How Tough Was the Fed's Sensitivity Analysis

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On June 25, the Federal Reserve released the results of its supervisory stress tests for 2020. The supervisory stress test disclosures also included projections of the stressed aggregate common equity tier 1 (CET1) capital ratio and aggregate loan loss rates under the Federal Reserve’s alternative downside scenarios (aka sensitivity analysis). This post measures the severity of the sensitivity analysis by estimating the peak in the unemployment rate that would produce results consistent with the reported loan loss rates and concludes the Fed's sensitivity analysis was extremely tough.

The sensitivity analysis combined a severe macroeconomic outlook with other “targeted adjustments” to arrive at the projected loan loss rates under the alternative downside scenarios. For example, one of those adjustments assumed that specific business sectors would come under more stress due to the COVID event, on top of what was already expected by the path of the macroeconomic series in the alternative downside scenarios.

As a result, while the unemployment rate peaked at 15½ percent in one of the alternative scenarios, the projected loan loss rate exceeded 10 percent, well-above the loss rate projected by standard models for a 15½ percent unemployment rate. Specifically, this post shows that the projections of a top-down model that can replicate the aggregate loss rate under the severely adverse scenario would require the unemployment rate to reach 25 percent to match the aggregate loss rate in two of the three alternative downside scenarios. A 25 percent unemployment rate is about 9 percentage points higher than the peak unemployment rate in the Fed's downside scenarios. This is as high as the level the unemployment rate reached during the Great Depression.

ALTERNATIVE DOWNSIDE SCENARIOS WERE WELL WITHIN THE RANGE OF PROJECTIONS AVAILABLE IN MAY . . .

The Federal Reserve’s sensitivity analysis assessed the resiliency of banks operating in the U.S. to a sudden and drastic change in the economic outlook driven by the COVID event. The sensitivity analysis included three different macroeconomic scenarios: a rapid V-shaped recovery, a slower U-shaped recovery, and a W-shaped double-dip recession. In a nutshell, the sensitivity analysis replaced a few macroeconomic series in the severely adverse scenario and re-ran the supervisory models to update the loan losses under the revised scenarios. The Fed also incorporated targeted adjustments to capture other sector-specific stresses.

As a result of the revised scenarios and those targeted adjustments, the loss rates increased from 6.3 percent in the severely adverse scenario to 8.2 percent in the V-shaped scenario, 10.3 percent in the U-shaped scenario, and 9.9 percent in the W-shaped scenario. The rest of this analysis focuses on the U-shaped and W-shaped downside scenarios to streamline this discussion, but these observations also apply to the V-shaped scenario.

The U-shaped delayed recovery and the W-shaped double-dip recession scenarios are characterized by more pessimistic paths for the unemployment rate and output growth over the next 2 years. The remaining macroeconomic series follow the path specified in the severely adverse scenario. The model we utilize
(described in more detail below) performs better when the unemployment rate replaces output growth as one of the principal risk drivers. It is therefore more relevant to assess the severity of the downward path of the unemployment rate in the alternative scenarios.

The slower U-shaped recovery scenario has the unemployment rate peaking at 15.6 percent in the second quarter of 2020 and remaining above 10 percent throughout the stress planning horizon, which goes until the first quarter of 2022. The W-shaped double-dip recession assumes the unemployment rate climbs to 16 percent in the second quarter of 2020 followed by a recovery to about 7 percent by the end of 2020. However, in this scenario the unemployment rate rises back to 14 percent in 2021, owing to a second wave of COVID infections.

According to the most recent Survey of Professional Forecasters (SPF), the trajectories of the unemployment rate utilized in the Fed’s alternative downside scenarios fell within the baseline forecasts of 50 percent of the contributing forecasters. Exhibit 1 shows the range of projections for the unemployment rate for the next 5 quarters (i.e., between 2Q20 and 2Q21) according to 42 forecasters surveyed by the Federal Reserve Bank of Philadelphia in May of this year. The darker red-shaded area represents the unemployment rate projections between the 25th percentile and 75th percentiles across all projections in the survey. Moving away from the center, the next lighter red shaded band represents the projections for the 10th to 25th percentiles and for the 75th to 90th percentiles. Lastly, the lightest shaded area includes the ranges for the most optimistic and pessimistic unemployment rate forecasts. Only one economist made a baseline forecast in which the unemployment rate reached 25 percent.

It is also worth noting that the publication of the latest SPF preceded the June unemployment report release, which showed the unemployment rate dropping from 13.3 to 11.1 percent. Some of the more pessimistic
projections in the SPF also likely included a potential misclassification error in the unemployment rate.\footnote{The potential misclassification issue appeared because survey respondents who indicated they were employed but not working should have been classified as unemployed. See here for additional details.} Since the Bureau of Labor Statistics did not include such an adjustment in June, some of the more pessimistic forecasts are probably overstated.

**. . . BUT THE FED'S PROJECTED LOSS RATES WERE WELL ABOVE THOSE OF STANDARD TOP-DOWN MODELS**

The post uses a top-down econometric model to generate projections of loan losses under each scenario, which includes the severely adverse scenario as well as those utilized in the Fed's sensitivity analysis.\footnote{These models are considered standard and are widely used in tabletop stress tests. Examples include Covas, Rump and Zakrajsek (2014), Hirtle, Koyner, Vickery and Bhanot (2016), Blank, Hanson, Stein and Sunderam (2020), and Minneapolis Fed (2020).} The model is estimated using data from the FR Y-9C regulatory reports on banks' net charge-offs, and it convincingly mimics aggregate loss rate projections by supervisory models. To be more precise, the most conservative of a set of top-down models was chosen. This was because it is well known that the Fed's projections under the severely adverse scenario are already quite conservative (that is, more likely to overstate than underestimate loan losses). The model for aggregate loan losses includes four crucial variables in the supervisory scenarios—the unemployment rate, the house price index, the commercial real estate price index, and the corporate bond BBB credit spread. After estimating the model, the projections of net charge-offs over the nine-quarter stress planning horizon are made under the various macroeconomic scenarios.

![Exhibit 2: Unemployment Rate Paths and Projected Loss Rates](image)

Source: Federal Reserve Board, Survey of Professional Forecasters, BPI calculations.

Exhibit 2 shows that the top-down model does an excellent job matching the severely adverse scenario's loss rate. The aggregate loss rate is projected to be 6.1 percent under the severely adverse scenario while the
projections based on supervisory models indicated a loss rate of 6.3 percent. In dollar terms, the difference is less than $10bn. This is quite small, given that aggregate losses were projected to be $433bn based on supervisory models.

However, the top-down models forecast loss rates under the U-shaped and W-shaped scenarios of 7.5 percent and 8 percent, respectively. Recall that, the Fed’s sensitivity analysis projects the loss rate to be 10.3 percent in the U-shaped scenario and 9.9 percent in the W-shaped scenario. In dollar terms, the difference in loan losses was approximately $170bn in the U-shaped scenario. This means the differences in loss rates are quite significant and indicates that the targeted adjustments played an essential role in increasing loan losses under the alternative downside scenarios.³

As noted, the Federal Reserve made a series of targeted adjustments for the alternative downside scenarios. However, the most relevant ones include the widespread downgrades of corporate borrowers in specific industries that had substantial demand declines following the COVID event. More COVID-related stress was also extended to commercial real estate loans. The adjustment to credit ratings of corporate borrowers had a sizable impact on loss rates, because it makes bank portfolios considerably riskier at the start of the stress tests.

The Fed also increased holdings of corporate loans held by banks subject to the stress tests, following the large draws on credit lines in March and April. However, those additional adjustments only help explain the increase in loan losses, not the unexpected rise in the loss rate.

**THE UNEMPLOYMENT RATE WOULD HAVE TO REACH 25 PERCENT TO MATCH THE FED’S PROJECTED LOSS RATES**

Without the targeted adjustments, what would be the peak level of unemployment that would match the 10.3 percent loss rate reported in the Fed’s sensitivity analysis? As shown in Exhibit 2, the projected loss rate would reach 10.2 percent under the worst-case projection in the SPF. As shown in Exhibit 1, the most pessimistic forecast assumes the unemployment rate rises to 25 percent in the third quarter of 2020 and remains well above 10 percent over the rest of the stress planning horizon. As a result, the combination of the targeted adjustments and the path of the unemployment in the U-shaped scenario generates almost the same level of severity as a scenario that features the unemployment rate soaring to a level of 25 percent in the third quarter of 2020.

**AND STILL, BANKS REMAINED WELL CAPITALIZED**

Despite the severe assumptions in the Fed’s sensitivity analysis, 75 percent of banks remained well above their minimum capital requirements at the end of the stress planning horizon. As Vice-Chair Randal K. Quarles said on July 7 in response to a question, “[The most recent sensitivity analysis] showed that the banks really were, in the face of everything that we could throw at them, still quite robustly capitalized” (emphasis added). In the fourth quarter of 2019, the 33 banks subject to the stress tests had $1,240bn in CET1 capital—the most loss-absorbing type of capital—and $87bn in loan loss reserves. They generated $46bn in loss-absorbing pre-provision net revenue (PPNR). The aggregate CET1 capital ratio of those banks was 12 percent. As the COVID event unfolded in the first quarter of 2020, those banks still held $1,237bn in CET1 capital with $146bn in loan loss reserves—a 7.0 percent increase—and generated $66bn in PPNR. In addition, risk-weighted assets (RWA) of banks subject to the stress tests rose 3.7 percent, primarily driven by

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³ There is no obvious reason why the top-down models would not work under the alternative downside scenarios. Perhaps, supervisory models are highly nonlinear concerning changes in the unemployment rate. However, this seems unlikely because it would have been challenging for supervisory models to incorporate this type of nonlinearity due to the lack of historical observations.
the surge in revolver draws in March. Despite the increase in RWA, the aggregate CET1 capital ratio declined only 50bp to 11.5 percent. Meanwhile, over the second quarter, many corporations have reportedly repaid their credit-line drawdowns. The still elevated commercial and industrial loans on the bank books reflect loans originated under the Paycheck Protection Program (which appropriately have a zero risk-weight).

In summary, the post argues the Fed’s sensitivity analysis was extremely severe. Our results indicate that even if the unemployment rate were to reach 25 percent (as they appear to have in the sensitivity analysis), about 75 percent of banks would still remain well above their minimum capital requirements. As a reminder, the unemployment rate reached 25 percent in the Great Depression, and the consequences then for the banking sector were catastrophic. That appears unlikely to happen again as a result of the COVID event. Lastly, an extremely severe stress test conducted in the middle of an economic downturn makes the capital framework procyclical and unduly restricts credit availability.

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