

Estimating Exposure at Default

As lenders, we know that a small portion of our Commercial and Industrial (C & I) customers will fail. For those that have already failed or are in imminent danger of doing so, we have identified the problem, assessed the potential losses and set aside reserves that are expected to cover the damage. Past history suggests that most institutions have probably set aside more than needed, for the average lender is innately conservative and this conservatism is encouraged by both the audit process and the regulators.

The New Current Expected Credit Loss (“CECL”) Rules

Soon there will be new rules which will require lenders to set aside reserves for potential losses in the portfolio of loans and other credit risks that are currently performing well. The logic for this is inescapable, there is certainty of losses from those borrowers even though we have not yet been able to establish which ones they are. This is Expected Loss, calculated as the Probability of Default (“PD”) multiplied by the Exposure at Default (“EAD”) and the Expected Loss Given Default (“LGD”).

The most difficult of these estimates is the PD, but that does not lessen the importance or the difficulty of dealing with the other elements in the calculation. The purpose of this paper is to look at EAD and suggest what lenders will have to do in order to comply with the new rules without having to set aside reserves that are far in excess of the most probable outcome.

Exposure at Default

The FDIC reported in 2009 that close to 80% of all C & I loans in the United States are done using commitment contracts. As the estimated value of the undrawn amount of those contracts at that time was \$1.9 trillion, it is safe to say that this is a massive issue affecting all lenders and therefore all attempts to get the calculation as close as possible to the most probable outcome should be a major focus.

Unfortunately these contingent loan contracts are far from homogenous. There is a major difference for example from back-up lines granted to Commercial Paper issuers to overdraft facilities granted to small business borrowers. Moreover there is an almost infinite number of possible combinations of clauses within loan agreements that will affect the potential for both usage and loss. This makes broad statements and narrow estimates highly problematic, nevertheless each lender with contingent credit contracts must determine how they are to be treated in the CECL calculation. Otherwise the base assumption could be that all contingent credit will be fully drawn at default, producing a simply massive increase in loss reserves in the first year of the new standards. Indeed such increases could well eliminate profitability in that year and alarm investors, depositors and even regulators.

Examining the Full Usage Assumption

It would seem logical to assume that a business that is descending toward default would have increasing needs for cash. It might also seem logical to assume that such businesses would continue to access that cash for as long as they could before default took place or until an element in the loan agreement permitted the lender to have no further obligation to fund the business. It would therefore follow that the base assumption would be that all available irrevocable credit would have been accessed before default. That would be incorrect. But of course it is inadequate to simply state that 100% usage at default is incorrect, the onus is on the lender to provide evidence through time to provide an acceptable alternative to that assumption.

In order to do so, the various types of business lending need to be examined, for each has different dynamics and can produce very different results. In the following section each of the major loan types are briefly examined to see what needs to be done if EAD is to be estimated as accurately as possible thus leading to the most appropriate CECL measurement.

Commercial Paper Back-Up Lines

Back-up lines for Commercial Paper ("CP") issuers are required for the issuer to achieve a rating of the paper from the major rating agencies. The process is as follows: the borrower files a prospectus to enable it to issue a maximum amount of 90 day commercial paper. For example a AAA company would file a shelf prospectus for (say) \$5 billion. That amount is not expected to be used in full, however, it provides liquidity and remains under the control of the issuer. In other words, if the AAA firm (non-investment grade firms are generally unable to access the CP market) has ongoing credit needs, it can issue the CP until those needs are met so long as it remains within the limit and so long as investors are willing to take on the risk of that paper.

The investors have two elements of confidence (apart from the short term nature of the paper). They have the risk of default of the issuer that is usually very low indeed, and they have the knowledge that the borrower can repay the paper using credit lines that have been provided by high credit quality banks. The banks receive a fee for the back-up line and are essentially selling their own leverage power with little expectation that the lines will be used.

That is not to say that the lines will never be used. As a firm deteriorates, investor confidence declines and there will be a reluctance to purchase their paper in the market. There is risk here but the key question is how much risk that might be. Assume for a moment that a high quality firm has a \$5 billion CP program in place backed up by \$5 billion in paid lines from large banks. At any point in time there will be none or some CP issued, usually far, far less than the maximum. If a bank has provided the back up for (say) 1 billion of the program, then it is exposed to 20% of the outstanding amount of CP. To assume that the CP issuer has issued the maximum amount of CP at the date of its demise would be hopelessly pessimistic. The reality can be measured by looking at the CP usage at default of CP issuers through time that have failed while the paper was still outstanding and the appropriate fraction can be used to estimate the EAD for the back-up line.

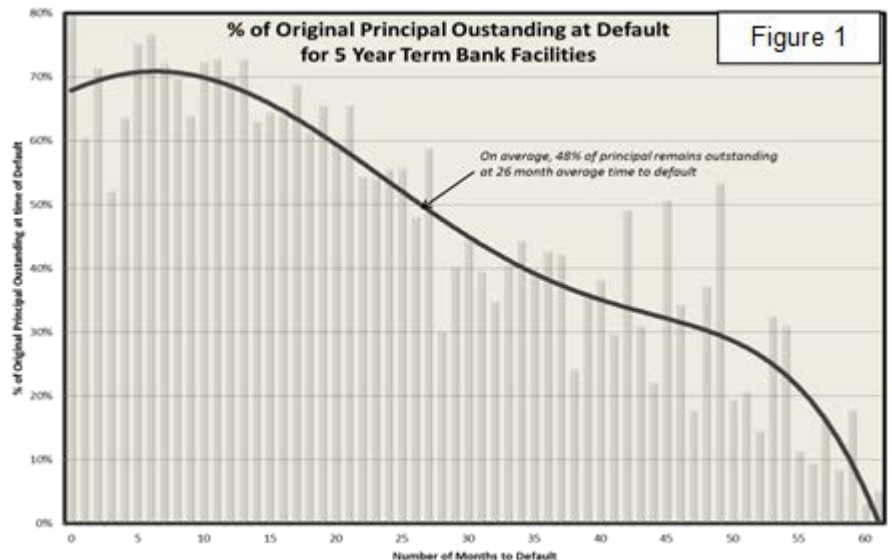
The purpose of using this example of contingent credit is to illustrate how a simple assumption, prompted by innate conservatism can produce a result that is highly inaccurate and potentially misleading to owners, analysts, depositors and even regulators.

Amortizing Loans and Leases

Amortizing loans are generally made where the borrower is acquiring a specific asset; a residential mortgage or an equipment lease being common examples. For C & I loans, most credit analysis is focused on the cash flow of the business. Loans for the purchase of specific assets are often done by specialist leasing and asset-finance firms. Where this activity lies within the banking industry the banks often use a designated subsidiary for that activity.

The EAD problem is simple. How much of the principal will have been repaid at the time of default? The most conservative answer is that the loan will default before any scheduled payment is made. The least conservative answer is that the borrower will default on the eve of the final payment. Obviously both answers are almost always incorrect, but to satisfy the requirements of the CECL rules, lenders must produce evidence for any assumption. As we will see throughout this paper, that evidence needs to be supported by data of sufficient sample size and through at least one economic cycle. What is needed is a database of (ideally) thousands of defaults of amortizing loans and leases revealing the average principal balance remaining at the date of default. Fortunately such data exists.

Figure 1 illustrates the output from more than 16,000 amortizing loans and leases over a period spanning 14 years (and thus includes the 2007-2009 recession). It shows that the average number of months to default for loans and leases with original terms of 5 years was 26 months with 48% of principal repaid. In other words just about half of the original principal was repaid and thus a supportable assumption for a lender would be an EAD of 52% of the original advance. The loss would of course only be determined by the recovery and sale of the underlying asset, but that is the third stage in the calculation.



A skeptical examiner or auditor might ask whether these loans were homogenous. The sample could be biased by thousands of auto loans or very different results from medical equipment or copiers. Fortunately a database of this size can run sub samples with specific asset types and produce similar graphs to show any differences by asset class. This may well be important for specialist lenders although the captive leasing companies in particular have long maintained this data as it is a critical part of their business economics.

That same skeptic might also ask whether the time to default is different when the loan or lease is something other than 5 years. Does the 50% assumption stand when the original contract was three, four or more than five years? Once again the answer lies in the data and needs to be discovered unless the examiner will accept that the five-year curve can be used for all terms.

Real Estate Construction

Real estate construction loans are a very complex area and one where the description is simpler than the reality, as construction of office towers is different than warehouses, strip malls, condominiums, and other types of commercial real estate. The EAD problem is similar to that of amortizing loans. If the construction project default takes place very early into the process, then the amount outstanding at default will be quite small as these loans are generally structured to increase based on the progress of the construction. If the project defaults at or just before completion, then the exposure is likely to be the full amount of the commitment or very close to it. Thus the most conservative assumption would be the end of the commitment not the beginning. Of course at that point it is likely to be a much more saleable asset, but that is not the point at this stage.

Once again there is a need for a default database and one that has the sample size to cover these very different types of construction with very different levels of value volatility. Note that the term “default database” is used rather than “loss database”, as there are many loans and leases that default where the lender recovers all the principal, but these are still defaults and are needed for expected loss calculations. That being said, the definition of default is a very important consideration as a missed or late payment for most C & I loans is not necessarily sufficient to place the lender into default.

Overdrafts

Lines of credit are the most important product for the banking system. They provide liquidity to clients from individuals to the largest corporations and thus enable every element of electronic payment and indeed virtually all commerce. For many individuals, cash has become a debit card and purchases are enabled by the use of the personal line of credit known as a credit card. Home Equity lines of credit provide the convenience of instant liquidity for holders of residential real estate to make purchases without application and delay.

The same is true for C & I loans. Businesses generate cash and have needs for liquidity for all manner of reasons. For the most part, these lines of credit remain unused or are used in a similar manner to credit cards with repayment from the regular inflows of income via sales or paid receivables. For monthly or seasonal needs most businesses opt for overdraft facilities which are short term and renewable or cancellable by the lender at any time. Thus the overdraft issue for the CECL calculation is not one of forecasting over years, but rather one of finding a defensible position for the assumption of usage at the time of default.

Once again the conservative position would be that all overdrafts are fully drawn at the date of default. That claim would appear to be reasonable, after all a declining business will have liquidity needs and that is the purpose of an overdraft facility. Reality is different for any number of reasons, but reality must be demonstrated, not claimed. Lenders will have to show what the most probable level of drawdown at default has been through time and through at least one recessionary environment. We need data and lots of it to do this.

Not only will we need data on the proportion of overdraft facilities that are drawn at the date of default, we will also need to prove that this data can be applied across the commercial loan portfolio. Are smaller (say, sales of <\$1 million) businesses more likely to have used the whole

facility at default? Are retail businesses different from manufacturing or other types with overdraft facilities? These and other questions will have to be addressed with data and a large sample size will be crucial if the output is to be adopted in the CECL calculation.

Revolving Lines of Credit

As stated earlier, the provision of credit/liquidity facilities by means of a contractual commitment is the largest part of commercial lending. The most common form is the revolving line of credit which is most often for the longer term (up to five years in most cases) but with a nominal term of 365 days, renewable at the end of each year. The 365 rolling revolver dominates in large part because of the original regulatory capital measurement rules from the Bank for International Settlements (“BIS”) which came out in 1988.

The good news for lenders is that most of these facilities are short term and will not need forecasts beyond a year. But once again there can be the “conservative” assumption that all these lines will be fully drawn at the date of default. The impact of that outcome will be very significant for most lenders as the amount of undrawn commitments is probably 10 or more times the amount of the drawn amounts. The bigger the lender and the bigger the client, the greater that gap will be. This is why most commentators (and indeed the former Chair of the FASB) have suggested that they expect the CECL rules in the first year to cause at least a 50% increase in credit loss provisions.

All lenders know that there are many reasons why a borrower will avoid drawing all available liquidity before a default takes place. For example:

1. Borrowers that are moving toward default will find it better to begin negotiations with creditors before that event takes place. A dominant creditor can remove management and begin the process of liquidating assets with the sole intention of recovering their principal and thus may not realize the optimum value that might leave the owners with some return.
2. If the cause of the problem is high interest or accelerated repayment terms, then it will prove more valuable to negotiate with the lender than to draw down cash for which there is no immediate need.
3. Lenders that observe a gradual decline that could result in failure will make every attempt to minimize the damage and forestall draw-downs to the extent possible.
4. There needs to be a use for the cash drawn. If the decline is not precipitous then the cash drawn will attract a cost greater than the income that can be earned by its presence.

These are all logical reasons why a borrower would avoid drawing on liquidity without immediate need for that liquidity, but it is true that there are instances where the borrower exhausts all available funds before failing or filing for bankruptcy protection. To comply with the provisions of the CECL rules, a lender must attempt to prove what the most probable outcome will be and for that purpose a default database needs to be maintained. For all but the largest lenders, access to a larger database needs to be acquired as there is likely to be insufficient examples of default to produce a statistically valid sample.

A comprehensive default database will be able to examine large numbers of defaults where the borrower had a revolving line of credit and answer the question of how much of the available lines were undrawn at the date of default. The database needs to separate lines that are available for longer terms (>365 days) and the analysis of those facilities must determine whether the usage varies dependent upon the remaining term. In other words the usage of a 3 year term revolver at default has to be contrasted with the usage of a 2, 4 and 5 year revolver.

It would also be valuable to have this data by business type for there are many examples of businesses that have a strong seasonal bias leaving revolver usage higher at some times in the year than others. Retailers for example may often hold higher inventories before Thanksgiving and Christmas in anticipation of imminent sales and this will be the time of the greatest revolver (or overdraft) usage. Because most individual lenders have relatively few defaults, a broader, multi-lender database is more likely to have sufficient default incidences to provide a better chance of a supportable assumption other than full usage.

Term Loans

A much smaller proportion of the C & I lending business is in loans for a specific term with the cash advanced at the beginning and repaid at the option of the borrower until the term expires. For these loans the amount outstanding at default should be expected to be the amount of the original advance less any prepayments that have taken place. But businesses that are failing are less likely to be in a position to make prepayments and so the more probable assumption for EAD will be the full amount of the term loan.

That being said it may be that the business was successful for some time before the default took place and used those funds to make prepayments and so it is desirable to maintain a database that will show term loan prepayment propensity. The FASB have stated that they are prepared to accept prepayment probability to reduce the EAD of term lending facilities. Yet again, the bigger the database the better, so long as the pools are comprised of assets with a measurable degree of homogeneity.

The Effect of Loan Structures

There are two other areas of commercial lending that merit mention here for they are both important tools in the lenders' arsenal and both are used to affect term and the probability of loss, yet both are currently not part of the CECL rules and the estimation of EAD.

Loans with Covenants

C & I loan agreements often contain covenants whereby the borrower agrees to certain conditions for the loan to continue to its nominal term. Some of these covenants can be light and generalized such as asset maintenance, material adverse change and the like. Some are specifically aimed at the preservation of cash such as restrictions on dividends and new fixed asset acquisitions. Neither of these will help in the early detection of problems nor will they allow intercession upon business deterioration. Most however are aimed at ensuring that any financial problems can be identified by the lender at an early enough stage that they can intervene or prevent further additions to the loan.

The skills here are considerable. The lender needs to be able not only to negotiate a condition that the borrower would rather not include, but also to set that condition at a level where the breach is not too late to abate loss, but not too early to make the condition an irritant rather than a control. Properly done, they are the lender's most valuable tool in dealing with term risk. That being said, at this point their existence is not explicitly acknowledged in the calculation of expected loss in the new CECL rules.

The CECL rules do however require a forecast to the expected life of the loan and thus there should be a means by which the effect of covenants is recognized in the construction of the forecast. An example might illustrate the point.

Consider a lender providing a five-year revolving line of credit to a small manufacturer. The lender's concern is that the manufactured goods might be affected by an improved product, a cheaper import or other events that reduce demand. Accordingly the lender puts a covenant in the loan relating to inventory levels and the current ratio that will identify if the products are being stockpiled rather than sold as expected. The purpose is to prevent the line of credit being used to produce unsaleable items, indeed it should prevent the entire line being used unless the business is successful.

There is one important caveat here and that is that the lender will act where there is a breach in a manner that demonstrably reduces loss. If covenant breaches are routinely waived then any examiner or auditor is likely to take the position that the protection they provide is of little or no value for the probability of their being acted upon is low or unpredictable.

So a lender needs to measure the effects of covenants and not just put them in the agreements without seeing the outcomes that they produce. Once again we have to turn to data. Does your institution act on covenant breaches consistently? If breaches are waived, is this more of a function of their being set too aggressively or a function of indifference? Do you get breach information in sufficient time to enable effective action? If, for example, you have to wait until the annual financial statements are produced, then it could be months after the breach and losses have piled up in the meantime.

Gathering the data that will enable a lender to measure the effect of covenant protection should improve the loan process and increase profitability. Moreover, providing their default data to a central source, lenders will gain the advantage of being able to not only measure the value of their own structuring skills but measure those skills against a common pool. With sufficient pooled data it is to be hoped that covenant protection data will eventually be accepted in the CECL calculation even though there will always be a high degree of borrower specific customization.

Loans with Margin Requirements

Loans with margin requirements are essentially the same as loans with covenants except that here the loan contract specifies that a certain asset (most often accounts receivable) must remain at a level proportionate with the amount of the loan. These loans are really short term loans for the test of the advances against the contract are often monthly or quarterly. Thus if the principal is threatened by the liquid asset falling below a specified level, any remaining commitment is cancellable.

This method is also used in mining and resource loans where there are frequent engineering reports that provide a value for the proven assets (and often a portion of the unproven but probable assets) that gives assurance to the lender that principal recovery is likely.

In these cases the EAD is just as unknown, but there is a virtual guarantee that there will be assets available to the lender to recover some or all of the principal. But the most important feature of these loan agreements is that their term should be considered no more than the term of the underlying margined asset. As an extreme example, say that a lender was to provide a 10 year loan to a firm that provided all its services to the U.S. government (in other words the receivables will always be good) and that it required that the loan could not exceed 75% of the receivables. So long as there are no other creditors that could rank ahead of the lender in the event of default then the term of the loan is really the term to the reporting date of the accounts receivable.

There can always be circumstances that might be cited to change this contract into something less secure (for example the government might refuse to pay for lack of quality or some other reason thus reducing the apparent receivables to below the margin), but any reasonable examiner would consider this to be a loan of the highest quality and not require a forecast for the remaining years of the deal. The CECL rules however do not contemplate any allowance for margin contracts and therefore it will be necessary for lenders to prove through time that the expected losses for these contracts are far lower than for contracts without margin. Yet again we need to amass and acquire data to ensure that the accounting rules and the realities of the business are aligned.

A Default Database

Consider a single product lending business, for example a captive leasing company that provides credit to the buyers of its products and only those buyers. Assume further that these buyers are businesses rather than individuals for the latter are assisted by the enormous databases provided by the credit scoring companies. The lender is generally eager to do the deal as their primary purpose is not the earning of spreads, but rather as support for the manufacturing and sales operations. That is not to say that they are indifferent to credit risk or unsophisticated in their approach, indeed the opposite is very often true, but with sales as their objective they have an expectation of being in the position of having to deal with defaults and recoveries.

These firms maintain data on losses that have occurred in order to ensure that they can be informed not only as to frequency but also as to extent. They use the data to help them price the risk of loss into each new transaction. They use the data to assess their decision making ability and to assess whether their expectations on recovery are likely to be met. Unfortunately the road to improvement is paved with mistakes. As James Joyce said “mistakes are the portals of discovery.” Defaulted loans may be only a very small percentage of any portfolio, but they provide guidance on becoming better. Niels Bohr said that “an expert is a person that has made all the mistakes that can be made,” but with a myriad of business types, terms and conditions as well as an economy that constantly produces innovation and redundancy there are always new mistakes in the future.

In order to deal with a forecast of exposure at default we need to discover what the most common occurrence has been by examining as many defaults as possible through as many years as possible with as many business types as possible. It will of course be invaluable in the estimation of what is likely to be recovered, a topic that will be addressed in a forthcoming paper in this series, but the problem of estimating EAD and its importance cannot be understated. Bankers have more contingent credit on their books than they have loans outstanding and the difference is not small. Without some realistic way of measuring EAD there is a grave and serious risk that the regulators and auditors will be forced into assumptions that are probably wrong but justified on the basis of conservatism. This is not a good outcome for shareholders, and arguably a deliberate overstatement of loan loss reserves is not in the best interest of any party.

A Positive Outcome

Once more however there is a ray of light. Every step toward a better understanding of credit risk and every step toward achieving a competent and reasoned measurement of expected loss should lead to better loans, better profitability, better client relationships, more liquidity and a stronger financial system. Getting there may be difficult pain but it will be a worthwhile investment.