

Some Options for Evaluating Significant Deterioration Under IFRS9

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ABSTRACT

According to the IFRS 9 standard, if the credit risk on an instrument has increased “significantly” since the instrument’s original recognition and the resulting credit risk is more than “low credit risk,” then the institution would recognize a loss allowance on the instrument in the amount of lifetime, expected credit losses (ECLs). Alternatively, at original recognition and thereafter in the absence of significant deterioration in credit risk, the institution would recognise an allowance in the amount of 12-months of ECLs (or lifetime, if the instrument matures in less than 12 months). In clarifying this aspect of IFRS 9, the IASB has specified that, in evaluating whether an instrument has suffered significant deterioration, an institution would consider only lifetime default risk, excluding consideration of possible changes in the exposure at default (EAD) and loss given default (LGD) components of ECLs. The authorities have also stated that the triggering of a lifetime allowance would reflect circumstances under which the spread inherent in contractual pricing no longer compensates fully for credit risk. Further, in its analysis of IFRS 9, the Bank for International Settlements (BIS) has presented a view that most any deterioration in credit risk should be considered significant.

But how precisely does an institution determine whether an instrument has suffered a significant deterioration in its credit risk to a point in excess of low credit risk? Beyond the unspecific guidance mentioned above, the authorities have said little and so many institutions appear to be unclear on this matter and remain provisional in their planning for full implementation of IFRS 9. In this study, we present some implementation options that, for corporate and commercial portfolios of instruments evaluated individually, seem compatible with the IASB’s limited guidance to date. As a leading candidate for a decision measure, we introduce the levelised forward PD (LFPD). The LFPD translates a PD term structure into a spread equivalent. If this spread measure increases, one can conclude that the (real not risk neutral) PD component of the instrument’s par spread has increased and so, on the basis of default-risk information alone, one would have evidence that the initial contract pricing was insufficient to cover prospective credit risk. We present this default-risk measure along with a couple of others that similarly reduce an instrument’s PD term structure at original recognition and at a later reporting date to summary numbers that one can rank and use in determining whether significant deterioration has occurred.

Not all institutions will be able to calculate such PD-spread measures at least initially, so we also review some alternate decision rules. We compare various options and suggest the use of a hierarchical structure based on an institution's data availability with use of PD-spread measures at the top of the hierarchy. We describe ways to simplify the assessment of PIT PD term structures. We explore ways on designing threshold for Stage 2 allocation and suggest combining a percentage-change threshold for significant deterioration together with an absolute threshold (on annualised default risk) for low credit risk. Last, we provide some perspective on implementation requirements for this standard.

Keywords: Lifetime Point-in-Time (PIT) PD, Significant Deterioration, Stage Allocation, IFRS9, expected credit loss (ECL)

1. OVERVIEW

The transition from current accounting standards, IAS 39 to IFRS 9 is under way and one of the aspects with the least amount of guidance is the determination of significant deterioration. This requirement is part of the overall move from an incurred loss approach to expected-loss and fair-value based approaches (Beerbaum, 2015). IFRS 9 standards (IFRS 2014a, 2014b) call for an institution to classify each of its financial instruments carried at amortised cost into one of three stages:

- Stage 1: Performing: At initial recognition of a financial instrument, an institution would set aside an allowance in the amount of 12-months of ECLs. This serves as a proxy for the ECLs initially priced into the instrument.
- Stage 2: Significantly Deteriorated: When credit quality deteriorates significantly to a position in excess of low credit risk, the allowance would change from 12-months to lifetime ECLs.
- Stage 3: Impaired

IFRS (2014a) Sec 5.5.10 defines the need for lifetime ECL for instruments that have deteriorated significantly.

"... At each reporting date, an entity shall measure the loss allowance for a financial instrument at an amount equal to the lifetime expected credit losses if the credit risk on that financial instrument has increased significantly since initial recognition."

Thus, to determine whether, on an unimpaired instrument, the appropriate allowance amounts to lifetime or 12-months of ECLs depends on whether the instrument has suffered significant deterioration.

IFRS (2014a) Sec 5.5.9 defines the need for Significant Deterioration as:

"At each reporting date, an entity shall assess whether the credit risk on a financial instrument has increased significantly since initial recognition. When making the assessment, an entity shall use the change in the risk of a default occurring over the expected life of the financial instrument instead of the change in the amount of expected credit losses. To make that assessment, an entity shall compare the risk of a default occurring on the financial instrument as at the reporting date with the risk of a default occurring on the financial instrument as at the date of initial recognition and consider reasonable and supportable information, that is available without undue cost or effort, that is indicative of significant increases in credit risk since initial recognition."

The above mentioned requirement further leads to the following modelling and implementation requirements:

- "At each reporting date ..." implies that the institution must be able to reassess continuously whether significant deterioration in lifetime default risk has occurred.
- "... credit risk on a financial instrument ..." implies that the assessment has to be for each financial instrument.

- “ ... has increased significantly since initial recognition” implies that the comparison always involves an assessment of credit risk today in relation to the reference point of initial recognition.
- “... the change in risk of default ...” implies that the assessment considers only the risk of default and not the LGD and EAD components of ECL.
- “... occurring over the expected life ...” implies the need to measure risk of default over the life of the instrument.
- “... instead of the change in the amount of expected credit ...” reiterates that the determination of significant deterioration involve only measures of default.
- “... consider reasonable and supportable information ...” places an onus on the institution to consider a wider range of relevant data in evaluating whether an instrument has experienced significant deterioration.

In our view, with these key requirements in mind, institutions now have the tasks of:

- defining risk of default
- assessing the definition of risk of default against the requirement
- coming up with business logic of definition of risk of default customized to an institution’s portfolios and data availability
- defining mechanism of quantifying significant
- defining threshold levels to be used for quantification of significant change, i.e. how do instruments get classified as Stage 1 or Stage 2
- devising a robust implementation strategy to run this process in production

This paper focuses on significant deterioration and is built around these key requirements and tasks. Since the topic is much debated as there are almost no precedents guiding implementation of such a standard, we present some options for satisfying these requirements.

IFRS 9 requirements are relatively new and while there are other papers such as Reitgruber (2015) and Xu (2016) focussing on calculation of ECL components, this paper focuses exclusively on significant deterioration. It does not delve into other IFRS9 requirements, except for certain other standards that have a bearing on IFRS (2014a) Sec 5.5.9, which introduces significant deterioration.

2. DEFINING RISK OF DEFAULT

We view the term ‘risk of default’ as referring to the probability of default (PD) over one or more time intervals, with the coming year being the most common reference period. While we’ve seen others define the term in a more nebulous way, we always focus on quantitative PDs. One can hardly imagine pricing for credit risk properly or managing a credit portfolio well unless one has numerical PDs. For further details on ways to quantify/represent risk of default see IFRS (2012, 2013).

Credit institutions typically have one (and sometimes more than one) master scale expressing the relationship between ratings and PDs. Thus, henceforth we refer to grades as (rounded) PDs. In the rare case of an institution without a master mapping table, the process of determining PDs from grades or of comparing grades from different grading models becomes more difficult.

The presence of PDs doesn't guarantee that an institution estimates default risk accurately. We find that many existing, PD or grading models produce estimates that are biased, over or under stating realized default rates (DRs) on average, or excessively stable, failing to track closely the temporal DR fluctuations, which can be large. The use of such PD estimates, taken at face value, would impair an institution's management of credit risk. Thus, it makes sense to adjust PD models so that they are unbiased and point in time, tracking DRs as closely as possible. As a matter of terminology, we refer to a model as 'hybrid' if its output is not fully PIT and not fully through the cycle (TTC). A TTC PD is a pro forma estimate under the usually counterfactual assumption that credit-cycle conditions are in a long-run average state.

Most analysts agree that IFRS 9 calls for the use of unbiased estimates of PDs over the life of a loan, with 'lifetime PDs' interpreted as PD term structures. We elaborate on this in following sub-sections:

2.1. One-year point-in-time (PIT) PD

Even though IFRS (2014a) Sec 5.5.9 clearly asks for change in lifetime risk of default, IFRS9 Sec 5.5.13 and 5.5.14 acknowledges that under certain circumstances, change in one-year risk of default may be reasonable proxy of change in lifetime risk of default

"The methods used to determine whether credit risk has increased significantly on a financial instrument since initial recognition should consider the characteristics of the financial instrument (or group of financial instruments) and the default patterns in the past for comparable financial instruments. Despite the requirement in paragraph 5.5.9, for financial instruments for which default patterns are not concentrated at a specific point during the expected life of the financial instrument, changes in the risk of a default occurring over the next 12 months may be a reasonable approximation of the changes in the lifetime risk of a default occurring. In such cases, an entity may use changes in the risk of a default occurring over the next 12 months to determine whether credit risk has increased significantly since initial recognition, unless circumstances indicate that a lifetime assessment is necessary."

"However, for some financial instruments, or in some circumstances, it may not be appropriate to use changes in the risk of a default occurring over the next 12 months to determine whether lifetime expected credit losses should be recognised. For example, the change in the risk of a default occurring in the next 12 months may not be a suitable basis for determining whether credit risk has increased on a financial instrument with a maturity of more than 12 months when:

(a) the financial instrument only has significant payment obligations beyond the next 12 months;

(b) changes in relevant macroeconomic or other credit-related factors occur that are not adequately reflected in the risk of a default occurring in the next 12 months; or

(c) changes in credit-related factors only have an impact on the credit risk of the financial instrument (or have a more pronounced effect) beyond 12 months."

The above, IFRS passage seems paradoxical, since it allows the use of a one-year PD as a proxy for the lifetime PD only under circumstances in which the two are consistent in their depiction of default risk. One however can only know this by comparing the two alternatives, in which case one has the lifetime PD and therefore wouldn't use the one-year PD as a proxy for lifetime. Nonetheless, we consider the use of one-year PDs as a possible option. Evidently, there are circumstances in which an institution has lifetime loss rates, to be used in determining lifetime ECLs, but, as yet, only one-year PDs. We accept that possibility, though it seems unlikely, and on that basis will continue to discuss the one-year PD option.

In IFRS (2015), Transition Resource Group has clarified the use of 12-month vs lifetime PDs and we refer to this document on appropriateness but in this paper we clarify the quantitative foundation of it.

In any case, regardless of whether one uses 12-month or lifetime PDs in assessing significant deterioration or in managing credit risk, one needs to make sure that the estimates are accurate. In our experience, the PD estimates for corporate and commercial portfolios are much too stable, failing to explain much of the temporal fluctuations in DRs. Since, the significant deterioration standard involves a comparison of lifetime PDs at different points in time, the cross temporal inconsistencies intrinsic to hybrid or TTC models

makes them ineligible for use in those comparisons. Hence, for IFRS 9, one needs to covert hybrid or TTC PD models to PIT ones.

The techniques for doing this draw either on realised DRs observed in large samples representative of an particular, credit portfolio (Carlehed and Petrov, 2012) or, as a way to mitigate sampling errors in DRs from other than very large portfolios, on summary measures of PDs obtained in turn from a PIT PD model (Aguais et al, 2004, 2007; and Forest et al, 2013).

Here we describe the second approach, which involves the use of industry-region credit-cycle Z indexes. One can find a detailed description of this approach in Forest et al, 2015; Chawla et al 2015, 2016.

Forest et al, 2015 and Chawla et al 2015 find that agency ratings are roughly 80% TTC. They also demonstrate a way of converting those ratings to PIT PDs that track closely the temporal fluctuations in DRs of agency-rated companies. Equation (1) summarizes the way one may use industry-region credit cycle indices in converting hybrid or TTC PDs to PIT PDs.

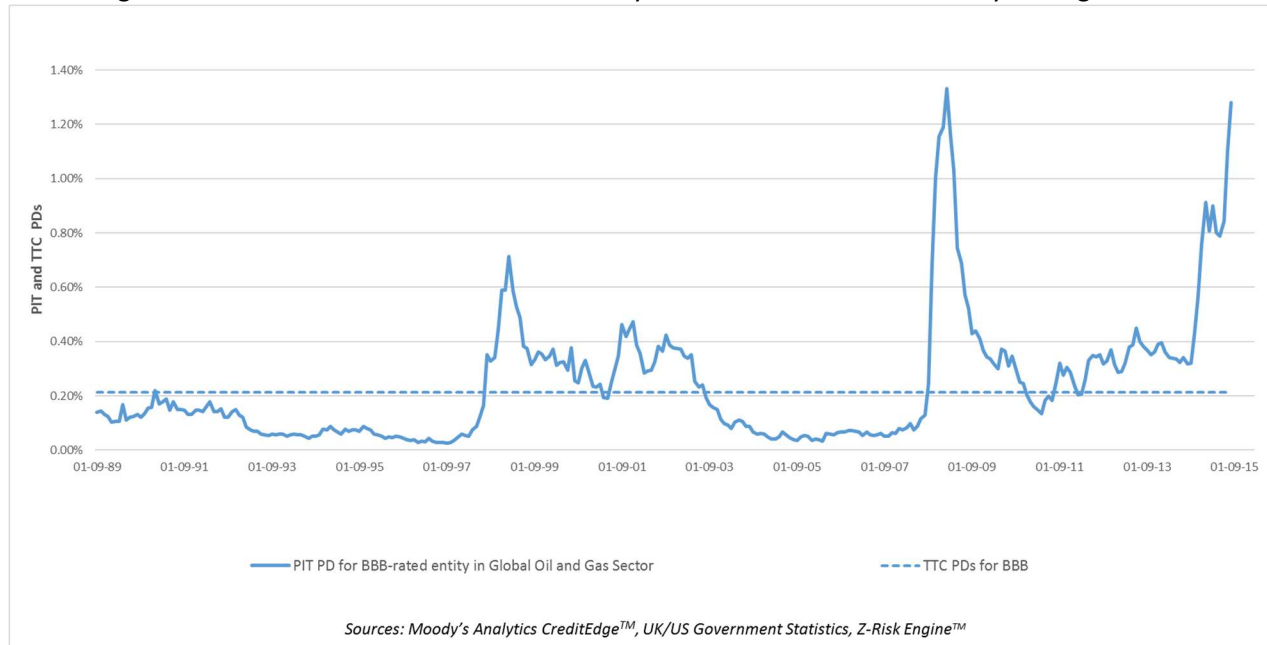
$$PIT\ PD_{i,t} = \Phi \left(- \frac{f(DD_{i,t}) + b \cdot \sqrt{\rho_{I(i),R(i)}} \cdot Z_{I(i),R(i),t} + \sqrt{\rho_{I(i),R(i)}} \cdot \Delta Z_{I(i),R(i),t}}{\sqrt{1 - \rho_{I(i),R(i)}}} \right) \quad (1)$$

where $PIT\ PD_{i,t}$ is the PIT Probability of Default for the i^{th} entity at time t
 $DD_{i,t}$ is the idiosyncratic internal model score/DD/PD/grade/rating for the i^{th} entity at time t
 f is a bespoke functional form for every model, e.g. logistic or Probit
 Φ - standard normal cumulative distribution function
 $Z_{I(i),R(i),t}$ – industry (I) and region (R), credit-cycle index (CCI), at time t . Z is a quantification of credit condition using PIT-TTC framework. It measures how far an industry or region credit conditions are from its long run average.
 $\Delta Z_{I(i),R(i),t+1}$ – change in industry (I) and region (R) credit cycle index (from t to $t+1$)
 b – regression coefficient which denotes the degree of TTC-ness of $DD_{i,t}$
 ρ – correlation factor related to $DDGAP$

Once one converts all PD model outputs to PIT, one can use these outputs in the intertemporal comparisons involved in evaluating significant deterioration.

In using industry-region credit cycle indices rather than broad macroeconomic indicators, one takes account of the occasionally large deviations in conditions across sectors. Figure 1 below shows conversion of a TTC-BBB rated entity's grade to a PIT PD using the 'Global Oil and Gas' credit cycle index. One can see from the figure that the facilities to such entities originated in 2005-06 would mostly by 2008-09 have suffered significant deterioration as would be the case in most industries. However, we also see that those originated to oil-and-gas firms in 2012-13 would also have suffered significant deterioration by 2014-15, probably unlike most facilities in many other sectors. Thus, a broad macroeconomic indicator that gives the same signal for all sectors would fail to pick up such distinctions.

Figure 1: PIT PD variation for BBB rated entity in Global Oil and Gas Industry through time



2.2. Lifetime PIT PD Term Structure

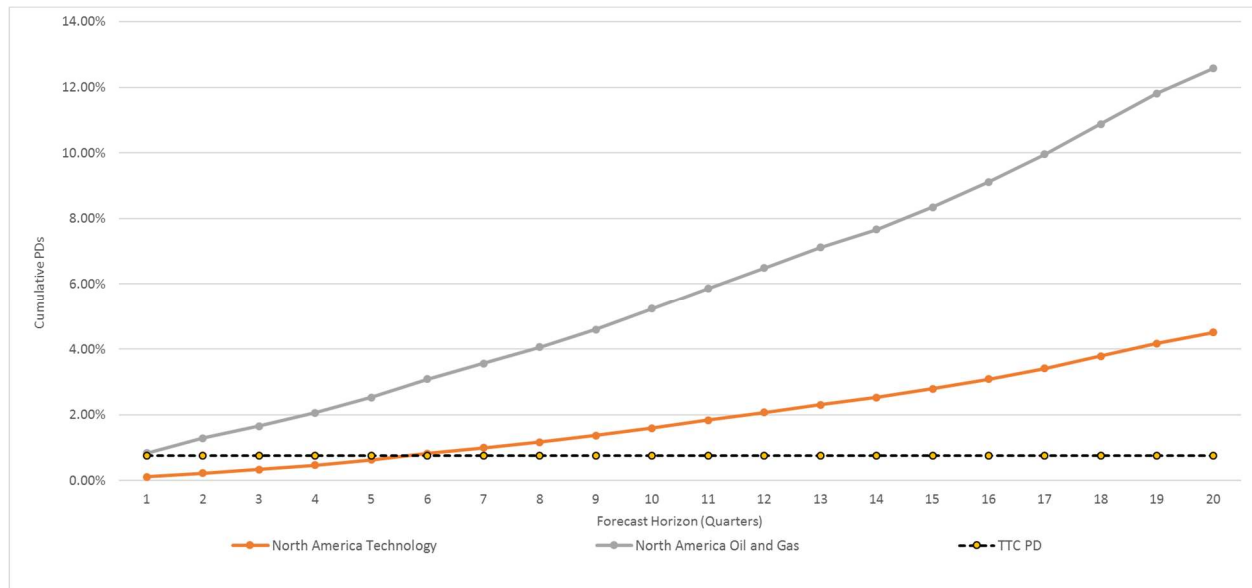
In writing this paper, we chose to start with a discussion of a short-term (e.g. one-year) PD, because, to have any hope of building an accurate PD term structure, one must start with a good estimate of initial conditions. As discussed before, for corporate and commercial portfolios, the legacy models produce short-term PDs that are generally not PIT and indeed far from it. Hence, one needs first to convert those outputs to PIT and then use those PIT estimates of initial conditions in producing a PD term structures extending over the life of each exposures.

There are techniques, for doing this. One may start with a series of forward PD models. However, while this approach can produce PD term structures, it doesn't offer a way of running the joint, PD, LGD, and EAD scenarios needed in accounting for the effects of PD, LGD, EAD correlation on the ECL term structures. So the main alternative, which involves the use of transition matrixes in developing period by period PDs is preferable. But to do this in a way that accounts for current and prospective conditions, and not just long-run average conditions, one needs to use credit-cycle-conditional transition matrixes. One could imagine accomplishing this using macro-economic scenarios as in existing regulatory stress-test models. But, at the present time, most institutions haven't developed the capacity of generating the large number of probabilistic macroeconomic scenarios that one needs if one is to obtain not just current stresses but credible estimates of unconditional expectations extending several years. So we instead use a more tractable and arguably more accurate approach drawing on time-series models of the stochastic evolution of credit-cycle, Z indexes. Z-index scenarios entered into a CreditMetrics model of transition matrices, produces the needed transition and multi-period PD scenarios. The mathematics of multi-year term structure construction is beyond the scope of this paper and deserves a full technical article in itself. Hence we refrain from going into the details but simply summarize that the process leads to several future views of PIT PDs using Monte Carlo Simulation of the future Z scenarios. The averages of the many PD scenarios provide estimates of the unconditional PIT PD term structure.

Figure 2 below compares an unconditional, lifetime PIT PD term structure of two entities each with a TTC PD of 75bps. Since Global Oil and Gas is experiencing harsh credit conditions today with news of

bankruptcies and insolvencies, the one year (4 quarter) PIT PD for the first entity in Oil and Gas industry is higher than its TTC PD and its cumulative PD term structure continues to climb higher. In stark contrast is a second entity with TTC PD of 75 bps, but with lower one year (4 quarter) PIT PD and the overall term structure being lower compared to that of the first entity.

Figure 2: Cumulative PIT PD term structure for two entities in different sectors



Since the standard calls for “risk of a default occurring over the expected life of the financial instrument”, it makes sense to look at the entire term structure of PD over the life of the exposure j in evaluating significant deterioration ed.

Also, IFRS (2014a) Sec 5.5.10 calls for lifetime ECL for facilities that have deteriorated significantly in credit risk.

“... At each reporting date, an entity shall measure the loss allowance for a financial instrument at an amount equal to the lifetime expected credit losses if the credit risk on that financial instrument has increased significantly since initial recognition.”

This means that institutions using PD, LGD, EAD modelling for ECL, have to compute lifetime PIT PDs as part of the process in determining lifetime ECL. Hence, it makes sense to calculate PDs together with the ECLs.

The use of PIT PD term structures in gauging significant deterioration gives rise to a quantification question. A term-structure curve exists at time of origination and another at a later, reporting date. How should the two be compared with the aim of determining which is higher and which lower? We illustrate this problem in Figure 3 below, which considers a case of a facility with original maturity of five years. Over two years, the cumulative PD term structure over the three years of remaining tenor has shifted up from the position of that same part of the term structure at original recognition, but the tenor has dropped by two years causing some higher PD tenor points to fall out of the analysis. Has this facility suffered significant deterioration?

Figure 3: Change in Cumulative PIT PD Term Structure with Passage of Time



In assessing the curves (at time of origination and another one at reporting date) with the aim of determining whether significant deterioration has occurred, one must decide which of two curves is “above” the other. To do this, one must apply a metric for reducing curves to numbers representing distances above the default-free, PD=0 curve. We suggest the following three metrics:

1. Lifetime annualized PD (LAPD), which expresses the lifetime PD as an annual average rate. This is a constant, default-intensity rate that cumulates at term to the exposure’s lifetime PD. It involves no discounting of future, incremental PDs, so is always larger than the related LMPD or LFPD described below.
2. Levelized marginal PD (LMPD), which is a weighted average of annualized, marginal PDs, with discount rates driving from the EIR as weights. This is the constant, riskless premium (rate) that, paid periodically up to the term of the exposure, cumulates to a PV that is same as that of the exposure’s default risk while using the EIR in discounting.
3. Levelized forward PD (LFPD), which is a weighted average of annualized, forward PDs, with survival rates (SRs) multiplied by discount rates as weights. This is the constant, premium (rate) that, paid periodically so long as the exposure survives, cumulates to a PV the same as that of the exposure’s default risk. Since the premium occurs only if the exposure survives, the LFPD must be larger than the corresponding LMPD.

LAPD, LMPD, and LFPD provide similar measures of distances from risk free. To derive these, we make use of cumulative PD curve, marginal PD curve or the forward PD curve respectively as shown in Figure 4. The vast majority of commercial and corporate exposures have (marginal) PD term structures that slope upwards, revealing that annual average default-risk rises with tenor. In these cases, therefore, if the risk grade remains fixed, the LAPD, LMPD, and LFPD will decline as tenor shrinks. We illustrate these ways of measuring default risk over several time periods in Figure 4. Note that these metrics basically convert a PD term structure into a spread equivalent. Indeed, assuming that the real PD term structure is the same as the risk-neutral one, the LFPD corresponds to the par spread on a CDS contract that pays EAD in the event of default.

Since the LFPD represents a type of spread, this seems to align it with the IASB's expressed intent that the significant deterioration trigger occur under circumstances in which initial pricing no longer covers credit risk to the same extent as at original recognition. See, for example, page 20 in the IFRS 9 Project Summary (IFRS 2014b):

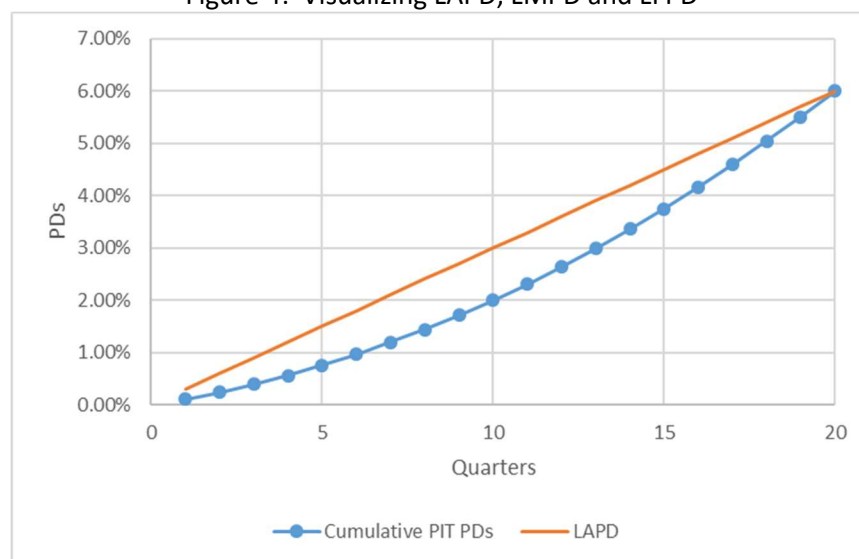
"When credit is first extended the initial creditworthiness of the borrower and initial expectations of credit losses are taken into account in determining acceptable pricing and other terms and conditions. As such, recognizing lifetime expected credit losses from initial recognition disregards the link between pricing and the initial expectations of credit losses."

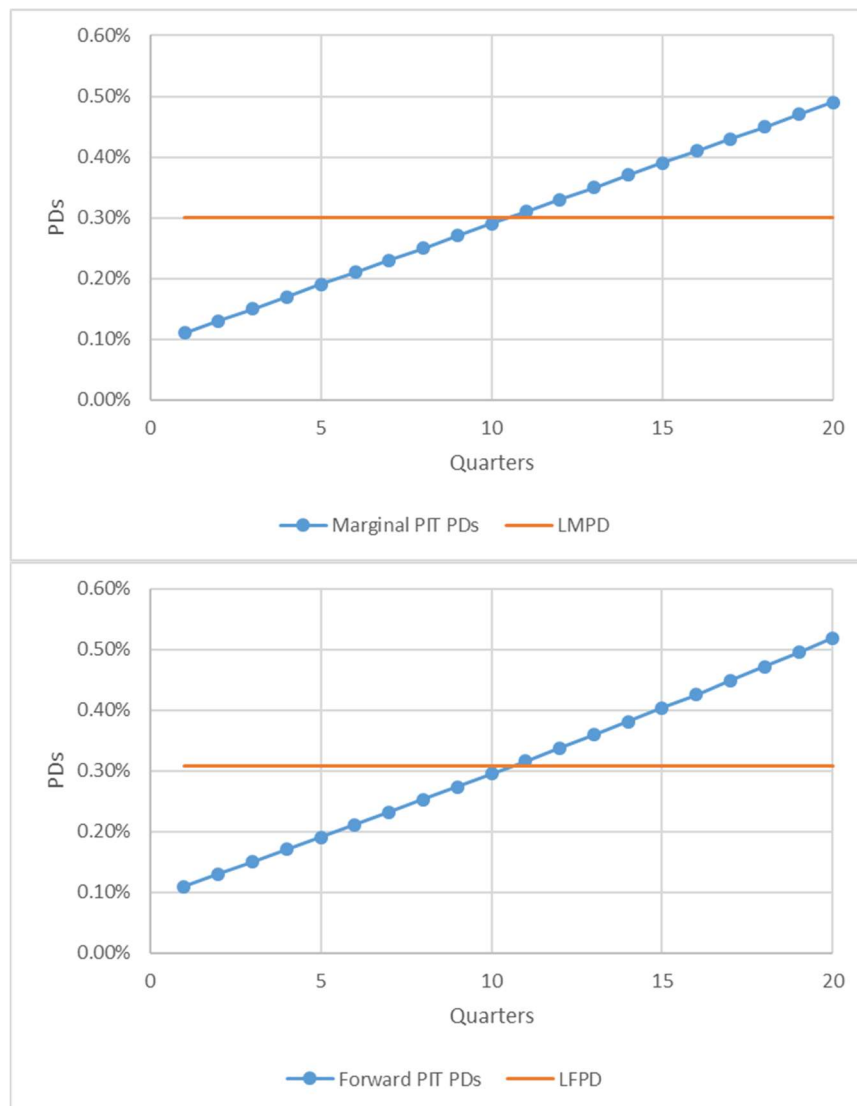
"A true economic loss arises when expected credit losses exceed initial expectations (ie when the lender is not receiving compensation for the level of credit risk to which it is now exposed). Recognising lifetime expected credit losses after a significant increase in credit risk better reflects that economic loss in the financial statements"

The LAPD, LMPD, and LFPD measures will indicate deterioration since origination only if a sufficiently large worsening of the risk grade or increase in the reference (e.g. one-year) PD has occurred. "Sufficiently large" means "large enough to more than offset the risk reduction associated with shorter tenor".

To implement the stage 1 versus 2 allocations, one needs to establish the amount of increase in the metric that would be considered significant. One could, for example, establish that a 10% increase in LFPD was significant and that an LFPD over 20 bps was in excess of "low credit risk."

Figure 4: Visualizing LAPD, LMPD and LFPD





2.3. Other indicators representing risk of default

In some cases, particularly early on in the application of IFRS 9 when an institution may be lacking term structures at original recognition for many facilities, the institution may use other default-risk indicators in evaluating whether significant deterioration has occurred. IFRS (2014a) Sec B5.5.17 provides a non-exhaustive list of indicators related to risk of default. We deliberately call them 'indicators representing default' because these are not 'pure quantifications' of risk of default. Most are qualitative in nature and can be interpreted by people differently based on each individual's experiences and biases. In Table 1 below, we show how these triggers can be applied to a large to mid corporate portfolio. Such an example highlights the shortcomings of using such data to represent risk of default.

Further, most are backward looking and defeats the very purpose of forward looking nature of IFRS9. There are a variety of pros and cons with usage of such data. We believe such data can be:

- A good starting point when institutions don't have one-year PIT PD or lifetime PIT PD but cannot be a substitute because most of them are backward looking

- A benchmark for one-year PIT PD or lifetime PIT PD (but only those indicators which are leading)
- As a backstop in case forward looking information is not available (for those indicators which are lagging e.g. days past due)

Table 1: Assessment of Data representing risk of default for typical Corporate/Commercial portfolio

	Assessing Changes in Credit Risk by	Portfolio Coverage	Coverage in terms of lifetime risk of default	Propensity to create false positives	Propensity to create false negatives	Timeliness
a)	Internal price indicators of credit risk	High	Only if lifetime PD/grades or lifetime cash flows are used	Low	High because of TTC or hybrid grades which don't reflect current credit conditions and forward forecast	Lagging if based on TTC or hybrid grades
b)	Changes in rates or terms of existing instrument (such as forbearance)	High	High	Low	High – lagging nature means those deteriorated but not days past due are missed	Severely Lagging
c)	Significant changes in external market indicators	High	High	Low only if market signals are relevant drivers, otherwise creates noise	Low	Leading
d)	External credit rating	Depends on portfolio coverage	High since ratings take a longer view	Low	High because external credit ratings are about 20% PIT and do not reflect current credit conditions and forward forecast	Somewhat lagging
e)	An actual or expected internal credit rating	High	High if lifetime ratings are used	Low	High if TTC or hybrid grades which don't reflect current credit conditions and forward forecast	Somewhat lagging
f)	Existing or forecast adverse changes in business, financial or economic conditions	High	High	Low only if market signals are relevant drivers, otherwise creates noise	Low	Leading
g)	An actual or expected significant change in the operating results of the borrower	Low – forecasting changes in operating results is hard and expensive	High	Low	Low	Leading
h)	Significant increases in credit risk on other financial instruments of the same borrower	Low	High	Low	High – not all cases can be covered due to low coverage	Somewhat lagging
i)	Actual or expected significant adverse change in the regulatory, economic, or technological environment of the borrower	High	High	Low only if market signals are relevant drivers, otherwise creates noise	Low	Leading
j)	Significant changes in the value of collateral supporting the obligation	Low – needs collateral valuation	Low	High – need to create collateral valuation (LGD/EAD) to PD link	High – not all cases can be covered due to low coverage	Somewhat lagging

	Assessing Changes in Credit Risk by	Portfolio Coverage	Coverage in terms of lifetime risk of default	Propensity to create false positives	Propensity to create false negatives	Timeliness
k)	A significant change in the quality of the guarantee provided by a shareholder	Low – applies to guarantees only	Low	Low	High – not all cases can be covered due to low coverage	Somewhat lagging
l)	Changes in the quality of credit enhancements	High	High	Low	High – lagging nature means those deteriorated but not days past due are missed	Somewhat lagging
m)	Expected changes in the loan documentation	High	High	Low	High – lagging nature means those deteriorated but not days past due are missed	Severely Lagging
n)	Changes in the payment status of borrowers in the group	Low	High	Low	High – lagging nature means those deteriorated but not days past due are missed	Somewhat lagging
o)	Changes in the entity's credit management approach	Low	High	Low	High – not all cases can be covered due to low coverage	Somewhat Leading
p)	Past due information	High	High	Low	High – lagging nature means those deteriorated but not days past due are missed	Severely Lagging
The propensity to create false positive is like Type 1 error of a model. In this case it refers to the data calling something Significantly Deteriorated when it is NOT Significantly Deteriorated, i.e. creating noise. The propensity to create false negatives is like Type 2 error of a model. In this case it refers to the data calling something NOT Significantly Deteriorated when it is in fact Significantly Deteriorated, i.e. missing relevant signal.						

3. SIGNIFICANT DETERIORATION THRESHOLDS

Significant deterioration requirements call for both a measure of lifetime default risk and thresholds to use in determining whether the measure has increased significantly to a position in excess of low credit risk. There are some clear ways to establish thresholds:

- **Absolute Change:** Here one would determine that the stage 2 threshold was exceeded if a facility's lifetime-PD measure increases by more than a fixed amount. For example, if one measures lifetime default risk using LFPD, one could set a threshold of 20 bps. Thus, if the LFPD were to rise by more than 20 bps, one would conclude that the facility had deteriorated significantly.
- **Percentage Change:** In this case, one would express the threshold as a percentage change. Again using LFPD as the lifetime default measure, one would determine that a facility had deteriorated significantly if its LFPD had increased by more than a fixed percentage amount since the date of initial recognition. Suppose one sets a percentage threshold of 10%. Consider a facility with an initial LFPD of 70 bps. In this case, one would conclude that the facility had suffered significant deterioration, if its LFPD at a subsequent reporting date were to exceed 77 bps. Alternatively, suppose that the initial LFPD was 50 bps. In this case, a subsequent LFPD in excess of 55 bps would indicate significant deterioration.
- **Absolute Change with Threshold Rising in Higher Risk Bands:** This case is similar to the percentage change threshold.
- **Absolute Level:** This type of threshold applies in the cases of determining whether a facility has low credit risk. Again, consider the case of using the LFPD for evaluating lifetime default risk. Here, one could use a value (say) of 30 bps. In this case, if the LFPD at the reporting date were above 30 bps, one would conclude that the facility's default risk was greater than low default risk.
- **Combination of above**

4. THRESHOLD LEVELS FOR CHANGE IN RISK OF DEFAULT

With the above mentioned trigger design where the PIT PD multiple largely covers most part of the book, the level of threshold is still a question. Whether a 10%, 20%, or some other percentage rise in the significant-deterioration metric is the proper threshold for significant deterioration is an open to debate. There are no established conventions, but based on the advice of BIS, the threshold will surely not be an extremely permissive one. Here we focus on mathematical foundations for developing threshold levels rather than providing an outright solution or equation. Alternative ways for quantifying threshold levels are:

1. Calibration to banks existing credit processes, watch list criteria and acceptance criteria to identify the level of significant deterioration, but these are marred with issues like lagging indicator and low coverage and hence calibration of threshold level using this technique
2. Model errors whereby models error bounds are considered. However, the calculation of error bands for multiyear PDs is complex and restricted by limited data, so we doubt that this approach will be definitive.
3. Base the threshold on expert judgement, such as a level identified at a management review committee based on general understanding of rating level changes, e.g. a 3 PIT grade downgrade on a 21-point scale is excessive. Note that in such a case TTC like grades will not work, e.g. Agency ratings on Oil & Gas and Mining firms were not downgraded 3 or more notches even though the sector is going through systematic distress.

5. IMPLEMENTATION CONSIDERATIONS

We think implementing significant deterioration in systems will be challenge because of the following modelling related reasons:

- Stage allocation is done at financial instrument level (not obligor level), leading to cross reference of systems and possibility of instruments from the same obligor in different stages.
- Historical data going back to origination may not be available. In case of corporate and commercial portfolios, one can assume same TTC-like grade and back-cast PIT PDs back in history using credit cycle index approach discussed earlier, thereby alleviating this concern somewhat.
- Implementing term structure for each entity and instrument, both historically and going forward in time is a time consuming and error prone.
- Change of upstream models e.g. Corporate model v1 implemented in 2012, v2 in 2015 and v3 in 2017 can make cross model PD output comparison extremely hard.
- Experts reviewing Significant Deterioration model output attempting to override the model output by changing trigger or threshold levels leading to an unstable and ever changing model
- Reversion, i.e. going back from Stage 2 to Stage 1 will have to be modelled and implemented as well.

IFRS (2014a) Sec 5.5.7 provides the following guidance on reversion

"If an entity has measured the loss allowance for a financial instrument at an amount equal to lifetime expected credit losses in the previous reporting period, but determines at the current reporting date that paragraph 5.5.3 is no longer met, the entity shall measure the loss allowance at an amount equal to 12-month expected credit losses at the current reporting date."

Since, PDs are continuous but the Stage Allocation trigger is binary, there is a possibility of entities going back and forth between Stage 2 and 1 on a monthly or quarterly basis. To alleviate an institution may apply a business rule as 'Stage 2 for at least 12 months' which would also lead to provisions stability.

However, we believe that with time, the process will become smooth. Institutions will migrate to forward looking PIT PD term structures and one-year PIT PDs and process automation will lead to a more forward looking early warning system.

6. SUMMARY

In this paper, we focus on IFRS9 requirement for significant deterioration. We understand these requirements as (i) defining risk of default, (ii) assessing the definition of risk of default against the requirement, (iii) coming up with business logic of definition of risk of default customized to an institutions portfolios and data availability, (iv) defining trigger mechanism of quantifying significant, (v) defining threshold levels to be used for quantification of significant change and (vi) devising a robust implementation strategy to run this process in production

We discuss that the hybrid and TTC-like PDs produced by many legacy, PD and grading models don't properly quantify changes in default risk over time and so an institution needs to convert its PDs to PIT measures. We then demonstrate some options for evaluating whether significant deterioration has occurred. We offer three metrics for comparing PIT PD term structures.

We discuss pros and cons of using indicators other than PIT PDs for representing risk of default, but show that such measures tend to be backward looking, contrary to the desired forward-looking nature of IFRS9. Thus, it seems best that those other indicators be limited to an interim implementation or as a backstop.

We explore ways on designing a trigger for Stage 2 allocation and recommend a combination of low credit risk, PD multiple and absolute level. The proper way of determining thresholds is far from settled. But surely a consensus will emerge over time.

DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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