Credit Risk Data Issues for Capital Allocation

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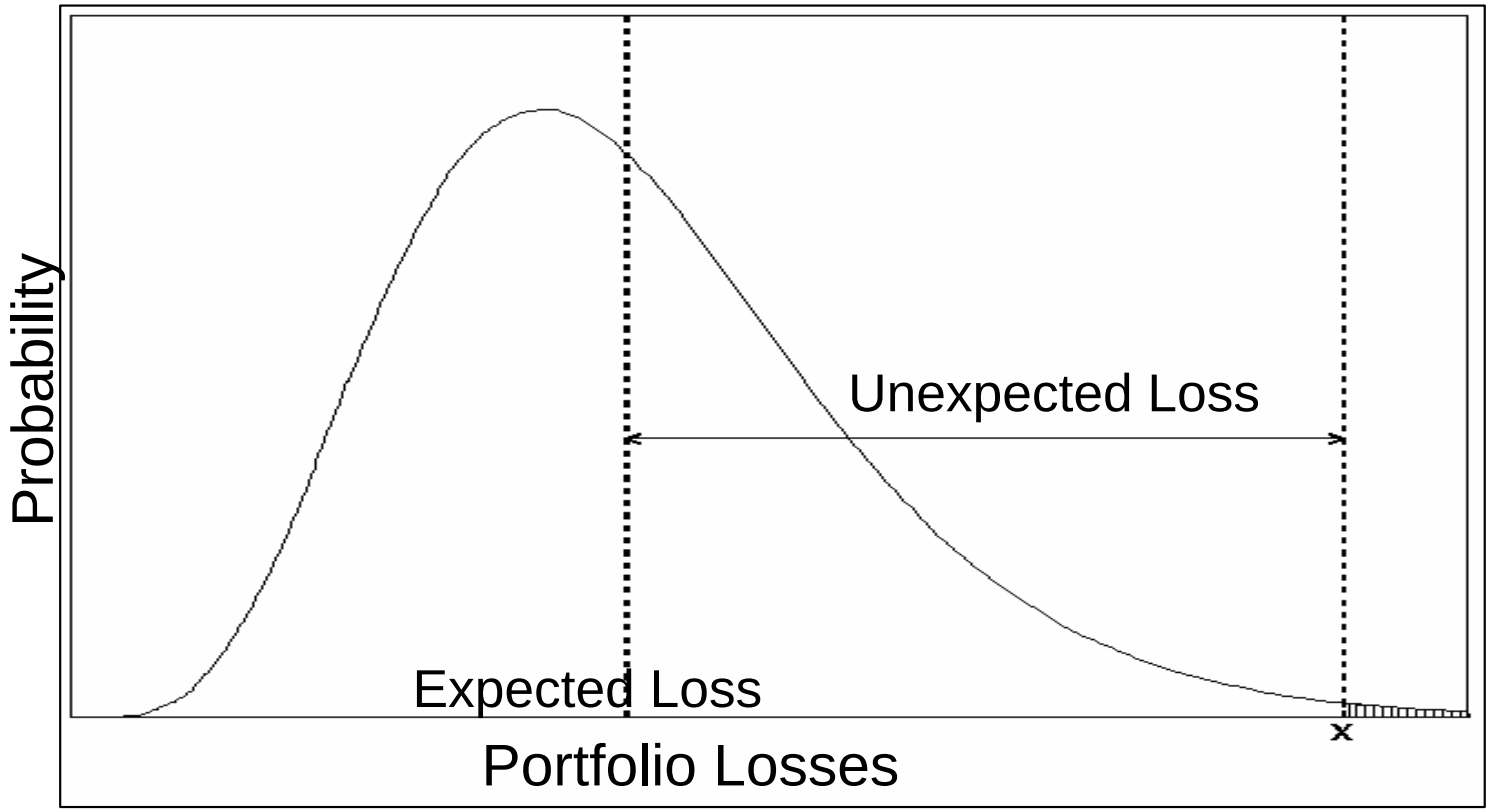
Outline

- Economic capital basics
- Elaboration on parameters using bank examples
  - PD
  - EAD
- LGD and “Stress” LGD
- Stress testing

Economic Capital Basics

- Economic capital provides a common language of risk



Components of Economic Capital

Parameters

- PD
- LGD
- EAD
- Volatility of above
- Maturity
- Concentration
- Correlation/diversification
- Horizon

Risks to Measure

- Credit risk
- Market risk
- Operational risk
- Liquidity risk
- Interest rate risk
- Business risk
- Reputational risk
- Country risk
- Intangibles risk…etc

Economic Capital Basics

- Wide range of practice across the industry
  - Some banks rely heavily on EC models and use outputs in multiple ways
    - eg portfolio risk management, performance measurement
  - Other banks devote fewer resources to the EC process; may not even report EC requirements

- Factors contributing to extent of application
  - Corporate culture
  - Business model
  - Data, data, data

Data is always an issue

- Sometimes banks are wary of model output
  - Even banks with a comprehensive model in place may have concerns about acquired portfolios (eg differences in geography, legal environment, business lines)
  - Banks trying to get a model off the ground may have concerns about the applicability of external data or robustness of internal data

Economic Capital - PD

- Various players in the industry have expended considerable resources on PD estimation
  - Rating agencies
  - Consultants
  - Bankers
  - Vendors

- Banks must exhibit care in applying PD estimates to their portfolio exposures
  - Dependent upon rating methodology
  - Requires explicit consideration of ratings philosophy

Ratings Philosophy

- Common to see references to “Point in Time or Current” vs “Through the Cycle” philosophies
  - Terminology is unfortunate; no consistent definition
  - Meant to reflect endpoints on philosophy spectrum
  - Banks aren’t generally at either end of spectrum

- Key issues
  - Expected rate of migration
  - Potential for capital volatility
  - Implications for capital planning and management

Economic Capital - PD

PDs applied in EC calculations vary considerably across banks

Case 1 – rating through use of a model that estimates an individual default probability for each obligor

- Some banks use these individual DPs directly
- Some use these individual DPs with constraints
  - eg rating grades are defined with a probability of default band; those endpoints limit the applied DP for any obligor in that rating bucket
- Some use a combination of these individual DPs, internal historical default estimates and agency default rates

Economic Capital - PD

Case 2 – rating obligors based on more traditional credit analysis, consideration of multiple quantitative and qualitative factors, expert judgment, and certain model outputs as input to the rating assessment

- Some banks use historical internal default estimates
- Some use historical internal default estimates and a "cycle factor" adjustment
- Some use a combination of historical default estimates, agency default rates and model default estimates

Economic Capital - PD

Case 3 – rating obligors based primarily on a reported external rating agency assessment

- Some banks apply the reported agency default rates directly
- Some use a combination of historical default estimates and agency default rates
- Some use a combination of historical default estimates, agency default rates and model default estimates

Economic Capital - PD

Given the wide range of practice, what is expected of any particular bank?

- Banks must have ownership of their techniques, particularly if adapted from a competitor bank or suggested by a vendor or consultant
- Application must be consistent with a bank's own rating methodologies
- Each bank should have a comprehensive understanding of the economic capital implications of various perturbations of its designated estimation technique

Economic Capital - EAD

- LEQ estimation is the heart of EAD estimation
  - Assignment of an estimate of potential drawdowns of currently undrawn off-balance sheet exposures
- Banks have not devoted significant resources to LEQ estimation
  - Lack of data
  - “you can’t sell it” - absence of a profit motive
  - But LEQ clearly has a significant impact on EC derivations
- Similarly, external parties (academics, rating agencies, consultants) have not contributed empirical or theoretical research
  - Again, lack of data
  - Lack of market

Economic Capital - EAD

- Lack of data availability and strong conceptual foundations has led to LEQ estimation driven largely by expert judgment and a trial and error process

- In recent years, banks have made some interesting changes to their LEQ estimates
  - Note that the changes were often not to the *estimation techniques*, but to the estimates directly

LEQ estimation is an evolving practice…

Economic Capital - EAD

Adapted examples of bank practice

Case 1

- Lacking internal data, a bank applied 100% LEQs to all credits for EC modeling
  - Concerns about the sparse external data available (small sample size, old data, applicability to current portfolio, etc)
- This practice did not comport with business experience
- So a limited internal data sample was collected
  - Concerns persist about sample size and time period of data collection (ie business expansion)

Economic Capital - EAD

- Ultimately evolved beyond 100% LEQs and relied upon combination of internal and external data
  - Applied LEQ by rating grade
- The new LEQs induced significant reductions in estimates of expected loss and economic capital
- This example underscores the importance of LEQ in capital modeling but triggers multiple questions
  - Was the bank comfortable with its prior EC estimates?
  - Why is the bank comfortable with this parameter change and the resultant impact on capital?

Economic Capital - EAD

Case 2

- Within its well-developed and extensively used economic capital model, a bank reported LEQs by risk rating for various facility types and lines of business

- The LEQs for each facility type exhibited a positive slope (ie low rates for strong credits, high rates for weak credits)

Economic Capital - EAD

- The LEQ matrix was used for a number of years

- Bank collected additional data (and hired a consultant)
  - Previous LEQ matrix was abandoned
  - LEQ reported by line of business
  - LEQ relationship inverted such that pass credits have higher rates than watch credits

Economic Capital - EAD

- With updated LEQ data, bank indicated that the prior fundamental relationship of LEQ to risk rating was not well founded

- This example highlights the degree of uncertainty around LEQ and its estimation
  - LEQ approach was completely overhauled
  - How to reconcile prior and ongoing capital estimates? How comfortable is a bank with either output?
  - Underscores need for additional LEQ research

Economic Capital – LGD

LGD is a key input for economic capital calculations

- LGD is most commonly calculated via discounted cash flow analysis
  - Key issues – timing of all costs and recoveries, proper discount rate, proper measure of exposure
- Alternatively, one could estimate LGD via consideration of market prices (in the least is a useful benchmark)
- Sources of recovery information
  - Academic papers
  - Agency reports
  - Internal data
  - Vendor models/consultants

Economic Capital – LGD and Stress LGD

- For use in economic capital models, many banks have expressed a preference for reliance on internal data
  - Derivation of internal historical loss estimates has often involved culling data from paper files
  - Many data systems were not designed to collect the gamut of information necessary to identify loss drivers or track credits from “cradle to grave”
  - Generally, banks ultimately report annual loss rates and an aggregate statistic (eg dollar-weighted or default-weighted LGD)
  - Some banks have attempted to incorporate “stress” parameters into EC models

Economic Capital – Stress LGD

"Stress" parameters are stressful

- As with nomenclature of ratings philosophy, there is not a consensus definition of "stress"
- As with all aspects of economic capital modeling, different banks attempt to incorporate stress conditions differently
- Stress PDs are often baked into the model
- Stress LGD and EAD cause much confusion and consternation

What have we seen in practice? Some adapted examples follow…

Economic Capital – Stress LGD

- Many banks, while acknowledging a correlation between LGD and PD, ignore the volatility of LGD (and EAD) in their EC modeling

- A bank might characterize “stress” as the worst annual internal experience
  - gets credit for attempting to model the desired phenomenon, especially relative to its peers
  - Questions still arise:
    - What is the bank’s conceptual target? (ie 99.97% event, n^{th} percentile, a bad recession, etc.)
    - Is this estimate a good measure of the conceptual target?
    - Is the time series sufficient?
    - Is the data sample sufficient?
    - Are the data representative of the current portfolio?

Economic Capital – Stress LGD

- A bank might estimate the correlation between PD and LGD and the volatility of LGD in its internal data
  - Average LGDs used for EL calculations
  - Upward-adjusted LGDs (based on the PD correlation) used for capital calculations

  - Conceptually, this gels with the fundamental EC model
  - Consistent with the premise that economic capital is measured to protect against large but infrequent losses and the economic conditions likely to exist under these circumstances

  - Empirical questions remain
    - Reliability of correlation and volatility estimates

Economic Capital – Stress Testing

- Stress Testing is an underserved area at many banks
  - Similar to stress parameters, there is no consensus definition of stress testing
  - Furthermore, one might conduct a stress test on different measures (eg a particular obligor, bank solvency, a model, or capital)

- Stress Testing capital
  - Many banks do not perform stress tests with any regularity
  - Some banks that perform such tests tend to apply somewhat arbitrary shocks
  - Some banks that perform stress tests tend to not report the results or use them in a meaningful way

Economic Capital – Stress Testing

- We have seen banks stress key parameters of their EC models
  - eg increase all PDs, LGDs or correlations by 25%, 50% or 100%
- We've also seen banks shock their portfolios
  - eg impose a two-grade downward migration across the portfolio
- Banks have often not incorporated relevant information or data that were available to them
  - eg internal transition matrices, internal economic projections, historical parameter behavior

Economic Capital – Stress Testing

- We'd like to see banks advance stress testing practices for the purposes of capital planning and management
  - Banks should take the time to identify possible, but unlikely, scenarios and measure the impact on ratings migration, key parameters and capital needs
  - Necessary capital should be compared to actual capital and capital projections
  - Banks should use this information to augment their understanding of their model and the potential capital impact of "bad" realizations

Takeaways

- Economic capital practices continue to be varied among banks
- Banks' comfort with and reliability on their EC models is a function of their corporate culture and data availability
- Data is always an issue; banks always want more (at least for modeling purposes)
- Applying stress parameters and conducting stress tests may be challenging but it is worthwhile work