



Model Validation and Stress Testing

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Over the past twelve to eighteen months there has been heightened regulatory focus on interest rate risk models, with increased scrutiny of model validation and back-testing as well as the need to “stress test” various model assumptions.

Unfortunately, we have witnessed substantial inconsistency by field examiners regarding their opinions and interpretations of published guidance. Since this has often been reflective of a literal reading of guidance (vs. assessment of the intent), too many good risk managers find themselves feeling “inadequate” following an exam for reasons that are frequently irrelevant in the assessment of their interest rate risk position and/or the integrity of their risk modeling activities.

Conversely, we have found that banks that preempt commonly asked questions with an explanation of their process at the start of a regulatory examination generally fare better in reducing their frustration level with what is often perceived to be “busy work.” The following provides an overview of some of the more common themes of disconnect between practices and understanding of the process that we have garnered from experiences in the field.

Misunderstood Models

At the start of any regulatory examination of interest rate risk, one of the first issues that needs to be addressed is to obtain concurrence from the examiner as to the purpose and scope of an interest rate risk modeling system. First and foremost, an interest rate risk measurement model is expected to help the bank understand the interest rate risk *currently embedded* in the balance sheet. That is the reason most models use a static balance sheet (i.e. no change in balance sheet size or asset and liability composition) and vary cash flows and repricings under different interest rate scenarios. This approach is generally supported by the regulatory community, at least according to 2010 Interagency Advisory on Interest Rate Risk Management. The objective of these “base” scenarios is to allow the bank to understand how the net interest income (NII) and economic value of equity (EVE) of the current balance sheet will react to various interest rate environments.

Once the base models have been run, banks can add expected changes in balance sheet volumes and mix to their models in an attempt to ascertain

how these projected changes will impact the future interest rate risk profile of the bank. In both the base case and forecasted balance sheets, the objective of the modeling is to enable the bank to understand which interest rate environments are beneficial or detrimental to the bank and to measure NII and EVE volatility created under different interest rate scenarios. Understanding the current embedded risk position and the projected risk created from changing volumes and balance sheet mix should allow bank management to formulate appropriate strategies for managing risk levels within acceptable tolerances.

Before the commencement of the on-site examination, a banker should obtain clarification of examiner expectations relative to the interest rate modeling activities of the bank. There should be some level of agreement about the purpose, scope and acceptable margins of error allowable for determination of model adequacy.

Model Validation

Just as there may be some confusion about model purpose and scope there is also ongoing debate as to what constitutes model validation. From a software perspective, model validation usually means an independent third part review of data inputs, data manipulation, formula integrity, calculation testing, and output verifications to ensure the logic and programming of the model are not flawed.

From a model user's perspective, validation often has another meaning: have the results forecasted by the model *reasonably approximated* the actual results achieved by the bank over extended periods of time? Can the actual results be *reasonably* reconciled with model forecasts? What has been the level of variance quarter-to-quarter? Is the level of variance *reasonably* acceptable?

Oftentimes the on-site regulator wants complete reconciliation of variances rather than being willing to accept the differences between an interest rate risk model and a budget model. Reconciling an interest rate risk model to the penny is a fool's errand; especially if using a base model with no changes of balance sheet size or mix (the preferred approach based upon Interagency Guidance on Interest Rate Risk, 2010). The actual results compared with the model forecast will always be different as a result of volume and mix changes or as a result of even subtle changes in the slope of the yield curve.

Each bank must be prepared to discuss with the on-site examination team what their definition and expectations for model validation and back-testing might be. Any differences in expectations should be resolved before the examination begins rather than become an area of contention later in the examination process.

Stress Testing

The third issue that continually arises at recent regulatory exams relates to stress testing of modeling assumptions. There is an increasing emphasis on the need to stress test:

- Loan and investment prepayment speeds in various rate scenarios.
- Deposit and loan pricing assumptions in various scenarios.
- Deposit sensitivity and migration under various rate scenarios.
- Decay rate and average life assumptions for non-maturity deposits for Economic Value of Equity (EVE)/ Net Portfolio Value (NPV) calculations.
- Model results under extreme and prolonged interest rate shock environments.

Each bank needs to determine the assumptions that need to be stress tested for their balance sheet and the logic required for each scenario to be evaluated. Stress testing of all material assumptions should be performed on a scheduled basis, at least annually.

Conclusion

Heightened regulatory scrutiny of interest rate modeling systems will, most likely, add additional complexity to any bank's next safety and soundness examination. Effective communication at the start of the

examination process regarding expectations for model reviews and a well thought out plan and schedule for stress testing assumptions can help frame the scope and effort required for an acceptable examination result. Banks that do not prepare for model scrutiny at their next exam can probably expect a not so favorable outcome.

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