2014 Comprehensive Capital Analysis and Review Stress Test Results

In March, the Federal Reserve published the results from its 2014 round of capital adequacy stress testing for large banks in two parts. The first part was the Dodd-Frank Act Stress Test (DFAST) analysis of bank balance sheets, earnings, losses, and capital under three different economic scenarios. The second was the Comprehensive Capital Analysis and Review (CCAR) test of the banks' submitted capital plans, using the results from the DFAST scenario runs.[1]

The following report presents a comparison of loan loss stress test results for large banks from three different sources: the Federal Reserve's DFAST/CCAR modeling, the banks' own models, and Trepp's T-CAST model. Since credit losses were the primary driver of bank distress in previous cycles, including the most recent recession and bank failure cycle, the focus is on comparing loan losses from the three sets of models.

The Dodd-Frank Act currently requires the banks to publish summary results of their own internal analyses for the Severely Adverse scenario. Trepp has gathered these figures and labeled them "company" results in this report. While Trepp groups these results together, they are actually produced by each bank on its own, using data, tools, and methods that, for the most part, also have been developed independently by each bank.

Trepp's T-CAST (Trepp Capital Adequacy Stress Test) model produces scenario-based forecasts for individual bank balance sheets, income/expense, loan losses, and capital impacts for banks and bank holding companies. The T-CAST model uses the same economic scenarios used by the Fed for DFAST/CCAR to produce an enterprise-wide picture of individual banks through a 9- or 13-quarter forecast horizon.

1 DFAST (Dodd-Frank Act Stress Test) and CCAR (Comprehensive Capital Analysis and Review) were both mandated by the Dodd-Frank Act, although CCAR predates the Dodd-Frank Act. The terms refer to different parts of stress testing, though CCAR tends to be used more broadly and tends to be used to incorporate DFAST as well.

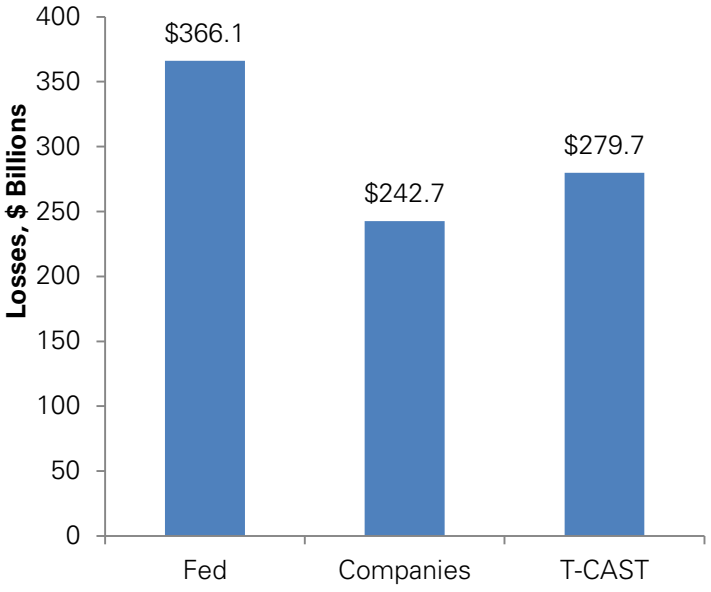
In the comparison of loan loss results, Trepp uses the third quarter 2013 as the starting point for the forecasts, covering the 9-quarter period from Q4 2013 through Q4 2015. The analysis pertains to the results from the Severely Adverse scenario, which produces the highest credit losses for banks.

Aggregate Loan Losses

The Federal Reserve's modeling produced the highest loss estimates for the 30 CCAR banks, totaling $366.1 billion in the Severely Adverse scenario. The companies' own results came in at an aggregate $242.7 billion, while Trepp's T-CAST model produced total loan loss estimates of $279.7 billion.

The same sort of pattern tends to show up in individual bank results, with the Federal Reserve's loss estimates typically higher than the bank's own estimates, and Trepp's T-CAST results between the two.

Loss Estimate Comparison - Severely Adverse Scenario
Cumulative 9-Quarter Losses, $ Billions



Sources: Federal Reserve, Company Reports, Trepp LLC

The general similarity in the three sets of results should instill confidence in each set individually, as well as the aggregation of results across all the models. At a fundamental level, each of the three models[2] is starting with the same basic data for the bank—e.g., the size and condition of the loan portfolios—and the same economic scenario forecasts. However, each set of models goes about producing forecasts in its own way. There is very limited insight into the models the Fed uses, and outside firms have virtually no detail about each banks' independent models. Furthermore, the banks and the Fed have minimal knowledge of each other's models.

Individual Bank Results

The 30 CCAR banks range in size from $55 billion in assets (Zions Bancorporation) to $2.5 trillion in assets (JPMorgan Chase). Loan loss estimates range from $0.1 billion (State Street company estimate) to $55.5 billion (Federal Reserve results for Citigroup). Aggregate loss rate estimates range from a low of 0.6% (State Street company estimate) to a high of 15.2% (Federal Reserve results for Discover Financial).

Across the three sets of results—the Federal Reserve, the companies', and T-CAST—the largest four banks (JPMorgan Chase, Bank of America, Citigroup, and Wells Fargo) account for 59% of the aggregate loan losses for the 30 banks, in-line with their share of total assets.

In the chart below, several themes are evident:

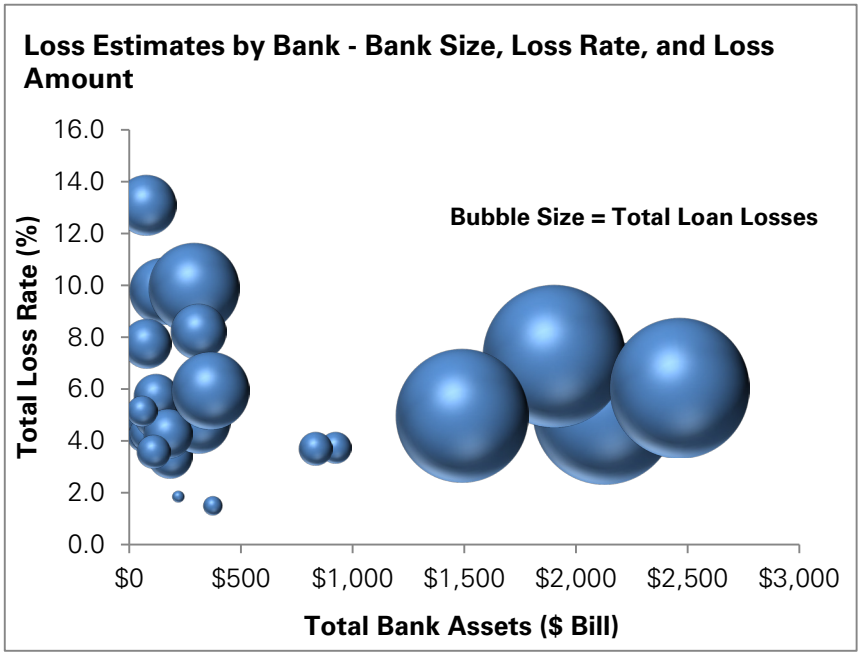
- The four largest banks comprise the lion's share of both assets and stress test loan losses.

- The consumer loan/credit card banks are clustered in the upper left, with loss rates of 8% and above.

- Goldman Sachs and Morgan Stanley—the two investment banks—have relatively small loan portfolios for their size, and correspondingly modest loan loss amounts.

- State Street and Bank of New York Mellon both have below-average modeled loss rates and total loss amounts.

- The rest of the banks have relatively diversified loan portfolios and are generally clustered in the 3% to 6% loss rate range.



The horizontal axis shows bank assets, the vertical axis the 9-quarter stress test loss rate, and the size of the bubbles the total stress test loan losses for each bank. For loss rates and total loan loss amounts, the results of the three models – the Fed's, the companies' and T-CAST are averaged. See the Appendix for more detail.

Loss Amounts by Loan Type

Retail exposures (residential and consumer loans) account for approximately two-thirds of the loss estimates across all three sets of results. Wholesale exposures (C&I and CRE loans) make up about 30% of loss estimates and other loans comprise about 6%. For all but two loan types, the T-CAST results are

2 We treat the company results as one set of results although each company has produced its results independently of the other banks.

between the Fed and the company loss estimates. For the remaining two loan types—CRE and Other Consumer—the T-CAST results are very close to company figures.

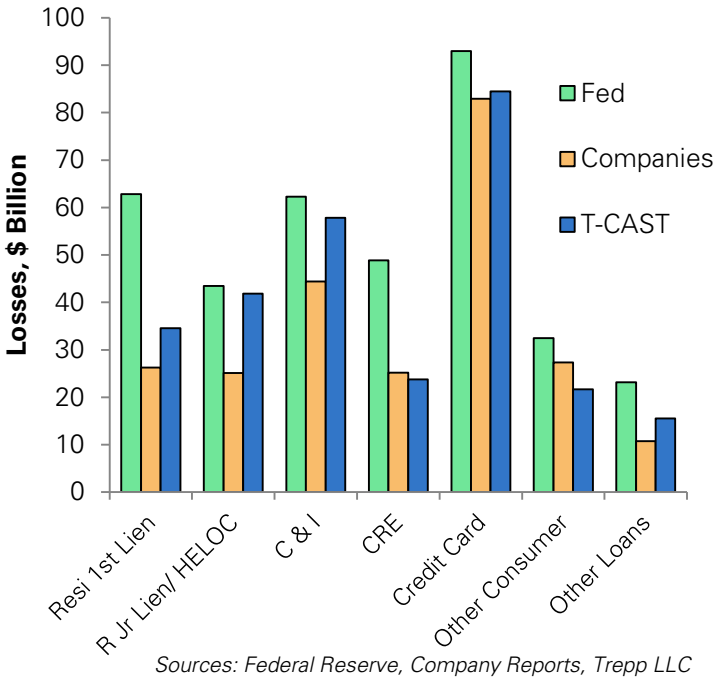
- Residential First Lien Mortgage loss estimates range from $26.3 billion (company) to $62.8 billion (Fed). The T-CAST results come in at $34.6 billion, closer to the company estimates.

- Residential Junior Lien and HELOC loss estimates range from $25.2 billion (company) to $43.5 billion (Fed). T-CAST produces results of $41.8 billion, close to the Fed's estimates.

- C&I loss estimates are in a somewhat tighter range, from $44.4 billion (company) to $62.3 billion (Fed). The T-CAST results total is $57.8 billion, midway between the other two.

- CRE loss estimates fall in a rather broad range, from $23.8 billion (T-CAST) to $48.9 billion (Fed). The company results are $25.2 billion, close to the T-CAST figures.

Loss Estimates by Loan Type-
Cumulative 9-Quarter Losses, $ Billions



Sources: Federal Reserve, Company Reports, Trepp LLC

- Credit Card loss estimates are clustered around $90 billion, ranging from $82.9 billion (company) to $93 billion (Fed). T-CAST total $84.5 billion, closer to the company figures.

- Other Consumer Loan loss estimates range from $21.7 billion (T-CAST) to $32.5 billion (Fed). The company results are $27.4 billion, about midway between the other two.

- Losses on Other Loans range from $10.8 billion (company) to $23.2 billion (Fed). The T-CAST total is between the other two at $15.5 billion.

Loss Rates by Loan Type

The loss rates for each loan type provide perspective on the relative risk of different areas of lending. Loss dollar amounts are driven by both the size of the exposure and the modeled loss severity on those exposures. As with the loss amounts (in dollars), the T-CAST loss rates are very similar to the Fed and company loss rates. Median loss rates for each loan type are compared below.[3]

- Residential First Lien Mortgage loss rates range from 1.9% (T-CAST) to 4.3% (Fed). The company median loss rate is 2.5%.

- Residential Junior Lien and HELOC loss rates are higher, reflecting the poor quality of collateral in a downturn, and range from 5.7% (company) to 8.6% (Fed). The T-CAST median is 6.4%.

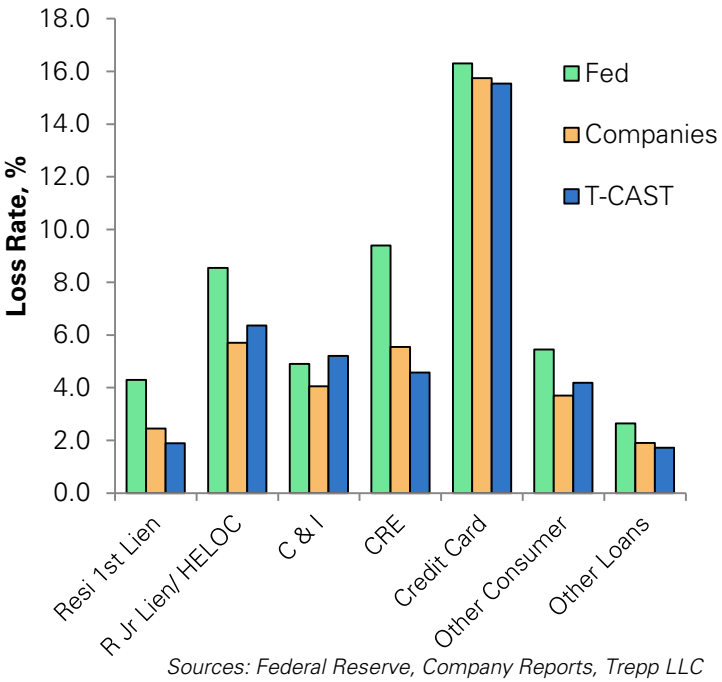
- C&I loss rates fall in a fairly tight range, from 4.1% (company) to 5.2% (T-CAST). The Fed median is 4.9%.

- CRE loss rates range from 4.6% (T-CAST) to 9.4% (Fed). The company median loss rate is 5.6%.

- Credit Card loss rates are universally high and in a tight range, from 15.5% (T-CAST) to 16.3% (Fed). The company median is 15.8%. The high

3 Median cumulative 9-quarter loss rate across the 30 banks from each of the 3 sources compared here: the Fed, the companies and T-CAST.

Loss Rates by Loan Type-
Median 9-Quarter Loss Rate by Loan Type



Sources: Federal Reserve, Company Reports, Trepp LLC

loss rates reflect the risk of this loan type in a severe downturn.

• Other Consumer Loan loss rates range from 3.7% (company) to 5.5% (Fed). The T-CAST loss rate is 4.2%.

• Other Loan loss rates are generally low, with the median rate spanning 1.7% (T-CAST) to 2.7% (Fed). The company median is 1.9%.

Correlations

There are certainly differences between the Fed, company, and T-CAST models, but the similarities are greater than the differences. At the aggregate total loss level, the correlations across the three sets of results are very high, ranging from 0.95 to 0.98.
At the loan-type level, there is more variation, though the correlations are again very high. Only a handful of correlations are below 0.9, and only one was below 0.7.

This is a comparison of loan loss dollar amounts. Correlations of the loss rates show a similar pattern, though generally with fit statistics that are not as high. In several of the smaller loan types, there are some volatile loss rates at the individual company level that have a minimal overall impact when applied to smaller portfolio sizes.

Loan Loss Correlations, Cumulative 9-Quarter Loss Amounts, Severely Adverse Scenario

	Fed	Company	T-CAST	Fed	Company	T-CAST	Fed	Company	T-CAST
	Total Loan Losses			*Resi 1st Lien*			*Resi Jr Lien/HELOC*		
Fed	1.00			1.00			1.00		
Company	0.98	1.00		0.94	1.00		0.98	1.00	
T-CAST	0.98	0.95	1.00	0.96	0.94	1.00	0.97	0.98	1.00

	C&I			*CRE*			*Credit Card*		
Fed	1.00			1.00			1.00		
Company	0.95	1.00		0.90	1.00		0.99	1.00	
T-CAST	0.91	0.83	1.00	0.98	0.84	1.00	0.99	1.00	1.00

	Other Consumer			*Other Loans*		
Fed	1.00			1.00		
Company	0.93	1.00		0.92	1.00	
T-CAST	0.78	0.60	1.00	0.92	0.90	1.00

- For C&I, the T-CAST correlation with the companies' results was 0.83.
- For CRE, the T-CAST correlation with the companies was 0.84.
- For Other Consumer, the T-CAST to Fed correlation was 0.78 and the T-CAST to company correlation was 0.6.

Appendix - Individual Company Results - 3 Models

Model Summary - Individual Company Results
Severely Adverse Scenario, $ in Billions

			Avg of 3 Models		Loss Amount			Loss Rate %		
Bank Name	Ticker	Tot. Assets (Q3 2013)	Loss Amt	Loss Rate	Fed	Company	Trepp	Fed	Company	Trepp
Ally Financial Inc.	-	$150.6	$4.0	4.3%	$5.0	$2.7	$4.3	5.0	3.2	4.8
American Express Company	AXP	$150.2	$9.9	9.8%	$11.4	$9.5	$8.8	10.7	9.7	9.0
Bank of America Corporation	BAC	$2,128.7	$46.3	5.1%	$54.9	$30.3	$53.8	5.8	3.6	5.9
The Bank of New York Mellon Corporation	BK	$372.0	$0.7	1.5%	$0.8	$0.4	$1.0	1.6	0.8	2.1
BB&T Corporation	BBT	$181.1	$4.3	3.4%	$5.2	$3.8	$3.8	4.5	2.3	3.5
BBVA Compass Bancshares, Inc.	-	$70.1	$2.2	4.6%	$2.6	$2.2	$1.8	5.2	4.7	3.8
BMO Financial Corp.	-	$113.1	$2.8	5.4%	$3.3	$2.5	$2.5	6.1	5.0	5.1
Capital One Financial Corporation	COF	$290.2	$18.2	9.9%	$22.8	$15.0	$16.8	11.8	8.4	9.5
Citigroup Inc.	C	$1,899.5	$45.3	7.3%	$55.5	$40.1	$40.4	8.4	7.0	6.5
Comerica Incorporated	CMA	$64.7	$2.0	4.7%	$2.1	$2.0	$1.8	4.7	4.7	4.7
Discover Financial Services	DFS	$75.5	$8.0	13.1%	$9.5	$6.7	$7.7	15.2	10.8	13.4
Fifth Third Bancorp	FITB	$125.7	$4.0	4.7%	$4.8	$3.6	$3.5	5.5	4.3	4.3
The Goldman Sachs Group, Inc.	GS	$923.4	$2.1	3.8%	$1.6	$1.1	$3.6	3.1	2.9	5.3
HSBC North America Holdings Inc.	-	$309.3	$6.8	8.2%	$10.0	$4.6	$5.8	10.8	7.5	6.4
Huntington Bancshares Incorporated	HBAN	$56.6	$1.7	4.2%	$2.1	$1.6	$1.6	4.9	3.7	3.9
JPMorgan Chase & Co.	JPM	$2,463.3	$43.7	6.1%	$54.2	$36.5	$40.5	7.3	5.1	5.8
KeyCorp	KEY	$91.0	$2.5	4.6%	$2.9	$2.2	$2.5	5.1	4.2	4.5
M&T Bank Corporation	MTB	$84.4	$3.0	4.3%	$4.0	$2.4	$2.5	5.3	3.3	4.4
Morgan Stanley	MS	$832.2	$2.4	3.7%	$1.7	$2.0	$3.4	3.0	2.5	5.7
Northern Trust Corporation	NTRS	$96.0	$1.4	4.9%	$2.4	$1.0	$0.8	8.2	3.5	3.1
The PNC Financial Services Group, Inc.	PNC	$308.9	$8.9	4.8%	$10.1	$6.9	$9.8	5.2	3.7	5.4
RBS Citizens Financial Group, Inc.	-	$120.7	$4.0	5.0%	$4.9	$3.0	$4.2	5.8	3.8	5.3

Model Summary Cont'd- Individual Company Results
Severely Adverse Scenario, $ in Billions

			Avg of 3 Models		Loss Amount			Loss Rate %		
Bank Name	Ticker	Tot. Assets (Q3 2013)	Loss Amt	Loss Rate	Fed	Company	Trepp	Fed	Company	Trepp
State Street Corporation	STT	$216.8	$0.3	1.9%	$0.5	$0.1	$0.3	3.1	0.6	1.9
SunTrust Banks, Inc.	STI	$172.0	$5.1	4.3%	$5.7	$5.5	$4.2	4.6	4.7	3.6
U.S. Bancorp	USB	$360.7	$13.3	6.0%	$15.6	$15.0	$9.2	7.0	6.6	4.3
UnionBanCal Corporation	-	$105.5	$2.4	3.6%	$3.4	$1.9	$1.9	5.0	2.8	3.0
Wells Fargo & Company	WFC	$1,488.1	$39.6	5.0%	$55.1	$26.8	$36.8	6.8	3.4	4.8
Zions Bancorporation	ZION	$55.2	$1.9	5.2%	$2.5	$1.8	$1.4	6.6	4.8	4.1

About Trepp

Trepp, LLC, founded in 1979, is the leading provider of information, analytics and technology to the CMBS, commercial real estate and banking markets. Trepp provides primary and secondary market participants with the web-based tools and insight they need to increase their operational efficiencies, information transparency and investment performance. From its offices in New York, San Francisco and London, Trepp serves its clients with products and services to support trading, research, risk management, surveillance and portfolio management. Trepp is wholly-owned by DMG Information, the information publishing division of the Daily Mail and General Trust (DMGT).