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Fed's versus banks' own models in stress testing: what have we learned so far?

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I. Summary

The role of supervisory stress tests in banking supervision has increased significantly in the aftermath of the 2007–2009 financial crisis. The first coordinated supervisory stress test in the U.S. was the Supervisory Capital Assessment Program in 2009, a precursor to the on-going Comprehensive Capital Analysis and Review (CCAR) which was initiated in 2011. In 2013, the Fed began conducting its Dodd-Frank Act stress tests (DFAST) – which is closely linked to CCAR – and the banks began conducting their own Dodd-Frank company-run stress tests and publicly disclosing the results of the exercise. The availability of historical data provides an opportunity to compare the results of stress tests obtained using the Fed's models relative to the results obtained using banks' models.[1] Specifically, this note analyzes how those models differ in their projections of stressed revenues, losses, risk-weighted assets and resulting post-stress capital ratios under DFAST. Our results can be summarized as follows:

- Banks' projections of pre-tax net income are on average more pessimistic than the Fed's projections, particularly for revenues under stress.

- The Fed projects that asset and loan balances grow over the stress horizon, with a resulting increase in risk-weighted assets, while banks assume that their balance sheets shrink due to a decrease in loan demand during a severe recession, with a resulting decrease in risk-weighted assets.

- Lastly, the disagreement between banks' own projections and the Fed's are persistent but only predictable in part.

II. Background

The U.S. supervisory stress tests differ from those administered by the Bank of England and the European Banking Authority in multiple ways, but one key difference is that the U.S. supervisory stress tests rely almost exclusively on the Fed's own models to generate the projections of banks' post-stress regulatory capital ratios. In contrast, the Bank of England and the European Banking Authority allow banks' own models to play a key role in generating the projections of stressed loan losses and net revenues, which are key inputs required to calculate banks' post-stress regulatory capital ratios. One reason commonly proffered for the U.S. approach is that banks will knowingly understate losses and overstate revenues, and therefore the Fed must use its own models. Although the same Fed also reviews and approves bank stress testing models, this process is deemed insufficient to prevent "gaming." The objective of this note is to evaluate the concern that banks would arrive at less-pessimistic results than those obtained using the Fed's models.

Under the Dodd-Frank Act, the Fed is required to conduct an annual stress test of large BHCs (total consolidated assets of $50 billion or more) and nonbank financial companies designated by Financial Stability Oversight Council for Fed

1 Gallardo et al (2016) compared the Fed's and banks' own projections until CCAR 2015. See Gallardo, German G., Til Schuermann, and Michael Duane, "Stress Testing Convergence," Journal of Risk Management in Financial Institutions, May 2016, Vol. 9, No. 1, pp. 32-45.

supervision. Banks are also required to conduct their own stress tests (company-run stress tests). Annual supervisory stress testing exercises have become a key component of how the Fed attempts to ensure that large banks are sufficiently resilient to survive and continue to support economic activity even if another set of severe financial and economic shocks were to affect the financial system. There are three key dimensions of the stress tests: (i) design of stress scenarios; (ii) models and assumptions used to translate the stress scenarios to banks' regulatory capital ratios; and (iii) choice of post-stress capital thresholds.

The Fed assesses the resilience of banks under three supervisory scenarios: a baseline, adverse and severely adverse. The baseline scenario is generated based on the consensus views of private-sector forecasters, but has never operated as a binding constraint under the test. The adverse and severely adverse scenarios, designed by Fed staff, are used to assess the resilience of banking organizations under adverse economic environments. In the company-run stress tests, banks are required to use the three scenarios developed by the Fed as well as at least two additional scenarios, a BHC baseline and BHC-defined stress scenario. There is also a separate global market shock applied to the six U.S. GSIBs with large trading operations and a counterparty default scenario applied to the eight U.S. GSIBs. These BHCs are required to include these shocks as part of their calculations of post-stress capital under the adverse and severely adverse supervisory scenarios.

In terms of the models used to translate the stress scenarios, the Fed uses its own supervisory models to project revenues, losses and expenses, balance sheet and risk-weighted assets and the resulting post-stress regulatory capital ratios for each BHC. The Fed's models take a "one-size-fits-all" approach, which requires the Fed to make important simplifying assumptions and not take into account bank-specific business practices. Banks use their own models to arrive at post-stress capital ratios under the company-run stress tests, but in contrast to the Fed's approach, banks' own models are tailored to their own business model and banks also have the benefit of all the historical data on the performance of their own portfolios. Lastly, the Fed and banks use the same post-stress capital thresholds, which vary across five different regulatory capital ratios.[2]

The supervisory stress tests comprise of three key exercises: DFAST, the quantitative portion of CCAR and the qualitative portion of CCAR. The only differences between DFAST and the quantitative portion of CCAR are the capital actions assumed to be undertaken by a BHC in each exercise. Under DFAST, dividend payments are set at the same level as in the previous year, but repurchases and issuance of common stock are set at zero. In contrast, under the quantitative portion of CCAR, the Fed uses banks' planned capital actions under banks' own baseline scenario as submitted to the Fed. Thus, if a bank is planning to increase distributions to shareholders, DFAST post-stress capital ratios would be higher than CCAR post-stress capital ratios, reflecting the planned increase in equity payouts. The qualitative portion of CCAR consists of a Fed review of each bank's capital planning processes.

The Fed began conducting the stress tests required by the Dodd-Frank Act in 2013. For purposes of the analysis contained in this note, we use publicly available data on stressed revenues, losses, risk-weighted assets

2 In particular, the required minimum common equity tier 1 (CET1) ratio is 4.5 percent, the required minimum tier 1 risk-based capital ratio is 6 percent, the required minimum total risk-based capital ratio is 8 percent, the required minimum tier 1 leverage ratio is 4 percent, the required minimum supplementary leverage ratio is 3 percent.

and post-stress capital ratios for five DFAST cycles, namely from 2013 through 2017. We also compare differences on the "return on risk-weighted assets" calculated using the projections obtained using the Fed's and banks' own models. This metric is very close to the "stress capital buffer" which is about to be proposed by the Fed as a way of incorporating the results of the stress tests into the point-in-time capital requirements.[3] Lastly, the number of BHCs participating in the stress tests has grown significantly over time. In particular, the Fed conducted supervisory stress tests on 18 BHCs in 2013 and has gradually increased the number of covered banks to 34 in the last DFAST exercise.

II. Overview of the Fed's stress scenario

Before delving into the analysis of the differences between the Fed's and banks' own projections of post-stress regulatory capital ratios, it is useful to review the Fed's scenarios and how they have changed over time just to set the stage for the main analysis. Specifically, the severity of the scenarios impact the results of the stress tests, regardless of whether Fed's models or banks' own models are used to conduct the test. Our analysis is based on the Fed's severely adverse scenario, since it is only under this scenario that both the Fed and banks publicly disclose their own projections of revenues, losses, risk-weighted assets, and post-stress regulatory capital ratios.

In general terms, the severity of the Fed's scenarios has increased over time. This results from a general improvement in macroeconomic conditions, especially driven by the decline in the unemployment rate in the post-crisis period. In addition, it is also consistent with the Fed's stated desire to mitigate procyclicality in the financial system, which the Fed tries to accomplish by specifying scenarios that become more severe when the economy is strong and less severe when the economy is weak. That said, it remains yet to be seen if the Fed will make the scenarios less strict in a worsening of economic conditions.

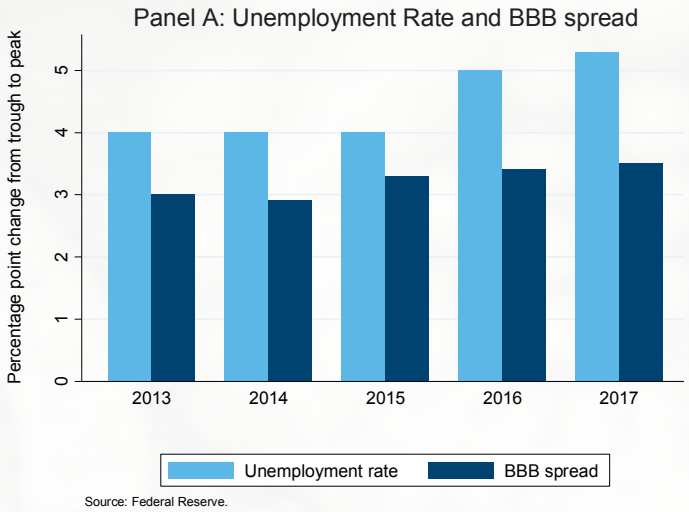
The increase in the scenario severity does not automatically translate into higher losses because banks have significantly improved the quality of the loans held on their books since the crisis. In addition, the stress test results are also dependent on banks' business models. For example, the impact of negative yields for short-term U.S. Treasury securities in 2016 was uneven across bank types. In particular, banks more focused on lending were more affected by negative rates than universal banks, which are also active in trading and market activities and therefore more diversified.

As a matter of calibration, the Fed has stated that the severely adverse scenario will consist of "a set of economic and financial conditions that reflect the conditions of post-war U.S. recessions."[4] In particular under the DFAST rules, this scenario includes an increase in the unemployment rate of at least 3 to 5 percent, but, at a minimum, an increase sufficient to result in a projected unemployment rate of at least 10 percent. After specifying the path of the unemployment rate, the Fed postulates the path of the remaining macroeconomic and financial variables based on the underlying structure of the scenario.

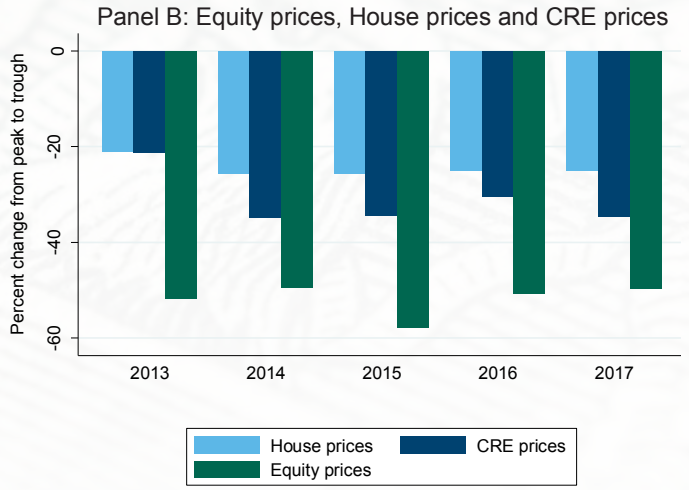
3 See, "Next Steps in the Evolution of Stress Testing" by Daniel K. Tarullo (September 26, 2016).
4 12 CFR 252

The desire to increase the severity of the severely adverse scenario is evident in terms of its impact on the unemployment rate over the past 5 years. As shown in panel A of Figure 1, the shock to the unemployment rate is more severe in the last two stress scenarios as the unemployment rate rises by 5 p.p. and 5¼ p.p. in the 2016 and 2017 severely adverse scenarios, respectively. In contrast, the unemployment rate increased by 4 p.p. in the 2013, 2014 and 2015 stress scenarios. As also shown in panel A, the shock to the BBB spread has also risen over time. It is the most severe in the 2017 stress scenario, with a 3½ p.p. widening of the spread from trough to peak.The increase in the severity of the stress scenario over the past 5 years is less prevalent in the shocks to equity prices, house prices and commercial and real estate (CRE) prices. As shown in panel B of Figure 1, the shock to equity prices was the most severe in the 2015 severely adverse scenario. In particular, equity prices were set to decline 58 percent from peak to trough in the 2015 stress scenario, while they fall about 50 percent in the 2017 stress scenario. The decline in the house price index has been roughly the same across all years, with the exception of 2013 where the housing price shock was not as extreme. Finally, CRE prices fall more than 30 percent in all stress scenarios post-2014 (inclusive), and in particular the scenario in the 2017 cycle was designed to reflect a period of heightened stress in CRE markets.

FIGURE 1: DIFFERENCES IN THE SEVERITY OF STRESS SCENARIOS



Source: Federal Reserve.



Source: Federal Reserve.

III. Impact of the Fed's stress scenario on the CET1 ratio

It's useful to start the analysis by looking at the overall impact of the stress scenario on banks' regulatory capital ratios–in particular, by analyzing the change in the aggregate CET1 ratio from the start of stress tests up to the lowest point over the nine-quarter stress horizon. The decomposition is based on publicly available data and subject to some approximations, particularly with respect to capital actions in DFAST and the minimum level of CET1 capital under stress. In addition, this analysis combines data from four of the five DFAST cycles, although we analyze differences over time later in more detail.[5]

5 Due to the lack of information on risk-weighted assets in the last quarter of the stress tests planning horizon in DFAST 2013, this year is excluded from Figures 2 and 3

As shown panel A of Figure 2, the severely adverse scenario would reduce the aggregate CET1 ratio across all banks from 12.1 percent to 8.1 percent using the Fed's models, on average over the past four DFAST cycles. Similarly, as shown in panel B the severely adverse scenario would reduce the aggregate CET1 ratio from 12.1 percent to 8.8 percent using banks' own models. To understand the differences between these two results, the decrease in the CET1 capital ratio is decomposed into four key drivers: (i) projections of pre-tax net income; (ii) projections for risk-weighted assets; (iii) capital actions; and (iv) other. The "other" category includes deductions from capital (e.g., deferred tax assets) and the impact of the transition to fully phased-in Standardized capital rules. The key results can be summarized as follows:

- The impact of the Fed's severely adverse scenario on the projections of revenue, expenses, and various types of losses and provisions that comprise pre-tax net income is about the same across the Fed's and banks' own models.

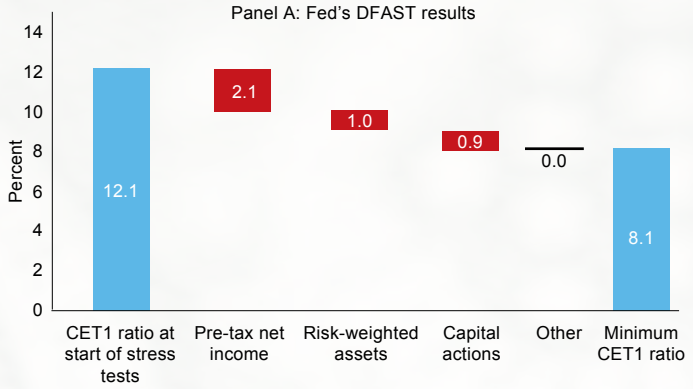
- There are two important differences between the Fed's and banks' own DFAST results:

  – First, are the projections of the balance sheet and risk-weighted assets. In particular, while the Fed projects risk-weighted assets to increase over the planning horizon reflecting projected asset and loan growth (mainly for macroprudential reasons), banks assume that their balance sheets shrink due to a decrease in loan demand during a severe recession.

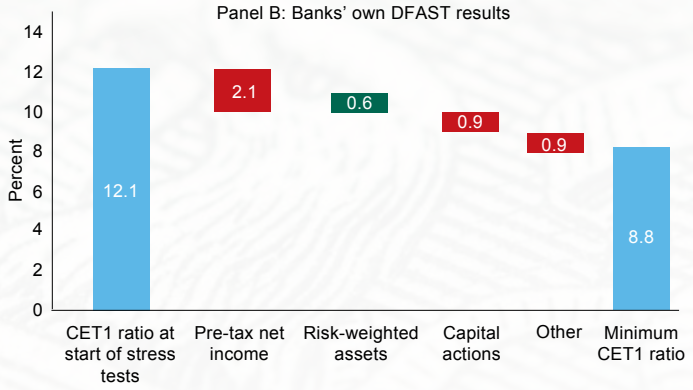
  – Second, projections of the "other" category are also significantly different. This includes the treatment of taxes, deductions from capital, and the phase-in of transitional arrangements that are part of the Standardized Approach. In particular, our results indicate that banks project significantly higher deductions from capital relative to the Fed, most likely due to the approach taken by banks in dealing with deferred tax assets. Our own estimates could also be impacted by measurement error if there were significant differences in the projections of the quarter in which each bank reaches its minimum CET1 capital ratio.

6 Our own estimates could also be impacted by measurement error since we have to estimate the minimum CET1 capital as the Fed and banks' only disclose the minimum CET1 ratio. If there are significant differences in the projections of the quarter in which each bank reaches its minimum CET1 ratio, it could also drive differences in the "other" category. That is a possibility since the projections of risk-weighted assets at the end of the nine-quarter stress horizon are markedly different using the Fed's versus banks' own models.

FIGURE 2: DRIVERS OF CHANGES IN THE AGGREGATE CET1 RATIO UNDER STRESS



Based on DFAST 2014 through DFAST 2017



Based on DFAST 2014 through DFAST 2017

- We assume capital actions are the same across the Fed's and banks' own DFAST results, following DFAST instructions on equity payouts.[7]

The key takeaway of Figure 2, is that the stress projections for pre-tax net income, which are separately determined using the Fed's and banks' own models, are roughly identical over the past four DFAST cycles, on average. Below, we

7 Per DFAST instructions, "for the first quarter of the planning horizon, capital actions for each BHC are assumed to be the actual actions taken by the BHC during that quarter. Over the remaining eight quarters, common stock dividend payments are generally assumed to be the average of the first quarter of the planning horizon and the three preceding calendar quarters. Also, BHCs are assumed to pay scheduled dividend, interest, or principal payments on any other capital instrument eligible for inclusion in the numerator of a regulatory capital ratio. However, repurchases of such capital instruments and issuance of stock are assumed to be zero, except for issuance of common or preferred stock associated with expensed employee compensation or in connection with a planned merger or acquisition." We tried to approximate DFAST payouts using the FR Y-9C to the extent possible. Based on banks' own disclosures, our approximation understates payouts by approximately 0.1 p.p.

analyze the differences in projections across time and note that banks' own projections have become more pessimistic over time, and, in particular, the decline in CET1 ratios due to net losses is more pronounced using banks' own models over the past two DFAST cycles.

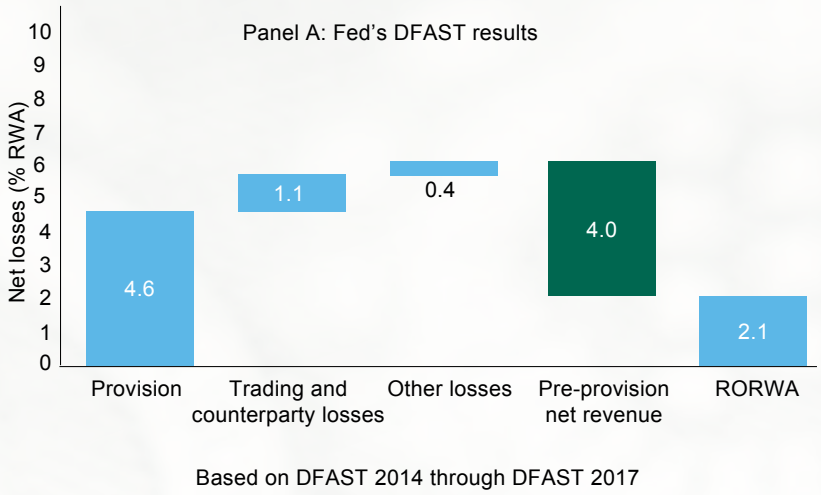
In the top-down analysis of regulatory minimum requirements, the Basel Committee popularized a variable called "return on risk-weighted assets" (RORWA), which is calculated as the ratio of pre-tax net income to risk-weighted assets. The stress tests disclosures allow the calculation of RORWA using cumulative pre-tax net income over a nine-quarter horizon.[8] As shown in Figure 2, aggregate RORWA is -2.1 percent using both the Fed's and banks' own models across the past four DFAST cycles. As was the case with aggregate CET1 ratio, we can calculate the subcomponents of RORWA since each one is projected using a different suite of models.

Figure 3 decomposes the projections of RORWA into four subcomponents: (i) provisions for loan losses; (ii) trading and counterparty losses; (iii) other losses; and (iv) pre-provision net revenue (PPNR). The other losses subcomponent includes the sum of realized losses on securities and other losses, net of other revenues. Although the aggregate RORWA projection is the same using the Fed's and banks' own models, it masks important differences in the Fed's and banks' own projections for provisions and pre-provision net revenue. As shown by the left-most bar in each panel, the Fed's projections for provisions is more pessimistic than banks' own projection, while banks' own projections for PPNR is more pessimistic relative to the Fed's own projections (green bars).

We can further illustrate this point in Figure 4, which plots the empirical cumulative distribution function of the difference in

8 As shown in Basel Committee on Banking Supervision, "Calibrating regulatory minimum capital requirements and capital buffers: a top-down approach,"(October 2010), pre-tax RORWA is on average lower than after-tax RORWA.

FIGURE 3: DRIVERS OF RORWA



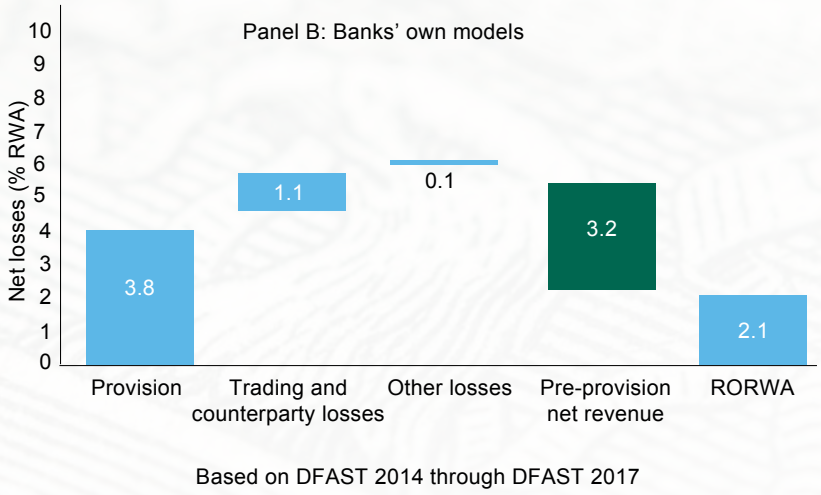
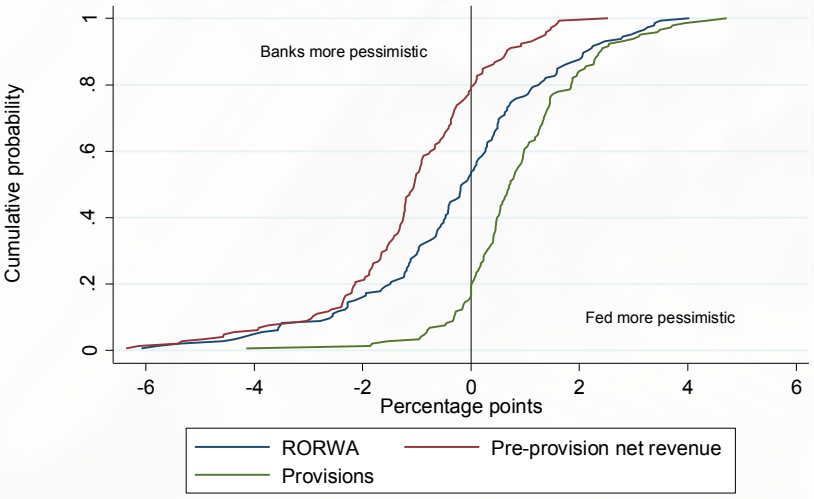


FIGURE 4: EMPIRICAL CUMULATIVE DISTRIBUTIONS OF DIFFERENCES IN PROJECTIONS



Source: Federal Reserve, Banks' DFAST disclosures.
Note: Each line in the chart plots the difference in the Fed's and banks' own projections scaled by risk-weighted assets.

RORWA projections obtained using banks' own models and Fed's models. As shown by the red line, approximately 80 percent of PPNR projections using banks' own models are lower than those obtained using the Fed's own models. Conversely, as shown by the green line only 20 percent of projections for provisions using banks' own models are more pessimistic relative to the Fed's projections. On net, as shown by the blue line approximately half of the banks generate lower projections for RORWA.

Over time, banks' own projections of pre-tax RORWA have become more pessimistic relative to those based on the Fed's models. Table 1 demonstrates this result by showing the average, median and selected percentiles of the distribution of RORWA under the Fed's models and banks' own models. For example, while the Fed's average projection of pre-tax RORWA was 90 basis points lower than banks' own projection in DFAST 2013, it became higher on the order of 50 to 70 basis points post DFAST 2015 (inclusive). This result is similar for the median and other percentiles of RORWA distribution, although the lower projections of RORWA by banks are definitely more pronounced over the past two DFAST cycles. It is also interesting to note that the median pre-tax RORWA in the BCBS (2010) study was -1.7 percent in the 2007-2009 crisis, while the average was -4.4 percent. The higher average losses in the BCBS study likely reflects the presence of outliers and the fact that some banks held significantly riskier assets at the onset of the past financial crisis.

IV. Differences in RORWA projections across banks

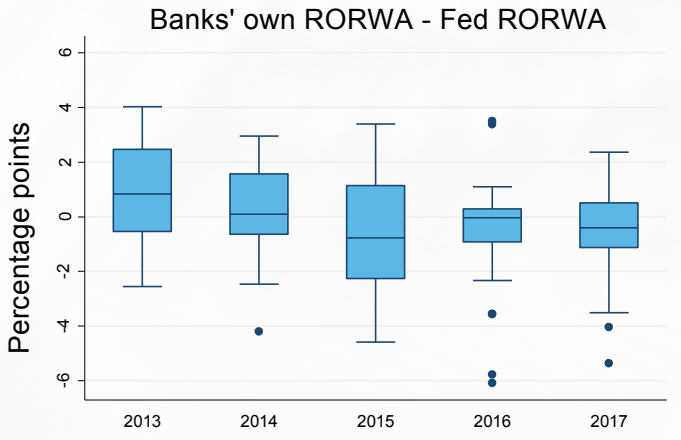
So far our analysis has demonstrated that on aggregate and across all years the Fed's and banks' own estimates of RORWA are very close; however, over time, banks' own RORWA projections have become more pessimistic relative to the Fed's projections. In addition, we have also shown that the source of the pessimism on banks' own models resides, for the most part, in their own projections of PPNR.

One way to measure the disagreement between the Fed's and banks' own projections is to look at the interquartile range, or the difference between 75th percentile and the 25th percentile of the RORWA forecasts over time. This is done by calculating the difference between banks' own RORWA projections and the Fed's RORWA projections for each year and ranking the difference in projections from highest to lowest value. Afterwards, the difference in projections between the 75th slot and the 25th slot is plotted and the gap between the two quartiles is used as a proxy for the degree of disagreement. The bottom and top of the box shown in Figure 5 are the 25th and 75th percentiles of the distribution. As shown in the chart, the disagreement in projections was the lowest in DFAST 2016 and was the highest in DFAST 2015. The band inside the box represents the median difference. Consistent with the results of Table 1, the median difference is RORWA's projection is negative over the past 3 DFAST cycles. Roughly speaking, more than 50 percent of the banks participating in the U.S. stress tests project a lower stressed RORWA than the Fed. The end of the whiskers represents the lowest and highest point within 1.5x the interquartile range and the dots are outliers. For example, the variation in difference in RORWA projections is still quite large in DFAST 2017 – from -4 p.p.

TABLE 1: DISTRIBUTION OF RORWA IN U.S. STRESS TESTS

		2013	2014	2015	2016	2017
Average	Fed Models	-1.8%	-1.7%	-1.2%	-1.8%	-1.1%
	Bank Models	-0.9%	-1.5%	-1.9%	-2.3%	-1.6%
Median	Fed Models	-2.4%	-2.0%	-1.9%	-2.1%	-1.4%
	Bank Models	-1.0%	-2.0%	-1.8%	-2.2%	-1.6%
10th percentile	Fed Models	-6.2%	-4.9 %	-4.9%	-4.3%	-3.7%
	Bank Models	-3.7%	-3.7%	-4.5%	-5.1%	-4.0%
25th percentile	Fed Models	-3.7%	-3.8%	-3.7%	-3.1%	-2.5%
	Bank Models	-2.9%	-2.6%	-3.0%	-3.6%	-2.8%
75th percentile	Fed Models	0.4%	-0.4%	-0.1%	-1.3%	0.4%
	Bank Models	0.1%	-0.3%	-0.8%	-0.3%	-0.4%
90th percentile	Fed Models	2.1%	1.8%	3.6%	0.6%	1.7%
	Bank Models	2.5%	1.1%	0.7%	0.4%	1.1%

FIGURE 5: DIFFERENCE IN RORWA PROJECTIONS



Source: Federal Reserve, Banks' DFAST disclosures.
Note: RORWA is defined as cummulative pre-tax net income over the 9-quarter planning horizon scaled by risk-weighted assets.

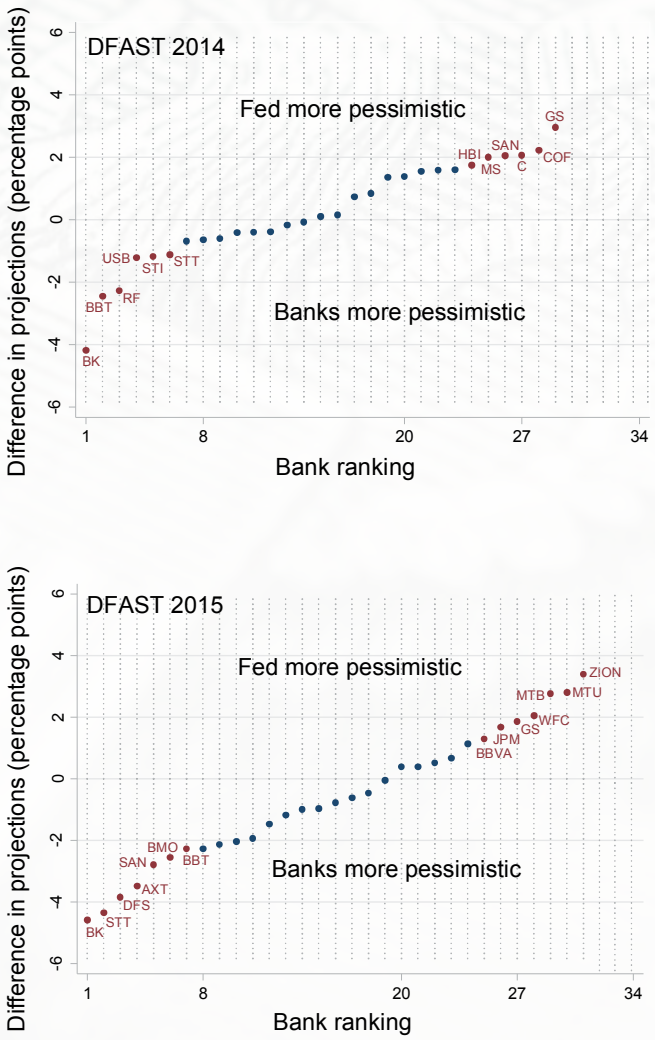
to 2 p.p. – leading to uncertainty in post-stress regulatory capital ratios and reducing efficiency in the allocation of capital.

Figure 6 plots the difference between each bank and the Fed's RORWA projection over the nine-quarter planning horizon from DFAST 2014 through DFAST 2017. The red dots are observations in the lower 25 percent and upper 25 percent tails of the distribution. Negative values indicate that each bank's own projection is more pessimistic than the Fed's projection for that bank and positive values reflect the opposite. This representation of the data allows for an inspection of the outliers which deserve further investigation. Note that some of these differences are quite significant and have a first-order impact on post-stress regulatory capital ratios.

Take for instance the difference in RORWA projections in DFAST 2017 (last panel of Figure 6), to illustrate how banks' own models could be used to determine post-stress capital ratios and having Fed's models used to challenge banks' own results. Four banks – SAN, CFG, BK and DFS – project RORWA to be more than two percentage points lower than the Fed's models. For almost all banks in the lowest quantile, the differences in projections are driven by banks' more pessimistic projections of PPNR under stress. For example, BK projects RORWA to be 1.7 percent while under the Fed's models RORWA is projected to be 5.2 percent, yielding a difference of -3.5 p.p. The behavior of RORWA is driven by pre-tax net income, and as shown in Figure 3, pre-tax net income is mainly driven by the projections of PPNR, provisions and trading and counterparty losses. A comparison of the Fed's and BK's own DFAST disclosures shows that the difference in RORWA is in most part driven by PPNR projections under stress. Specifically, while BK forecasts its own PPNR to be $5.3 billion over the nine-quarter horizon, the Fed projects BK's PPNR to be $10.2 billion. For provisions, the Fed's and BK's projections overlap at approximately $2 billion. So, why are PPNR projections so different using BK's own models versus the Fed's models? Unfortunately, the DFAST disclosures do not provide projections for the subcomponents of PPNR, such as net interest income, noninterest income, noninterest expense, losses due to operational-risk events, litigation-related costs and expenses related to the disposition of foreclosed properties. The lack of additional information makes it impossible to better assess the sources of disagreement between banks' own projections and the Fed's projections.

On the opposite tail of the distribution of differences in RORWA under DFAST 2017, BNP projects RORWA to be -1.5 percent whereas the Fed forecasts it to be -3.9 percent, yielding a difference of more than 2 p.p. in BNP's RORWA projection. Based on the DFAST disclosures, the Fed's forecasts of loan loss provisions are almost 2x higher than BNP's own forecasts, although BNP's PPNR projections are somewhat more pessimistic, which offsets some of the differences in loan losses. In particular, loan losses using the Fed's own models are greater relative to those reported using BNP's own models across all loan types with the exception of credit card loans. The additional disclosure on loan losses provides some additional hints of potential drivers of differences in RORWA projections. The fact that loan losses are higher using the Fed's models for all loan types with the exception of credit card loans, suggests that such differences could be driven by the Fed's higher

FIGURE 6: DIFFERENCES IN RORWA PROJECTIONS BY BANK



estimates of loss given default. Those differences would not be apparent for credit card loans since typically the loss given default of such loans is very close to 100 percent. However, the Fed's higher projected loan losses for the remaining portfolios could be because the Fed does not incorporate bank-specific effects in its projections, in part because it doesn't have the data required to capture the unique characteristics of each bank or its business model.

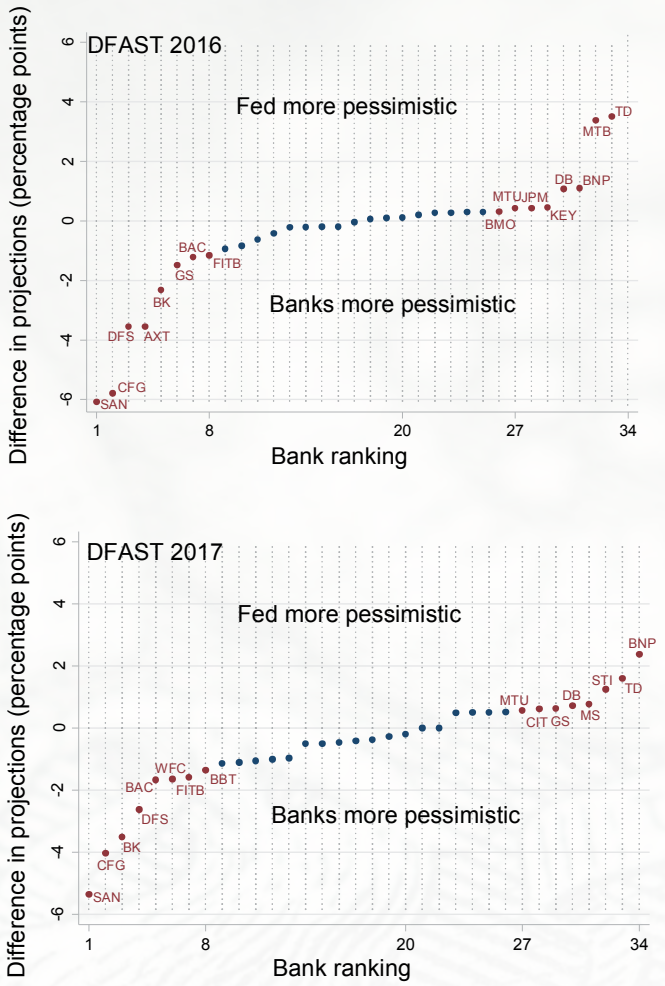
Finally, it is also worth pointing out that differences in RORWA projections between each bank and the Fed are persistent and therefore somewhat predictable. In particular, the autocorrelation of the difference in RORWA projections is 0.55. In addition, the autoregressive term in a dynamic panel data regression that includes year dummies is equal to 0.47 and it is statistically different from zero at the 1 percent level. This is a remarkable degree of persistence given that we are dealing with yearly observations.

IV. Summary

First, our results show that although the decline in the post-stress CET1 ratio is on average higher under the Fed's DFAST results relative to banks' own DFAST results, it is almost exclusively driven by differences in the projections for risk-weighted assets. In particular, due to the requirement that banks' cannot restrict the supply of loans during the stress scenario for macroprudential reasons, the Fed's projections for risk-weighted assets are significantly higher than banks' own projections. Alternatively, if the stress tests were to impose a simple assumption and let balance sheets and risk-weighted assets remain constant over the severely adverse scenario, banks' own DFAST results would yield a significantly more pronounced decline in the CET1 ratio under stress. In particular, banks' projections of pre-tax net income are on average more pessimistic than the Fed's projections, particularly for revenues under stress.

Second, due to the large and persistent differences in the projections of pre-tax net income generated using the Fed's and bank's own models, our results suggest that moving to a regime where banks' own models determine equity payouts would significantly reduce the uncertainty around capital planning at each bank, and increase efficiency and credit availability. Moreover, the Fed's models would still be important in the stress tests to conduct peer benchmarking and ensure consistency and level playing field across participating banks. It would simply require the Fed's examiners to focus their scrutiny on portfolios where the differences in projections between the Fed's models and banks' own models are the greatest. Lastly, the use of banks' own models would boost innovation in risk management at banks and also improve financial stability by eliminating the risk of the industry coalescing around the same models as those used by the Fed.

FIGURE 6 (CONT.)



Another area where banks' own models could play a key role is on a proposal the Fed is considering to simplify the current capital regime. In particular, to integrate the stress tests with the point-in-time Basel III capital requirement by replacing the current capital conservation buffer with the maximum decline in a bank's CET1 ratio under stress. Our results indicate that the calibration of the so called "stress capital buffer" should also incorporate the results of banks' own models under the BHC-stress scenario as well as the Fed's results under its own severely adverse scenario.