August 11, 2016

Forecasting Loan Losses for Stress Tests

Bank capital requirements are back in the news with the recent announcements of the results of U.S. stress tests by the Federal Reserve and the European Union (E.U.) stress tests by the European Banking Authority (EBA). The Federal Reserve found that all 33 of the bank holding companies participating in its test would have continued to meet the applicable capital requirements. The EBA found progress among the 51 banks in its test, but it did not define a pass/fail threshold. In summarizing the results, EBA Chairman Andrea Enria is widely quoted as saying, "Whilst we recognise the extensive capital raising done so far, this is not a clean bill of health," and that there remains work to do.

The results of the stress tests do not mean that banks could survive any possible future macroeconomic shock. That standard would be an extraordinarily high one and would require each bank to hold capital equal to its total assets (or maybe even more if the bank held derivatives). However, the U.S. approach to scenario design is intended to make sure that the "severely adverse" scenario is indeed a very bad recession.

The Federal Reserve's Policy Statement on the Scenario Design Framework for Stress Testing indicates that the severely adverse scenario will have an unemployment increase of between 3 and 5 percentage points or a level of 10 percent overall. That statement observes that during the last half century, the United States has seen four severe recessions with that large of an increase in the unemployment rate, with the rate peaking at more than 10 percent in last three severe recessions.

To forecast the losses from such a severe recession, the banks need to estimate loss models for each of their portfolios. In these models, the bank estimates the expected loss associated with a portfolio of loans as a function of the variables in the scenario. In estimating these models, banks often have a very large number of loans with which to estimate losses in their various portfolios, especially the consumer and small business portfolios. However, they have very few opportunities to observe how the loans perform in a downturn. Indeed, in almost all cases, banks started keeping detailed loan loss data only in the late 1990s and, in many cases, later than that. Thus, for many types of loans, banks might have at best data for only the relatively mild recession of 2001–02 and the severe recession of 2007–09.

Perhaps the small number of recessions—especially severe recessions—would not be a big problem if recessions differed only in their depth and not their breadth. However, even comparably severe recessions are likely to hit different parts of the economy with varying degrees of severity. As a result, a given loan portfolio may suffer only small losses in one recession but take very large losses in the next recession.

With the potential for models to underestimate losses given there are so few downturns to calibrate to, the stress testing process allows humans to make judgmental changes (or overlays) to model estimates when the model estimates seem implausible. However, the Federal Reserve requires that bank holding companies should have a "transparent, repeatable, well-supported process" for the use of such overlays.

My colleague Mark Jensen recently made some suggestions about how stress test modelers could reduce the uncertainty around projected losses because of limited data from directly comparable scenarios. He recommends using estimation procedures based on a probability theorem attributed to Reverend Thomas Bayes. When applied to stress testing, Bayes' theorem describes how to incorporate additional empirical information into an initial understanding of how losses are distributed in order to update and refine loss predictions.

One of the benefits of using techniques based on this theorem is that it allows the incorporation of any relevant data into the forecasted losses. He gives the example of using foreign data to help model the distribution of losses U.S. banks would incur if U.S. interest rates become negative. We have no experience with negative interest rates, but Sweden has recently been accumulating experience that could help in predicting such losses in the United States. Jensen argues that Bayesian techniques allow banks and bank supervisors to better account for the uncertainty around their loss forecasts in extreme scenarios.

Additionally, I have previously argued that the existing capital standards provide further way of mitigating the weaknesses in the stress tests. The large banks that participate in the stress tests are also in the process of becoming subject to a risk-based capital requirement commonly called Basel III that was approved by an international committee of banking supervisors after the financial crisis. Basel III uses a different methodology to estimate losses in a severe event, one where the historical losses in a loan portfolio provide the parameters to a loss distribution. While Basel III faces the same problem of limited loan loss data—so it almost surely underestimates some risks—those errors are likely to be somewhat different from those produced by the stress tests. Hence, the use of both measures is likely to somewhat reduce the possibility that supervisors end up requiring too little capital for some types of loans.

Both the stress tests and risk-based models of the Basel III type face the unavoidable problem of inaccurately measuring risk because we have limited data from extreme events. The use of improved estimation techniques and multiple ways of measuring risk may help mitigate this problem. But the only way to solve the problem of limited data is to have a greater number of extreme stress events. Given that alternative, I am happy to live with imperfect measures of bank risk.

Author's note: I want to thank the Atlanta Fed's Dave Altig and Mark Jensen for helpful comments.

By Larry D. Wall, director of the Atlanta Fed's Center for Financial Innovation and Stability

January 7, 2016 in Education, Employment, Labor Markets | Permalink