RISK AND REGULATORY INSIGHTS

About the author:
Clifford Rossi, Ph.D. is the Chief Risk and Regulatory Advisor for Five Bridges Advisors and is Professor-of-the-Practice at the Robert H. Smith School of Business at the University of Maryland.

Reconciling Default Concepts for Risk Management Analytics

Various regulatory, accounting and portfolio management exercises require different credit loss estimates. This has created confusion in the industry over what measures of default to apply and how to produce them, resulting in the proliferation of multiple credit analytic tools within firms. This profoundly affects risk management activities as it has become more difficult to reconcile default estimates and communicate outcomes to decision makers. It also requires more technical and financial resources to maintain multiple approaches to measuring credit risk. With the new CECL loan loss reserving framework looming on the horizon, it is instructive to sort out the various concepts relating to default measurement and prepare for yet another variation in credit loss determination.

Primary uses of credit risk estimates at banks today include loan loss reserving, Basel capital requirements, stress testing, loss forecasting and product pricing and portfolio valuation. The common denominator of each activity is the need to compute an estimate of credit loss defined as the product of probability of default (PD), loss given default (LGD), and exposure at default (EAD). However, behind this calculation lie a number of factors which vary according to the requirements of the analysis being performed. These include assumptions regarding time horizon, economic cycle, conditionality, as well as intertemporal and distributional considerations.

Depending on the application, time horizon over which loss is measured ranges from less than one year to lifetime. In credit valuation and pricing applications, for example, the entire time profile of default can be generated and used to produce discounted cash flows of individual assets or portfolios. Basel capital calculations require a one year estimate of PD while the new CECL framework requires a lifetime estimate of loss. But even lifetime loss in this case is based on the estimated life of a loan which can be quite different than the loan's maturity. Take for example a 30-year fixed-rate amortizing mortgage. Prepayments reduce the effective lives of these assets to an average duration of between 5 and 7 years. This introduces another assumption into credit loss estimates—measurement of conditional or unconditional default rates. Using the mortgage example above, taking into account previous prepayment and default outcomes yields a conditional view of default.

Today, the incurred loss approach to loan loss reserving reflects a loss emergence view that typically extends only a year or so, but while the time horizon between it

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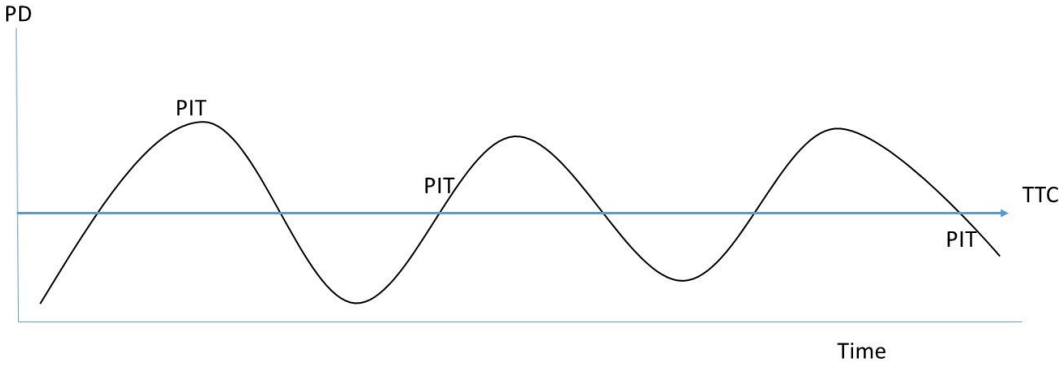
Five Bridges Advisors, LLC
7315 Wisconsin Ave.
Suite 1150, West Tower
Bethesda, MD 20814

www.fivebridgesllc.com

and a Basel capital estimate may be similar, assumptions regarding economic cycle and distributional considerations preclude the direct use of one estimate for another. Economic cycle assumptions matter in developing PD and loss estimates and generally fall into one of two categories; point-in-time (PIT) and through-the-cycle (TTC). A PIT PD, for example, measures default taking into account current and/or future conditions over some time window. In that regard, PDs and hence loss estimates will vary depending on the part of the cycle (peak, trough, other) reflected by current conditions. The CCAR severely adverse scenario, for example, is a PIT estimate, evaluated at the bottom of the cycle. By contrast, a TTC view incorporates outcomes across the entire economic cycle. A TTC estimate of PD does not change over time and reflects the consolidated view of credit risk over a period of time sufficient to capture the variability of losses under different business conditions. Basel capital models for credit are considered to represent TTC views. Intertemporal considerations matter as well. Both PIT and TTC estimates of PD are depicted in Figure 1. Historical estimates augmented with a qualitative factor to generate an estimate of loan loss provisions under the incurred loss approach, or use of current plus future forecasts to generate a CECL estimate of provisions will potentially produce demonstrably different default outcomes. However, both are considered to be PIT estimates.

Figure 1



Another consideration in credit loss analysis relates to probabilistic outcomes. Figure 2 presents a stylized lognormal loss distribution as may have been estimated from historical data for a type of loan, such as a residential mortgage. Expected losses,

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E(L), define the average loss associated with this asset class. By contrast, a more severe loss estimate is shown as L^{99th} which describes the loss rate associated with the 99^{th} worst loss outcome. The difference between these two estimates is referred to as unexpected loss. Unexpected losses are found more in Basel capital models or specific scenarios such as the severely adverse scenario associated with CCAR stress tests. Development of loss distributions can be made analytically by leveraging such techniques as the Vasicek portfolio credit loss model, or by using simulation-based methods. A variant of the former is found in the Basel AIRB capital model while the latter could be represented by projecting numerous "paths" of key macroeconomic variables that affect default over time. This is depicted in Figure 3 below.

Figure 2

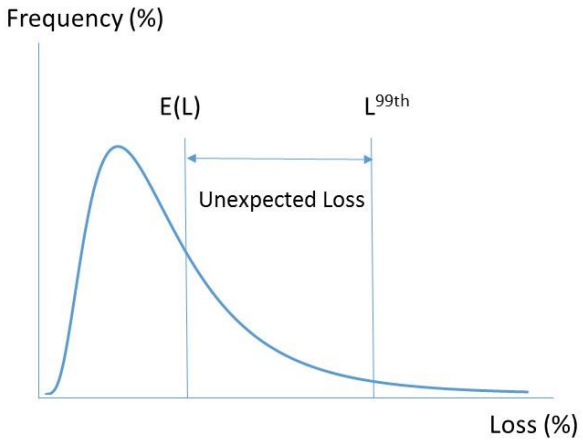
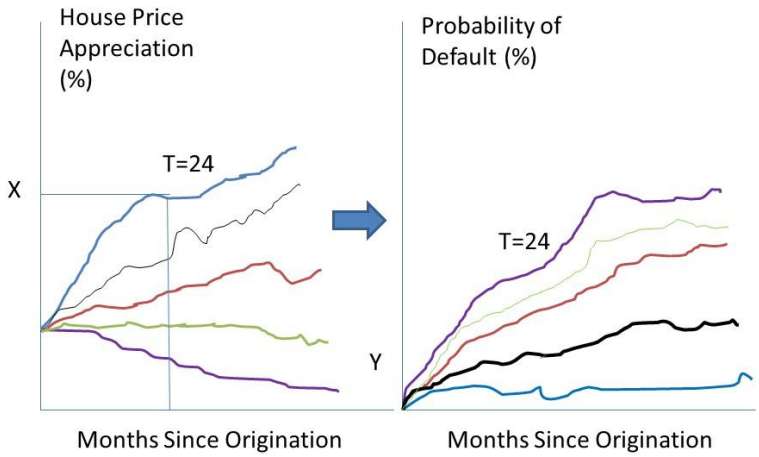


Figure 3



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Using the example of a mortgage, home prices are a well-known factor that affect default. As such, this variable is typically found in models of mortgage default (along with other macroeconomic variables). The evolution of home prices over the economic cycle can be statistically generated to produce results resembling the left-hand side of Figure 3, in this case evaluated at month 24. Each of these home price paths can then be evaluated in the default model over all projected paths, producing what is shown on the right-hand side of Figure 3. These estimates of default can then be aggregated to produce the loss distribution in Figure 2. The expected loss derived from a simulation analysis shown in Figure 3 would be considered to be a TTC view since it takes into account the effect of the entire economic cycle via the simulation of key economic variables.

In the case of CECL, the concept of current expected lifetime loss puts a new spin on our traditional default concepts. Technically, the CECL framework is characterized as a PIT approach. On the surface that seems inconsistent with the notion of expected loss as described above as a TTC estimate; however, the difference is that expected loss in the CECL context is evaluated currently, taking reasonable and supportable forecasts into account as well as historical outcomes. As a result, loss estimates for CECL provisioning would be expected to change over time with current conditions, loan performance and updated forecasts.

Risk managers face substantial complexity regarding differing requirements of regulatory, accounting and portfolio management credit loss estimation exercises. Reserving, capital requirements, stress testing, loss forecasting and loan pricing and valuation applications vary greatly in terms of underlying assumptions regarding the type of loss estimate being produced. Understanding these differences is vital to producing accurate loss estimates that can be communicated clearly to internal and external stakeholders. While a one size fits all credit model remains elusive, the possibility exists to leverage a baseline default model that can accommodate any point on the loss distribution over a prescribed time horizon and under varying economic conditions and assumptions for multiple risk management purposes.

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