Bank Stress Tests and Consumer Credit Markets: Credit and Real Impacts

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Motivation

- Bank stress tests are arguably the most important change in post-GFC banking supervision.
  - An assessment of how a hypothetical recession scenario would affect banks' capital ratios

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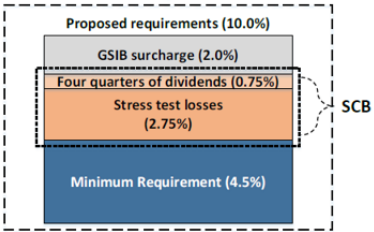
  - An assessment of how a hypothetical recession scenario would affect banks' capital ratios
- ... consequential to banks
  - Affects bank capital distributions (e.g., dividends payout and share repurchases) and bonus payments
  - Test results now used to set year-round bank capital requirements (SCB) – example below



Research Questions

- Stress test results are confidential prior to public release; upon release, they could be shocks to banks.
  - Jamie Dimon described it as "unpredictable."
- How do stress test “shocks" affect consumer credit supply?
  - Quantity and price of consumer credit

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- How do stress test “shocks" affect consumer credit supply?
  - Quantity and price of consumer credit
- How are stress test “shocks" transmitted to the consumer credit market and how do they affect consumer credit outcomes?
  - Credit vs. real impact

Identification Challenges

- Comparing stress tested and non-stress tested banks
  - Early papers used this approach.

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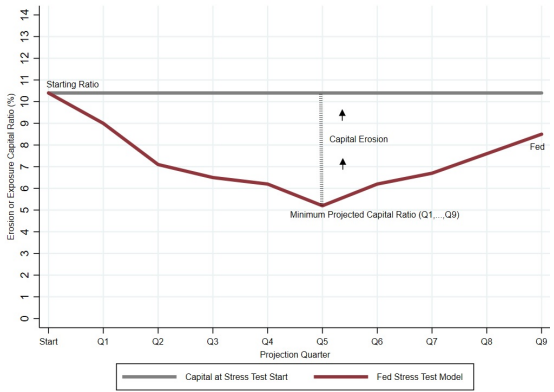
- Comparing stress tested and non-stress tested banks
  - Early papers used this approach.
- Using projected bank “capital erosion" as a measure of “stress test shock"
  - Better, but the erosion is partially driven by banks' risk-taking behavior unrelated to the stress tests, raising endogeneity concerns.



Our Approach

- We exploit an exogenous variation in the stress tests: the difference between capital projections made by banks and those by the Fed.
  - Banks and the Fed have separate models. Banks' passage of stress tests is ultimately determined by Fed models.
  - **Banks with a more optimistic capital projection relative to the Fed's would experience a "shock."**
  - We examine banks' supply of credit and consumer credit outcomes in the months subsequent to the revelation of the shock, i.e., the release of the Fed's stress test results.

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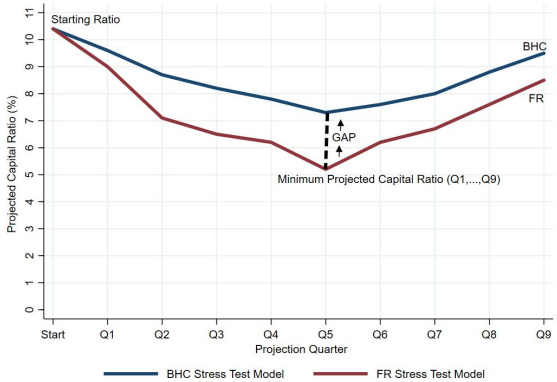
  - We examine banks' supply of credit and consumer credit outcomes in the months subsequent to the revelation of the shock, i.e., the release of the Fed's stress test results.
- We mainly focusing on consumer credit cards
  - Cards are affecting about 175 million consumers (CFPB, 2021).
  - Cards are unsecured credit; issuing banks should be sensitive to card risk exposure.
  - Card losses have been the single largest loss item in the stress tests ($120 billion in 2023).

Our “Shock" Measure

- **Stress test capital GAP**:

$$Capital\ GAP = \min[(Capital\ Ratio_{\mathrm{BHC}})_{Q1,\ldots,Q9}] - \min[(Capital\ Ratio_{\mathrm{FR}})_{Q1,\ldots,Q9}]. \quad (1)$$

  - A positive GAP means that the bank's projection is more optimistic than the Fed's, so the Fed's result would come in as a negative shock to the bank.

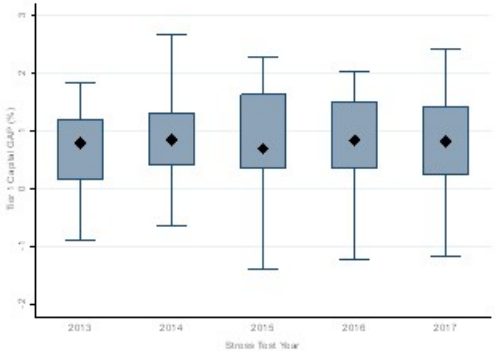


Preview of Main Findings

- A positive feedback loop among credit supply, credit usage, and credit performance due to the stress tests
  - Banks reduce their new supply of risky credit, on both the intensive and extensive margins.
  - However, these banks offer attractive promotions & rewards to borrowers they decide to lend to.
  - Accordingly, consumers with these banks increase their credit card spending; they also demonstrate stronger debt repayment behavior and better credit performance.

Data

- **Capital projections under the severely adverse scenario**
  - Bank projections from the Y14A data (confidential).
  - Fed projections from the CCAR/DFAST public release.



Data (cont'd)

- Loan-level data on consumer credit cards from Y-14M:
  - A rich set of consumer-level and loan-level characteristics
  - 2013:M6-2017:M12, more than 500 million obs. per month.
  - Stress tested banks are dominant players (market share over 80%).
- BHC financial data from the quarterly FR Y-9C reports to control for supply factors.
- For additional controls and analyses: U.S. Census Bureau, FDIC Summary of Deposits, FFIEC Census Demographic Data.

Aggregate Consumer Credit Supply

Independent Variables:	[1]	[2]	[3]
	Dependent Variable = (Credit Limit/ County Population) for New Originations		
Stress Test Measures			
Tier 1 Capital GAP	-0.2154*** [0.006]	-0.1877*** [0.006]	-0.2266*** [0.006]
BHC Characteristics (Lagged one quarter)	NO	NO	YES
Borrower & loan Characteristics	NO	YES	YES
County × Month-Year FE	YES	YES	YES
BHC × County FE	YES	YES	YES
Cluster by BHC × County	YES	YES	YES
Observations	1,334,680	1,332,288	1,332,288
Adj R-squared	0.813	0.818	0.822

- Economic significance: Changing *Tier 1 Capital GAP* from the 10th percentile to the 90th percentile, with all other characteristics set to their means, results in **a reduction in the credit limit of 14%**.

Decomposition of the Credit Supply Effects

Independent Variables:	[1] Credit Limit/ County Population	[2] Avg. Credit Limit	[3] No. of New Accounts/ County Population
Stress Test Measures			
Tier 1 Capital GAP	-0.2266*** [0.006]	-75.4651*** [4.144]	-0.0187*** [0.001]
BHC Characteristics	YES	YES	YES
Borrower & loan Characteristics	YES	YES	YES
County × Month-Year FE	YES	YES	YES
BHC × County FE	YES	YES	YES
Observations	1,332,288	1,332,288	1,332,288
Adj R-squared	0.822	0.617	0.862
Derivative product rule: component contribution		*36.6%*	*63.4%*

- We find the decreases in aggregate credit supply appear to be driven by **both** lower average credit limits as well as lower numbers of new accounts issued by the lenders, with the latter being a bigger effect.

Credit Supply by Risk Segment

	[1]	[2]	[3]	[4]	[5]	[6]
	Dependent Variable = Credit Limit for New Originations					
Independent Variables:	FICO <620	FICO [620, 680)	FICO [680, 720)	FICO [720, 760)	FICO [760, 800)	FICO ≥800
Stress Test Measures						
Tier 1 Capital GAP	-72.7418***	-32.1492***	-59.0811***	-85.1985***	-84.6875***	-75.0741**
	[20.100]	[10.953]	[18.284]	[25.548]	[30.177]	[30.281]
Consumer, Loan Characteristics	YES	YES	YES	YES	YES	YES
BHC Characteristics	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC × County FE	YES	YES	YES	YES	YES	YES
Observations	81,850	328,055	265,060	253,675	241,282	356,715
Adj R-squared	0.200	0.231	0.181	0.262	0.327	0.391
Dependent variable mean	*748.4*	*1963.3*	*3951.6*	*6006.2*	*8307.7*	*9678.0*

- **Banks target specifically the riskiest segments of their customer base in their credit supply reduction**.
- The impact on subprime borrowers is 10 times more than that on prime borrowers.

APR of Consumer Credit by Risk Segment

Independent Variables:	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	Dependent Variable = Cycle APR for New Originations						
	All	FICO <620	FICO [620, 680)	FICO [680, 720)	FICO [720, 760)	FICO [760, 800)	FICO ≥800
Stress Test Measures							
Tier 1 Capital GAP	0.0671***	0.3236***	0.1665***	0.0534	-0.0408	-0.0819**	0.4009***
	[0.019]	[0.094]	[0.034]	[0.038]	[0.033]	[0.033]	[0.029]
Ln(1+ Credit Limit)	YES	YES	YES	YES	YES	YES	YES
Consumer, Loan Characteristics	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES
BHC × County FE	YES	YES	YES	YES	YES	YES	YES
Observations	1,681,940	81,850	328,055	265,060	253,675	241,282	356,715
Adj R-squared	0.310	0.283	0.364	0.302	0.323	0.344	0.385
Dependent variable mean	*18.438*	*18.786*	*19.574*	*18.401*	*18.224*	*17.691*	*18.000*

- We find **statistically but not economically meaningful reductions in credit card Cycle APR** associated with a higher Capital GAP.

Rewards & Promotions by Risk Segment

Independent Variables:	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	Dependent Variable = Rewards/Promotions for New Originations						
	All	FICO <620	FICO [620, 680)	FICO [680, 720)	FICO [720, 760)	FICO [760, 800)	FICO ≥800
Stress Test Measures							
Tier 1 Capital GAP	0.0109***	0.0083***	0.0092***	0.0096***	0.0063***	0.0099***	0.0120***
	[0.001]	[0.005]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Consumer, Loan Characteristics	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES
BHC × County FE	YES	YES	YES	YES	YES	YES	YES
Observations	1,681,940	81,850	328,055	265,060	253,675	241,282	356,715
Adj R-squared	0.245	0.133	0.246	0.272	0.254	0.247	0.248
Dependent variable mean	*0.266*	*0.208*	*0.258*	*0.291*	*0.284*	*0.283*	*0.245*

- Changing a firm's Tier 1 Capital GAP from the 10th percentile to the 90th percentile, with all the other characteristics set to their means, the firm would be 10.8 percent more likely to offer rewards or promotions for new origination.

Consumer Spending by Risk Segment

Independent Variables:	Dependent Variable = 24mos Ln[1+Avg Total Spending Volume]						
	All	FICO <620	FICO [620, 680)	FICO [680, 720)	FICO [720, 760)	FICO [760, 800)	FICO ≥800
Stress Test Measures	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Tier 1 Capital GAP	0.0349***	0.0192	-0.0022	-0.0015	0.0375***	0.0656***	0.0725***
	[0.004]	[0.017]	[0.007]	[0.008]	[0.010]	[0.011]	[0.009]
Consumer, Loan Characteristics	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES
BHC × County FE	YES	YES	YES	YES	YES	YES	YES
Observations	1,647,706	80,573	323,546	260,241	248,132	235,083	345,807
Adj R-squared	0.231	0.154	0.180	0.195	0.240	0.255	0.286
Dependent variable mean	*3.883*	*3.834*	*3.939*	*4.082*	*4.008*	*3.880*	*3.598*

- Changing a firm's Tier 1 Capital GAP from the 10th percentile to the 90th percentile, with all the other characteristics set to their means, results in a 2.4 percent stronger spending overall for new issuances, but effects are about 4.5-5.3 percent stronger spending for prime and superprime customers.

Repayment Behavior by Risk Segment

Independent Variables:	Dependent Variable = 24mos Ln(1+Avg Payment)						
	All	FICO <620	FICO [620, 680)	FICO [680, 720)	FICO [720, 760)	FICO [760, 800)	FICO ≥800
Stress Test Measures	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Tier 1 Capital GAP	0.0457***	0.0217	0.0043	0.0064	0.0384***	0.0657***	0.1088***
	[0.004]	[0.017]	[0.007]	[0.008]	[0.009]	[0.010]	[0.009]
Consumer, Loan Characteristics	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES
BHC × County FE	YES	YES	YES	YES	YES	YES	YES
Observations	1,657,785	80,717	324,583	261,513	249,698	236,807	350,003
Adj R-squared	0.211	0.126	0.160	0.166	0.218	0.238	0.282
Dependent variable mean	*4.114*	*3.755*	*3.980*	*4.227*	*4.269*	*4.260*	*4.030*

- The high prime and super prime show the strongest repayment effects of 4.1 and 7.1 percent (compared to the 3% average effect).

Credit Performance by Risk Segment

Independent Variables:	Dependent Variable = 24mos Avg Days Past Due						
	All	FICO <620	FICO [620, 680)	FICO [680, 720)	FICO [720, 760)	FICO [760, 800)	FICO ≥800
Stress Test Measures	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Tier 1 Capital GAP	-0.0897***	0.0956	-0.1443***	-0.0816***	-0.0217	-0.0070	-0.0023
	[0.010]	[0.155]	[0.032]	[0.020]	[0.016]	[0.010]	[0.006]
Observations	1,657,835	80,717	324,597	261,523	249,706	236,812	350,011
Adj R-squared	0.121	0.119	0.073	0.026	0.002	0.010	0.013
Consumer, Loan Characteristics	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES
BHC × County FE	YES	YES	YES	YES	YES	YES	YES
Dependent variable mean	*1.538*	*9.374*	*2.851*	*1.061*	*0.569*	*0.291*	*0.161*

- Changing *Tier 1 Capital GAP* from the 10th percentile to the 90th percentile, with all the other characteristics set to their means, results in a 18.3 percent lower likelihood to become delinquent 24 months since origination.

Robustness

- Alternative measures of key variables
  - Alternative quantity and price proxies
  - Alternative capital exposure measures
- Alternative checks/specifications/samples
  - Segmentation of effects by consumer income instead of FICO
  - Falsification tests
  - Exclude counties with top or bottom 1%-10% limit market share
  - Non-linearity of the relation between credit limit and capital GAP
  - Cluster errors at $\mathtt{BHC} \times \mathtt{yearmonth}$ level
  - Exclude observations of BHCs that failed the previous stress test
  - Include only BHCs that exist in all stress years
  - Exclude one stress test at a time
  - Exclude one BHC at a time
  - Exclude BHCs with different business model
  - Alternative 1% random samples
  - Portfolio-level analysis of credit supply and credit card profitability (BHC-month)

Effects on New Mortgage Originations and Credit Performance

Independent Variables:	[1] Loan Amount/ County Population	[2] Ln(1+Avg Loan Amount)	[3] No New Loans/ County Population	[4] Mortgage Interest Rate	[5] 36mos 60DPD	[6] 36mos Paidoff
Stress Test Measures						
Tier 1 Capital GAP	-3.6711*** [0.156]	0.0310*** [0.002]	-0.0149*** [0.000]	0.0007*** [0.000]	-0.0009** [0.000]	0.0079*** [0.002]
Consumer, Loan Characteristics	YES	YES	YES	YES	YES	YES
BHC Characteristics	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC × County FE	YES	YES	YES	YES	YES	YES
Observations	333,850	333,850	333,850	332,663	181,576	181,576
Adj R-squared	0.580	0.712	0.751	0.302	0.067	0.068

- **Bigger capital shocks are associated with decreased overall mortgage credit**, driven primarily by a reduction in the number of new loans originated and higher mortgage interest rate.

Conclusions

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- More importantly, we also investigate whether stress tests have real effects on consumers.
- We find a positive feedback loop among credit supply, credit usage, and credit performance due to the stress tests.
  - Banks reduce their new supply of risky credit (on both the intensive and extensive margins) and cut their credit card risk exposure subsequent to stress tests.
  - However, these banks offer attractive rewards and promotions to borrowers they decide to lend to.
  - Accordingly, consumers with these banks increase their credit card spending; they also demonstrate stronger debt repayment behavior and better credit performance.

Policy Implications

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- Stress tests are able to steer both banks and consumers toward the intended goal of improved credit risk management.
  - We find new evidence in this paper.
- Banks keep on pushing for more disclosure of Fed models. However, some opacity of regulatory models may be desirable.
  - Stress test “shocks" provide incentives for banks to adjust their portfolios that have led to positive outcomes as we document in the paper. Thus, the unpredictability of the stress tests can actually provide some important benefits.