels. The contingent exposure facility allows the counterparty to extend guarantees to third parties up to a limit. At the time of ECL calculation, there may be headroom to extend new guarantees under this limit. To estimate how much of this headroom will be used, CCF-K factor methodology of the uncertain exposure should be applied. This will estimate the potential EAD. The potential EAD will become actual EAD if the third parties towards which FI has guaranteed payment, will claim payment from FI. The percentage of potential EAD that will become actual EAD is estimated with CCF-Q factor.

The CCF-Q factor therefore, only depends on the type of contingent exposure. For example, for letter of credit, CCF-Q factor is expected to be varying 50% to 100%, whereas for a facility like bid bond the CCF-Q factor may be considerably lower. In general, the more a contingent exposure resembles a regular credit product (e.g. credit substituting guarantees), the closer the CCF-Q factor will be to 100%.

Complicating Factors:

In all the above scenarios, EAD calculation may get complicated due to netting agreements, foreign exchange and operational mistakes.

There can be cases where the outstanding amount at the time of ECL calculation is negative (e.g. an overdraft facility with a deposit). Experience has shown that these “negative exposure” are short-lived in the progression toward counterparty default – applying the standard methodology will understate EAD. Therefore, it is recommended to adjust

all negative current outstanding to a zero balance before applying the uncertain exposure EAD formula.

Netting agreements are legal arrangements that allow FIs to offset multiple exposures to and from another counterparty with one another to arrive at a counterparty level net exposure. These agreements do not inhibit the application of facility level EAD estimation methodologies. All facilities under netting agreement umbrella should be examined separately to estimate facility level EADs. The netting agreement exposure is the sum of these EAD figures, adjusted by the amount owed by the FI to the counterparty.

Foreign exchange (FX) issues occur when committed lines, facility limits, and/or outstanding amounts are denominated in different currencies. To calculate EAD, all parameters should be converted to the committed limit reporting currency at the exchange rate prevailing on reporting date. At the individual facility level, an EAD issue arises if currency fluctuations have occurred such that outstanding amount is greater than committed limit. If this occurs, the EAD should be the outstanding exposure amount.

Operational mistakes occur when a counterparty is allowed to drawdown more than the committed limits. These events are considered to be part of operational risk and therefore not considered for estimation of EAD under credit risk.

Approaches for estimating Prepayment and CCF:

In practice, FIs today are following multiple approaches for computation of prepayment and CCF as per their portfolio type, size, and availability of data. For IFRS 9 purpose, most of these approaches can be used as it is, provided that the approaches account for forward-looking scenarios for computation of EAD. For computation of EAD, FIs may choose one of two options: use projected cash flows from ALM system or build parametric EAD models.

ALM systems provide series of contractual cash flow that the FI should be expecting for each of the facilities in its portfolio. Most of the ALM systems may also provide forward-looking macroeconomic adjustment options to this cash flow and thus factor in prepayment rate in the contractual cash flow. With such systems, computation of EAD is relatively easy. Alternatively, in absence of such systems, FIs may leverage their existing data sources and develop in-house EAD models. The approach and factors that FIs may consider for such parametric modeling are discussed in the subsequent sections.

Selection of modeling approaches:

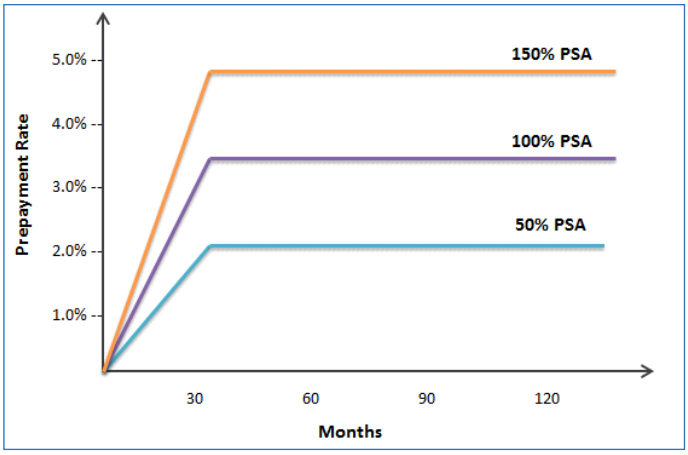
For modeling EAD using these approaches, FIs may use single methodology or combination of methodologies. For computation of EAD through CCF modeling approach, multilayered approach to modeling may be needed, especially when FI is following linear or logistic approach for CCF modeling. Like Loss Given Default (LGD), CCF-K is essentially bimodal in nature (i.e. having CCF-K of 0% or 100%).

Moreover, the CCF-K is a limit dependent factor that varies between 0% and 100%. In some situations, there are possibilities that the limit may get enhanced due to annual facility reviews or for other business reasons. . Under such scenarios, the CCF-K factor may be under predicted as it does not adjust with change in limit. Such cases should be considered while modeling for CCF using any approaches mentioned herein. Modeling approach in line with equation (ii) as mention in the box "CCF and LEQ" would be an appropriate approach for computation of CCF-K for such cases.

A few published papers have discussed CCF-K in commercial lending. Asarnow and Marker (1995) showed that CCF-K decreases with increasing facility rating. In practice the CCF-K factor may depend upon size of commitment, region, industry and facility rating to name a few. Such observations should be accounted for while choosing the level of granularity of data while modeling.

A) Prepayment:

Prepayment is primarily an option to borrower to make bulk payment (full or partial) for availed facility ahead of its scheduled time. Prepayment is essentially a call option to the borrower and is subject to many factors, with macroeconomic and idiosyncratic factors being the most common.



i) Standardized prepayment path:

In this approach FIs leverage standardized prepayment path. These standardized approaches assume that the prepayment rate will be zero at the point of origination of a loan, typically mortgage loans, and then the prepayment

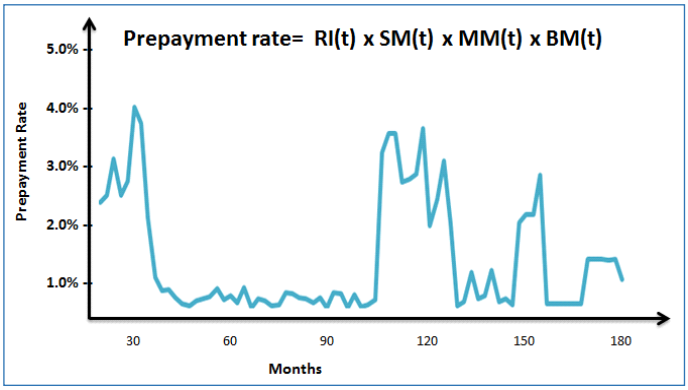
rate increases linearly up to a point of saturation. Once the prepayment rate reaches this saturation point, it remains stable over the remaining life of the facility. These standards are adopted by the Public Securities Association (PSA) and the curves that define prepayment are denoted as “100 PSA”, “150 PSA” and “200 PSA” and so on.

These types of prepayment structures are suitable in more advanced economies. Since these PSA curves are derived historically, the effects of dynamic forward-looking macroeconomic component are minimal. One way to account for forward-looking macroeconomics, as required in IFRS 9, is to use macroeconomic factors as a basis for selection of a particular PSA curve.

ii) Cumulative Prepayment Rate (CPR) model:

An alternative approach to model prepayment is to develop CPR model. Under this approach the four factors that affect the prepayment rates are:

- Refinancing Incentive
- Age of the facility (Seasoning)
- The month of the year (Seasonality)
- Premium Burnout (Principal balance)



This model is standardized again as,

Prepayment rate= RI(t) x SM(t) x MM(t) x BM(t)

- RI(I) is refinancing incentive factor defined as a function of the (refinancing) interest rate R and the collateral coupon rate
- SM(t) is seasoning or ageing effects with an observation that newer loans tend to prepay slower than older loans.
- MM(t) is a seasonality factor
- BM(t) is a burnout multiplier factor that takes into account seasoning or ageing. It reflects the observation that newer loans tend to prepay slower than older loans and that the tendency for prepayment decreases over time

The refinance factor measured over the life of the facility is considered to be the primary incentive for prepayments. The age factor discounts some of the prepayment impact for less seasoned loans. New loans usually have less incentive to prepay initially due to the possibility of having to incur refinancing costs. The burnout factor, which is caused by the population heterogeneity, discounts the refinancing incentive via the remaining principal factor of the loans.

Compared to Standardized prepayment path, the CPR model allows some flexibility to modelers. In other words, it allows analysis of four factors that impact prepayment, enabling FIs to internally define and measure factors as per their experiences on prepayment. The CPR model is widely used for mortgages.

B) Credit Conversion Factor (CCF):

For facilities that have undrawn portion in its structure, the EAD is computed by summing drawn amount and CCF-K factor weighted undrawn amount. The application of CCF is more prominent for revolving facilities in which the undrawn portion of entire limit set by creditor is more likely to be used under adverse macroeconomic scenarios. For contingent facilities, CCF-Q factor needs to be modeled in addition to CCF-K factor. CCF-Q factor is typically modeled at the facility level based historical experience of such off balance sheet exposure getting crystalized as on balance sheet exposure.

Since approaches that can be followed for computation of CCF are similar to the ones that we discussed for LGD modeling, following sections are intended to provide a brief recap of those approaches.

i. Decision tree-based approach:

Under this approach, various factors that impact CCF based on historical data are identified. A decision tree to identify nodes differentiating high CCF from low CCF is prepared. The business rules as implied by these decision trees are then used to compute CCF factors for each facility.

The decision tree-based approach relies significantly on data availability and data quality. One of the key challenges for CCF models derived using decision tree-based approach is finding a relevant external benchmark. One of the key advantages of decision tree-based approach is that it allows judgmental overlay while branching out the decision tree.

Although this is a primary advantage, it should be enforced carefully, as the tree derived with such overlay should be conservative enough to comply with the regulatory directives.

ii. Linear and logistic regression based modeling:

This is a typical modeling approach in which logistic regression is built to identify whether a default will occur under different scenarios. These scenarios are derived by regressing default rate with macroeconomic factors that may impact performance of the borrowers. Utilizing undrawn portion of a loan under such scenarios is highly likely and thus a robust regression model is needed to quantify this relationship. Some of the factors that can be of help in such quantification are:

- Committed Size / Amount drawn
- Undrawn amount drawn Percentage
- Time to default
- Rating class
- Change in drawn percentage
- Macroeconomic factors

This approach being relatively more quantitative in nature requires significant amount of data. Thus ideally the approach would be more suitable for retail portfolio in which data is abundant. Also, given the bimodal nature of CCF, two stage approach is more suitable for CCF modeling. In this approach, logistic regression can be used to predict whether CCF is continuous or discrete 0% and 100%. As a second step, linear regression can be used to estimate continuous CCFs.

iii. Direct value:

Direct value approach relies on CCF factor provided by regulators in the region. This approach is more suitable for a portfolio for which data is limited or quality of data is questionable.

To summarize, for IFRS 9 purpose FIs may use their existing ALM systems for computation of EAD through prepayment and CCF computation, provided they account for forward-looking macroeconomic factors. Moreover, FIs also have other alternatives such as parametric modeling: starting from simpler approach to more complex and robust data extensive approach. In absence of sufficient data for modeling, FIs may also rely upon regulatory CCF. Thus, an approach that FIs follow may be driven by set of factors, including but not limited to, availability of data, availability/sophistication of ALM system, type of facilities within its portfolio - all of which determine the benefits of EAD modeling for CCF as opposed to using regulatory CCFs. By leveraging historical data and estimating CCF through modeling, FIs may well be able to justify lower CCF as compared to seemingly conservative regulatory CCF estimates, and thus lower the overall ECL amount.

Feel free to send your IFRS-9 related queries to:

Sandip Mukherjee
Co-Founder and Principal Consultant
Email: sandip.mukherjee@aptivaa.com
Phone: +91- 98210- 41373

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