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Abstract

Using Federal Reserve (Fed) confidential stress test data, we exploit the gap between the Fed and bank capital projections as an exogenous shock to banks and analyze how this shock is transmitted to consumer credit markets. First, we document that banks in the 90th percentile of the capital gap reduce their new supply of risky credit by 13 percent compared with those in the 10th percentile and cut their overall credit card risk exposure on an annual basis. Next, we show that these banks find alternative ways to remain competitive and attract customers by lowering interest rates and offering more rewards and promotions to select groups of borrowers. Finally, we show that consumers at banks with a gap increase their credit card spending and debt payoff and at the same time experience fewer delinquencies. We also show that our results are generalizable to other lending products such as mortgages and home equity. Overall, our results demonstrate a positive feedback loop among credit supply, credit usage, and credit performance due to the stress tests.

Keywords: bank stress tests, credit supply, cost of credit, credit usage, credit performance, credit cards, mortgages, home equity lines of credit

JEL Classification Codes: G21, G28, Z1

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1. Introduction

Watchdog institutions, regulators, and rating agencies routinely grade firms, securities, and even countries. Sometimes it is as simple as pass/fail, but more often it is more complex, in which they assign various shades of passing grades. Businesses and even countries optimize on these grades to produce the highest valuation for their investors, provide the best value for customers, and attempt to promote favorable government policies.[1]

U.S. bank stress testing is an example of a *pass/fail* grading scheme that has far-reaching impacts. The stress tests are intended to ensure that banks have sufficient capital to continue operating and lending even during times of severe economic and financial market stress. In addition to the Federal Reserve (Fed)'s authority to limit bank capital distributions under the stress tests,[2] markets pay serious attention to stress tests. As one piece of evidence from common stock returns, in Appendix Table A.1, we show that banks that "failed" the stress tests experienced significant negative abnormal stock returns following the release of the stress test results. Thus, an important question is how banks respond to such shocks and how the shocks affect consumer credit markets that constitute a large share of economic activity.

This paper studies whether and how U.S. bank stress tests during 2013–2017 affected the supply of consumer credit, consumers' cost of credit, credit usage, and credit performance, exploiting the Fed's confidential stress tests and loan-level consumer credit data. We note a number of difficulties in analyzing the effects of stress tests on consumer credit and households. First, many factors affect borrower and bank behavior at the same time, so it is challenging to disentangle the effect of stress tests on consumer credit outcomes. Second, the existing literature uses stress tests projected capital ratio erosion as a measure of a "shock" to banks. However, the projected capital ratio erosion is partially driven by banks' risk-taking behavior unrelated to the stress tests, which affects both credit supply and consumer credit outcomes, raising endogeneity concerns. Third, stress tests are intended to work through changing bank behavior, such as their risk management strategies in the supply of credit, which must be disentangled from the choices of their customers (i.e., credit demand). Finally, existing data on consumer credit such as that from credit bureaus tend to

[1] For example, oil and coal industries try to make pollution levels lower, countries work to improve their sovereign debt ratings, and banks alter lending practices to comply with regulations.

[2] See, e.g., https://www.federalreserve.gov/newsevents/pressreleases/bcreg20200625c.htm.

comingle consumer spending and debt repayment, and thus, lack the detailed information to separately identify the effects on credit usage and debt management.

To disentangle the effects of stress tests from other confounding effects and to resolve the endogeneity of the relationship between stress tests and consumer credit and other outcomes, we exploit an exogenous variation to banks in the stress tests — the difference between independent capital projections made by the banks and the confidential Federal Reserve projections.[3] We start by noting that banks and the Fed have separate models concerning how much banks' capital will decline under the "severely adverse" scenario prescribed by the Fed, which comprises a stylized set of severe economic shocks to credit markets. Since banks' passage of the stress tests is ultimately determined by the Fed's model results, banks with a higher, more optimistic, capital ratio projection relative to the Fed's may face the risk of not passing the stress test the next year, limiting their ability to make capital distributions or expand lending. Thus, a positive difference between the bank and the Fed capital projections represents a negative *shock* to the banks, and they may act on this gap by reducing the risk exposure of their portfolios.[4] In that regard, we examine banks' supply of credit and consumer credit outcomes in the months subsequent to the revelation of the difference (i.e., the release of the Fed's stress test results).

Besides the capital-ratio information, we use consumer credit data on credit cards and mortgages collected monthly by the Fed on its regulatory FR Y-14M schedule pursuant to the Dodd–Frank Wall Street Reform and Consumer Protection Act.[5] Our data are at the loan level and contain detailed information on the quantity of credit granted by the bank; credit costs such as interest rates on accounts, rewards, and promotions; consumers' credit usage, such as credit card new purchases and repayments; and consumer credit performance, such as delinquencies and bankruptcies. Our data are monthly and span different consumer credit types such as credit cards, mortgages, and home equity lines of credit (HELOCs). The granular loan-level data allow us to control for consumer demand in several ways, including using a rich set of consumer and loan characteristics

[3] Note that the Fed's stress tests apply to bank holding companies (BHCs), but for generality, we use the terms *banks* and *banking organizations* interchangeably henceforth to refer to BHCs. More information about stress tests will be provided in Section 2.

[4] It is important to note the gap may not imply that the bank has failed the stress test or that the Fed has any information that the bank could fail the test the next year.

[5] The data dictionaries on the variables collected are summarized in the following report https://www.federalreserve.gov/apps/reportforms/reporthistory.aspx?sOoYJ+5BzDYnbIw+U9pka3sMtCMopzoV.

in our estimations. In addition, we obtain bank financial data from Y-9C reports to account for varying financial conditions across banks and over time.

The main part of our analysis focuses on credit cards. Credit cards represent the largest consumer market in terms of total users, affecting about 170 million consumers (see Consumer Financial Protection Bureau, 2019). To banks, what distinguishes credit cards from many other retail products is their unsecured nature, which means that lenders could incur significant losses in the case of borrower default and thus should be especially sensitive to their risk exposure.[6] In fact, in recent years, credit card losses have been the single largest loss item in the stress tests.[7] Credit card balances are also always retained on bank balance sheets for capital purposes; even securitized credit card lending is consolidated on balance sheets under generally accepted accounting principles (GAAP) and regulatory accounting.[8] In some supplementary analyses, we study secured credit such as mortgages and HELOCs.

Stress tests involve a forward-looking projection of banks' capital ratios over a nine-quarter capital-planning horizon under the baseline, adverse, and severely adverse scenarios of key macroeconomic factors provided by the Fed. We define our *shock* measure as the difference between banks' own minimum projected capital ratio and the Fed's under the severely adverse scenario, which we label *Capital GAP*. A positive Capital GAP represents a negative shock to the bank; it can constrain future growth opportunities and capital distributions. In each of the years we study, about 80 percent of banks have a positive Capital GAP. Since the banks do not have access to the proprietary models the Fed uses for capital projections,[9] the Capital GAP represents an exogenous and random shock to banks. The Capital GAP in our data shows that, in the cross-section, the gap varies randomly by bank, and in the time series, the gap varies randomly by year for each bank. Moreover, the gap does not converge to zero over time for a bank. The random nature of the Capital GAP allows us to estimate a simple model in which we study the variable of

[6] Harris, Kahn, and Nissim (2018) show that credit card losses account for most of consumer credit losses over their sample period 1996–2015, while Surane (2019) estimates these to be over 80 percent of total consumer credit costs.

[7] From 2017 to 2019, losses on credit cards in the severely adverse scenario of the Fed's stress tests ranged from $100 billion to $113 billion, larger than commercial and industrial loan losses or trading and counterparty losses.

[8] Because of recourse agreements on credit card securitizations, the Financial Accounting Services Board (FASB) ruled that banks must consolidate credit card asset-backed securities (ABS) on balance sheets under generally accepted accounting principles (GAAP). Regulatory Accounting Principles (RAP) follow GAAP on this.

[9] The Fed does not disclose model parameters, and the models can evolve from year to year.

interest as a function of the gap and other controls. Therefore, the underlying thought experiment is this: If a bank has a random shock of a large capital gap, does it then try to reduce the gap by altering the underlying credit risk of its portfolio?

In our first set of analyses, we find that stress-tested banks with a larger Capital GAP subsequently both issue lower credit limits for new credit card originations and reduce the number of new credit card accounts, with the latter being a bigger effect. The combined credit quantity effects are economically significant: If the capital gap increases from the 10th percentile to the 90th percentile, credit quantity declines by about 13 percent. The reduction in cards' credit supply is primarily to non-prime and lower-income consumers. These findings suggest that banks reduce their risk exposure subsequent to receiving a negative shock through stress tests.

We further investigate the timing and persistency of the effects. We find that the credit reduction effects emerge immediately after the stress test results are released and peak in the second quarter after release. The effects become weaker in the third quarter after the release and diminish in the fourth quarter before the next stress test cycle starts, which brings in a new round of effects on banks' credit supply. The timing of the effects, in addition to our exogenous shock measure, supports our causal inference of stress tests on cards' credit supply.

After establishing the credit supply channel as the mechanism through which banks respond to stress tests, we analyze the pricing and other costs of credit on new credit cards. Specifically, we examine credit card interest rates as well as rewards and promotions. We find that, ceteris paribus, banks that encounter a larger stress test shock reduce interest rates on their borrowers with higher-credit scores and higher incomes. They give more cash rewards to lower-credit score or lower-income borrowers, but more miles rewards to borrowers with higher-credit scores and higher income. Note that cash rewards are usually more valuable to consumers with lower-credit score or lower-income, and the opposite is true for miles rewards. These findings suggest that banks experiencing bigger negative shocks move strategically with their pricing to remain competitive while trying to address their capital gaps. In addition, we find that banks that encounter a larger stress test shock offer more interest rate promotions to their lower-credit score and lower-income borrowers, which increases the likelihood they repay their credit card debts, discussed next. Again, these findings are consistent with banks' strategic and competitive motives.

We then turn to post-origination performance of these new credit card accounts issued after each stress test. We find that, controlling for other risk factors, accounts issued by banks with larger stress test shocks performed better, measured mainly by two-year cumulative 60-day delinquencies and average number of days past due. The performance improvements are applicable to both low- and high-credit score borrowers. Finally, we examine credit usage and debt repayment. We find that credit card accounts issued by banks with larger stress test shocks are associated with bigger new purchases and higher utilization rates, ceteris paribus. However, those accounts are also associated with higher-debt repayment. While the effects are all significant among high- and low-credit score borrowers, the new purchase effects are bigger among the higher-credit score group, and the debt repayment effects are bigger among the lower-credit score group. Overall, the credit usage and credit performance results indicate that borrowers who benefit from better pricing in the credit card market use their credit cards more without increasing delinquencies or total debt.

Additional analyses show that banks experiencing larger stress test shocks reduce the number of mortgage loans they originate but issue larger loan amounts and longer loan terms to their prime borrowers, ceteris paribus. They also earn slightly higher interest rates on those less-risky loans. In terms of HELOCs, more highly shocked banks issue more credit lines and provide their prime borrowers with larger credit limits. However, they shorten the draw periods, especially for their non-prime borrowers. They also earn slightly higher interest rates on their prime borrowers. We find no immediate credit performance effect in mortgage or HELOC lending. These findings suggest that banks employ similar risk management strategies in response to stress tests for secured consumer credit — those experiencing larger stress test shocks rebalance their mortgages and home equity lending toward less-risky customers to reduce their risk exposure. Meanwhile, they are able to earn slightly higher yields on those less-risky loans, possibly because of inefficient borrower rate shopping in the mortgage market (see, e.g., Bhutta, Fuster, and Hizmo, 2019).

The results continue to hold following a variety of robustness tests and samples. For example, some bank-level analysis shows that banks experiencing larger stress test shocks reduce their credit card lending as a share of their overall lending or as a share of total assets. This is consistent with those banks' risk reduction motive for credit cards, which are higher risk compared with other types of credit, such as mortgages. Our results are unaffected by excluding any one bank or any one stress test from our sample. We do find heterogeneity of the stress test effects across banks.

For example, the effects are stronger among banks that have higher local presence; the size of the banks matter in terms of their credit quantity versus pricing strategies; and the credit effects are significantly larger among banks that have higher credit card lending growth and lower capitalization. The stress test effects also vary across different neighborhoods (e.g., urban neighborhoods see significantly bigger effects). Our results are also robust to alternative shock measures, even though our current measure produces significantly higher estimates of the effects and sharper identification. Finally, we show some contrasts between new originations and existing credit card accounts. For existing accounts, we find that banks experiencing larger stress test shocks engage in more line increases to their consumers and earn higher interest rates on their higher-credit score borrowers, possibly because of the stickiness of those borrowers. In fact, we show that existing borrowers with older accounts pay higher interest rates, ceteris paribus, which is evidence of borrower stickiness.

Our paper contributes to several strands of literature. First, we add to the burgeoning literature on the effects of stress tests on credit to economic agents described in more detail in Appendix A.1 (e.g., Acharya, Berger, and Roman, 2018; Bassett and Berrospide, 2019; Cortés et al., 2020). It has been over a decade since bank stress tests started in 2009.[10] The growing literature on bank stress tests generally focuses on three main areas: stress tests theory and design,[11] the effects of stress tests disclosure,[12] and the effects of stress tests on small and large businesses.[13] Little is known about the effects of stress tests on consumer banking and households, despite that household spending has vast macroeconomic implications; it accounts for about 70 percent of U.S. Gross

[10] The first stress test, the Supervisory Capital Assessment Program (SCAP), occurred in 2009. After skipping 2010, it evolved into two permanent annual test events: the Comprehensive Capital Analysis and Review (CCAR) from 2011 onward and the Dodd–Frank Act Stress Tests (DFAST) from 2013 onward.

[11] See, e.g., Tarullo (2010); Bernanke (2013); Acharya, Engle, and Pierret (2014); Goldstein and Sapra (2013); Kapinos and Mitnik (2014); and Goldstein and Leitner (2018).

[12] See, e.g., Peristiani, Morgan, and Savino (2010); Glasserman and Tangirala (2015); and Flannery, Hirtle, and Kovner (2017).

[13] See, e.g., Acharya, Berger, and Roman (2018); Connolly (2018); Covas (2018); Bassett and Berrospide (2019); and Cortés, Demyanyk, Li, Loutskina, and Strahan (2020).

Domestic Product (GDP).[14] Paradkar (2019) is the only other paper we know that has looked at the consumer credit effects of stress tests.[15]

We also add to the literature on determinants of consumer credit and behavior. This literature investigates various determinants of consumer behavior changes, such as negative equity and liquidity constraints (e.g., Gross and Souleles, 2002; Elul et al., 2010), interest rate sensitivity (e.g., Alan and Loranth, 2013; Stango and Zinman, 2016), financial literacy (e.g., Brown et al., 2016), foreclosure laws (e.g., Chan et al., 2016); and fintech (e.g., Danisewicz and Elard, 2020). We contribute by showing how stress tests affect consumer credit, spending, and performance post-origination.

Finally, we add to the broader literature on banks and the real economy. This literature includes but is not limited to research about bank deregulation (e.g., Jayaratne and Strahan, 1996; Morgan, Rime, and Strahan, 2004; Rice and Strahan, 2010; Beck, Levine, and Levkov, 2010; Krishnan, Nandy, and Puri, 2014), bank regulations such as Basel Accord capital standards and countercyclical capital buffers (e.g., Allen, 2004; Uluc and Wieladek, 2016; Auer and Ongena, 2019), the Community Reinvestment Act (CRA) of 1977 (e.g., Agarwal et al., 2015), bank bailout programs (Duchin and Sosyura, 2014; Berger and Roman, 2017), bank mergers (Garmaise and Moskowitz, 2006), and shocks to bank deposits (Gilje, Loutskina, and Strahan, 2016; Gilje, 2019), that are found to have real effects on firms and the economy. We add to this research by showing that banks' responses to stress tests can have real effects for consumers.

The remainder of the paper proceeds as follows. Section 2 discusses the institutional background. Section 3 describes the data and our empirical models. Sections 4 and 5 present our main results on new credit cards issuance. Sections 6 provides robustness tests. Sections 7 and 8 provide additional analyses on existing credit card accounts, mortgages, and HELOCs. Section 9 concludes.

[14] See, e.g., https://fred.stlouisfed.org/graph/?g=hh3.

[15] The biggest difference between our papers is that we exploit an exogenous shock to banks by employing the confidential Federal Reserve stress test results compared with banks' stress test results, and then analyze the size of the shock on originations, pricing, credit usage, and performance of newly issued accounts. Paradkar (2019) focuses on *existing* accounts with credit bureaus data. In Section 7, we analyse existing accounts and find results similar to his when analyzing credit supply quantities. However, unlike the credit bureaus, we have access to pricing information, and we find banks increased annual percentage rates (APRs) on these *existing* accounts, suggesting risks were captured in pricing.

2. Institutional Background

Stress tests are a policy instrument that regulators use to promote safety and soundness of the financial system. Under stress tests, large banking institutions have their capital adequacy assessed to ensure they can absorb losses and continue operating and lending to households and businesses during a severe economic downturn. In the U.S., the Fed's stress testing program consists of two primary components: the Dodd–Frank Act Stress Tests (DFAST) and the Comprehensive Capital Analysis and Review (CCAR) Program.

Under DFAST, the Fed uses a set of confidential supervisory models developed by its staff to make forward-looking projections of the banks' potential losses to their loan portfolios and other banking activities, such as securities investment and trading.[16] At the same time, banks use their own models to project potential losses of their own portfolios and investment and trading activities over the same time horizon. Both projections use a set of hypothetical scenarios including a baseline, a severe, and a severely adverse scenario prescribed by the Fed.[17,18] The most critical scenario in terms of the capital ratios is the severely adverse scenario, which is characterized by a severe recession with significant increases in unemployment rates and declines in house prices and equity market prices, among other stresses. The Fed projections use each bank's specific loan portfolio information (i.e., credit cards, mortgages) together with a broad array of consumer and loan characteristics from banks' Y-14M loan-level submissions.

The DFAST model results feed into CCAR, the other component of the stress-testing program. In particular, banks' model results are submitted to the Fed (in the Federal Reserve Y-14A schedule) along with detailed model documentation and capital plans as part of the Fed's *qualitative* review for CCAR. Over the 2013–2017 period of our study, the Fed's model results, together with banks' capital plans, were used in the *quantitative* part of CCAR to determine whether a bank *passes* or

[16] Note that the stress tests only apply to large banking organizations. For example, the first stress test, the Supervisory Capital Assessment Program (SCAP) implemented in 2009 applied to the 19 largest bank holding companies (BHCs) with consolidated assets exceeding $100 billion. CCAR and DFAST started in 2011 and applied to BHCs with consolidated assets exceeding $50 billion and the intermediate holding companies (IHCs) of foreign banks. The 2018 Economic Growth, Regulatory Relief, and Consumer Protection Act (EGRRCPA) provided immediate regulatory relief from DFAST for banks with assets less than $100 billion.

[17] The EGRRCPA removed the *adverse* scenario, reducing the number of DFAST scenarios from three to two.

[18] In the company-run stress tests, banks are required to use additional scenarios (baseline and stress scenarios) developed by the banks themselves to reflect their idiosyncratic risks.

fails the stress test.[19,20] Specifically, the quantitative test compares the minimum projected capital ratios during a nine-quarter capital-planning horizon with a set of predetermined minimum capital ratio requirements.[21] If a bank's minimum projected capital ratio falls short of the minimum requirement, then in the immediate term, the bank is given a one-time opportunity before the public release of CCAR results to revise its capital plan to meet minimum requirements. The following year, the bank may need to raise more capital or reduce its risk exposure, if the bank wants to execute its capital plans on dividend payments and common stock repurchases without Fed restrictions.[22]

Our identification grows out of this dual modeling exercise by the Fed and the CCAR banks, which we explain in Section 3. Meanwhile, a number of other institutional details are important to our study. First, stress tests are conducted annually and banks first submit their DFAST and CCAR results to the Fed in early April, which has been the case since 2016. Then, the Fed releases DFAST and CCAR results three months later in late June.[23] Second, while the Fed obtains details about banks' models, banks only receive high-level summary information and do not have details about the Fed's models. In recent years, for transparency purposes, the Fed has released enhanced disclosure on its stress test models, but the full models of the Fed remain confidential supervisory information. Third, from the quantitative side, the results of the Fed's DFAST models serve as a binding constraint on whether a bank *passes* the stress tests.

[19] Until 2019, the Fed could object to banks' capital plan (banks' *failing* of a stress test) for insufficient capital (quantitative assessment in CCAR), inadequate capital planning practices (qualitative assessment in CCAR), or both. In 2019, the Fed issued a final rule exempting from the qualitative portion banks that participated in CCAR for four past consecutive years and passed the final year's qualitative component without objection, unless they are "large and complex" institutions. There are four IHCs that are still subject to the qualitative objection/non-objection decision for CCAR 2020. In March 2020, the Fed signed a final rule that would replace the quantitative portion of CCAR with stress capital buffer requirements tailored to individual banks so that banks would have to keep year-round capital ratios above the stress buffer requirements to avoid restrictions on capital distributions and compensation.

[20] See the Federal Reserve's Stress Tests and Capital Planning (https://www.federalreserve.gov/supervisionreg/stress-tests-capital-planning.htm) for a general overview of the relationship between DFAST and CCAR.

[21] For example, the minimum requirement on Common Equity Tier 1 (CET1) capital ratio is 4.5 percent.

[22] After the one-time resubmission of its capital plan, if a bank still *fails* the stress test, it cannot take any capital action such as dividend payment and common stock repurchase unless authorized by the Federal Reserve Board.

[23] Pre-2015, banks submitted their CCAR results in early January, and the Fed released the DFAST results in March.

3. Data and Methodology

3.1 Data sources and sample construction

We compile our data from several sources. We acquire loan-level, new-origination data on consumer credit cards from monthly Federal Reserve Y-14M reports. The Y-14M is the schedule for bank holding companies (BHCs) that are required to participate in the CCAR and DFAST stress tests to submit detailed loan-level information on credit cards, first-lien mortgages, and HELOCs. This data set is available from June 2013 and includes a rich set of consumer and loan characteristics, as well as consumers' geographic location down to the zip code, while consumer identity is anonymized. The credit card data set is very large, each individual month having more than 500 million observations. Thus, we adopt two approaches to deal with these big data challenges. We focus on new originations, and in one approach, aggregate origination data at the firm–county–month level comprising the full population. In the second approach, we employ 1 percent random loan-level samples for our various analyses. The 1 percent random samples allow us to segment data using various risk indicators and estimate individual loan performance over a 24-month period following origination. Note that stress-tested banks are dominant players in the credit card market, holding a market share of over 70 percent,[24] which allows us to draw conclusions that are relevant for the market as a whole.

To this loan-level data, we add BHC financial information from the quarterly FR Y-9C reports collected as part of bank supervision. To construct stress test measures discussed next, we combine DFAST and CCAR public release and confidential supervisory participant information contained in the Federal Reserve Y-14A reports on projected capital ratios. We also use data from other sources for additional controls and analyses, such as the U.S. Census Bureau, the Federal Deposit Insurance Corporation (FDIC) Summary of Deposits, and the Federal Financial Institutions Examination Council (FFIEC) Census Demographic Data.

Our main data set covers the period June 2013–December 2017. From the original credit card data, we omit non-consumer cards and consumer charge cards, for which the balance is paid in full in each billing cycle, having different business models from consumer credit cards. We also omit

[24] This is based on market-share assessments of these banks in Y-14M compared with the Federal Reserve Bank of New York (FRBNY) Consumer Credit Panel (CCP)/Equifax, which has information on the total credit card market.

purchased-impaired loans that have different accounting treatment. Next, we remove any loan-level observations that have missing or incomplete information on basic loan and consumer characteristics such as credit limit, account balance, credit score, consumer income, purchase APR, or for which we do not have the consumer county of residence. To remove observations with incorrect credit scores, we restrict consumer credit scores to be between 300 and 900. We adjust BHC financial variables to be in real 2017Q4 terms using the GDP price deflator. These screens leave us with a final aggregated firm–month–county regression sample of 1,335,178 observations for 16 BHCs, 3,142 U.S. counties, and 55 months covering the full population over the entire sample period. The final 1 percent random regression sample has 1,686,990 loan-level observations for 16 BHCs, 2,992 counties, and 55 months over the entire sample period of June 2013–December 2017.

Table 1 provides variable definitions, mean, median, standard deviation, and 25th and 75th percentiles across our sample for the variables used in our analyses. Panel A reports characteristics for our firm–county–month sample, while Panel B reports characteristics for our loan-level sample. Looking at Panel A, in terms of consumer and loan characteristics, the consumers in our sample are generally of high quality, having an average consumer credit score of 731.5.[25] The mean and median borrower annual income at origination in logarithmic form (actual) are 11.0 ($96,490) and 11.1 ($66,929), respectively. The average utilization rate is 9.7 percent. On average, about 4.2 percent of the consumers have joint accounts and about 20.6 percent have a prior banking relationship with the lender, while 89.4 percent of the credit card accounts have variable interest rates.[26]

The sample covers a set of very large BHCs (all CCAR banks with material credit card portfolios), with a mean bank size of $1,166.9 billion (average log of bank size is 20.4). Other financial characteristics are consistent with other studies exploring large BHCs. The mean *Capital Adequacy* is 11.8 percent, which indicates that the average BHC is far from default, the mean nonperforming loans ratio (Asset Quality) is 2.1 percent, the mean return on equity (Earnings) is 10.5 percent, and

[25] The vast majority (over 80 percent) of the credit card accounts in Y-14M over our sample period have FICO, but a small number have other types of credit scores.

[26] Most credit card accounts have their APR indexed to prime rate, so they are variable-rate accounts. Historically, prior to the Credit Card Accountability Responsibility and Disclosure (Credit CARD) Act of 2009, there were more fixed-rate accounts.

the mean liquidity ratio is 8.6 percent. The BHCs in our sample have an average share of consumer loans of 26.8 percent, an average share of residential real estate loans of 24.1 percent, and an average share of trading assets of 6.3 percent. The summary statistics in Panel B for our 1 percent loan-level sample are generally similar to those for our firm–county–month sample.

3.2 Measures of stress tests shocks

We construct measures of shocks induced by stress tests using the different model results produced by the Fed and each bank. Leveraging the supervisory data we have on banks' model results, we calculate *Capital GAP* as the difference between the minimum nine-quarter capital ratio projected in the BHC's own internally developed stress test model (from the Y-14A Schedule) and the minimum nine-quarter capital ratio projected by the Fed's supervisory stress test model (publicly disclosed), both using the Fed's DFAST severely adverse scenario. The gap can only be constructed starting in 2013 when banks were required to release their own capital projections and is given by equation (1) below and illustrated in Figure 1 Panel A:

$$Capital\ GAP = min\left[\left(Capital\ Ratio_{BHC}\right)_{Q_1,\ldots,Q_9}\right] - min\left[\left(Capital\ Ratio_{FR}\right)_{Q_1,\ldots,Q_9}\right] \quad (1)$$

Given that BHCs' passage of stress test is determined by the Fed's model results, a positive *Capital GAP* (i.e., a lower capital ratio projection made by the Fed relative to that by BHCs) puts regulatory pressure on the BHCs. For example, banks with a too-optimistic projection relative to the Fed's can face the risk of not passing the stress test the following year, limiting their ability to make dividend distributions and/or common stock share repurchases if they do not reduce their risk exposure in the 12 months after the Fed model results are revealed.[27] Therefore, a positive *Capital GAP* represents a negative *shock* to the BHC. The larger the gap, the bigger a shock it is to the BHC.

As a comparison, what has been used in the literature as an instrument is the projected capital ratio erosion over the capital-planning horizon, which is the stress test starting capital ratio minus the projected minimum nine-quarter capital ratio. We think the issue with this measure is that it is endogenous — banks with a strong risk appetite are most likely to have a bigger projected capital

[27] Between two stress test cycles, the Fed and banks conduct *off-cycle* runs of the stress test model as a portfolio monitoring exercise. The bank results are submitted to the Fed, but the Fed's off-cycle run results are not disclosed.

ratio erosion. In contrast, our shock measure is likely exogenous because banks do not know the exact size of the $Capital\ Ratio_{FR}$ ahead of time. In addition, the Fed's models are evolving year over year to include new salient risks or to improve upon the existing models, making the Fed's model results unpredictable. In fact, Schneider, Strahan, and Yang (2020) find no evidence that banks could reverse-engineer the Fed's models. Finally, the Fed's model is an overall banking industry model, and thus, the Fed's model results for specific firms are not likely to be correlated with idiosyncratic practices of a particular BHC. We use two different capital measures in all our main analyses, *Tier 1 Capital GAP* and *Total Capital GAP*. Table 1 reports summary statistics. The two capital gap measures average between 0.796 and 0.869 percentage points (medians of 0.760 and 0.726, respectively). These numbers capture how much of a gap exists between the BHC's and the Fed's capital projections for a typical bank. They are economically significant, as they are approximately 72 percent or 82 percent in magnitude, respectively, of the one-standard-deviation change in the corresponding capital ratio. Capital GAPs vary considerably across banks as well, having a standard deviation of 1.053 to 1.058 percentage points, depending on the capital ratio.

Panels B and C of Figure 1 plot the cross-sectional distribution of the two Capital GAPs from 2013 to 2017 in box plots. In each of the years, we find that about 80 percent of banks had their Capital GAP as positive, meaning bank projections are more optimistic than the Fed's. These figures show that there is substantial variation in the cross-section. Meanwhile, there is also some time series variation. Overall, there does not appear to be a trend in either the level or variation of the gaps across BHCs. We also make scatterplots of the Capital GAP for each year and find the gaps to be evenly distributed (i.e., no clustering). Further analyses of the time series for each bank show no serial correlation or time trend. In addition, we group banks by S&P bond credit rating and by size and find no clear pattern in terms of their Capital GAP. Finally, we test if the market is able to predict the Capital GAP by correlating the cumulative abnormal return (CAR) of bank stocks around the release date of stress test results and our Capital GAP and find no meaningful correlation.[28] All these analyses indicate the randomness of the Capital GAP.

Figure 2 plots a U.S. county heat map with the correlations of our first measure of stress test shocks, *Tier1 Capital GAP*, with our main credit quantity proxy, sum of all credit card credit limits divided

[28] To preserve confidentiality of the data, we do not show these results in the paper. They are available upon request under a confidentiality agreement.

by county population (*Credit Limit/County Population*). We observe for most counties negative correlations over our sample period, suggesting that higher BHC Capital GAPs tend to be associated with lower credit supply. This is suggestive initial evidence, indicating that capital constraints from stress tests may induce BHCs to reduce credit card risk exposure by reducing credit quantities to consumers. While this is suggestive, it will be more formally tested using multivariate regression analysis in the next section.

3.3 Regression framework

To examine the relationship between stress tests and consumer credit supply, we estimate the following regression model based on the full population of Y-14M credit card loans aggregated at the bank–county–month level:

$$\begin{aligned} Y_{c,b,t} = {} & \beta_0 + \beta_1 BHC\ Capital\ GAP_{b,t-k} + \beta_2 Consumer\ \&\ Loan\ Characteristics_{c,t} + \\ & \beta_3 BHC\ Characteristics_{b,t-1} + \beta_4 BHC\ FE_b + \\ & \beta_5 County \times Month\ FE_{c,t} + \varepsilon_{c,b,t}, \end{aligned} \tag{2}$$

where *c* indexes the county, *b* indexes the bank, and *t* indexes the month–year. $Y_{c,b,t}$ refers to credit indicators, such as quantity or price, based on the Y-14M data set, such as *Credit Limit/County Population* and *CC Cycle APR* (APR during a specific month). $BHC\ Capital\ GAP_{b,t-k}$ is the BHC's *Capital GAP* (*Tier 1 Capital GAP* or *Total Capital GAP*) in the last stress test, where *k* ranges between 1 and a maximum of 12 months before the current reporting month.[29] Negative coefficients on the *Capital GAP* terms would show reductions in credit resulting from stress tests, and vice versa for positive coefficients.

To mitigate the potential for credit demand driving our results, we include a strong set of consumer and loan characteristics at the consumer county-level measured at the time of the credit card issuance, $Consumer\ \&\ Loan\ Characteristics_{c,t}$. These variables include consumer credit score, log of consumer annual income, consumer utilization rate, percent of consumers with joint accounts, percent of consumers with relationship lending, and percent of variable interest rate accounts. To account for demand factors in the local markets over time, we include high granularity *County* ×

[29] An exception is the 2016 stress test year, when the disclosure month changed from March in 2015 to June in 2016, lengthening the in-between period for these two tests by three additional months for 2016.

Month fixed effects, which help capture local economic conditions ultimately affecting consumer credit demand. This allows us to compare banks operating in similar markets and serving similar borrowers but facing different stress test shocks. To account for supply factors affecting BHC credit decisions other than the Capital GAPs, we include a number of BHC characteristics, *BHC Characteristics*$_{b,t-1}$. These are capital adequacy, share of nonperforming loans, earnings proxied by return on equity, BHC size proxied by the log of total assets, the share of consumer loans, the share of residential real estate loans, and the share of trading assets. All BHC characteristics are lagged one quarter to avoid reverse causality concerns. We also include BHC fixed effects to account for other BHC-level unobservable factors; $\varepsilon_{c,b,t}$ is an error term. Finally, heteroskedasticity-robust standard errors are clustered at the county level.

Similarly, we estimate a loan-level model for a 1 percent random sample of new credit card originations, which is similar to the first model except that the credit information here is at the loan level (rather than aggregated at the county level); all consumer and loan characteristics are also at the loan level. In addition, as before, we include the same set of bank and county characteristics as in the first model:

$$\begin{aligned} Y_{i,j,c,b,t} = \; & \varphi_0 + \varphi_1 BHC\ Capital\ GAP_{b,t-k} + \\ & \varphi_2 Consumer\ Characteristics_{j,c,t} + \varphi_3 Loan\ Characteristics_{i,c,t} \\ & \varphi_4 BHC\ Characteristics_{b,t-1} + \varphi_5 BHC\ FE_b + \\ & \varphi_6 County \times Month\ FE_{c,t} + \eta_{i,j,c,b,t}, \end{aligned} \tag{3}$$

where *i* indexes the loan, *j* indexes the consumer, *c* indexes the county, *b* indexes the bank, and *t* indexes the month–year.[30]

4. Credit Effects

4.1 Quantities of credit supply

It is unclear *ex ante* whether bank stress tests would improve or worsen credit conditions for consumers. On the one hand, banks with higher capital shocks may restrict consumer credit supply at the extensive margin (quantities) particularly to riskier customers to reduce risk-weighted assets,

[30] Results are robust to an alternative specification in which we use *Zip Code-Month* fixed effects instead of *County-Month* fixed effects.

the denominator of the risk-based capital ratios, or because of higher charter value incentives induced by the higher capital ratios. Alternatively, stress-tested banks with higher capital shocks may increase credit supply at the extensive margin, particularly for riskier borrowers who pay more to offset the reduction in leverage risk from higher capital ratio requirements or engage in reaching-for-yield behavior to boost their earnings. We test these opposing views empirically overall and by risk segments to understand which one has the most empirical support.

Table 2 Panel A presents the main results for the effects of stress tests on credit card quantities using equation (2). We report results from regressing *Credit Limit / County Population* (our main credit quantity proxy) on our two stress tests shock measures, *Tier 1 Capital GAP* and *Total Capital GAP,* and different sets of controls. Models 1–2 control only for BHC fixed effects and *County* × *Month* fixed effects at the time of credit card issuance. Models 3–4 additionally control for consumer and loan characteristics. Models 5–6, our main specification, additionally control for one quarter lagged BHC characteristics.

Throughout all specifications in Table 2, the coefficients on the Capital GAP terms (shown in the shaded area), are negative and statistically significant in all six cases. Controlling for a very strong set of controls, including high granularity *County* × *Month* fixed effects, bigger *Capital GAPs* are associated with smaller per capita new issuance credit cards limits. This suggests that banks that receive a bigger shock from the stress tests may be managing credit card risk more carefully by reducing their credit card risk exposures to comply with the stress tests.

The reductions in credit limits are also economically significant. Using the full set of control variables, the coefficient on *Tier 1 Capital GAP* of -0.2017 in Model 5 suggests that 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 substantial reduction in the credit limit of 13.21 percent (from 4.605 to 3.997).

We also test non-linearity in the relation between credit supply and the stress test shock. In that regard, we run similar regressions but with fifth-order polynomial terms of the Capital GAP as explanatory variables. In Appendix Figure A.1, we plot the relation between new issuance credit limit and the *Tier 1 Capital GAP*. We see clear non-linearity — the relation becomes concave when the gap becomes larger, suggesting that the response from banks with particularly large shocks is

stronger.[31] It is worth pointing out that when the Capital GAP is negative, meaning that when banks find their own estimates to be more conservative, they tend to supply more credit, which is consistent with the intuition that there is room for banks to take additional risk in that case. However, we see the sensitivity is smaller in those negative gap cases than in the positive gap cases, judging by the slopes of the curve.[32]

Turning to the control variables, we find consistent signs with expectations and prior research. Starting with consumer and loan controls, we find that across all models in Table 2, borrowers and accounts that are less risky (higher credit score, higher income, lower utilization rate, joint accounts, fixed rate accounts, relationship consumers) are associated with higher credit limits. For BHC controls, we see that BHCs with more economies of scale and better ability to lend (higher capital ratios, lower share of non-performing loans, higher earnings, higher liquidity ratio, larger size) provide their borrowers with larger credit limits. In addition, BHCs with higher shares of consumer and residential real estate loans, and thus more of their lending specialized in consumers, also tend to provide higher credit card limits. Finally, BHCs with higher shares of trading assets are associated with lower credit limits, likely to offset their higher risks from trading activities.

In Table 2 Panel B, we decompose the credit supply quantities into average credit limit per account and number of new accounts. Specifically, Models 1–2 show results using *Log(1+ Total Credit Limit)* as the dependent variable, while Models 3–6 show results using *Log(1+ AvgCredit Limit)* and *Log(1+ No. New Accounts)* as the dependent variable, respectively. Across all models, the coefficients on the Capital GAP terms (shown in the shaded area) continue to be negative and statistically significant in all cases. Results confirm that higher capital shocks from the stress tests are associated with decreases in consumer credit limits for newly originated credit card accounts. Moreover, the results in Models 3–6 indicate that the decreases appear to be driven by both lower average credit limits as well as lower number of new accounts issued by the lenders, with the latter being a bigger effect.

[31] We also run quantile regressions and find the coefficient of the upper quartile to be bigger than that of the lower quartile. For brevity, those results are available upon request.

[32] We also run a regression to separate the effects for those that had positive gaps versus those that had negative gaps. The results are consistent with what we see in Appendix Figure A.1. For brevity, those results are available upon request.

4.2 Credit supply quantities by risk segments on loan-level data

In Table 3 Panel A Models 1–2, we rerun our main quantity analysis using our 1 percent random sample instead of the aggregated firm–county–month sample above and using *Log(1+ Credit Limit)* for new originations as the dependent variable following equation (3) above. The coefficients on the capital shock variables are negative and statistically significant, indicating consistency with our main previous results. Then, for the rest of Panels A and B, we tackle the relative effects of stress tests on loans to riskier versus less risky consumers. We reestimate the main regressions for *Log(1+ Credit Limit)* for subsamples of riskier and less-risky consumers partitioned based on six different *Consumer Credit Score* groups, ranging from less than 620 to 800+ in Panel A Models 3–14, and for subsamples of riskier and less-risky consumers partitioned based on *Consumer Income* quintile groups in Panel B Models 1-10.

Starting with the credit score in Panel A, we find that the credit limit decreases are statistically significant for riskier borrowers, the largest decline being in the credit score group <620 (subprime) followed by a smaller decline in the credit score group between 620 and 680. Effects are either insignificant or very small for other risk groups, and notably, the credit score 800+ group registers increases rather than decreases in credit limits. Results in Panel B by income quintiles suggest that credit limit decreases are larger in magnitude for the bottom quintiles (Quintile1–Quintile3), becoming insignificant or very small for the top upper quintile.

Both sets of results are consistent with the notion that BHCs manage their risk more for the riskier segments. Thus, banks may be restricting consumer credit supply at the extensive margin (quantities) to riskier customers to reduce risk-weighted assets, the denominator of the risk-based capital ratios (a mechanical effect). In addition, the reduction in credit can also occur because of charter-value-induced incentives. Stress-tested banks may reduce credit risk by constricting credit supply, particularly to the riskier customers, to protect their high charter values (e.g., Keeley, 1990).

4.3 Credit card pricing

Besides changing credit limits to reduce their credit card risk exposure, BHCs with capital shocks could also alter other credit terms for credit cards, particularly pricing, rewards, and promotions.

Stress-tested banks may constrict credit supply at the intensive margin (prices) as well to further manage risk by charging customers more or offering fewer rewards/promotions to earn more on loans that pay back to cover losses on defaulted loans. In contrast, banks may be concerned with maintaining their competitive stance in the consumer market to earn more profits while complying with the stress tests. Thus, banks may try to attract less-risky consumers or induce credit card usage by improving credit at the intensive margin (i.e., pricing, rewards, and promotions). Lenders often use prices and other terms as a marketing device to attract new customers. We examine the effects of stress tests on credit card pricing and then on rewards and promotions. Table 4 presents the results for credit card pricing. Panel A presents the main results for the effects of the bank stress tests on credit card pricing (*CC Cycle APR)* for new originations, while also controlling for quantities (*Log (1+ Credit Limit))* as an important control, which could affect prices. We report results using the aggregated county–firm–month sample in Models 1–2 and the 1 percent random sample in Models 3–4. Controlling for a strong set of controls, including high granularity *County × Month* fixed effects to reduce the potential that credit demand drives our findings, the results in all models show statistically significant reductions in credit card APRs, consistent with BHCs offsetting the declines in credit limits with better terms on prices as a strategic effort to remain competitive in the market.

The reductions in APR are also economically significant. Using the aggregated sample in Model 1, the coefficient on *Tier 1 Capital GAP* of -0.3577 in Model 5 suggests that 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 decline in APR for new originations of almost a full percentage point (from 17.953 percent to 16.959 percent). The other columns in Table 4 Panel A are comparable and demonstrate robustness.

Next, in Panels B and C, we reestimate the results for *CC Cycle APR* for subsamples of riskier and less-risky consumers partitioned based on six different Consumer Credit Score groups, ranging from less than 620 to 800+ in Panel B Models 1–12, and for subsamples of riskier and less-risky consumers partitioned based on Consumer Income quintile groups in Panel C Models 1–10. Results show that APR decreases are not statistically significant for the subprime consumers (credit score <620) or the lowest-income quintile group, our riskiest groups, and decreases in APR tend to be larger for higher-credit score and higher-income borrowers, indicating that BHCs do take

into consideration risk in their pricing strategy. One exception is the credit score 800+ group for which prices increase, but this may be driven because this very safe group is not price sensitive.

Overall, results suggest that, everything else equal, banks with larger shocks find alternative ways other than managing quantities to remain competitive and attract lower-risk and higher-income customers to use credit. One important way is to reduce interest rates for less-risky borrowers with more borrowing capacity.

4.4 Credit card rewards and promotions

While credit limits and APRs are important features for consumers, other ways that BHCs may attract consumers is to offer credit card rewards and promotions. These are common marketing devices that have the ability to accelerate credit card usage for new customers so they can accumulate the rewards or take advantage of the promotions that credit cards offer. Our data allow us to study how BHCs with capital shocks affect credit supply via two important credit card reward programs (cash back and airline miles), as well as card promotions. These features can help BHCs remain competitive and attract customers and/or induce credit card usage while complying with the stress tests.

Table 5 presents the results for total rewards and promotions, cash-back rewards, miles rewards, and credit card promotions. Panel A presents the main results for the effects of bank stress tests on these for new originations. We report results using the aggregated county–firm–month sample in Panel A1 and the 1 percent random sample in Panel A2. The results in both panels show statistically significant increases in credit card cash-back and miles rewards, as well as promotions for new originations in almost all cases, consistent with BHCs enticing consumers with these other credit terms to attract new credit usage and remain competitive in the market.

The increases in rewards and promotions are also economically significant. Using the aggregated sample in Panel A1 and Model 1 for *% Rewards/Promotions*, the coefficient on *Tier 1 Capital GAP* of 0.021 suggests that changing *Tier 1 Capital GAP* from the 10th percentile to the 90th percentile, with all the other characteristics set to their means, results in an increase in the percent of rewards/promotion accounts for new originations by 16.5 percent (from 35.347 percent to 41.191 percent).

Similarly, focusing on individual components of rewards and promotions, we find economically significant results. Looking at Model 3 for *% Rewards: Cash Back*, the coefficient on *Tier 1 Capital GAP* of 0.006 suggests that changing *Tier 1 Capital GAP* from the 10th percentile to the 90th percentile, with all the other characteristics set to their means, results in an increase in the percent of cash rewards accounts for new originations by 10.1 percent (from 15.826 percent to 17.420 percent). In Panel A1 Model 5, the coefficient on Tier 1 Capital GAP of -0.005 in Panel A1 for *% Rewards: Miles* suggests that changing *Tier 1 Capital GAP* from the 10th percentile to the 90th percentile, with all the other characteristics set to their means, results in an increase in the percent of miles rewards accounts for new originations by 35.8 percent (from 4.144 percent to 5.629 percent). Finally, in Model 7 for *% Promotion*, the coefficient on *Tier 1 Capital GAP* of 0.0099 in Model 5 suggests that changing *Tier 1 Capital GAP* from the 10th percentile to the 90th percentile, with all the other characteristics set to their means, results in an increase in the percent of promotion accounts for new originations of 18.0 percent (from 15.376 percent to 18.141 percent). The other columns of Panel A1 for cash-back rewards, miles rewards, and promotions are comparable and demonstrate robustness.

Next, in Panels B and C, we reestimate the results for rewards and promotions for subsamples of riskier and less-risky consumers partitioned based on the six different Consumer Credit Score groups, ranging from less than 620 to 800+ from before in Panel B Models 1-12, and for subsamples of riskier and less-risky consumers partitioned based on Consumer Income quintile groups in Panel C Models 1–10. While rewards and promotions tend to apply to a wide variety of both risky and safe consumers, cash-back rewards tend to apply to all other than very safe customers (credit score 800+ and highest income quintile), and the magnitudes are generally larger among lower-credit score and lower-income groups. In contrast, miles rewards tend to be more frequent among lower-risk customers (higher credit score and higher income). Interestingly, promotions are more common again among riskier customers, generally non-prime (credit score <720) and lower-income groups and less common among the other customers. Promotions to riskier customers may provide a better chance for them to repay their debt, in addition to encouraging them to use their credit cards.

Similar to pricing, these results suggest that stress-tested banks with larger capital shocks find alternative ways to remain competitive by using more rewards and promotions to entice consumers and stir credit usage, supporting the banks' strategic and competition motives.

4.5 Persistence of stress test effects

We examine whether there is persistence of the stress test effects on credit card supply quantities and credit pricing, promotions and rewards for new card originations. We do so by conducting regression analyses as previously stated but including a series of dummy variables in the regressions to trace the effects of each individual quarter after the results are disclosed. Specifically, we replace the Capital GAP terms with interactions of the Capital GAP measures with dummies for each of the quarters since the Fed's stress test results disclosure. In these tests, we exclude month 12 to avoid the confounding effect from next year's stress test results release.[33] We plot the interaction coefficient estimates as well as their confidence intervals in Figure 3. We have six panels in the figure for credit limit, APR, rewards and promotions, cash rewards, miles rewards, and promotions, respectively.

The results are consistent with our main findings that stress-tested banks with higher-capital shocks reduce credit risk exposure after the stress tests disclosure as indicated by negative and statistically significant coefficients in all quarters since the tests' disclosure. More interesting, there are differences in intensity over different periods. Specifically, the credit supply begins to decline in the first quarter immediately after disclosure and become most pronounced in the second quarter where the highest portfolio adjustments occur. After which, the credit decline weakens in the third quarter and diminishes in intensity in the last quarter as BHCs again slow their adjustments before another stress test cycle starts.

We see the exact same pattern in cash rewards. The effect is the most pronounced in the second quarter after the stress tests results' release. It then becomes smaller in the third and fourth quarter. Promotions and miles rewards show similar patterns. However, the effects on APR are not peaking in the second quarter, and they drop in the fourth quarter. This would be expected for at least two

[33] For the 2015 stress test, we exclude months 13, 14, and 15, which appear in the year following the 2015 stress test because of changes in the results disclosure month from March to June from the 2015 stress test to the 2016 stress test lengthening the in-between period for these two tests.

reasons. First, lower pricing, along with promotions and miles rewards, is likely to increase credit risk and adversely impact the Capital GAP. Second, if the bank can mitigate the effect of lower-credit lines with rewards, then why lower the APR and negatively impact the profitability of the portfolio.

4.6 Cross-sectional evidence — splits by BHC characteristics

Table 6 Panels A–D show cross-sectional evidence for the main results when splitting the data by several BHC characteristics: 1) local lender presence (whether the BHC has a local branch in the consumer county based on the Summary of Deposits (SOD) data), which may denote special knowledge about the local market and enables the lender to make more informed credit decisions; 2) BHC credit card loan growth (large versus small credit card loan growth using the upper and bottom halves based on Y-9C data); 3) BHC size (top 5 BHCs in terms of total assets versus other smaller BHCs based on Y-9C data); and 4) BHC capitalization (high versus low capital ratio using the upper and bottom halves based on Y-9C data).

Results hold in various subsamples, but credit quantity declines are more pronounced for local lenders that are more cognizant of local risks, banks with higher credit card loan growth, and banks with lower capitalization ratio. Prices decline more for local lenders, banks with higher capitalization, banks with higher card loan growth, and smaller banks, the last two of which have a higher desire to expand their market share. Offering rewards and promotions is more pronounced among non-local lenders, banks with lower-card loan growth, larger lenders, and lower capital banks. These categories appear to strategically try to attract new business and/or certain groups of customers.

4.7 Cross-sectional evidence — splits by neighborhood characteristics

Table 7 Panels A–E show cross-sectional evidence for the main results when splitting the data by several local market/neighborhood characteristics, all based on the FFIEC HMDA/CRA local market demographics data: 1) urban versus rural consumer local market; 2) high versus low percent of minorities in the county (using the upper and bottom halves); 3) high versus low income (based on whether the ratio of the tract family income/MSA income is greater or less than one); 4)

HMDA/CRA low-income local market binary indicator; and 5) high versus low unemployment rate.

Results again hold in various subsamples, but credit quantity declines are more pronounced for urban local markets, low-income markets, and high unemployment markets, while effects on high-minority neighborhoods are roughly similar to those on low-minority neighborhoods, suggesting no concerns of consumer discrimination. Prices decline more in low-minority and high-income areas, consistent with increased risk management and safety, while urban and rural areas and high- and low-unemployment areas yield roughly comparable declines. Offerings of rewards and promotions are more common in urban areas, slightly higher in low-income areas, but about the same in high versus low minority and high versus low unemployment areas.

5. Real Effects

5.1 Real effects: credit usage and debt payoff

The changes in credit conditions are likely to impact real economic conditions for consumers, leading to better or worse economic conditions, and with potentially different effects for risky versus less-risky customers. Less credit, particularly to riskier consumers, may protect these consumers from negative outcomes (e.g., excessive spending and debt, delinquency and bankruptcy) if they do not get credit they cannot pay back. Alternatively, more credit to riskier consumers can increase these consumers' propensity for negative outcomes, which can take the form of higher-debt burdens and a higher likelihood of delinquency and bankruptcy. We next test these hypotheses empirically overall and by risk segments.

Table 8 provides evidence on consumer credit usage and debt. We analyze several credit usage indicators. We first include *Log(1+Sum Purchase Volume)*, the natural log of one plus the total consumer purchase volume over 24 months since origination. Second, we use *Log(1+Avg Purchase Volume)*, the natural log of one plus the average consumer purchase volume over 24 months since origination. Third, we use *24mos Avg Util Rate*, the average utilization rate over 24 months since origination. Fourth, we include *Log(1+Avg Cycle Balance)* and *Log(1+Avg Daily Balance)*, the average consumer cycle and daily unpaid principal balance, respectively, over 24 months since origination. Finally, we look at how indebted the consumer is after origination, by

including *Log(1+Sum Total Debt)*, the natural log of one plus the total consumer debt over 24 months since origination, where total debt is balance plus payments minus new purchases.

Panel A reports results for the full sample. Across all columns 1–10 in Panel A, we find evidence of an increase in credit usage measured in several different ways, while columns 11–12 suggest that, despite increased credit usage, consumers have less overall total debt. Results are statistically and economically significant.

For brevity, we discuss the economic significance on *Log(1+Sum Purchase Volume)* and *Log(1+Sum Total Debt)* in Models 1 and 11. Looking at Model 1 for total consumer purchase volume, the coefficient on *Tier 1 Capital GAP* of 0.096 in Panel A1 for *Log(1+Sum Purchase Volume)* suggests that changing *Tier 1 Capital GAP* from the 10th percentile to the 90th percentile, with all the other characteristics set to their means, results in an increase in credit card use by 4.5 percent (from 5.988 to 6.256). Finally, in Model 11 for total consumer debt, the coefficient on *Tier 1 Capital GAP* of -0.142 in Panel A1 for *Log(1+Sum Total Debt)* suggests that 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 decrease in debt by 5.2 percent (from 7.561 to 7.166). The other columns in Panel A are comparable and demonstrate robustness.

Panels B and C reestimate the consumer credit usage and debt results for subsamples of riskier and less-risky consumers partitioned by credit score broad categories (non-prime: credit score <680 and prime: credit score ≥680). The evidence suggests that credit usage increased for both non-prime and prime customers and so did debt repayment. However, the credit usage increased more for less-risky or prime consumers, while total debt decreased more for non-prime consumers. Results suggest that stress tests may have induced credit usage without increasing consumer indebtedness.

5.2 Real effects: credit performance

Table 9 provides evidence on consumer delinquency, bankruptcy, and credit score declines. First, we include *24mos 60 Days Past Due (DPD)*, a dummy equal to one if a credit card account was 60 or more days past due or in severe delinquency within 24 months since origination, and zero otherwise. Second, we use *24mos Avg Days Past Due*, the average of days past due for the credit

card account within 24 months of the loan's life. Third, we use *24mos Bankruptcy*, a dummy equal to one if the credit card consumer was ever in bankruptcy within 24 months since the loan was originated, and zero otherwise. Finally, we use *24mos Credit Score Decline*, a dummy equal to one if the consumer's credit score ever declined below the origination credit score over 24 months since origination, and zero otherwise. Panel A reports results for consumer performance for the full sample. The evidence shows that loans originated by BHCs with high capital shocks are less likely to become delinquent, have a smaller number of days past due, and are less likely to have their credit score decline. Effects on bankruptcy are not statistically significant.

Results are statistically and economically significant. For brevity, we discuss the economic significance on *24mos 60DPD*, likely the most common indicator for consumer delinquency. Looking at Model 1, the coefficient on *Tier 1 Capital GAP* of -0.0024 in Panel A1 for *24mos 60DPD* suggests that 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 decrease in delinquency by 12.3 percent (from 5.462 percent to 4.789 percent). The other columns in Panel A are comparable and demonstrate robustness.

Panels B and C reestimates the consumer performance results for subsamples of consumers partitioned by credit score broad categories (non-prime: credit score <680 and prime: credit score ≥680). The evidence suggests better consumer performance (fewer delinquencies and fewer credit score declines) is applicable to both non-prime and prime customers. There is no impact on consumer bankruptcy.

6. Robustness Tests and Additional Analyses

In addition to the previously mentioned tests, in Appendix Tables A.3–A.6 and Appendix Figure A.2, we present the following robustness checks, all of which produce similar results to what we have discussed.

First, as shown in in Table A.3, we rerun our regressions using alternative dependent variables for credit quantities and alternative measures for pricing *in lieu of* those used in our main analyses. Thus, in Panel A, the dependent variables are *Cash Advance Limit/County Population*, credit card cash-advance limit at the firm-county level divided by the county population for new originations;

Log (1+ Total Cash Advance Limit), the natural logarithm of the credit card cash-advance limit at the firm-county level for new originations; *Credit Limit/BHC Total Loans*, the credit card limit at the firm-county level for new originations divided by the BHC total loans; and *Δ CC Credit Limit*, the annual change in credit card limit for new originations at the firm-county level. In Panel B, the dependent variables are *CC Cycle APR (weighted)*, APR weighted by credit limit used for the cycle for consumer retail purchases for new originations; *CC Cash APR*, APR used for the cycle for cash advances for new originations; *CC Max APR*, the maximum or default APR (rate cap) allowed to be used for the cycle for both retail purchases and cash advances; *CC Interest Rate Margin*, the purchase APR margin reflecting the number of percentage points that credit card lenders add to the prime rate (or other index) to calculate the variable interest rate. Across all these different measures, we continue to find statistically and economically significant effects of the capital shocks on consumer credit supply similar to our main findings.

Second, in Table A.4, we run results using alternative capital exposure variables, based on public data employed in prior bank stress tests research (e.g., Paradkar, 2019; Cortés et al., 2020), instead of our capital shocks that are based on confidential supervisory data. In these tests, the key explanatory variables are *Tier 1 Capital Exposure* and *Total Capital Exposure*, which represent the difference between the publicly disclosed BHC's initial capital ratio and the lowest capital ratio projected by the Fed under the severely adverse scenario. As we explained earlier, these capital exposure variables are likely subject to endogeneity concerns making causal inference of the results dubious, while our preferred capital shocks constructed based on confidential supervisory information are likely exogenous to bank credit decisions and consumer behavior. Nevertheless, even with these limitations, we find consistent results with our main findings despite the magnitudes being smaller at times, likely because of biases in the measures.

Third, as shown in Table A.5, we conduct a number of additional robustness tests:

We first address potential endogeneity concerns related to unobservable omitted shocks or factors that may occur at the same time as our Capital GAP shocks and may drive our results by conducting a falsification test. Specifically, we obtain an empirical distribution of the GAP shocks and randomly assign the Capital GAPs to banks following the empirical distribution, and construct *Pseudo Tier 1 Capital GAP* and *Pseudo Total Capital GAP* and rerun our main regressions. This

method preserves the distribution of the capital shocks from our baseline specification, but it disrupts the proper assignment of the shocks to the banks. If unobservable shocks occur at approximately the same time as the capital shocks, they would still exist in the testing framework and could drive the results. However, if no such shocks exist, our placebo assignments should weaken our main results. Results reported in Table A.5 Panels A1–A2 show that the coefficient estimates of the placebo capital shocks in this falsification test are statistically insignificant and not different from zero, suggesting that our main results are not driven by alternative shocks.

We next test the sensitivity of our main results to an alternative specification with a more stringent clustering of the error terms at the *BHC* × *Month* level instead of at the *County* × *Month* level. This can account for any within BHC × month correlations and better account for the level of variation in the capital shocks. However, one concern is that our sample consists of a small number of BHCs, so these newly reported standard errors could be biased with too few clusters. Nevertheless, our results in Table A.5 Panels B1–B2 show robust significant estimates suggesting that they are not affected by the level of error clustering.

One BHC in our credit card sample was revealed to have a very different business model from the other BHCs. To attenuate concerns that these differences may trigger our main results, we exclude this one BHC and rerun our results. The coefficient estimates on our capital shock variables remain significant and qualitatively similar to our main findings, as shown in Table A.5 Panels C1–C2.

BHCs that "failed" the stress tests may be severely constrained and thus may be more likely to take actions to mitigate their capital deficiencies and a concern is that our results may be particularly driven by them. To alleviate such concerns, we exclude observations of BHCs that "failed" the previous stress test. As we can see from Table A.5 Panels D1–D2, the results are robust.

The number of banks participating in different stress tests has increased over time up to December 2017, the end of our sample period, because of changes in asset thresholds in the CCAR/DFAST stress test requirements. To ensure our results are unbiased by these changes, in an additional robustness test, we only include BHCs that exist in all stress test years. We find our results continue to hold and are not driven by different BHC sorting across different stress years, as shown in Table A.5 Panels E1–E2.

To ensure our results reflect new effects about stress tests rather than simply effects of the BHCs capital levels unrelated to stress tests, in all our results, we include the BHC capital ratio in the previous quarter as a control variable. However, one may argue that the initial capital ratio at the beginning of a stress test better reflects the BHCs capital levels and constraints. Thus, in an additional test, we control for this initial stress test capital ratio instead of the capital ratio in the previous quarter. This test leaves our main results unchanged, as shown in Table A.5 Panels F1–F2, suggesting our results are not sensitive to this alternative capital control.

To ensure the results are not driven by one particular stress test that may be particular stringent on the banks, we rerun results excluding one stress test year at a time and using all the other tests. We find our results shown in Table A.5 Panels G1–G3 on the main outcome variables are robust to this test.

We noticed in the data that one particular BHC tends to always report its new originations one month later than the other banks. To ensure our results are not biased from excluding this institution, we rerun results in which we include this one BHC, and we observe from Table A.5 Panels H1–H2 that our results remain qualitatively similar to our main results.

To ensure the results are not driven by one particular BHC, in unreported tests, we reestimate results by excluding one bank at a time and reestimating results with the remaining BHCs. Across all specifications, we continue to find that coefficient estimates on our capital shocks remain similarly statistically and economically significant, suggesting that no particular bank appears to be driving the documented results.[34]

Given that some of our analyses discussed previously are based on a random sample of credit card accounts, in Appendix Figure A.2, we plot coefficient estimates from rerunning regressions using 10 different 1 percent random samples to ensure our results are not driven by the random sample selection. These results show qualitatively similar results across different random samples. Estimates in almost all cases are within the 95 percent confidence intervals of the 1 percent random sample used in our main analyses.

[34] To preserve confidentiality, results are available upon request with confidentiality agreement.

Finally, we conduct a BHC-level analysis using Y-14M portfolio data for credit cards for the period June 2013–December 2017, resulting in 3,105 bank-month observations for 18 unique BHCs and 67 time periods. Importantly, these data are for all credit card accounts, so we cannot distinguish between new and existing accounts. Definitions and summary statistics for the variables used in this analysis are shown in Appendix Table A.2. For this analysis, we run linear regressions in which we regress credit quantity measures at the BHC level *(CC UPB/Total Loans* and *CC UPB/Total Assets*) on our capital shock variables, the same controls for BHC characteristics as before plus a few additional ones to control for other consumer credit — first-lien mortgages and home equity, as well as BHC fixed effects and month–year fixed effects.

Results for the BHC-level analysis are reported in Appendix Table A.6 and indicate significant declines in credit supply for credit cards, corroborating results in our previous main analysis. However, one limitation is that we cannot distinguish how much is because of new versus existing credit cards.

7. Evidence from Existing Accounts

As mentioned in the introduction, a contemporaneous paper, Paradkar (2019), used credit bureau data and investigated effects of stress tests on *existing* credit card accounts and found increases in credit limits to non-prime customers by the banks with higher capital exposures, consistent with increased moral hazard behavior. Our additional tests for existing accounts yield similar results as Paradkar (2019) on card credit supply quantities. However, beyond what is in Paradkar (2019), we find banks increased APRs on these borrowers, which suggests these risks were priced into the accounts. Given the very large credit card data, for this additional analysis, we use a 0.02 percent loan-level random sample of the Y-14M existing account population and keep only accounts with ages that are 24 months or more, to avoid potential overlap with our new accounts analysis and their performance. We apply equation (3) to the existing accounts and use the same comprehensive set of controls including *County* × *Month* fixed effects as for our main analysis to estimate effects of capital shocks on credit supply for existing accounts. Specifically, we regress an indicator for *Line Increase* (equal to one if the line was increased by the lender in the respective month) and *CC Cycle APR* (capturing any APR changes by the lender in the credit cycle) on our two measures of capital shocks.

Results are presented in Table 10. Panel A Models 1–4 show the main results — increases in credit limits from BHCs with higher capital constraints for the existing accounts; however, these credit quantity changes appear to be at least partially offset by increases in APR. Thus, lenders may react differently to existing accounts than new accounts by increasing pricing on existing accounts to manage their credit risks. Models 5–12 show subsamples by broad credit score categories (non-prime: credit score <680 and prime: credit score ≥680) and suggest higher line increases for prime customers relative to non-prime ones, which are accompanied by higher APR to mitigate credit risk.

Credit effects could vary with different account age. Hence, Panel B Models 1–16 reestimates the credit supply results for subsamples partitioned by several credit card age groups ([2,3 years), [3,5 years), [5,10 years), and ≥10 years). Evidence suggests an interesting lender strategy pattern by age. Relatively younger accounts, up to five years old, are more likely to get higher line increases and lower APRs, while older accounts, particularly those over 10 years old, obtain lower line increases and are charged higher APRs. The more favorable terms for younger accounts may be because these borrowers do not have a long history with the bank and may require better terms to be retained. The higher charges for older accounts may be because of consumer stickiness.

8. Evidence from New Originations of Mortgages and Home Equity Lines of Credit

We next address the possibility that stress tests may also affect other consumer products such as first-lien mortgages and home equity lines of credit (HELOCs).

Similar to our analysis on credit cards, we conduct analyses looking at effects of BHC capital shocks on new first-lien mortgage and HELOC originations using monthly Y-14M mortgage and home equity data, respectively, which covers the period of June 2012–December 2017.[35] Specifically, we use bank–county–month aggregated samples for the full population as well as a 10 percent random sample of the loan-level population. The 10 percent random samples allow us to segment data using various risk indicators and estimate individual loan performance over 24 months after origination. We merge the Y-14M loan-level data with BHC financial information from the quarterly Y-9C reports and measures of capital gaps constructed from combined public

[35] Note that mortgage and home equity data are available from June 2012 rather than June 2013 for credit cards.

disclosure and supervisory capital projections information (Y-14A) over a nine-quarter horizon from the DFAST/CCAR stress tests results.

From the original Y-14M mortgage and HELOC data, we keep portfolio loan observations, which matter for bank portfolio risk while excluding commercial loans and purchased impaired loans, both of which have different portfolio or accounting treatments. We also exclude all government loans from our data sets since they are insured against credit risk. We also remove any loan-level observations that have missing, incomplete, or erroneous information on basic loan and consumer characteristics. We adjust BHC financial variables to be in real 2017:Q4 terms using the GDP price deflator.

We use the same econometric models described previously for credit cards (equations (2) and (3)) with slight modifications noted next. We use mortgage loan amount (HELOC limit amount), interest rate, and maturity (HELOC draw period) for new originations as dependent variables, along with the same controls for BHC characteristics lagged one quarter, and county-level and loan-level characteristics at origination specific to mortgages/HELOCs (consumer credit score, LTV (CLTV) ratio, property type dummies (single family 2-4 units, condo, planned unit development, other); occupancy type dummies (primary home, secondary home, investment, other), loan purpose type (refinance, cash-out, other)) as well as high granularity *County x Month* fixed effects and BHC fixed effects. Our key independent variable is the BHC's Capital GAP (*Tier 1 Capital GAP* or *Total Capital GAP*) in the most recent stress test. Finally, heteroskedasticity-robust standard errors are clustered at the county level. Specifications for interest rates and mortgage maturity (HELOC draw period) also include *Log(1+Loan Amount)* for mortgages and *Log(1+Limit Amount)* for HELOCs as controls.

8.1 Evidence from first-lien mortgages

For mortgages, after applying the filters discussed previously, we have a final aggregated bank–county–month regression sample of 341,355 observations for 29 BHCs, 2,784 U.S. counties, and 67 months covering the full population over the entire sample period. The final 10 percent loan-level random sample has 337,457 observations for 28 banks, 1,981 counties, and 67 months over the entire sample period of June 2012–December 2017.

Table 11 presents the results for the effects of stress tests on new mortgage originations, where Panels A and B show the effects on credit supply — quantities, interest rates, and maturities, using the aggregated bank–county–month sample in Panel A, and the 10 percent random sample in Panel B. Panel C revisits the main results by subsamples segmented by risk by broad credit score categories (non-prime: credit score <680 and prime: credit score ≥680), while Panel D reports credit performance (*24mos 90DPD*, *24 mos Foreclosure/REO*, and *24mos Bankruptcy*), indicators for whether a loan was 90 days past due, property entered foreclosure and/or became real estate owned, or the consumer entered bankruptcy, respectively) of the newly originated loans 24 months after their origination.

The evidence in Panels A and B shows that higher capital shocks are associated with decreased overall mortgage credit quantities, driven primarily by a reduction in the number of new loans originated, while the average mortgage loan amount originated and maturity is actually higher. Results also indicate higher mortgage interest rates on new originations. The overall decreased credit quantities and the increased interest rates on new mortgage originations can reflect some risk management to allow banks to manage credit risk by reducing exposures and/or earnings more on loans that pay back to cover losses on the unsuccessful loans.

Panel A shows the full aggregated sample results for new mortgage originations, with Models 1–8 for credit quantities, including loan amount and numbers of loans; Models 9–10 for mortgage interest rate; and Models 11–12 for maturity term. Results are all statistically and economically significant for credit quantities and pricing. The coefficient in Model 1 on *Tier 1 Capital GAP* of -2.021 suggests that 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 decrease in the aggregate mortgage amount for new originations of 38.7 percent (from 16.436 to 10.071). Similarly, the coefficient in Model 9 on *Tier 1 Capital GAP* of 0.002 suggests that changing *Tier 1 Capital GAP* from the 10th percentile to the 90th percentile results in an increase in the interest rate for new originations of 19.6 percent (from 3.341 percent to 3.996 percent). Finally, effects are not economically significant for mortgage terms, and for brevity, we do not go over them in detail.

Further analysis in Panel C reflects that higher average loan amounts, higher maturities, and higher interest rates are concentrated in prime consumers, while effects are insignificant in all cases for

non-prime consumers. This suggests that banks with higher capital shocks rebalance their credit supply toward less-risky customers to reduce their risk exposure, while earning more on these less risky loans possibly because of both inefficient consumer rate shopping and relationship lending. Finally, Panel D suggests that across the board, there are no statistically significant effects on any of the performance indicators.

8.2 Evidence on HELOCs

For HELOCs, our data samples include a final aggregated bank–county–month regression sample of 299,522 observations for 24 BHCs, 2,293 U.S. counties, and 67 months covering the full population over the entire sample period. The final 10 percent loan-level random sample has 221,921 observations for 24 banks, 1,473 counties, and 67 months over the entire sample period of June 2012–December 2017.

Table 12 presents the results for the effects of stress tests on new HELOC originations, where Panels A and B show the effects on credit supply — quantities, interest rate, and draw period, using the aggregated bank–county–month sample in Panel A and the 10 percent random sample in Panel B. Panel C revisits the main results by subsamples of risky and safe consumers by broad credit score categories (non-prime: credit score <680 and prime: credit score ≥680), while Panel D reports credit performance (*24mos 90DPD*, *24 mos Foreclosure/REO*, and *24mos Bankruptcy*, indicators for whether a loan was 90 days past due, property entered foreclosure, and/or became real estate owned, or the consumer entered bankruptcy, respectively) of the newly originated loans 24 months after their origination.

The evidence in Panels A and B shows that higher capital shocks are associated with higher overall HELOC credit quantities driven primarily by both higher average HELOC limit amount originated as well as an increase in the number of new loans originated. Results on other terms indicate higher HELOC interest rates and lower HELOC draw periods on new originations, both of which may indicate bank risk management to mitigate credit risk.

Looking at Panel A showing the full aggregated sample for new HELOC originations, and Models 1 for *Limit Amount/Population* and 9 for *HELOC Interest Rate*, the results are also economically significant. The coefficient in Model 1 on *Tier 1 Capital GAP* of 0.0834 suggests that changing

Tier 1 Capital GAP from the 10th percentile to the 90th percentile, with all the other characteristics set to their means, results in an increase in HELOC limit for new originations of 7.8 percent (from 3.092 to 3.334). Similarly, the coefficient in Model 9 on *Tier 1 Capital GAP* of 0.0002 suggests that changing *Tier 1 Capital GAP* from the 10th percentile to the 90th percentile results in an increase in the interest rate of 1.4 percent (from 4.267 percent to 4.327 percent). Finally, effects are not economically significant for HELOC draw period, and for brevity, we do not go over them in detail.

For HELOCs, further analysis in Panel C reflects that higher average limit amounts, interest rates, and draw periods are concentrated in the prime consumers, while effects are insignificant in all cases for non-prime consumers. The higher credit limits for prime customers demonstrates that banks with higher shocks redirect their credit supply toward less-risky customers to reduce risky credit exposure. The higher interest rates and lower draw periods may again indicate inefficient consumer rate shopping or relationship lending. Panel D finds no statistically significant effects on any of the performance indicators.

9. Conclusions

Bank stress tests are important forward-looking capital requirements used by the Federal Reserve for supervising large banking organizations. It has been over a decade since the first bank stress test was implemented in 2009, and a growing extant literature has analyzed many aspects and goals of stress tests, including optimal stress tests design and disclosure and improved credit risk management by banks. This paper is among the first to examine their effects on consumer credit markets.

Moreover, some critical unanswered questions remain as to whether stress tests improved or worsened credit conditions for average American consumers. Increases in consumer spending can drive economic growth, while decreases in spending can have negative effects on the economy. In addition, in recent years, U.S. consumer debt reached record highs ($14.3 trillion in 2020:Q1[36]), worrying policymakers, especially if losses are to follow. In this paper, we investigate whether stress tests affect credit supply and have real effects for consumers. To do so, we use unique

[36] See Center for Microeconomic Data — Household Debt and Credit Report (Q1 2020), https://www.newyorkfed.org/microeconomics/hhdc.html.

supervisory data at the consumer loan level that are used directly in the BHC's and Fed's DFAST models. For identification, we exploit an exogenous shock to BHCs induced by the Capital GAP between the Fed's and the BHC's stress tests model results.

We have several important findings. First, we find that stress-tested banks with higher capital gaps significantly reduce limits for new card originations and reduce the number of new accounts. The quantity decline is primarily among riskier consumers (non-prime and lower income) consistent with banks with higher capital shocks engaging in risk management and reducing exposure to these higher-risk groups. The timing of the effects, in addition to our exogenous shock measure, further backs our causal inference of the effects of bank stress tests on credit card supply. Second, despite the large declines in credit quantities, we find that banks with larger capital shocks find alternative ways to remain competitive and attract their best customers by improving pricing, rewards, and promotions to them while staying in compliance with stress test capital requirements.

Third, we follow the new card accounts issued over 24 months after origination to evaluate real outcomes for consumers. We find that, controlling for other risk factors, consumers with new card originations by banks with higher-capital shocks performed better, and improvements are applicable to both low- and high-credit score borrowers. With regard to credit usage and debt repayment, we find that consumers with new originations from banks with larger shocks tend to make larger new purchases and increase their credit usage; they also tend to make higher debt repayments. Effects apply and are significant for both low- and high-credit score borrowers. However, the new purchase effects are larger among higher-credit score groups, and the debt repayment effects are bigger among the lower-credit score group. Overall, these results show that customers who benefit from better pricing and rewards/promotions in the credit card market engage in more credit card usage without increasing delinquencies or total debt. Finally, our additional analyses on mortgages and HELOCs further show that banks with higher capital shocks from stress tests also employ risk management for these other consumer products.

In terms of consumer welfare, based on our results, it might be true that some risky borrowers are rationed out of the market made by the largest creditors as an impact of the stress test requirements. However, borrowers who are granted credit are benefiting from lower APRs and more rewards and promotions. A back-of-the-envelope calculation shows $1.7 billion annual savings from reduced

APR alone (calculated as 1 percent APR savings × $4,800 average annual card balance × 36 million new accounts per year). Moreover, an additional 2.2 million accounts could get promotions or rewards when banks try to meet stress test requirements (calculated as 5 percent more promotion/reward accounts × 36 million new accounts per year).

The paper contributes to several strands of research, including the literature on bank stress tests, the literature on consumer behavior, and the broader literature on effects of banks on the real economy.

The paper also yields policy implications by showing that stress tests may be able to steer both bank and consumer behavior toward their intended goals of improved credit risk management. Our results demonstrate a positive feedback loop among consumer credit supply, credit usage, and credit performance due to the stress tests.

In addition, there are constant debates around stress test transparency and disclosure. Banks keep on pushing for more disclosure of Fed models. On the other hand, as noted in Flannery (2019) and Glasserman and Tangirala (2015), leaving the banks unsure about DFAST model parameters may be able to reduce their heavy reliance on the DFAST model in making their own portfolio choices, thus diversifying the banking system's risk exposure. Our paper shows that the opacity provides incentives for banks to adjust their portfolios that have led to positive outcomes as we document in the paper. In other words, the unpredictability of the stress tests actually provides important benefits. After all, a key purpose of capital is to protect against *unexpected* losses. The need for this is no more apparent than in the current economic crisis caused by the COVID-19 pandemic.[37]

[37] See e.g., Blank, Hanson, Stein, and Sunderam (2020) for a discussion on this.

References

Acharya, V.V., A. N. Berger, and R. A. Roman. 2018. "Lending Implications of US Bank Stress Tests: Costs or Benefits?" *Journal of Financial Intermediation* 34, 58–90.

Acharya, V., R. Engle, and D. Pierret. 2014. "Testing Macroprudential Stress Tests: The Risk of Regulatory Risk Weights." *Journal of Monetary Economics* 65, 36–53.

Agarwal, S., E. Benmelech, N. Bergman, and A. Seru. 2015. "How Much Did CRA Affect Bank Lending Standards?" National University of Singapore Working Paper.

Alan, S., and G. Loranth. 2013. "Subprime Consumer Credit Demand: Evidence from a Lender's Pricing Experiment." *The Review of Financial Studies* 26, 2353–2374.

Allen, L. 2004. "The Basel Capital Accords and International Mortgage Markets: A Survey of the Literature." *Financial Markets, Institutions & Instruments* 13, 41–108.

Auer, R., and S. Ongena. 2019. "The Countercyclical Capital Buffer and the Composition of Bank Lending." Bank for International Settlements Working Paper.

Bassett, W. F., J. M. Berrospide. 2019. "The Impact of Stress Tests on Bank Lending." Board of Governors of the Federal Reserve System Working Paper.

Beck, T., R. Levine, and A. Levkov. 2010. "Big Bad Banks? The Winners and Losers from Bank Deregulation in the United States." *Journal of Finance* 65, 1637–1667.

Berger, A. N., and R. A. Roman. 2017. "Did Saving Wall Street Really Save Main Street? The Real Effects of TARP on Local Economic Conditions." *Journal of Financial and Quantitative Analysis* 52, 1827–1867.

Bernanke, B. 2013. "Stress Testing Banks: What Have We Learned?" in *Maintaining Financial Stability: Holding a Tiger by the Tail* (conference volume).

Berrospide, J. M., and R. M. Edge. 2019. "The Effects of Bank Capital Buffers on Bank Lending and Firm Activity: What Can We Learn from Five Years of Stress-Test Results?" Board of Governors of the Federal Reserve System Working Paper 2019-050.

Bird, A., S. Karolyi, T. Ruchti, and A. Sudbury. 2015. "Bank Regulator Bias and the Efficacy of Stress Test Disclosures." Carnegie Mellon University Working Paper.

Bhutta, N., A. Fuster, and A. Hizmo, A. 2019. "Paying Too Much? Price Dispersion in the US Mortgage Market." Board of Governors of the Federal Reserve System Working Paper.

Blank, M., S. G. Hanson, J. Stein, and A. Sunderam. 2020. "COVID-19 and the Financial System — How Resilient Are the Banks? How Are They Supporting the Economy?" Brookings Institution webinar.

Bordo, M. D., and J. V. Duca. 2018. "The Impact of the Dodd–Frank Act on Small Business." NBER Working Paper 24501.

Brown, M., J. Grigsby, W. van der Klaauw, J. Wen, and B. Zafar. 2016. "Financial Education and the Debt Behavior of the Young." *Review of Financial Studies* 29, 2490–2522.

Calem, P., R. Correa, and S. J. Lee. Forthcoming. "Prudential Policies and Their Impact on Credit in the United States." *Journal of Financial Intermediation.*

Chan, S., A. Haughwout, A. Hayashi, and W. van der Klaauw. 2016. "Determinants of Mortgage Default and Consumer Credit Use: The Effects of Foreclosure Laws and Foreclosure Delays." *Journal of Money, Credit and Banking* 48, 393–413.

Clark, B., B. B. Francis, R. E. Garcıa, and S. Steele. 2020. "Stress Tests and the Hawthorne Effect in Banking." Rensselaer Polytechnic Institute Working Paper.

Connolly, M. 2018. "The Real Effects of Stress Testing in a Financial Crisis: Evidence from the SCAP." Boston College Working Paper.

Consumer Financial Protection Bureau. 2019. *The Consumer Credit Card Market*, https://files.consumerfinance.gov/f/documents/cfpb_consumer-credit-card-market-report_2019.pdf.

Cornett, M.M., K. Minnick, P. J. Schorno, and H. Tehranian. 2018. "An Examination of Bank Behavior Around Federal Reserve Stress Tests." *Journal of Financial Intermediation* 41, 100789.

Cortés, K., Y. Demyanyk, L. Li, E. Loutskina, and P. E. Strahan. 2020. "Stress Tests and Small Business Lending." *Journal of Financial Economics* 136, 260–279.

Covas, F. 2018. "Capital Requirements in Supervisory Stress Tests and Their Adverse Impact on Small Business Lending." The Clearing House Working Paper.

Danisewicz, P., and I. Elard. 2020. "The Real Effects of Financial Technology: Marketplace Lending and Personal Bankruptcy." Working Paper. University of Bristol Working Paper.

Doerr, S. 2020. "Unintended Side Effects: Stress Tests, Entrepreneurship, and Innovation." Bank for International Settlements Working Paper.

Duchin, R., and D. Sosyura. 2014. "Less Risky Ratios, Riskier Portfolios: Banks' Response to Government Aid." *Journal of Financial Economics* 113, 1–28.

Elul, R., N. S. Souleles, S. Chomsisengphet, D. Glennon, and R. Hunt, R. 2010. "What 'Triggers' Mortgage Default?" *American Economic Review* 100, 490–494.

Flannery, M. 2019. “Transparency and Model Evolution in Stress Testing, 2019, Comments Prepared for a Federal Reserve Conference on ‘Stress Testing: A Discussion and Review.’

Flannery, M., B. Hirtle, and A. Kovner. 2017. “Evaluating the Information in the Federal Reserve Stress Tests.” *Journal of Financial Intermediation* 29, 1–18.

Garmaise, M. J., and T. J. Moskowitz. 2006. “Bank Mergers and Crime: The Real and Social Effects of Credit Market Competition.” *Journal of Finance* 61, 495–538.

Gilje, E.P. 2019. “Does Local Access to Finance Matter? Evidence from US Oil and Natural Gas Shale Booms.” *Management Science* 65, 1–18.

Gilje, E.P., E. Loutskina, and P. E. Strahan. 2016. “Exporting Liquidity: Branch Banking and Financial Integration.” *Journal of Finance* 71, 1159–1184.

Glasserman, P., and G. Tangirala. 2015. “Are the Fed’s Stress Test Results Predictable?” Columbia University Working Paper.

Goldstein, I., and Y. Leitner. 2018. “Stress Tests and Information Disclosure.” *Journal of Economic Theory* 177, 34–69.

Goldstein, I., and H. Sapra. 2013. “Should Banks’ Stress Test Results Be Disclosed? An Analysis of the Costs and Benefits.” *Foundations and Trends in Finance* 8, 1–54.

Gross, D. B., and N. S. Souleles. 2002. “Do Liquidity Constraints and Interest Rates Matter for Consumer Behavior? Evidence from Credit Card Data.” *The Quarterly Journal of Economics* 117, 149–185.

Harris, T. S., U. Khan, and D. Nissim. 2018. “The Expected Rate of Credit Losses on Banks’ Loan Portfolios.” *The Accounting Review* 93, 245–271.

Hirtle, B., T. Schuermann, and K. Stiroh. 2009. “Macroprudential Supervision of Financial Institutions: Lessons from the SCAP.” Federal Reserve Bank of New York Staff Report 409.

Jayaratne, J., and P. E. Strahan. 1996. “The Finance-Growth Nexus: Evidence from Bank Branch Deregulation.” *Quarterly Journal of Economics* 111, 639–670.

Kapinos, P., and O. Mitnik. 2014. “A Top-Down Approach to the Stress-Testing of Banks.” Center for Financial Research, Federal Deposit Insurance Corporation Working Paper.

Keeley, M. C., 1990. “Deposit Insurance, Risk, and Market Power in Banking.” The *American Economic Review* 80, 1183–1200.

Krishnan, K., D.K., Nandy, and M., Puri. 2015. “Does Financing Spur Small Business Productivity? Evidence from a Natural Experiment.” *Review of Financial Studies* 28, 1768–1809.

Lambertini, L., and A. Mukherjee. 2016. "Is Bank Capital Regulation Costly for Firms? Evidence from Syndicated Loans." Ecole Polytechnique Federale de Lausanne Working Paper.

Morgan, D. P., B. Rime, and P. E. Strahan. 2004. "Bank Integration and State Business Cycles." *Quarterly Journal of Economics* 119, 1555–1584.

Morris-Levenson, J. A., R. F. Sarama, and C. Ungerer. 2017. "Does Tighter Bank Regulation Affect Mortgage Originations?" SSRN Working Paper.

Neretina, E., C. Sahin, and J. De Haan. Forthcoming. "Banking Stress Test Effects on Returns and Risks." *Journal of Banking and Finance*.

Paradkar, N. 2019. "Reducing Risk or Reaching for Yield? Impact of Stress Tests on Credit Card Lending." Georgia Tech University Working Paper.

Peristiani, S., D. Morgan, and V. Savino. 2010. "The Information Value of the Stress Test and Bank Oopacity." Federal Reserve Bank of New York Staff Report 460.

Rice, T., and P. E. Strahan. 2010. "Does Credit Competition Affect Small-Firm Finance?" *Journal of Finance* 65, 861–889.

Schneider, T. I., P. E. Strahan, J. Yang. 2020. "Bank Stress Testing: Public Interest or Regulatory Capture?" National Bureau of Economic Research Working Paper w26887.

Schuermann, T. 2014. "Stress Testing Banks." *International Journal of Forecasting* 30, 717–728.

Stango, V., and J. Zinman. 2016. "Borrowing High versus Borrowing Higher: Price Dispersion and Shopping Behavior in the US Credit Card Market." *Review of Financial Studies* 29, 979–1006.

Surane, J. 2019. "Bloomberg, U.S. Banks' Bad-Debt Pile Creeps Higher with Credit-Card Losses," https://www.bloomberg.com/news/articles/2019-05-01/u-s-banks-bad-debt-pile-creeps-higher-with-credit-card-losses.

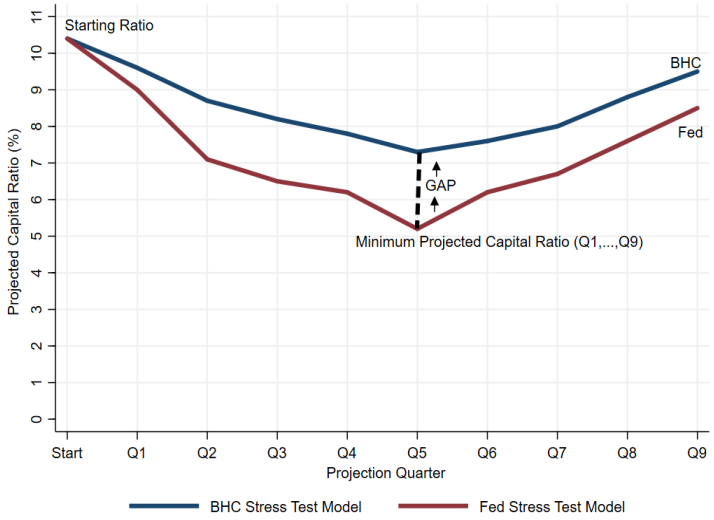
Tarullo, D. 2010. "Lessons from the Crisis Stress Tests", Speech at the Federal Reserve Board International Research Forum on Monetary Policy. Washington, D.C., March, Vol. 26.

Uluc, A., and T. Wieladek. 2016. "Capital Requirements, Risk Shifting and the Mortgage Market." Working Paper. European Central Bank.

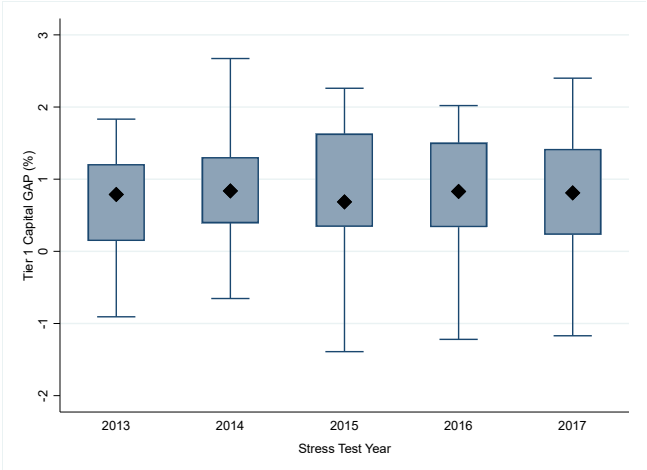
Figure 1: Distribution of Our Shock Measure — Stress Tests Capital 'GAPs' (2013–2017)

Panel A is a graphical illustration of a typical 9-quarter projection of the stressed capital ratio based on stress tests independently done by the bank holding companies (BHCs) and the Federal Reserve. The *GAP* is calculated as the difference between firm's lowest projected capital ratio and the Federal Reserve (Fed)'s lowest projected capital ratio during the 9-quarter capital planning horizon under a severely adverse scenario. A positive GAP means that the firm's projection is more optimistic than the Fed's, so the Fed's result would come in as a negative *shock* to the firm. Panels B and C show the cross-sectional distribution of the *Tier 1 Capital GAP* and *Total Capital GAP* for each year between 2013 and 2017 in our sample. Outliers are not shown in these charts to protect confidentiality of the BHCs.

Panel A: An Illustration of Stress Tests Capital Ratio Projections



Panel B: Distribution of Tier 1 Capital GAP



Panel C: Distribution of Total Capital GAP

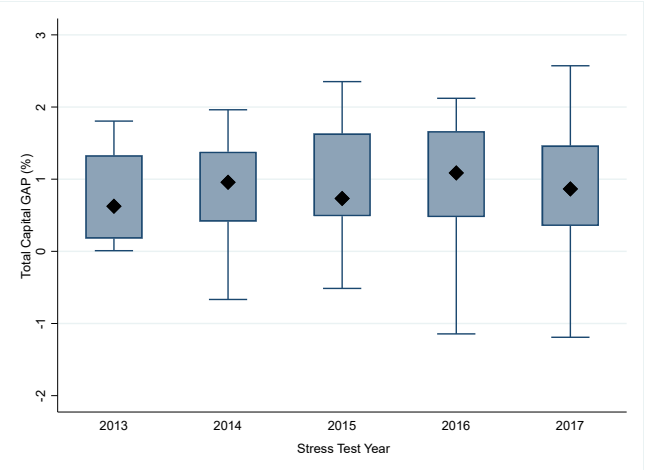


Figure 2: Correlations of Stress Test Shocks and Consumer Credit Supply by County

This figure shows the correlation of the *Tier 1 Capital GAP* with the newly issued credit card (CC) credit limit per capita (*Credit Limit/County Population)* across the counties in the U.S. The sample spans the periods June 2013–December 2017.

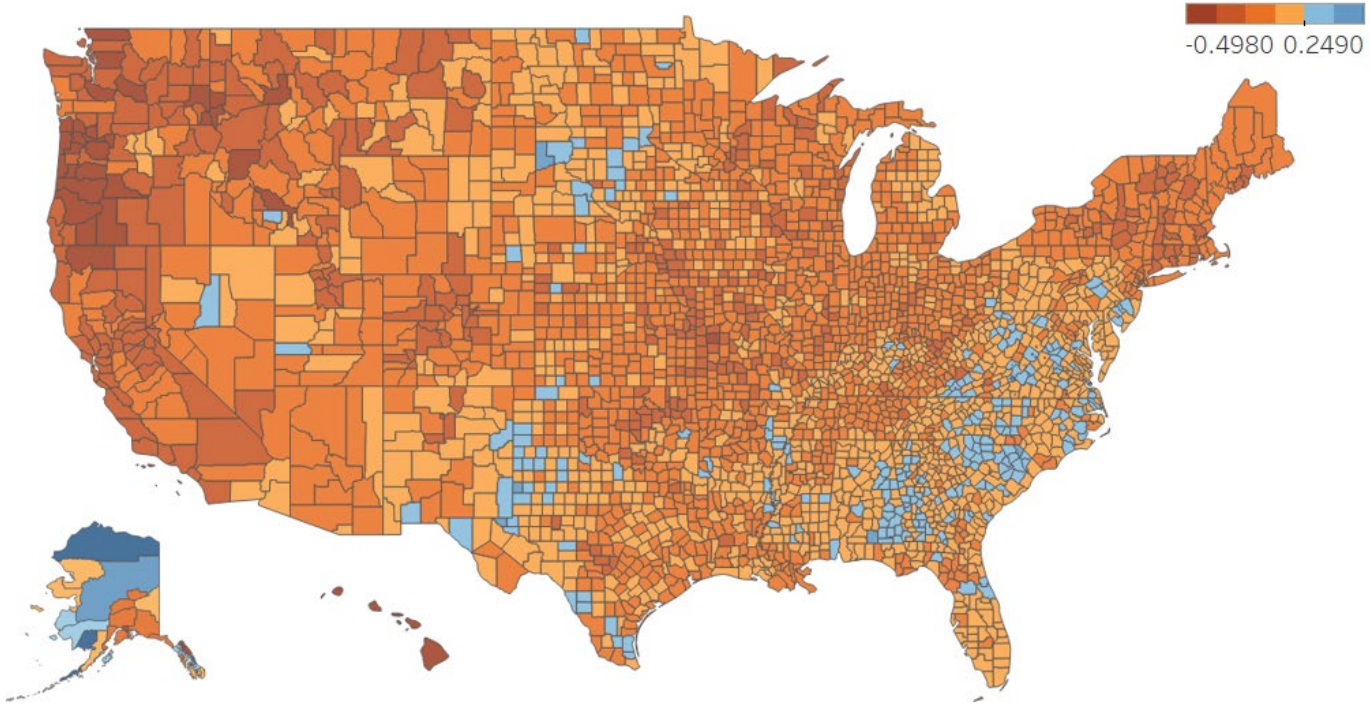
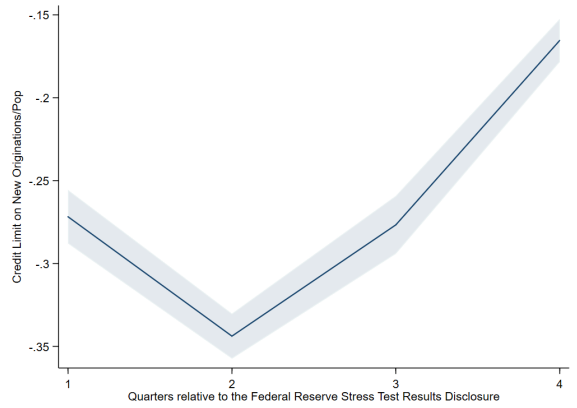


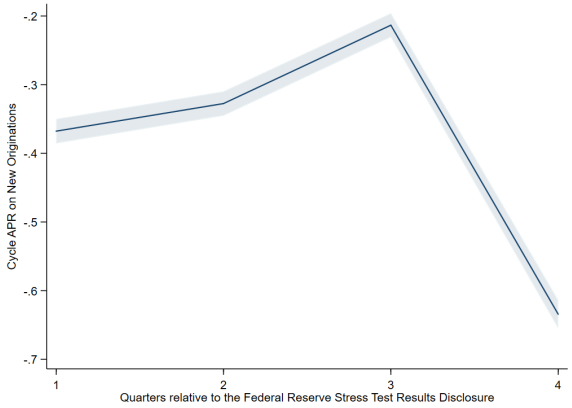
Figure 3: Persistence of Stress Test Effects on Consumer Credit Supply

This figure plots the regression coefficients for the effects of stress tests Capital GAPs on consumer credit quantities in Panel A, cycle APR in Panel B, % cash rewards in Panel C, % miles rewards in Panel D, and % promotions in Panel E, for each quarter since the Fed's stress test disclosure. The coefficients are plotted together by their 95% confidence intervals represented by the blue-gray dashed areas. Results are for new originations over June 2013–December 2017.

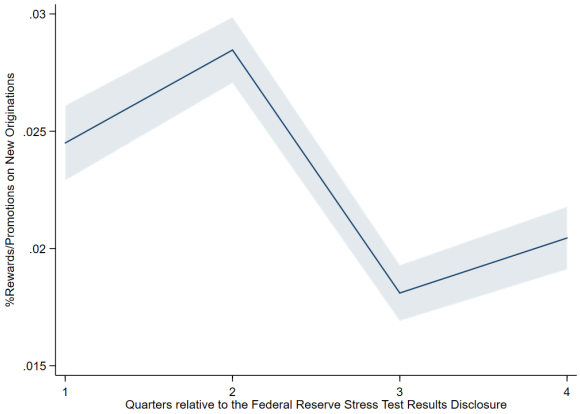
Panel A: Credit Limit/County Population



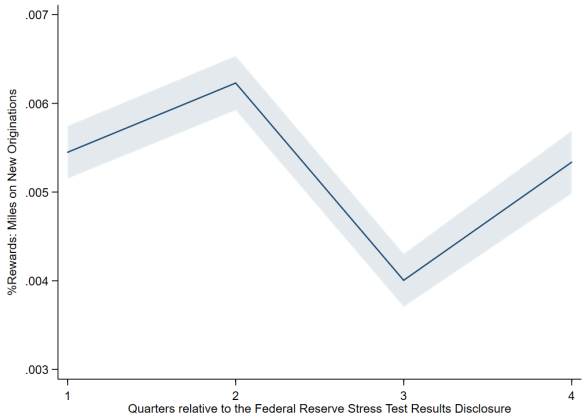
Panel B: Cycle APR



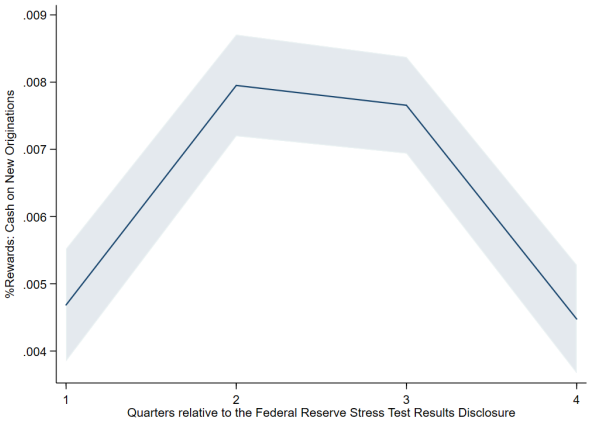
Panel C: % Rewards/Promotions



Panel D: % Rewards: Miles



Panel E: % Rewards: Cash



Panel F: % Promotions

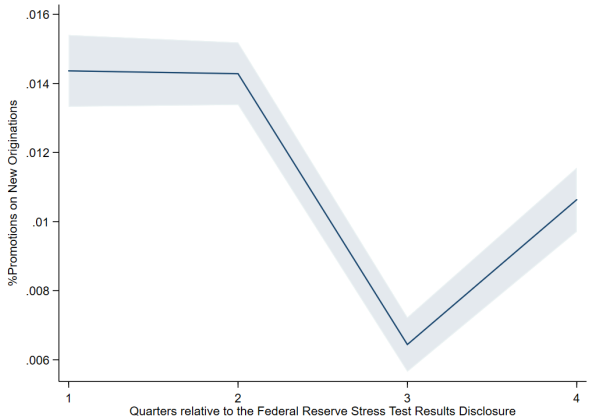


Table 1: Variable Definitions and Summary Statistics

This table provides summary statistics and definitions for the variables used in our analysis. Panel A presents statistics from Y-14M credit card new originations data aggregated at the firm–county–month level and public Y-9C BHC information. Panel B presents statistics from a 1% random sample of the Y-14M credit card new originations data and public Y-9C BHC information. Variables using dollar amounts are expressed in real 2017:Q4 dollars using the implicit GDP price deflator.

Variable	Mean	25th Percentile	Median	75th Percentile	Standard Deviation	No. of Observations	Definition
Panel A: Y14 firm-county-month data							
Stress Test Variables (lagged pertaining to last disclosure, Y14 and Public Reports)							
Tier 1 Capital GAP	0.796	0.175	0.760	1.610	1.053	1,335,178	Lowest projected tier1 capital ratio projected in the BHC's own exercise (Y-14A) minus the lowest projected tier1 capital ratio in the Fed's stress test exercise (publicly announced), both under the severely adverse scenario.
Total Capital GAP	0.869	0.274	0.726	1.521	1.058	1,335,178	Lowest projected total capital ratio (tier1+tier2) projected in the BHC's own exercise (Y-14a) minus the lowest projected total capital ratio in the Fed's stress test exercise (publicly announced), both under the severely adverse scenario.
Credit Supply (at origination) (Y14M)							
Credit Limit/County Population	4.304	0.974	2.502	5.733	5.331	1,335,178	Credit card limit at the firm-county level adjusted for inflation divided by the county population.
Log(1+ Total Credit Limit)	11.264	9.954	11.160	12.489	1.984	1,355,032	The log of one plus total credit card limit at the firm-county level adjusted for inflation.
Log(1+ Avg. Credit Limit)	8.488	8.238	8.618	8.964	0.741	1,355,032	The log of one plus average credit card limit at the firm-county level adjusted for inflation.
Log(1+No New Accounts)	2.944	1.609	2.708	3.970	1.697	1,355,032	The log of one plus number of new credit card accounts opened at the firm-county level adjusted for inflation.
Cycle APR	17.462	14.622	17.768	21.490	5.456	1,355,032	APR used for the cycle for consumer retail purchases.
% Rewards/Promotions	0.382	0.118	0.250	0.500	0.394	1,355,032	Percent of accounts with rewards (cash back and miles) or startup promotions.
% Rewards: Cash Back	0.166	0.000	0.040	0.246	0.255	1,355,032	Percent of accounts with cash-back rewards.
% Rewards: Miles	0.049	0.000	0.000	0.016	0.150	1,355,032	Percent of accounts with miles rewards.
% Promotions	0.167	0.000	0.100	0.200	0.241	1,355,032	Percent of accounts with start-up promotions.
Consumer Characteristics (at origination) (Y14)							
Consumer Credit Score	731.523	711.432	735.376	754.714	39.469	1,335,178	The consumer credit score or FICO.
Log(1+ Consumer Income)	11.043	10.904	11.133	11.371	1.090	1,335,178	The natural logarithm of one plus the consumer income.
Consumer Utilization Rate	0.097	0.010	0.075	0.135	0.113	1,335,178	The utilization rate on the account calculated as the outstanding balance divided by the credit limit.
% Consumers with Joint Accounts	0.042	0.000	0.000	0.008	0.121	1,335,178	Percent of consumer joint accounts.
% Variable Interest Rate Accounts	0.894	0.933	1.000	1.000	0.235	1,335,178	Percent of consumer variable interest rate accounts.
% Relationship Consumers	0.206	0.000	0.012	0.273	0.332	1,335,178	Percent of accounts from consumers with a prior relationship with the lender.
BHC Characteristics (lagged 1 quarter) (Y9-C)							
Capital Adequacy	0.118	0.108	0.116	0.129	0.015	1,335,178	BHC capital adequacy, proxied by the ratio of BHC equity to total assets.
Nonperforming Loans	0.021	0.014	0.017	0.025	0.011	1,335,178	BHC's ratio of nonperforming loans to total loans.
Earnings	0.105	0.072	0.093	0.124	0.061	1,335,178	Earnings proxied by ROE (return on equity), the ratio of BHC annualized net income to total equity.
Liquidity	0.086	0.034	0.081	0.135	0.053	1,335,178	Liquidity proxied by the ratio of BHC liquid assets to total assets.
BHC Size	20.436	19.588	21.176	21.448	1.110	1,335,178	The natural logarithm of the BHC total assets.
Consumer Loans	0.268	0.162	0.197	0.274	0.161	1,335,178	The ratio of consumer loans to total loans.
Residential RE Loans	0.241	0.171	0.277	0.305	0.110	1,335,178	The ratio of residential real estate loans to total loans.
Trading Assets	0.063	0.004	0.041	0.134	0.064	1,335,178	The ratio of trading assets to total assets.

Variable	Mean	25th Percentile	Median	75th Percentile	Standard Deviation	No. of Observations	Definition
Panel B: Y14 account-level data (1% random sample)							
Credit Supply (at origination) (Y14)							
Log(1+ Credit Limit)	8.039	6.990	8.221	9.003	1.192	1,686,990	The natural logarithm of one plus credit card credit limit at the firm-county level adjusted for inflation.
Cycle APR	18.436	14.990	22.240	25.240	9.235	1,686,990	APR used for the cycle for consumer retail purchases.
Rewards/Promotions	0.287	0.000	0.000	1.000	0.497	1,686,990	An indicator for accounts with rewards (cash-back and miles) or start-up promotions.
Rewards: Cash Back	0.111	0.000	0.000	0.000	0.314	1,686,990	An indicator for accounts with cash-back rewards.
Rewards: Miles	0.039	0.000	0.000	0.000	0.194	1,686,990	An indicator for accounts with miles rewards.
Promotions	0.137	0.000	0.000	0.000	0.344	1,686,990	An indicator for accounts with start-up promotions.
Consumer Characteristics (at origination) (Y14)							
Consumer Credit Score	732.200	674.000	733.000	794.000	74.778	1,686,990	The Consumer credit score or FICO.
Log(1+ Consumer Income)	10.971	10.541	11.018	11.479	1.061	1,686,990	The natural logarithm of one plus the Consumer income.
Consumer Utilization Rate	0.101	0.000	0.000	0.075	0.223	1,686,990	The utilization rate on the account calculated as the outstanding balance divided by the credit limit.
Joint Account	0.014	0.000	0.000	0.000	0.117	1,686,990	Indicator for consumer joint accounts.
Variable Interest Rate Account	0.897	1.000	1.000	1.000	0.303	1,686,990	Indicator for consumer variable interest rate accounts.
Relationship Consumer	0.173	0.000	0.000	0.000	0.378	1,686,990	Indicator for accounts of consumers with a prior relationship with the lender.
Additional Real Effects Variables (Y14 calculated over 24mos since origination)							
24mos 60DPD	0.104	0.000	0.000	0.000	0.305	1,662,883	An indicator for whether the account was ever in 60DPD over the 24mos since origination.
24mos Avg. Days Past Due	1.540	0.000	0.000	0.208	7.424	1,662,883	The average days past due over the 24mos since origination.
24mos Bankruptcy	0.001	0.000	0.000	0.000	0.038	1,662,883	An indicator for bankruptcy status over the 24mos since origination.
24mos FICO Decline	0.820	1.000	1.000	1.000	0.384	1,662,883	Indicator for whether the FICO of the consumer declined below the FICO at origination over the 24mos since origination.
24mos Log(1+SumPurchase Volume)	6.117	4.515	7.139	8.557	3.475	1,674,704	The natural logarithm of one plus the total purchase volume over 24mos since origination.
24mos Log(1+AvgPurchase Volume)	3.792	1.982	4.187	5.548	2.416	1,651,935	The natural logarithm of one plus the average purchase volume over 24mos since origination.
24mos Log(1+AvgCycleBalance)	5.065	3.354	5.765	7.169	2.709	1,651,755	The average cycle balance over the 24mos since origination.
24mos Log(1+AvgDailyBalance)	4.857	2.843	5.605	7.070	2.795	1,651,192	The average daily balance over the 24mos since origination.
24mos Avg. Utilization Rate	0.259	0.009	0.103	0.451	0.647	1,662,883	The average utilization rate over the 24mos since origination.
24mos Log(1+SumTotal Debt)	7.371	5.673	8.586	10.179	3.764	1,673,129	The natural logarithm of one plus the total debt over 24mos since origination (total debt = balance + payments - new purchases).

Table 2: Effects of Stress Tests on Aggregate Consumer Credit Supply

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card quantities for new originations. The loan origination data come from the supervisory FR Y-14M data set and covers the period June 2013–December 2017. The dependent variables are *Credit Limit/County Population*, credit card limit at the firm-county level divided by the county population for new originations in Panel A. Panel B decomposes credit supply effects into individual components and uses three additional measures: *Log (1+ Total Credit Limit)*, the natural logarithm of the credit card limit at the firm-county level for new originations; *Log (1+ Avg. Credit Limit)*, the natural logarithm of the credit card average limit at the firm-county level for new originations; and *Log (1+ Number of New Accounts)*, the natural logarithm of the number of new credit card accounts at the firm-county level for new originations. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, the percent of consumers with joint accounts, the percent of variable interest rate accounts, and the percent of relationship consumers. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Main Results on Aggregate Credit Limit

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Dependent Variable = (Credit Limit/County Population) for New Originations					
Stress Test Measures						
Tier 1 Capital GAP	-0.2017***		-0.2024***		-0.2188***	
	(-36.7084)		(-35.7901)		(-36.1995)	
Total Capital GAP		-0.2186***		-0.2337***		-0.2258***
		(-38.2008)		(-38.2371)		(-36.6330)
Consumer & Loan Characteristics at Origination						
Consumer Credit Score			0.0148***	0.0148***	0.0153***	0.0153***
			(60.6965)	(60.6516)	(61.3014)	(61.2634)
Log(1+ Consumer Income)			0.1038***	0.1040***	0.0689***	0.0703***
			(20.2720)	(20.3609)	(13.1214)	(13.4083)
Consumer Utilization Rate			-0.5043***	-0.5219***	-0.4802***	-0.4908***
			(-13.1851)	(-13.6031)	(-12.5644)	(-12.8171)
% Consumers with Joint Accounts			0.5394***	0.5213***	0.5045***	0.4978***
			(10.7759)	(10.4502)	(10.1037)	(9.9858)
% Variable Interest Rate Accounts			-0.4637***	-0.5503***	-0.5930***	-0.6333***
			(-9.1021)	(-10.6008)	(-10.5283)	(-11.1479)
% Relationship Consumers			2.8618***	2.8659***	2.9153***	2.9159***
			(36.5226)	(36.5647)	(37.0028)	(37.0167)
BHC Characteristics (Lagged one quarter)						
Capital Adequacy					14.7820***	12.1130***
					(14.4186)	(11.9895)
Non-performing Loans					-27.3659***	-28.4528***
					(-32.6650)	(-33.6560)
Earnings					5.5795***	5.5410***
					(49.9757)	(49.7436)
Liquidity					1.5836***	0.4988*
					(6.0340)	(1.8798)
BHC Size					2.0529***	2.0000***
					(17.6274)	(17.0788)
Consumer Loans					4.5922***	4.4482***
					(32.2028)	(31.3076)
Residential RE Loans					18.7070***	18.4676***
					(51.3333)	(51.2471)
Trading Assets					-25.2021***	-25.1422***
					(-38.0832)	(-38.0208)
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,337,577	1,337,577	1,335,178	1,335,178	1,335,178	1,335,178
R-squared	0.567	0.568	0.583	0.583	0.587	0.587

Panel B: Decomposition of the Credit Supply Effects

Independent Variables:	(1) Log(1+Total Credit Limit)	(2) Log(1+Total Credit Limit)	(3) Log(1+Avg Credit Limit)	(4) Log(1+Avg Credit Limit)	(5) Log(1+No New Accounts)	(6) Log(1+No New Accounts)
Stress Test Measures						
Tier 1 Capital GAP	-0.0401***		-0.0034***		-0.0331***	
	(-32.7506)		(-6.3115)		(-36.0161)	
Total Capital GAP		-0.0411***		-0.0048***		-0.0327***
		(-35.3310)		(-9.3677)		(-37.0557)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.815	0.815	0.741	0.741	0.851	0.851

Table 3: Effects of Stress Tests on Consumer Credit Supply by Risk Segment

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card quantities for new originations using a 1% loan-level random sample. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017. We report both main effects and risk segmentation by FICO and consumer income. The dependent variable is *Log(1+ Credit Limit)*, the natural logarithm of one plus the credit card limit for new originations. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced), both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, an indicator for consumers with joint accounts, an indicator for interest rate accounts, and an indicator for relationship consumers. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Full Sample and Segmentation by Granular FICO Buckets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Dependent Variable = Log(1+Credit Limit) for New Originations													
Independent Variables:	Full Sample	Full Sample	FICO <620	FICO <620	FICO [620, 680)	FICO [620, 680)	FICO [680, 720)	FICO [680, 720)	FICO [720, 760)	FICO [720, 760)	FICO [760, 800)	FICO [760, 800)	FICO ≥800	FICO ≥800
Stress Test Measures														
Tier 1 Capital GAP	-0.0043***		-0.0363***		-0.0082***		0.0014		-0.0011		0.0012		0.0173***	
	(-3.0878)		(-5.2425)		(-2.9100)		(0.5118)		(-0.3660)		(0.4132)		(5.9981)	
Total Capital GAP		-0.0074***		-0.0280***		-0.0080***		-0.0016		-0.0067**		-0.0046*		0.0119***
		(-5.7381)		(-4.9886)		(-3.0828)		(-0.6097)		(-2.4361)		(-1.7491)		(4.3696)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,686,990	1,686,990	84,103	84,103	332,761	332,761	269,774	269,774	258,159	258,159	245,882	245,882	361,361	361,361
R-squared	0.613	0.613	0.453	0.453	0.458	0.458	0.344	0.344	0.412	0.412	0.471	0.471	0.442	0.442

Panel B: Segmentation by Consumer Income (Quintiles)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Dependent Variable = Log(1+Credit Limit) for New Originations									
Independent Variables:	Consumer Income Quintile 1	Consumer Income Quintile 2	Consumer Income Quintile 2	Consumer Income Quintile 2	Consumer Income Quintile 3	Consumer Income Quintile 3	Consumer Income Quintile 4	Consumer Income Quintile 4	Consumer Income Quintile 5	Consumer Income Quintile 5
Stress Test Measures										
Tier 1 Capital GAP	-0.0200***		-0.0235***		-0.0191***		-0.0129***		-0.0045	
	(-6.3859)		(-9.6681)		(-7.2524)		(-4.7316)		(-1.4922)	
Total Capital GAP		-0.0187***		-0.0212***		-0.0184***		-0.0139***		-0.0084***
		(-6.2968)		(-9.4953)		(-7.6065)		(-5.3318)		(-2.9442)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	310,587	310,587	324,684	324,684	301,953	301,953	344,542	344,542	290,687	290,687
R-squared	0.631	0.631	0.639	0.639	0.643	0.643	0.628	0.628	0.605	0.605

Table 4: Effects of Stress Tests on the Price of Consumer Credit, Average and by Risk Segment

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card pricing for new originations using both the firm–county–month aggregated sample as well as a 1% random loan-level sample. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017. We report both main effects and risk segmentation by FICO and consumer income. The dependent variable is *CC Cycle APR*, the average APR used for the cycle for consumer retail purchases at the firm-county level (aggregated sample) or at the account-level (1% random sample) for new originations. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced), both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, an indicator for consumers with joint accounts, an indicator for interest rate accounts, and an indicator for relationship consumers. In addition, in all pricing tables, we include *Log(1+ Credit Limit)* as a control variable. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Full Sample (Aggregate and 1% Random Samples)

Independent Variables:	(1)	(2)	(3)	(4)
	Dependent Variable = CC Cycle APR for New Originations			
Stress Test Measures	Full Aggregate Sample	Full Aggregate Sample	Full 1% Random Sample	Full 1% Random Sample
Tier 1 Capital GAP	-0.3577***		-0.1098***	
	(-56.1608)		(-6.1626)	
Total Capital GAP		-0.3308***		-0.1028***
		(-55.7719)		(-6.1408)
Log(1+ Credit Limit)	YES	YES	YES	YES
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES
Observations	1,355,032	1,355,032	1,686,990	1,686,990
R-squared	0.626	0.626	0.321	0.321

Panel B: Segmentation by FICO Granular Buckets (1% Random Sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Dependent Variable = CC Cycle APR for New Originations											
Independent Variables:	FICO <620	FICO <620	FICO [620, 680)	FICO [620, 680)	FICO [680, 720)	FICO [680, 720)	FICO [720, 760)	FICO [720, 760)	FICO [760, 800)	FICO [760, 800)	FICO ≥800	FICO ≥800
Stress Test Measures												
Tier 1 Capital GAP	-0.0177		-0.1198***		-0.1635***		-0.1913***		-0.2010***		0.4124***	
	(-0.2528)		(-3.4853)		(-5.4283)		(-6.3327)		(-6.2532)		(12.8118)	
Total Capital GAP		-0.0777		-0.1032***		-0.1314***		-0.1842***		-0.2078***		0.4347***
		(-1.2560)		(-3.2323)		(-4.6847)		(-6.5396)		(-6.7729)		(14.5209)
Log(1+ Credit Limit)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	84,103	84,103	332,761	332,761	269,774	269,774	258,159	258,159	245,882	245,882	361,361	361,361
R-squared	0.427	0.427	0.422	0.422	0.371	0.371	0.389	0.389	0.402	0.402	0.435	0.435

Panel C: Segmentation by Consumer-Level Income (1% Random Sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Dependent Variable = CC Cycle APR for New Originations									
Independent Variables:	Consumer Income Quintile 1	Consumer Income Quintile 2	Consumer Income Quintile 2	Consumer Income Quintile 2	Consumer Income Quintile 3	Consumer Income Quintile 3	Consumer Income Quintile 4	Consumer Income Quintile 4	Consumer Income Quintile 5	Consumer Income Quintile 5
Stress Test Measures										
Tier 1 Capital GAP	0.0185		-0.0712**		-0.0795**		-0.1882***		-0.2402***	
	(0.6309)		(-2.2249)		(-2.1422)		(-7.0335)		(-8.0523)	
Total Capital GAP		0.0059		-0.0784***		-0.0623*		-0.1570***		-0.2135***
		(0.2260)		(-2.6392)		(-1.7278)		(-6.2104)		(-7.4442)
Log(1+ Credit Limit)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	310,587	310,587	324,684	324,684	301,953	301,953	344,542	344,542	290,687	290,687
R-squared	0.452	0.452	0.414	0.414	0.378	0.378	0.362	0.362	0.323	0.323

Table 5: Effects of Stress Tests on Credit Card Rewards and Promotions

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card rewards and promotions for new originations using both the firm–county–month aggregated sample as well as a 1% random loan-level sample. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017. We report both main effects and risk segmentation by FICO and consumer income. The dependent variables for the aggregated sample are: *%Rewards/Promotions*, *%Rewards: Cash Back*, *%Rewards: Miles*, and *%Promotions*, the percent of new credit cards with rewards and promotions, cash-back rewards, miles rewards, or start-up promotions at the firm-county level. The dependent variables for the 1% random sample are *Rewards/Promotions*, *Rewards: Cash Back*, *Rewards: Miles*, and *Promotions*, indicators for new credit cards with rewards and promotions, cash-back rewards, miles rewards, or start-up promotions at the account level. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced), both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, an indicator for consumers with joint accounts, an indicator for interest rate accounts, and an indicator for relationship consumers. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Full Sample: Aggregated Sample and 1% Random Sample Results

Panel A1: Full Sample – Aggregated Sample

Independent Variables:	(1) % Rewards/Promotions	(2) % Rewards/Promotions	(3) % Rewards: Cash Back	(4) % Rewards: Cash Back	(5) % Rewards: Miles	(6) % Rewards: Miles	(7) % Promotions	(8) % Promotions
Stress Test Measures	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample
Tier 1 Capital GAP	0.0210***		0.0057***		0.0053***		0.0099***	
	(38.9850)		(19.9652)		(44.8629)		(28.6042)	
Total Capital GAP		0.0163***		0.0051***		0.0050***		0.0062***
		(35.9523)		(19.2930)		(42.4545)		(21.2111)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.678	0.678	0.552	0.552	0.452	0.452	0.638	0.637

Panel A2: Full Sample – 1% Random Sample

Independent Variables:	(1) Rewards/Promotions	(2) Rewards/Promotions	(3) Rewards: Cash Back	(4) Rewards: Cash Back	(5) Rewards: Miles	(6) Rewards: Miles	(7) Promotions	(8) Promotions
Stress Test Measures	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample
Tier 1 Capital GAP	0.0174***		0.0036***		0.0110***		0.0023***	
	(19.7337)		(5.2472)		(23.0977)		(5.2260)	
Total Capital GAP		0.0124***		0.0014**		0.0104***		-0.0002
		(14.5916)		(2.0408)		(23.1970)		(-0.4034)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,686,990	1,686,990	1,686,990	1,686,990	1,686,990	1,686,990	1,686,990	1,686,990
R-squared	0.310	0.310	0.272	0.272	0.122	0.122	0.334	0.334

Panel B: Full Sample: Segmentation by Granular FICO — 1% Random Sample Results

	CC Cash Rewards, Miles Rewards, and Promotions for New Originations											
Independent Variables:	FICO<620	FICO<620	FICO [620, 680)	FICO [620, 680)	FICO [680, 720)	FICO [680, 720)	FICO [720, 760)	FICO [720, 760)	FICO [760, 800)	FICO [760, 800)	FICO≥800	FICO≥800
	Dependent Variable = CC Rewards: Cash Back for New Originations											
Stress Test Measures	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tier 1 Capital GAP	0.0089***		0.0096***		0.0076***		0.0034**		0.0018		-0.0101***	
	(4.0196)		(9.5893)		(6.3085)		(2.4695)		(1.1804)		(-7.9142)	
Total Capital GAP		0.0071***		0.0076***		0.0052***		0.0012		-0.0006		-0.0135***
		(3.6268)		(7.8414)		(4.6136)		(0.9635)		(-0.4125)		(-10.9203)
Observations	84,103	84,103	332,761	332,761	269,774	269,774	258,159	258,159	245,882	245,882	361,361	361,361
R-squared	0.293	0.293	0.310	0.310	0.345	0.345	0.345	0.345	0.343	0.343	0.339	0.339
	Dependent Variable = CC Rewards: Miles for New Originations											
Stress Test Measures	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tier 1 Capital GAP	0.0041***		0.0042***		0.0057***		0.0090***		0.0136***		0.0215***	
	(3.4880)		(6.4770)		(7.7261)		(10.7418)		(15.1391)		(23.1098)	
Total Capital GAP		0.0035***		0.0039***		0.0055***		0.0087***		0.0133***		0.0204***
		(3.4972)		(6.6238)		(7.9580)		(10.9355)		(15.2108)		(23.3141)
Observations	84,103	84,103	332,761	332,761	269,774	269,774	258,159	258,159	245,882	245,882	361,361	361,361
R-squared	0.239	0.239	0.170	0.170	0.167	0.167	0.172	0.172	0.196	0.196	0.181	0.181
	Dependent Variable = CC Promotion for New Originations											
Stress Test Measures	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tier 1 Capital GAP	0.0066**		0.0021*		0.0021**		-0.0007		-0.0018*		-0.0002	
	(2.5414)		(1.8643)		(2.0667)		(-0.6642)		(-1.6483)		(-0.2353)	
Total Capital GAP		0.0061**		0.0001		-0.0002		-0.0034***		-0.0045***		-0.0027***
		(2.5761)		(0.1138)		(-0.1706)		(-3.5770)		(-4.3175)		(-2.9925)
Observations	84,103	84,103	332,761	332,761	269,774	269,774	258,159	258,159	245,882	245,882	361,361	361,361
R-squared	0.364	0.364	0.390	0.390	0.451	0.451	0.420	0.420	0.411	0.411	0.361	0.361
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Panel C: Segmentation by Consumer-Level Income (Quintiles)

	CC Cash Rewards, Miles Rewards, and Promotions for New Originations									
Independent Variables:	Borrower Income Quintile 1	Borrower Income Quintile 1	Borrower Income Quintile 2	Borrower Income Quintile 2	Borrower Income Quintile 3	Borrower Income Quintile 3	Borrower Income Quintile 4	Borrower Income Quintile 4	Borrower Income Quintile 5	Borrower Income Quintile 5
	Dependent Variable = CC Rewards: Cash Back for New Originations									
Stress Test Measures	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Tier 1 Capital GAP	0.0055***		0.0054***		0.0047***		0.0041***		-0.0010	
	(4.6594)		(3.7214)		(3.4723)		(3.4199)		(-0.8432)	
Total Capital GAP		0.0034***		0.0035**		0.0026**		0.0016		-0.0035***
		(3.1526)		(2.5141)		(2.1149)		(1.3935)		(-2.9663)
Observations	310,587	310,587	324,684	324,684	301,953	301,953	344,542	344,542	290,687	290,687
R-squared	0.396	0.396	0.344	0.344	0.326	0.326	0.290	0.290	0.263	0.263
	Dependent Variable = CC Rewards: Miles for New Originations									
Stress Test Measures	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Tier 1 Capital GAP	0.0035***		0.0048***		0.0085***		0.0130***		0.0201***	
	(6.2750)		(8.4566)		(12.4190)		(16.1179)		(17.1842)	
Total Capital GAP		0.0035***		0.0048***		0.0080***		0.0123***		0.0195***
		(6.5966)		(8.9886)		(12.0155)		(16.3241)		(17.3814)
Observations	310,587	310,587	324,684	324,684	301,953	301,953	344,542	344,542	290,687	290,687
R-squared	0.190	0.190	0.163	0.163	0.180	0.180	0.176	0.176	0.179	0.179
	Dependent Variable = CC Rewards: Cash Back for New Originations									
Stress Test Measures	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Tier 1 Capital GAP	0.0125***		0.0008		-0.0039***		-0.0069***		-0.0079***	
	(12.9567)		(0.7598)		(-3.2853)		(-7.0012)		(-6.5723)	
Total Capital GAP		0.0097***		-0.0009		-0.0057***		-0.0082***		-0.0099***
		(10.7544)		(-0.8445)		(-5.1605)		(-8.7238)		(-8.5386)
Observations	310,587	310,587	324,684	324,684	301,953	301,953	344,542	344,542	290,687	290,687
R-squared	0.396	0.396	0.344	0.344	0.326	0.326	0.290	0.290	0.263	0.263
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 6: Effects of Stress Tests on Consumer Credit — Splits by BHC Characteristics

This table reports regression estimates for analyzing the effects of stress tests on consumer credit for new originations by focusing on several splits by BHC characteristics using the firm–county–month aggregated sample. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017. Panel A splits the sample into Local/Non-Local lenders based on whether or not the lender has local branches in the consumer county of residence. Panel B splits the sample into large versus small BHC credit card loan growth using the BHC median as a threshold. Panel C splits the sample into large versus small lender based on whether the lender is in the top 5 largest or not in terms of total assets. Panel D splits the sample into large versus small BHC capital ratio using the BHC median capital ratio (total equity/total assets) as a threshold. The dependent variables are: *Credit Limit/County Population*, credit card limit at the firm-county level divided by the county population for new originations; *CC Cycle APR*, the average APR used for the cycle for consumer retail purchases at the firm-county level; *%Rewards/Promotions*, *%Rewards: Cash Back*, *%Rewards: Miles*, and *%Promotions*, the percent of new credit cards with rewards and promotions, cash-back rewards, miles rewards, or start-up promotions at the firm-county level. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, an indicator for consumers with joint accounts, an indicator for interest rate accounts, and an indicator for relationship consumers. In all pricing regressions, we also include *Log(1+ Credit Limit)* as a control variable. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Splits by Local/Non-Local Presence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Independent Variables:	Credit Limit/County Population				Cycle APR				% Rewards/Promotions			
Group	LOCAL LENDER (LOCAL BRANCHES: YES)		NON-LOCAL LENDER (LOCAL BRANCHES: NO)		LOCAL LENDER (LOCAL BRANCHES: YES)		NON-LOCAL LENDER (LOCAL BRANCHES: NO)		LOCAL LENDER (LOCAL BRANCHES: YES)		NON-LOCAL LENDER (LOCAL BRANCHES: NO)	
Stress Test Measures												
Tier 1 Capital GAP	-0.2329***		-0.1514***		-0.3941***		-0.3587***		0.0160***		0.0206***	
	(-10.5829)		(-28.7066)		(-20.5026)		(-51.7985)		(15.2465)		(28.3279)	
Total Capital GAP		-0.2755***		-0.1559***		-0.4337***		-0.3279***		0.0107***		0.0161***
		(-10.6953)		(-30.0605)		(-22.7471)		(-50.6799)		(10.2542)		(26.1457)
Borrower & Loan Characteristics at Origination	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	203,276	203,276	1,088,371	1,088,371	203,276	203,276	1,108,094	1,108,094	203,276	203,276	1,108,094	1,108,094
R-squared	0.681	0.681	0.644	0.644	0.726	0.726	0.637	0.636	0.756	0.755	0.686	0.685

Panel B: Splits by Credit Card Loans Growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Independent Variables:	Credit Limit/County Population				Cycle APR				% Rewards/Promotions			
Group	LARGE CC GROWTH (≥ BHC MEDIAN)		SMALL CC GROWTH (< BHC MEDIAN)		LARGE CC GROWTH (≥ BHC MEDIAN)		SMALL CC GROWTH (< BHC MEDIAN)		LARGE CC GROWTH (≥ BHC MEDIAN)		SMALL CC GROWTH (< BHC MEDIAN)	
Stress Test Measures												
Tier 1 Capital GAP	-0.3563***		-0.1243***		-0.4935***		-0.2254***		0.0205***		0.0307***	
	(-40.7894)		(-18.6810)		(-64.6969)		(-29.7072)		(41.1773)		(37.3889)	
Total Capital GAP		-0.3668***		-0.1262***		-0.4526***		-0.2254***		0.0158***		0.0274***
		(-42.2932)		(-18.6745)		(-62.8855)		(-30.8973)		(36.9194)		(37.2241)
Borrower & Loan Characteristics at Origination	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	696,967	696,967	611,555	611,555	705,461	705,461	621,411	621,411	705,461	705,461	621,411	621,411
R-squared	0.582	0.582	0.658	0.658	0.654	0.654	0.673	0.673	0.709	0.709	0.707	0.706

Panel C: Splits by BHC Size

Independent Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Credit Limit/County Population				Cycle APR				% Rewards/Promotions			
Group	LARGE LENDER (TOP5)		SMALL LENDER (NON-TOP5)		LARGE LENDER (TOP5)		SMALL LENDER (NON-TOP5)		LARGE LENDER (TOP5)		SMALL LENDER (NON-TOP5)	
Stress Test Measures												
Tier 1 Capital GAP	-0.0751***		-0.0807***		-0.2648***		-0.7948***		0.0108***		0.0097***	
	(-10.4713)		(-22.9199)		(-52.0749)		(-70.0275)		(29.5948)		(9.3774)	
Total Capital GAP		-0.1027***		-0.0799***		-0.2720***		-0.7607***		0.0090***		0.0104***
		(-14.0027)		(-24.1689)		(-54.1457)		(-68.2367)		(24.7405)		(10.0939)
Borrower & Loan Characteristics at Origination	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	816,998	816,998	486,693	486,693	831,948	831,948	489,340	489,340	831,948	831,948	489,340	489,340
R-squared	0.598	0.598	0.443	0.443	0.679	0.679	0.748	0.747	0.510	0.510	0.783	0.783

Panel D: Splits by BHC Capitalization

Independent Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Credit Limit/County Population				Cycle APR				% Rewards/Promotions			
Group	HIGH CAPITAL (≥ BHC MEDIAN)		LOW CAPITAL (< BHC MEDIAN)		HIGH CAPITAL (≥ BHC MEDIAN)		LOW CAPITAL (< BHC MEDIAN)		HIGH CAPITAL (≥ BHC MEDIAN)		LOW CAPITAL (< BHC MEDIAN)	
Stress Test Measures												
Tier 1 Capital GAP	-0.0694***		-0.1430***		-0.4128***		-0.2838***		0.0033***		0.0133***	
	(-11.5888)		(-18.7068)		(-41.3766)		(-53.0468)		(3.7891)		(31.9978)	
Total Capital GAP		-0.0719***		-0.1569***		-0.3663***		-0.2852***		0.0014*		0.0098***
		(-12.4550)		(-19.9372)		(-38.1988)		(-53.1112)		(1.7114)		(24.7818)
Borrower & Loan Characteristics at Origination	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	466,142	466,142	843,259	843,259	470,702	470,702	856,513	856,513	470,702	470,702	856,513	856,513
R-squared	0.759	0.759	0.584	0.584	0.774	0.774	0.638	0.638	0.805	0.805	0.477	0.476

Table 7: Effects of Stress Tests on Consumer Credit — Splits by Neighborhood Characteristics

This table reports regression estimates for analyzing the effects of stress tests on consumer credit for new originations by focusing on several splits by neighborhood characteristics using the firm–county–month aggregated sample. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017. Panel A splits the sample into urban and rural counties based on whether the consumer county of residence is in a predominantly urban area (50% or more) or not. Panel B splits the sample into counties with high versus small % of minorities in the consumer county of residence using the % minority's median as a threshold. Panel C splits the sample into high- and low-income counties based on whether the population-weighted ratio of tract family median to MSA median income at county level is higher or below 1. Panel D splits the sample into high- and low-income counties based on the prevalence of the FFIEC Census low-income tract indicator aggregated at the county level (with a prevalence of 50% or more being denoted as low income). Panel E splits the sample into counties with high versus small unemployment rate in the consumer county of residence using the unemployment rate's median as a threshold. The dependent variables are: *Credit Limit/County Population*, credit card limit at the firm-county level divided by the county population for new originations; *CC Cycle APR*, the average APR used for the cycle for consumer retail purchases at the firm-county level; *%Rewards/Promotions*, *%Rewards: Cash Back*, *%Rewards: Miles*, and *%Promotions*, the percent of new credit cards with rewards and promotions, cash-back rewards, miles rewards, or start-up promotions at the firm-county level. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, an indicator for consumers with joint accounts, an indicator for interest rate accounts, and an indicator for relationship consumers. In all pricing regressions, we also include *Log(1+ Credit Limit)* as a control variable. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Splits by County Urban/Rural:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Independent Variables:	Credit Limit/County Population				Cycle APR				% Rewards/Promotions			
Group	URBAN		RURAL		URBAN		RURAL		URBAN		RURAL	
Stress Test Measures												
Tier 1 Capital GAP	-0.2553***		-0.1807***		-0.3279***		-0.3902***		0.0243***		0.0183***	
	(-24.1254)		(-29.7011)		(-35.0402)		(-45.4027)		(28.1271)		(28.4410)	
Total Capital GAP		-0.2689***		-0.1847***		-0.2957***		-0.3658***		0.0183***		0.0148***
		(-23.9476)		(-30.8539)		(-34.2215)		(-45.5248)		(25.0469)		(26.7634)
Borrower & Loan Characteristics at Origination	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	575,650	575,650	759,528	759,528	592,979	592,979	762,053	762,053	592,979	592,979	762,053	762,053
R-squared	0.637	0.637	0.586	0.586	0.691	0.691	0.585	0.585	0.732	0.731	0.637	0.637

Panel B: Splits by County % Minority

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Independent Variables:	Credit Limit/County Population				Cycle APR				% Rewards/Promotions			
Group	HIGH %MINORITY (UPPER HALF)		LOW %MINORITY (BOTTOM HALF)		HIGH %MINORITY (UPPER HALF)		LOW %MINORITY (BOTTOM HALF)		HIGH %MINORITY (UPPER HALF)		LOW %MINORITY (BOTTOM HALF)	
Stress Test Measures												
Tier 1 Capital GAP	-0.2149***		-0.2226***		-0.3393***		-0.3747***		0.0203***		0.0222***	
	(-22.0088)		(-32.9919)		(-37.1278)		(-41.4726)		(29.7248)		(26.8644)	
Total Capital GAP		-0.2233***		-0.2296***		-0.3104***		-0.3488***		0.0157***		0.0172***
		(-22.2292)		(-34.3834)		(-35.8125)		(-41.9181)		(27.4608)		(24.7910)
Borrower & Loan Characteristics at Origination	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	655,984	655,984	678,924	678,924	674,182	674,182	678,924	678,924	674,182	674,182	678,924	678,924
R-squared	0.558	0.558	0.634	0.634	0.638	0.638	0.630	0.630	0.700	0.700	0.658	0.658

Panel C: Splits by County Income (Tract/MSA)

Independent Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Credit Limit/County Population				Cycle APR				% Rewards/Promotions			
Group	HIGH INCOME (TRACT MED/MSA≥1)		LOW INCOME (TRACT MED/MSA<1)		HIGH INCOME (TRACT MED/MSA≥1)		LOW INCOME (TRACT MED/MSA<1)		HIGH INCOME (TRACT MED/MSA≥1)		LOW INCOME (TRACT MED/MSA<1)	
Stress Test Measures												
Tier 1 Capital GAP	-0.1746***		-0.2658***		-0.3656***		-0.3113***		0.0186***		0.0279***	
	(-34.0243)		(-16.9531)		(-49.5880)		(-24.4043)		(33.8985)		(22.9426)	
Total Capital GAP		-0.1790***		-0.2875***		-0.3405***		-0.2787***		0.0147***		0.0206***
		(-35.4423)		(-17.5734)		(-49.3690)		(-23.1427)		(31.4167)		(19.9185)
Borrower & Loan Characteristics at Origination	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	990,611	990,611	344,567	344,567	1,009,974	1,009,974	345,058	345,058	1,009,974	1,009,974	344,297	344,297
R-squared	0.623	0.623	0.612	0.612	0.617	0.617	0.664	0.664	0.666	0.666	0.719	0.718

Panel D: Splits by County HMDA/CRA Low Income Indicator

Independent Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Credit Limit/County Population				Cycle APR				% Rewards/Promotions			
Group	CRA LOW INCOME INDICATOR=0		CRA LOW INCOME INDICATOR=1		CRA LOW INCOME INDICATOR=0		CRA LOW INCOME INDICATOR=1		CRA LOW INCOME INDICATOR=0		CRA LOW INCOME INDICATOR=1	
Stress Test Measures												
Tier 1 Capital GAP	-0.1849***		-0.3017***		-0.3722***		-0.3304***		0.0193***		0.0265***	
	(-31.7014)		(-16.5161)		(-49.7492)		(-27.7711)		(31.2327)		(25.2410)	
Total Capital GAP		-0.1904***		-0.3193***		-0.3458***		-0.3007***		0.0151***		0.0203***
		(-33.4185)		(-16.6232)		(-49.4455)		(-27.0456)		(28.9813)		(22.7768)
Borrower & Loan Characteristics at Origination	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,006,482	1,006,482	328,696	328,696	1,019,292	1,019,292	335,740	335,740	1,019,292	1,019,292	334,979	334,979
R-squared	0.594	0.594	0.631	0.631	0.607	0.607	0.695	0.695	0.656	0.655	0.751	0.750

Panel E: Splits by County Unemployment Rate

Independent Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Credit Limit/County Population				Cycle APR				% Rewards/Promotions			
Group	HIGH UR (UPPER HALF)		LOW UR (BOTTOM HALF)		HIGH UR (UPPER HALF)		LOW UR (BOTTOM HALF)		HIGH UR (UPPER HALF)		LOW UR (BOTTOM HALF)	
Stress Test Measures												
Tier 1 Capital GAP	-0.1368***		-0.1167***		-0.2934***		-0.2799***		0.0181***		0.0191***	
	(-14.2398)		(-10.8266)		(-32.0519)		(-31.4941)		(31.1082)		(23.0259)	
Total Capital GAP		-0.1387***		-0.1370***		-0.2758***		-0.2509***		0.0148***		0.0137***
		(-14.6625)		(-12.9533)		(-31.4048)		(-29.7963)		(28.7555)		(19.1288)
Borrower & Loan Characteristics at Origination	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Local Market Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	654,912	654,912	680,266	680,266	673,371	673,371	680,266	680,266	673,371	673,371	680,266	680,266
R-squared	0.623	0.623	0.577	0.577	0.622	0.621	0.639	0.639	0.676	0.675	0.692	0.692

Table 8: Effects of Stress Tests on Credit Usage Pooled and by Risk Segment

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card credit usage post-origination using a 1% random loan-level sample. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017. We report both pooled main effects and risk segmentation by FICO groups. The dependent variables include several consumer credit usage indicators such as total and average purchase volume, average utilization rate, average cycle balance, average daily balance, and total consumer debt (balance+payments-new purchases), all computed over 24 months since origination. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, an indicator for consumers with joint accounts, an indicator for interest rate accounts, and an indicator for relationship consumers. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Consumer Credit Usage and Debt (24 months since origination)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Independent Variables:	Log(1+Sum Purchase Volume)	Log(1+Sum Purchase Volume)	Log(1+Avg Purchase Volume)	Log(1+Avg Purchase Volume)	24mos Avg Util Rate	24mos Avg Util Rate	Log(1+Avg Cycle Balance)	Log(1+Avg Cycle Balance)	Log(1+Avg Daily Balance)	Log(1+Avg Daily Balance)	Log(1+Sum Total Debt)	Log(1+Sum Total Debt)
Stress Test Measures												
Tier 1 Capital GAP	0.0963***		0.0517***		0.0022***		0.0692***		0.1994***		-0.1418***	
	(17.7597)		(14.2180)		(3.5560)		(14.2621)		(41.9484)		(-20.0973)	
Total Capital GAP		0.0866***		0.0430***		0.0018***		0.0557***		0.1944***		-0.1222***
		(17.8444)		(13.2071)		(2.9786)		(12.3641)		(42.7291)		(-17.2892)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,674,704	1,674,704	1,651,935	1,651,935	1,662,883	1,662,883	1,651,755	1,651,755	1,651,192	1,651,192	1,673,129	1,673,129
R-squared	0.198	0.198	0.236	0.236	0.096	0.096	0.247	0.247	0.271	0.271	0.285	0.285

Panel B: Consumer Credit Usage by FICO (24 months since origination)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Log(1+SumPurchase Volume)		Log(1+SumPurchase Volume)		Log(1+AvgPurchase Volume)		Log(1+AvgPurchase Volume)		24mos Avg Util Rate		24mos Avg Util Rate	
Independent Variables:	FICO<680	FICO<680	FICO≥680	FICO≥680	FICO<680	FICO<680	FICO≥680	FICO≥680	FICO<680	FICO<680	FICO≥680	FICO≥680
Stress Test Measures												
Tier 1 Capital GAP	0.0583***		0.1077***		0.0358***		0.0560***		0.0047***		0.0023***	
	(7.2769)		(15.6839)		(6.5402)		(11.9949)		(4.5674)		(3.0666)	
Total Capital GAP		0.0586***		0.0960***		0.0328***		0.0457***		0.0038***		0.0019**
		(8.2776)		(15.3925)		(6.6836)		(10.7488)		(4.0598)		(2.4192)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	434,402	434,402	1,206,379	1,206,379	429,878	429,878	1,188,281	1,188,281	431,160	431,160	1,197,930	1,197,930
R-squared	0.202	0.202	0.220	0.220	0.239	0.239	0.260	0.260	0.245	0.245	0.044	0.044

Panel C: Consumer Credit Usage and Debt by FICO (24 months since origination)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Log(1+ AvgCycle Balance)		Log(1+ AvgCycle Balance)		Log(1+ AvgDaily Balance)		Log(1+ AvgDaily Balance)		Log(1+Sum TotaDebt)		Log(1+Sum TotaDebt)	
Independent Variables:	FICO <680	FICO <680	FICO ≥680	FICO ≥680	FICO <680	FICO <680	FICO ≥680	FICO ≥680	FICO <680	FICO <680	FICO ≥680	FICO ≥680
Stress Test Measures												
Tier 1 Capital GAP	0.0291***		0.0781***		0.1221***		0.2067***		-0.2868***		-0.0623***	
	(4.7602)		(13.0665)		(16.9892)		(35.9538)		(-26.9883)		(-7.6034)	
Total Capital GAP		0.0253***		0.0631***		0.1203***		0.2037***		-0.2491***		-0.0437***
		(4.5858)		(11.1593)		(17.8663)		(37.3093)		(-24.9618)		(-5.3507)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	429,860	429,860	1,188,160	1,188,160	427,987	427,987	1,189,512	1,189,512	433,960	433,960	1,205,248	1,205,248
R-squared	0.226	0.226	0.269	0.269	0.236	0.236	0.299	0.299	0.360	0.360	0.291	0.291

Table 9: Effects of Stress Tests on Consumer Credit Performance Pooled and by Risk Segment

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card performance of new originations using a 1% random loan-level sample. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017. We report both pooled main effects and risk segmentation by FICO groups. The dependent variables include credit delinquency and performance indicators such as 60 days past due, average number of days past due, bankruptcy, and FICO decline, all calculated over 24 months since origination. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced), both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, an indicator for consumers with joint accounts, an indicator for interest rate accounts, and an indicator for relationship consumers. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Consumer Credit Performance (24 months since origination)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent Variables:	24mos 60DPD	24mos 60DPD	24mos Avg Days Past Due	24mos Avg Days Past Due	24mos Bankruptcy	24mos Bankruptcy	24mos FICO Decline	24mos FICO Downgrade
Stress Test Measures								
Tier 1 Capital GAP	-0.0024***		-0.0698***		0.0001		-0.0011**	
	(-8.6596)		(-6.9090)		(1.4301)		(-2.1001)	
Total Capital GAP		-0.0018***		-0.0489***		0.0001		-0.0006
		(-6.8642)		(-4.7744)		(1.2440)		(-1.2052)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,662,883	1,662,883	1,662,883	1,662,883	1,662,883	1,662,883	1,662,883	1,662,883
R-squared	0.143	0.143	0.165	0.165	0.066	0.066	0.081	0.081

Panel B: Consumer Credit Performance by FICO (24 months since origination)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent Variables:	24mos 60DPD FICO<680	24mos 60DPD FICO<680	24mos 60DPD FICO≥680	24mos 60DPD FICO≥680	24mos Avg Days Past Due FICO<680	24mos Avg Days Past Due FICO<680	24mos Avg Days Past Due FICO≥680	24mos Avg Days Past Due FICO≥680
Stress Test Measures								
Tier 1 Capital GAP	-0.0014		-0.0012***		-0.0025		-0.0369***	
	(-1.6261)		(-5.2442)		(-0.0855)		(-6.1262)	
Total Capital GAP		-0.0004		-0.0011***		0.0321		-0.0333***
		(-0.5593)		(-4.8453)		(1.1421)		(-5.6171)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES
Observations	431,160	431,160	1,197,930	1,197,930	431,160	431,160	1,197,930	1,197,930
R-squared	0.182	0.182	0.086	0.086	0.224	0.224	0.084	0.084

Panel C: Consumer Credit Performance by FICO (24 months since origination) cont.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	24mos Bankruptcy		24mos Bankruptcy		24mos FICO Decline		24mos FICO Downgrade	
Independent Variables:	FICO<680	FICO<680	FICO≥680	FICO≥680	FICO<680	FICO<680	FICO≥680	FICO≥680
Stress Test Measures								
Tier 1 Capital GAP	0.0002		-0.0000		-0.0036***		0.0006	
	(1.0495)		(-0.5170)		(-3.3537)		(0.9111)	
Total Capital GAP		0.0001		-0.0000		-0.0033***		0.0012**
		(0.9940)		(-0.5820)		(-3.3336)		(1.9795)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES
Observations	431,160	431,160	1,197,930	1,197,930	431,160	431,160	1,197,930	1,197,930
R-squared	0.123	0.123	0.075	0.075	0.135	0.135	0.090	0.090

Table 10: Effects of Stress Tests on Existing Credit Card Accounts

This table reports regression estimates for analyzing the effects of stress tests on credit card consumer credit for existing accounts (24 months or older) using a 0.2% random loan-level sample. The loan-level data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017. We report both pooled main effects and segmentation by FICO and account age groups. The dependent variables are: *Line Increase*, an indicator equal to one if the credit card limit was increased on the account; *CC Cycle APR*, the average APR used for the cycle for consumer retail purchases at the firm-county level. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, an indicator for consumers with joint accounts, an indicator for interest rate accounts, and an indicator for relationship consumers. In the pricing regressions, we also include *Log(1+ Credit Limit)* as a control variable. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Credit Effects for Existing CC Accounts: Line Increase and Purchase APR (Full Sample and Segmentation by FICO 680)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Independent Variables:	Dependent Variable = Line Increase		Dependent Variable = Purchase APR		Dependent Variable = Line Increase					Dependent Variable = Purchase APR		
Stress Test Measures	Full Sample		Full Sample		FICO<680		FICO≥680		FICO<680		FICO≥680	
Tier 1 Capital GAP	0.0007***		0.0505***		0.0002*		0.0008***		0.0072		0.0907***	
	(16.1350)		(10.6960)		(1.7255)		(17.1614)		(0.7106)		(17.4419)	
Total Capital GAP		0.0008***		0.0352***		0.0004***		0.0009***		-0.0005		0.0733***
		(19.3690)		(8.0351)		(3.6603)		(19.4091)		(-0.0520)		(15.1249)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Log(1+Loan Amount)	NO	NO	YES	YES	NO	NO	NO	NO	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	15,930,012	15,930,012	15,930,012	15,930,012	4,170,164	4,170,164	11,734,924	11,734,924	4,170,164	4,170,164	11,734,924	11,734,924
R-squared	0.014	0.014	0.442	0.442	0.035	0.035	0.019	0.019	0.271	0.271	0.458	0.458

Panel B: Credit Effects for Existing CC Accounts: Line Increase and Purchase APR (Segmentation by CC Account Age)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Independent Variables:	Dependent Variable = Line Increase								Dependent Variable = Purchase APR							
Stress Test Measures	CC Age [2,3 years)		CC Age [3,5 years)		CC Age [5,10 years)		CC Age ≥ 10 years		CC Age [2,3 years)		CC Age [3,5 years)		CC Age [5,10 years)		CC Age ≥ 10 years	
Tier 1 Capital GAP	0.0013***		0.0008***		0.0001		0.0003*		-0.1294***		-0.0063		0.3096***		0.0580***	
	(11.6317)		(8.1319)		(1.6363)		(1.8131)		(-11.8019)		(-0.6266)		(38.1005)		(5.3691)	
Total Capital GAP		0.0013***		0.0009***		0.0002***		0.0004***		-0.1326***		-0.0198**		0.2653***		0.0512***
		(12.7483)		(9.8164)		(3.2986)		(2.6126)		(-13.1668)		(-2.0819)		(35.3971)		(5.3597)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Log(1+Loan Amount)	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	3,447,843	3,447,843	4,424,521	4,424,521	5,453,848	5,453,848	2,512,022	2,512,022	3,447,843	3,447,843	4,424,521	4,424,521	5,453,848	5,453,848	2,512,022	2,512,022
R-squared	0.040	0.040	0.032	0.032	0.028	0.028	0.048	0.048	0.472	0.472	0.471	0.471	0.357	0.357	0.288	0.288

Table 11: Effects of Stress Tests on Other Consumer Products: New Mortgage Originations

This table reports regression estimates for analyzing the effects of stress tests on consumer mortgage credit supply for new originations using an aggregated firm–county–month sample in Panel A and a 10% random loan-level sample in Panel B. Panel C reports segmentation by FICO groups using the 10% random sample. Panel D reports performance for newly originated mortgages over 24 months since origination using the 10% random sample. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2012–December 2017. In Panels A C, the dependent variables several measures for mortgage loan amount including *Loan Amount / County Population*, *Log(1+Loan Amount)*, *Log(1+AvgLoan Amount)*, and *Log(1+No. New Loans)* in the aggregated sample and *Log(1+Loan Amount)* in the 10% random loan-level sample. Both the aggregated and random samples also use interest rate and maturity (months) for new originations as dependent variables. Panel D includes as dependent variables several credit performance indicators such as 90 days past due, foreclosure/REO, and bankruptcy, all calculated over 24 months since origination. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls specific to mortgages measured at the origination time: consumer credit score, LTV ratio, property type dummies (single family 2-4 units, condo, planned unit development; other), occupancy type dummies (primary home, secondary home, investment, other), loan purpose type dummies (refinance, cash-out, other)). In all pricing and maturity regressions, we also include *Log(1+ Loan Amount)* as a control variable. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Credit Effects for New Mortgage Originations (Aggregate Sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Independent Variables:	Dependent Variable = Loan Amount / Population		Dependent Variable = Log(1+ Loan Amount)		Dependent Variable = Log(1+AvgLoan Amount)		Dependent Variable = Log(1+ No New Loans)		Dependent Variable = Mortgage Interest Rate		Dependent Variable = Log(1+Mortgage Maturity) (Months)	
Stress Test Measures												
Tier 1 Capital GAP	-2.0207***		-0.0824***		0.0231***		-0.0884***		0.0021***		0.0049***	
	(-23.7610)		(-19.0585)		(13.9906)		(-24.1228)		(11.7205)		(6.7726)	
Total Capital GAP		-2.0685***		-0.0824***		0.0187***		-0.0856***		0.0022***		0.0032***
		(-24.0625)		(-18.3151)		(11.1880)		(-22.5940)		(10.7513)		(4.4957)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Log(1+Loan Amount)	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	341,355	341,355	341,355	341,355	341,355	341,355	341,355	341,355	340,420	340,420	341,355	341,355
R-squared	0.512	0.512	0.691	0.691	0.744	0.744	0.567	0.566	0.295	0.296	0.611	0.611

Panel B: Credit Effects for New Mortgage Originations (10% Random Sample)

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Dependent Variable = Log(1+Loan Amount)		Dependent Variable = Mortgage Interest Rate		Dependent Variable = Log(1+Mortgage Maturity) (Months)	
Stress Test Measures						
Tier 1 Capital GAP	0.0322***		0.0022***		0.0052***	
	(8.9340)		(6.3877)		(3.8731)	
Total Capital GAP		0.0281***		0.0021***		0.0047***
		(7.1317)		(5.3045)		(3.5264)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
Log(1+Loan Amount)	NO	NO	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	337,457	337,457	337,457	337,457	337,457	337,457
R-squared	0.607	0.606	0.265	0.265	0.416	0.416

Panel C: Credit Effects for New Mortgage Originations — Risk Segmentation by FICO (10% Random Sample)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

Independent Variables:	Dependent Variable = Log(1+Loan Amount)				Dependent Variable = Mortgage Interest Rate				Dependent Variable = Log(1+Mortgage Maturity) (Months)			
Stress Test Measures	FICO<680		FICO≥680		FICO<680		FICO≥680		FICO<680		FICO≥680	
Tier 1 Capital GAP	0.0128		0.0337***		0.0008		0.0023***		0.0040		0.0056***	
	(0.6612)		(9.0035)		(0.7766)		(6.4305)		(0.3898)		(4.3343)	
Total Capital GAP		0.0242		0.0293***		-0.0001		0.0023***		0.0064		0.0051***
		(1.0323)		(7.2642)		(-0.0677)		(5.4271)		(0.5573)		(3.9951)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Log(1+Loan Amount)	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	13,760	13,760	316,864	316,864	13,760	13,760	316,864	316,864	13,760	13,760	316,864	316,864
R-squared	0.605	0.605	0.606	0.606	0.697	0.697	0.270	0.270	0.458	0.458	0.419	0.419

Panel D: Performance Effects for New Mortgage Originations (10% Random Sample)

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Dependent Variable = 24mos 90DPD		Dependent Variable = 24mos Foreclosure/REO		Dependent Variable = 24mos Bankruptcy	
Stress Test Measures						
Tier 1 Capital GAP	-0.0002		-0.0000		-0.0000	
	(-0.8745)		(-0.3764)		(-0.0527)	
Total Capital GAP		-0.0003		-0.0000		-0.0000
		(-1.2459)		(-0.3032)		(-0.2431)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	183,478	183,478	183,478	183,478	183,478	183,478
R-squared	0.225	0.225	0.278	0.278	0.224	0.224

Table 12: Effects of Stress Tests on Other Consumer Products: New HELOC Originations

This table reports regression estimates for analyzing the effects of stress tests on home equity lines of credit (HELOCs) credit supply for new originations using an aggregated firm–county–month sample in Panel A and a 10% random loan-level sample in Panel B. Panel C reports segmentation by FICO groups using the 10% random sample. Panel D reports performance for newly originated HELOCs over 24 months since origination using the 10% random sample. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2012–December 2017. In Panels A C, the dependent variables several measures for mortgage loan amount including *Loan Amount / County Population*, *Log(1+Loan Amount)*, *Log(1+AvgLoan Amount)*, and *Log(1+No. New Loans)* in the aggregated sample and *Log(1+Loan Amount)* in the 10% random loan-level sample. Both the aggregated and random samples also use interest rate and HELOC draw period (months) for new originations as dependent variables. Panel D includes as dependent variables several credit performance indicators such as 90 days past due, foreclosure/REO, and bankruptcy, all calculated over 24 months since origination. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced), both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls specific to mortgages measured at the origination time: consumer credit score, CLTV ratio, property type dummies (single family 2-4 units, condo, planned unit development; other), occupancy type dummies (primary home, secondary home, investment, other), loan purpose type dummies (refinance, cash-out, other)). In all pricing and draw period regressions, we also include *Log(1+ Limit Amount)* as a control variable. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Credit Effects for New HELOCs (Aggregate Sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Independent Variables:	Dependent Variable = Limit Amount/Population		Dependent Variable = Log(1+ Limit Amount)		Dependent Variable = Log(1+Avg Limit Amount)		Dependent Variable = Log(1+No New Loans)		Dependent Variable = HELOC Interest Rate		Dependent Variable = Log(1+HELOC Draw Period)	
Stress Test Measures												
Tier 1 Capital GAP	0.0834***		0.0183***		0.0085***		0.0077***		0.0002***		-0.0063***	
	(4.4342)		(5.4567)		(5.3027)		(3.5822)		(6.4803)		(-9.0702)	
Total Capital GAP		0.0638***		0.0085**		0.0057***		0.0020		0.0004***		-0.0069***
		(2.9503)		(2.4036)		(3.4317)		(0.8765)		(9.9523)		(-8.8513)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Log(1+Loan Amount)	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	299,522	299,522	299,522	299,522	299,522	299,522	299,522	299,522	299,522	299,522	299,447	299,447
R-squared	0.494	0.494	0.579	0.579	0.519	0.519	0.538	0.538	0.509	0.509	0.567	0.567

Panel B: Credit Effects for New HELOCs (10% Random Sample)

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Dependent Variable = Log(1+ Limit Amount)		Dependent Variable = HELOC Interest Rate		Dependent Variable = Log(1+HELOC Draw Period) (Months)	
Stress Test Measures						
Tier 1 Capital GAP	0.0080**		0.0006***		-0.0026*	
	(2.5302)		(2.6158)		(-1.8699)	
Total Capital GAP		0.0070**		0.0009***		-0.0036**
		(2.1971)		(2.9927)		(-2.1955)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
Log(1+Loan Amount)	NO	NO	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	221,921	221,921	221,463	221,463	221,306	221,306
R-squared	0.335	0.334	0.162	0.162	0.425	0.425

Panel C: Credit Effects for New HELOCs — Risk Segmentation by FICO (10% Random Sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Independent Variables:	Dependent Variable = Log(1+Orig Limit Amount)				Dependent Variable = HELOC Interest Rate				Dependent Variable = Log(1+HELOC Draw Period) (Months)			
Stress Test Measures	FICO<680		FICO≥680		FICO<680		FICO≥680		FICO<680		FICO≥680	
Tier 1 Capital GAP	0.0490		0.0082**		0.0012		0.0006**		-0.0259***		-0.0024*	
	(1.2953)		(2.5437)		(1.0174)		(2.4439)		(-2.6962)		(-1.7454)	
Total Capital GAP		0.0565		0.0071**		0.0012		0.0008***		-0.0327***		-0.0033**
		(1.5071)		(2.1918)		(0.9870)		(2.8308)		(-2.7996)		(-2.0638)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Log(1+Loan Amount)	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,823	1,823	215,888	215,888	1,815	1,815	215,440	215,440	1,815	1,815	215,286	215,286
R-squared	0.564	0.564	0.332	0.332	0.713	0.713	0.157	0.157	0.671	0.672	0.424	0.424

Panel D: Performance Effects for New HELOCs (10% Random Sample)

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Dependent Variable = 24mos 90DPD		Dependent Variable = 24mos Foreclosure/REO		Dependent Variable = 24mos Bankruptcy	
Stress Test Measures						
Tier 1 Capital GAP	0.0001		-0.0000		0.0000	
	(0.4875)		(-0.6156)		(0.4460)	
Total Capital GAP		0.0000		-0.0001		-0.0000
		(0.1367)		(-0.8871)		(-0.2035)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
Log(1+Loan Amount)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	221,724	221,724	221,724	221,724	221,724	221,724
R-squared	0.144	0.144	0.162	0.162	0.149	0.149

Internet Appendix for "Banks' Stress Test Results and Their Impact on Consumer Credit Markets"

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A.1 Literature Review on Stress Testing

There is a growing literature on the U.S. bank stress tests. One strand of the literature focuses on the theoretical benefits and costs, and the methodology/design of stress tests. For example, Hirtle, Schuermann, and Stiroh (2009) argue that the 2009 U.S. stress test was credible and stabilizing for the banking system. Schuermann (2014) finds to the contrary that stress tests are counterproductive because they force banks to use similar models in passing the stress tests, which may set the system up for a subsequent crisis. Goldstein and Sapra (2013) provide a complete overview of the benefits and costs of the stress tests and their disclosure and conclude that benefits may outweigh the costs. Goldstein and Leitener (2015) develop a model for optimal stress tests disclosure policy for the regulators during normal and bad times.

Other papers look at stress tests disclosure specifically. For example, Peristiani, Morgan, and Savino (2010) find that Supervisory Capital Assessment Program (SCAP) results were informative, as banks with larger capital gaps registered more negative abnormal stock returns and negative credit default swap (CDS) spreads around release of SCAP results and other disclosures. Bird, Karolyi, and Ruchti (2020) find that CCAR has information content for banks. They report significant abnormal stock trading volume and returns, which are correlated with the unexpected component of the disclosure. Glasserman and Tangirala (2015) find stress tests outcomes have become more predictable and less informative over time. For example, they find that projected stress losses in the 2013 and 2014 stress tests are nearly perfectly correlated for banks that participated in both rounds.

A number of papers assess whether stress tests made banks less risky and find mostly positive effects. Acharya, Engle, and Pierret (2014) find that projected capital shortfalls from stress tests relative to banks' total assets and contributions to systemic risk match well, suggesting that stress tests are helpful in preparing banks for actual losses. Neretina, Sahin, and De Haan (2020) find that banks' systematic risk, measured by betas, declined in nearly all years after the publication of stress test results, suggesting that stress tests help reduce bank risk. Schneider, Strahan, and Yang (2020) find that larger stress-tested banks make more conservative capital plans as a result of the stress tests (i.e., are reluctant to commit to an aggressive dividend increase for fear of failing CCAR tests). Clark, Francis, Garcia, and Steele (2020) document that

non-stress tested (non-treated) banks also react to the stress tests by increasing capital and risk by 60 percent, while stress-tested banks decrease these by a similar percentage. In contrast, Cornett, Minnick, Schorno, and Tehranian (2018) suggest that stress-tested banks may be window dressing to look more attractive to regulators and investors: They show higher capital ratios than their peers in the CCAR starting quarter, but these get reversed in later quarters. Finally, a number of the papers discussed next focus on lending and derive effects for portfolio risk, a component of banks' overall risk.

An increasing number of papers focus on the effects of stress tests on large and small businesses and find either decreases or insignificant effects on credit supply. Acharya, Berger, and Roman (2018) find that stress-tested banks reduced credit supply at the intensive and extensive margins particularly to relatively risky business borrowers including large corporate borrowers below investment grade, commercial real-estate loan borrowers, and small business loan borrowers. Consistently, Lambertini and Mukherjee (2016) and Connolly (2018) also find reductions in credit supply at the intensive margin for large corporate borrowers in the syndicated loan market for various stress test years, but some were offset by credits from other institutions. Berrospide and Edge (2019) document significantly reduced commercial and industrial (C&I) lending to large firms by the stress-tested banks, but economic effects are inconsequential. Several papers, including Acharya, Berger, and Roman (2018), document significant decreases in lending to small businesses, often regarded as riskier customers. Cortés, Demyanyk, Li, Loutskina, and Strahan (2020) find that banks affected by stress tests reduce credit supply and raise interest rates on small business loans, while Covas (2018) finds that stress tests constrain the availability of small business loans secured by nonfarm nonresidential properties.[38] Doerr (2020) documents that stress tests led to strong cuts in small business loans secured by home equity, an important source of financing for entrepreneurs, with negative side effects on entrepreneurship and innovation by young firms. Finally, Flannery, Hirtle, and Kovner (2017) and Bassett and Berrospide (2019) find little to no effects on credit supply in broad loan categories using a sample covering mostly stress-tested banks.

Literature on the effects of stress tests on consumers is very scarce. To the best of our knowledge, only three papers have some evidence on consumer credit and only one looks at credit cards. Calem, Correa, and Lee (forthcoming) find that the CCAR 2011 test reduced jumbo mortgage approvals and originations. Morris-Levenson, Sarama, and Ungener (2017) analyze how asymmetric regulation on lenders in a given market affects the overall credit available in the mortgage market, and document that non-banks are able to increase mortgage shares as a result of stress tests. There is only one paper focusing on credit cards and closest to

[38] Related to this, Bordo and Duca (2018) document that the small loan share of C&I loans at large banks and banks with $300 million or more in assets has fallen by 9 percentage points since the 2010 Dodd–Frank Act.

ours. Paradkar (2019) analyzes effects of bank stress tests on credit limit changes for existing accounts using credit bureau data and reports that stress tests induce banks to increase credit limits to non-prime consumers, inconsistent with the credit-risk management goals of the stress tests.

Figure A.1: Non-linearity of the Relation between Credit Limit and Capital GAP

This figure illustrates the relation between credit card limits scaled by county population and Tier 1 Capital GAP. The *GAP* is calculated as the difference between firm's lowest projected capital ratio and the Federal Reserve (Fed)'s lowest projected capital ratio during the 9-quarter capital planning horizon under a severely adverse scenario. A positive GAP means that the firm's projection is more optimistic than the Fed's, so the Fed's result would come in as a negative *shock* to the firm.

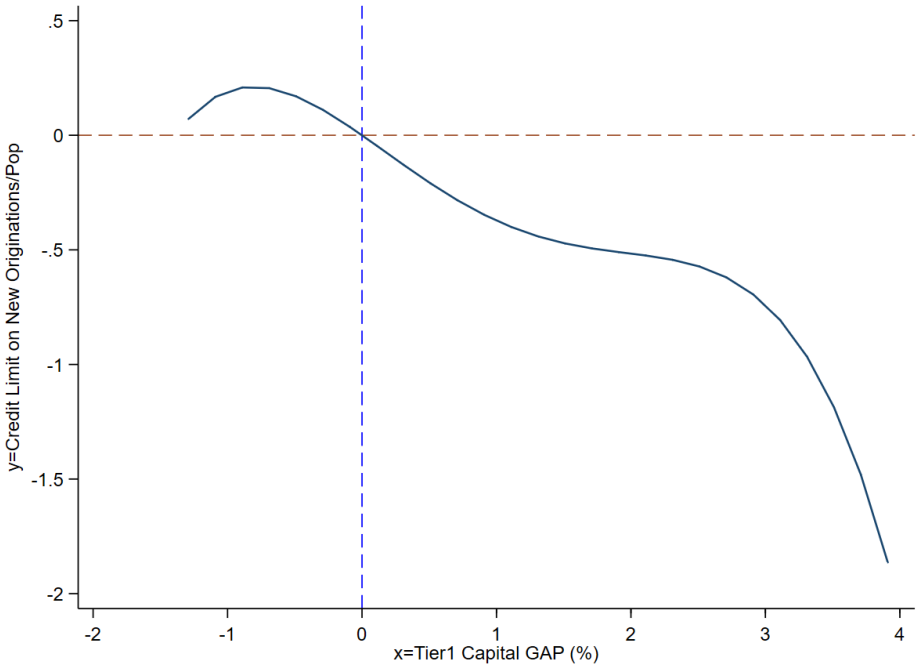

Figure A.2: 1% Random Sample Robustness Tests

This figure plots the regression coefficient estimates for the effects of bank stress tests Capital GAPs on consumer credit quantities in Panel A, cycle APR in Panel B, rewards and promotions in Panel C, cash rewards in Panel D, miles rewards in Panel E, and promotions in Panel F, using our 1% random sample shown in the paper tables and represented by a big black dot together with the afferent 95% confidence intervals represented by dotted lines, and estimates from 9 additional 1% random samples represented by smaller red dots. Results are for new originations over June 2013 to December 2017.

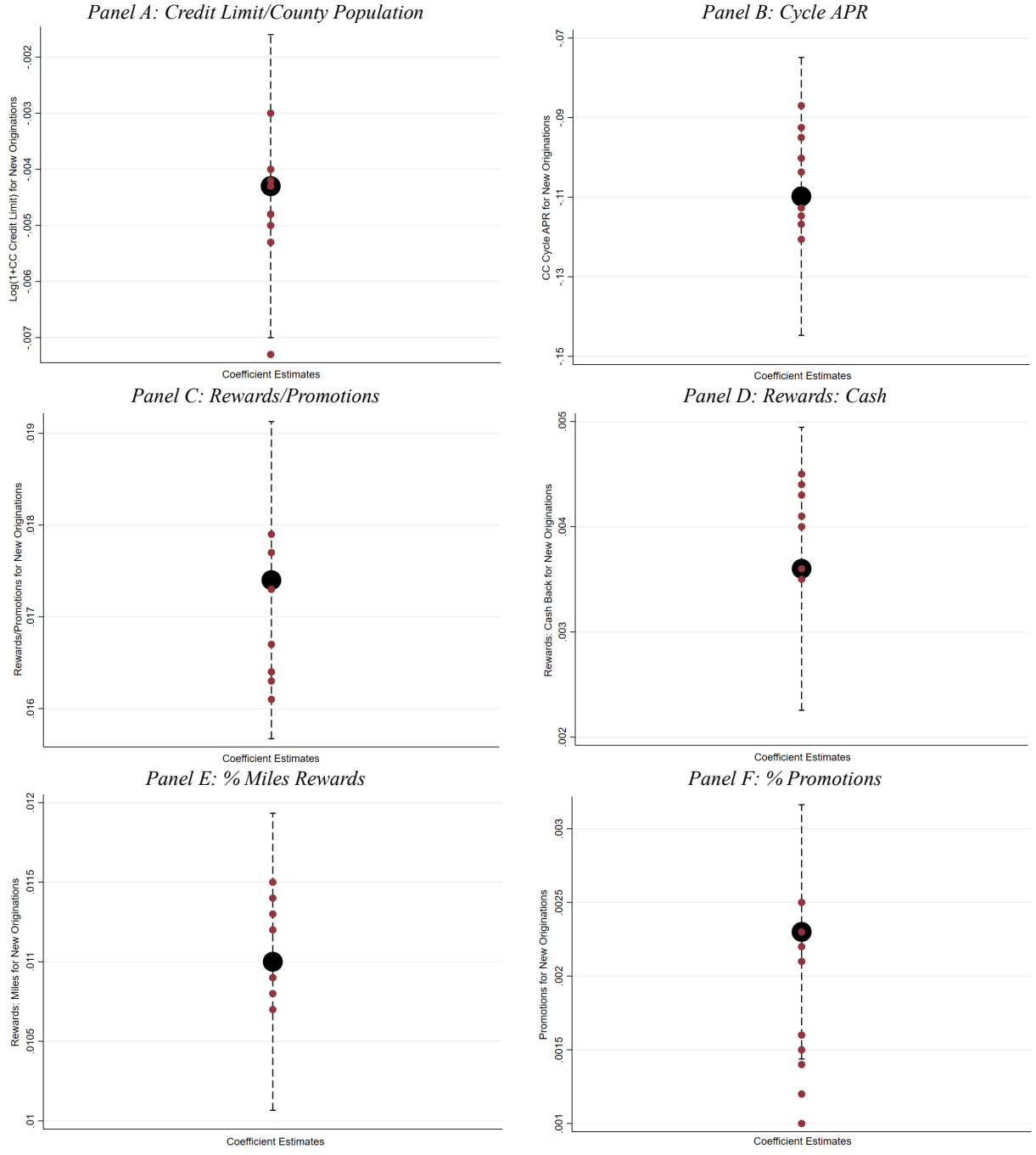

Table A.1: Stock Market Response to Banks' Stress Test Results

In this table, we report the mean abnormal returns (ARs) and cumulative abnormal returns (CARs) surrounding the CCAR results announcements (in percent) for credit card banks in our sample over stress tests 2013 to 2017. Banks that failed CCAR include banks that received objections and those that received conditional objection to their capital plans.[39] We use a pre-intervention estimation window starting 100 trading days before each event date and ending 50 days before each event date. The returns are calculated using the Fama-French Three-Factor model.[40] *, ** and *** indicate significance 10%, 5% and 1% level.

Bank Type	Banks that Passed CCAR			Banks that Failed CCAR		
Estimation	All Firm-Disclosure Events			All Firm-Disclosure Events		
Event Window (Day)	Mean AR	Patell *Z*	Obs.	Mean AR	Patell *Z*	Obs.
-1	0.197	1.190	72	0.030	0.094	5
0	0.242	0.389	72	0.497	1.403	5
1	0.662***	5.142	72	-2.358***	-8.254	5
Event Window (Days)	Mean CAR	Patell *Z*	Obs.	Mean CAR	Patell *Z*	Obs.
[-1, 1]	0.662***	3.880	72	-2.358***	-4.010	5
[0, 1]	0.459***	3.926	72	-2.406***	-4.878	5

[39] In unreported results, we also look at CCAR banks that failed with straight objection only (excluding conditional objection cases), and they register even stronger negative stock returns.

[40] Returns using Carhart Four-Factor model yield qualitative similar results.

Table A.2: Additional Summary Statistics and Variable Definitions

This table provides additional summary statistics and definitions for Y-14M credit card new originations data aggregated at the firm–county–month level and Y-14M portfolio data at the firm-month level as well as public Y-9C BHC information. Variables using dollar amounts are expressed in real 2017:Q4 dollars using the implicit GDP price deflator.

Variable	Mean	25th Percentile	Median	75th Percentile	Standard Deviation	No. of Observations	Definition
Additional Variables Used in Other Analyses							
Additional Dependent Variables							
CC Cash Advance Limit/ County Population	0.906	0.165	0.506	1.172	1.238	1,324,071	Credit card cash advance limit at the firm-county level adjusted for inflation divided by the county population.
Δ Credit Limit	0.026	-0.361	0.025	0.416	0.701	1,009,570	Annual change in credit card limit at the firm-county level.
Log(1+ Total Cash Advance Limit)	9.411	8.284	9.581	10.946	2.684	1,343,679	The log of one plus total cash advance limit at the firm-county level adjusted for inflation.
Credit Limit / BHC Total Loans	1.400	0.057	0.181	0.661	6.541	1,355,032	Credit card cash advance limit at the firm-county level divided by the BHC total loans.
Cycle APR (weighted)	16.454	13.728	16.234	20.050	5.472	1,355,032	APR weighted by credit limit used for the cycle for consumer retail purchases.
CC Cash APR	23.992	23.831	24.990	25.928	4.220	1,250,067	APR used for the cycle for cash advances.
CC Max APR	28.671	25.990	29.990	29.990	11.472	1,151,402	The maximum or default APR (rate cap) allowed to be used for the cycle for both retail purchases and cash advances.
CC Interest Rate Margin	15.482	13.115	14.866	18.320	4.181	1,311,295	The purchase APR margin, the number of percentage points that credit card lenders add to the prime rate (or other index) to calculate the variable interest rate. Issuers must disclose the margin at account-opening and in each monthly statement.
Additional Independent Variables							
Tier 1 Capital Exposure	3.547	2.400	3.600	4.700	1.689	1,355,032	The difference between the BHC's initial tier 1 capital ratio and the lowest implied tier 1 capital ratio expected under the severely adverse stress-test scenario.
Total Capital Exposure	3.712	2.500	3.500	4.900	1.756	1,355,032	The difference between the BHC's initial total capital ratio and the lowest implied total capital ratio expected under the severely adverse stress-test scenario.
Additional Y14 firm-month data (based on Y14 monthly portfolio data and Y9-C quarterly data)							
Credit Supply (at origination) (Y14)							
CC UPB /Total BHC Loans	0.002	0.000	0.000	0.001	0.004	3,768	Credit card balances to total BHC Loans.
CC UPB /Total BHC Assets	0.001	0.000	0.000	0.001	0.003	3,768	Credit card balances to total BHC Assets.
Stress Test Variables (lagged, pertaining to last disclosure, Y14 and Public Reports)							
Tier 1 Capital GAP	0.757	0.175	0.760	1.392	1.049	3,768	Lowest projected tier1 capital ratio projected in the BHC's own exercise (Y-14a) minus the lowest projected tier1 capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario.
Total Capital GAP	0.822	0.274	0.747	1.444	1.057	3,768	Lowest projected total capital ratio (tier1+tier2) projected in the BHC's own exercise (Y-14a) minus the lowest projected total capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario.
BHC Characteristics (lagged 1 quarter) (Y9-C)							
FL Mortgages/Total BHC Loans	0.611	0.166	0.510	1.041	0.537	3,768	FL balances to total BHC Loans.
HE/Total BHC Loans	0.055	0.009	0.057	0.085	0.045	3,768	HE balances to total BHC Loans.
FL Mortgages/Total BHC Assets	0.336	0.076	0.232	0.557	0.306	3,768	FL balances to total BHC assets.
HE/Total BHC Assets	0.031	0.006	0.029	0.046	0.029	3,768	HE balances to total BHC assets.
Capital Adequacy	0.120	0.109	0.120	0.131	0.015	3,768	BHC capital adequacy, proxied by the ratio of BHC equity to total assets.
Asset Quality	0.018	0.011	0.014	0.020	0.012	3,768	Asset quality of a BHC's portfolio proxied by the ratio of nonperforming loans to total loans.
Earnings	0.107	0.068	0.096	0.128	0.080	3,768	Earnings proxied by ROE (return on equity), the ratio of BHC annualized net income to total equity.
Liquidity	0.079	0.033	0.069	0.124	0.052	3,768	Liquidity proxied by the ratio of BHC liquid assets to total assets.
BHC Size	19.747	18.765	19.523	21.284	1.179	3,768	The natural logarithm of the BHC total assets.
Trading Assets/Total Assets	0.043	0.003	0.011	0.047	0.058	3,768	The ratio of trading assets to total assets.

Table A.3: Effects of Stress Tests on Consumer Credit – Alternative Credit Supply Measures

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card quantities for new originations using alternative measures of quantities in Panel A and alternative measures of pricing in Panel B than those used in our main results. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017. In Panel A, the dependent variables are: *Cash Advance Limit/County Population*, credit card cash advance limit at the firm-county level divided by the county population for new originations; *Log (1+ Total Cash Advance Limit)*, the natural logarithm of the credit card cash advance limit at the firm-county level for new originations; *Credit Limit/BHC Total Loans*, the credit card limit at the firm-county level for new originations divided by the BHC total loans; and *Δ CC Credit Limit*, the annual change in credit card limit for new originations at the firm-county level. In Panel B, the dependent variables are: *CC Cycle APR (weighted)*, APR weighted by credit limit used for the cycle for consumer retail purchases for new originations; *CC Cash APR*, APR used for the cycle for cash advances for new originations; *CC Max APR*, the maximum or default APR (rate cap) allowed to be used for the cycle for both retail purchases and cash advances; *CC Interest Rate Margin*, the purchase APR margin reflecting the number of percentage points that credit card lenders add to the prime rate (or other index) to calculate the variable interest rate. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, the percent of consumers with joint accounts, the percent of variable interest rate accounts, and the percent of relationship consumers. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. The variables are defined in Table 1 and Table A.2. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Alternative Measures of Credit Quantities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent Variables:	Cash Advance Limit / Population		Log(1+ Total Cash Advance Limit)		Credit Limit / BHC Total Loans		Δ CC Credit Limit	
Stress Test Measures								
Tier 1 Capital GAP	-0.0553***		-0.0695***		-0.0880***		-0.0131***	
	(-33.0624)		(-30.5315)		(-10.0723)		(-8.4196)	
Total Capital GAP		-0.0550***		-0.0550***		-0.0862***		-0.0149***
		(-33.2881)		(-33.2881)		(-9.9502)		(-10.5105)
Borrower & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,324,071	1,324,071	1,343,679	1,324,071	1,355,032	1,355,032	1,009,570	1,009,570
R-squared	0.489	0.489	0.686	0.489	0.494	0.494	0.24	0.24

Panel B: Alternative Measures of Pricing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent Variables:	CC Cycle APR (weighted)		CC Cash APR		CC Max APR		CC Interest Rate Margin	
Stress Test Measures								
Tier 1 Capital GAP	-0.3153***		-0.2687***		-0.0927***		-0.1925***	
	(-45.1187)		(-71.8147)		(-14.0727)		(-41.9140)	
Total Capital GAP		-0.3008***		-0.3129***		-0.1600***		-0.2402***
		(-45.6321)		(-110.6718)		(-31.5455)		(-57.7321)
Log(1+ Credit Limit)	YES	YES	YES	YES	YES	YES	YES	YES
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,355,032	1,355,032	1,250,067	1,250,067	1,151,402	1,151,402	1,311,295	1,311,295
R-squared	0.518	0.518	0.701	0.702	0.824	0.825	0.705	0.705

Table A.4: Effects of Stress Tests on Consumer Credit — Alternative Measures of Shock to Firms

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card quantities for new originations using alternative measures of capital exposure using public data only. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017.The dependent variables are: *Credit Limit/County Population*, credit card limit at the firm-county level divided by the county population for new originations; *Log (1+ Total Credit Limit)*, the natural logarithm of the credit card limit at the firm-county level for new originations; *CC Cycle APR*, the average APR used for the cycle for consumer retail purchases at the firm-county level; *%Rewards/Promotions*, *%Rewards: Cash Back*, *%Rewards: Miles*, and *%Promotions*, the percent of new credit cards with rewards and promotions, cash-back rewards, miles rewards, or start-up promotions at the firm-county level. The key explanatory variables are *Tier 1 Capital Exposure* and *Total Capital Exposure*, which represent the difference between the publicly disclosed BHC's initial capital ratio and the lowest implied capital ratio predicted by the Fed under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, the percent of consumers with joint accounts, the percent of variable interest rate accounts, and the percent of relationship consumers. In addition, in the pricing regressions, we include *Log(1+ Credit Limit)* as a control variable. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. The variables are defined in Table 1 and Table A.2. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Quantity and Price Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Credit Limit / County Population		Log(1+ CC Total Credit Limit)		CC Cycle APR	
Stress Test Measures						
Tier 1 Capital Exposure	-0.1724***		-0.0438***		-0.0325***	
	(-34.2530)		(-45.2702)		(-7.0567)	
Total Capital Exposure		-0.1878***		-0.0480***		-0.0333***
		(-38.1257)		(-50.7797)		(-7.3968)
Log(1+ Credit Limit)	NO	NO	NO	NO	YES	YES
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,335,178	1,335,178	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.587	0.587	0.816	0.816	0.624	0.624

Panel B: Rewards and Promotions Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent Variables:	% Rewards/Promotions		% Rewards: Cash Back		% Rewards: Miles		% Promotions	
Stress Test Measures	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample
Tier 1 Capital GAP	0.0213***		0.0119***		0.0056***		0.0038***	
	(36.0195)		(37.8141)		(43.6296)		(9.9600)	
Total Capital GAP		0.0178***		0.0101***		0.0059***		0.0018***
		(31.6856)		(33.8028)		(43.3945)		(4.9040)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.679	0.678	0.554	0.553	0.452	0.452	0.637	0.637

Table A.5: Effects of Stress Tests on Consumer Credit – Additional Robustness Tests

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card quantities for new originations using a variety of additional robustness tests: using a falsification test in which we allocate the capital GAPs randomly to the BHCs in Panel A; using alternative error clustering at *BHC × Month-Year* in Panel B; excluding one firm due to different business model in Panel C; excluding observations of BHCs that failed previous stress test in Panel D; including only BHCs that exist in all stress test years in Panel E; controlling for the initial stress test capital at the stress test onset instead of capital ratio in previous quarter in Panel F; excluding one stress test at a time in Panel G; and including one additional BHC which reports new originations later in Panel H. The loan origination data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017.The dependent variables are: *Credit Limit/County Population*, credit card limit at the firm-county level divided by the county population for new originations; *Log (1+ Total Credit Limit)*, the natural logarithm of the credit card limit at the firm-county level for new originations; *CC Cycle APR*, the average APR used for the cycle for consumer retail purchases at the firm-county level; *%Rewards/Promotions*, *%Rewards: Cash Back*, *%Rewards: Miles*, and *%Promotions*, the percent of new credit cards with rewards and promotions, cash-back rewards, miles rewards, or start-up promotions at the firm-county level. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a broad set of consumer and loan controls measured at the origination time: *Consumer Credit Score*, *Log(1+ Consumer Income)*, *Consumer Utilization Rate*, the percent of consumers with joint accounts, the percent of variable interest rate accounts, and the percent of relationship consumers. In addition, in the pricing regressions, we include *Log(1+ Credit Limit)* as a control variable. We also include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. All regressions include County × Month-Year FE as well as BHC fixed effects. All variables are defined in Table 1. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Random Assignment of the Capital GAPs to the BHCs

Panel A1: Main Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Credit Limit / County Population		CC Cycle APR		% Rewards/Promotions	
Stress Test Measures						
Pseudo Tier 1 Capital GAP	0.0011		0.0020		-0.0002	
	(0.3711)		(0.6385)		(-1.1067)	
Pseudo Total Capital GAP		0.0009		0.0023		-0.0002
		(0.2960)		(0.7179)		(-1.1280)
Log(1+ Credit Limit)	NO	NO	YES	YES	NO	NO
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by BHC × Month-Year	YES	YES	YES	YES	YES	YES
Observations	1,335,178	1,335,178	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.586	0.586	0.624	0.624	0.677	0.677

Panel A2: Additional Rewards/Promotion Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	% Rewards: Cash Back		% Rewards: Miles		% Promotions	
Stress Test Measures						
Pseudo Tier 1 Capital GAP	-0.0000		-0.0002		0.0000	
	(-0.4709)		(-1.4311)		(0.3456)	
Pseudo Total Capital GAP		-0.0001		-0.0002		0.0000
		(-0.4911)		(-1.4229)		(0.3137)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Cluster by BHC × Month-Year	YES	YES	YES	YES	YES	YES
Observations	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.451	0.451	0.552	0.552	0.637	0.637

Panel B: Alternative Error Clustering by BHC × Month-Year

Panel B1: Main Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Credit Limit / County Population		CC Cycle APR		% Rewards/Promotions	
Stress Test Measures						
Tier 1 Capital GAP	-0.2188***		-0.3577***		0.0210***	
	(-3.5064)		(-5.6630)		(5.1346)	
Total Capital GAP		-0.2258***		-0.3308***		0.0163***
		(-3.6592)		(-5.3223)		(4.1136)
Log(1+ Credit Limit)	NO	NO	YES	YES	NO	NO
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by BHC × Month-Year	YES	YES	YES	YES	YES	YES
Observations	1,335,178	1,335,178	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.587	0.587	0.626	0.626	0.678	0.678

Panel B2: Additional Rewards/Promotion Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	% Rewards: Cash Back		% Rewards: Miles		% Promotions	
Stress Test Measures						
Tier 1 Capital GAP	0.0053***		0.0057***		0.0099***	
	(6.5632)		(2.9085)		(2.9348)	
Total Capital GAP		0.0050***		0.0051***		0.0062*
		(6.2861)		(2.6414)		(1.9089)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Cluster by BHC × Month-Year	YES	YES	YES	YES	YES	YES
Observations	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.452	0.452	0.552	0.552	0.638	0.637

Panel C: Exclude One Firm Due to Different Business Model

Panel C1: Main Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Credit Limit / County Population		CC Cycle APR		% Rewards/Promotions	
Stress Test Measures						
Tier 1 Capital GAP	-0.2038***		-0.4067***		0.0176***	
	(-34.1717)		(-64.3322)		(46.7426)	
Total Capital GAP		-0.2091***		-0.3917***		0.0118***
		(-34.6723)		(-64.8772)		(40.0046)
Log(1+ Credit Limit)	NO	NO	YES	YES	NO	NO
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,215,751	1,215,751	1,232,479	1,232,479	1,232,479	1,232,479
R-squared	0.585	0.585	0.630	0.630	0.555	0.554

Panel C2: Additional Rewards/Promotion Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	% Rewards: Cash Back		% Rewards: Miles		% Promotions	
Stress Test Measures						
Tier 1 Capital GAP	0.0051***		0.0027***		0.0098***	
	(21.2605)		(35.0389)		(39.9036)	
Total Capital GAP		0.0039***		0.0025***		0.0054***
		(18.2496)		(33.4439)		(27.3514)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES

Bank FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,232,479	1,232,479	1,232,479	1,232,479	1,232,479	1,232,479
R-squared	0.556	0.555	0.331	0.331	0.704	0.703

Panel D: Exclude Observations of BHCs that "Failed" Previous Stress Test

Panel D1: Main Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Credit Limit / County Population		CC Cycle APR		% Rewards/Promotions	
Stress Test Measures						
Tier 1 Capital GAP	-0.2423***		-0.3408***		0.0210***	
	(-39.9730)		(-51.5767)		(37.2918)	
Total Capital GAP		-0.2465***		-0.3159***		0.0161***
		(-40.0584)		(-51.8815)		(34.3266)
Log(1+ Credit Limit)	NO	NO	YES	YES	NO	NO
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,293,030	1,293,030	1,311,821	1,311,821	1,311,821	1,311,821
R-squared	0.580	0.580	0.615	0.615	0.685	0.684

Panel D2: Additional Rewards/Promotion Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	% Rewards: Cash Back		% Rewards: Miles		% Promotions	
Stress Test Measures						
Tier 1 Capital GAP	0.0050***		0.0053***		0.0107***	
	(17.0672)		(43.8681)		(29.6940)	
Total Capital GAP		0.0044***		0.0050***		0.0067***
		(16.6871)		(41.4615)		(22.2772)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,311,821	1,311,821	1,311,821	1,311,821	1,311,821	1,311,821
R-squared	0.564	0.564	0.455	0.455	0.641	0.641

Panel E: Only Include BHCs that Exist in All Stress Test Years

Panel E1: Main Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Credit Limit / County Population		CC Cycle APR		% Rewards/Promotions	
Stress Test Measures						
Tier 1 Capital GAP	-0.2153***		-0.3928***		0.0180***	
	(-33.8384)		(-67.2614)		(61.6645)	
Total Capital GAP		-0.2209***		-0.3811***		0.0148***
		(-34.1244)		(-69.6542)		(54.2404)
Log(1+ Credit Limit)	NO	NO	YES	YES	NO	NO
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,279,083	1,279,083	1,298,291	1,298,291	1,298,291	1,298,291
R-squared	0.587	0.587	0.641	0.641	0.697	0.696

Panel E2: Additional Rewards/Promotion Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	% Rewards: Cash Back		% Rewards: Miles		% Promotions	
Stress Test Measures						
Tier 1 Capital GAP	0.0024***		0.0066***		0.0090***	
	(10.1397)		(48.3509)		(46.1489)	
Total Capital GAP		0.0024***		0.0062***		0.0062***

		(10.2081)		(45.6317)		(34.2204)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,298,291	1,298,291	1,298,291	1,298,291	1,298,291	1,298,291
R-squared	0.562	0.562	0.453	0.453	0.656	0.656

Panel F: Control for Initial Stress Test Tier 1 Capital instead of Capital Ratio in Previous Quarter

Panel F1: Main Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Credit Limit / County Population		CC Cycle APR		% Rewards/Promotions	
Stress Test Measures						
Tier 1 Capital GAP	-0.2269***		-0.3569***		0.0189***	
	(-37.0601)		(-53.7943)		(35.8320)	
Total Capital GAP		-0.2333***		-0.3292***		0.0139***
		(-37.3929)		(-52.9783)		(31.6660)
Initial ST Tier 1 Capital	0.0803***	0.0795***	-0.3676***	-0.3693***	0.0197***	0.0198***
	(10.1543)	(10.0800)	(-29.4679)	(-29.4901)	(25.8455)	(25.8647)
Log(1+ Credit Limit)	NO	NO	YES	YES	NO	NO
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,335,178	1,335,178	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.587	0.587	0.626	0.626	0.678	0.677

Panel F2: Additional Rewards/Promotion Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	% Rewards: Cash Back		% Rewards: Miles		% Promotions	
Stress Test Measures						
Tier 1 Capital GAP	0.0046***		0.0056***		0.0087***	
	(16.8565)		(46.1736)		(24.9047)	
Total Capital GAP		0.0038***		0.0053***		0.0048***
		(15.2159)		(43.9777)		(16.5375)
Initial ST Tier 1 Capital	0.0046***		0.0056***		0.0087***	
	(16.8565)		(46.1736)		(24.9047)	
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032	1,355,032
R-squared	0.553	0.553	0.452	0.452	0.637	0.637

Panel G: Exclude One Stress Test at a Time

Panel G1: Main Outcomes: Quantities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Independent Variables:	Credit Limit/County Population									
Stress Test Measures	Excl 2013	Excl 2014	Excl 2015	Excl 2016	Excl 2017	Excl 2013	Excl 2014	Excl 2015	Excl 2016	Excl 2017
Tier 1 Capital GAP	-0.1572***	-0.2641***	-0.2683***	-0.1580***	-0.2975***					
	(-26.4591)	(-37.6875)	(-35.9291)	(-30.0474)	(-37.7368)					
Total Capital GAP						-0.1596***	-0.2664***	-0.2848***	-0.1579***	-0.3053***
						(-26.8259)	(-37.6587)	(-37.4045)	(-29.8712)	(-38.2124)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,106,339	1,053,971	974,818	1,026,079	1,179,505	1,106,339	1,053,971	974,818	1,026,079	1,179,505
R-squared	0.580	0.583	0.583	0.610	0.586	0.580	0.583	0.583	0.610	0.586

Panel G2: Main Outcomes: Prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Independent Variables:	CC Cycle APR									
Stress Test Measures	Excl 2013	Excl 2014	Excl 2015	Excl 2016	Excl 2017	Excl 2013	Excl 2014	Excl 2015	Excl 2016	Excl 2017
Tier 1 Capital GAP	-0.4034***	-0.2755***	-0.5962***	-0.5274***	-0.2149***					
	(-54.5667)	(-42.1883)	(-65.9988)	(-65.2564)	(-37.2485)					
Total Capital GAP						-0.3568***	-0.2451***	-0.5553***	-0.5272***	-0.1810***
						(-51.7326)	(-38.8542)	(-66.7323)	(-68.8443)	(-33.4236)
Log(1+ Credit Limit)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,122,809	1,069,795	989,351	1,041,007	1,197,166	1,122,809	1,069,795	989,351	1,041,007	1,197,166
R-squared	0.641	0.624	0.616	0.628	0.629	0.641	0.624	0.616	0.628	0.629

Panel G3: Main Outcomes: Rewards/Promotions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Independent Variables:	% Rewards/Promotions									
Stress Test Measures	Excl 2013	Excl 2014	Excl 2015	Excl 2016	Excl 2017	Excl 2013	Excl 2014	Excl 2015	Excl 2016	Excl 2017
Tier 1 Capital GAP	0.0155***	0.0235***	0.0354***	0.0236***	0.0165***					
	(19.7081)	(44.2533)	(55.2219)	(44.8147)	(31.7583)					
Total Capital GAP						0.0116***	0.0193***	0.0284***	0.0182***	0.0124***
						(16.8074)	(42.0965)	(50.9602)	(41.0375)	(28.4679)
Log(1+ Credit Limit)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,122,809	1,069,795	989,351	1,041,007	1,197,166	1,122,809	1,069,795	989,351	1,041,007	1,197,166
R-squared	0.693	0.681	0.671	0.679	0.681	0.692	0.680	0.670	0.678	0.680

Panel H: Include One Additional Firm which Reports New Originations Later

Panel H1: Main Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	Credit Limit / County Population		CC Cycle APR		% Rewards/Promotions	
Stress Test Measures						
Tier 1 Capital GAP	-0.1859***		-0.3211***		0.0174***	
	(-33.0357)		(-53.4932)		(35.0603)	
Total Capital GAP		-0.1983***		-0.2894***		0.0128***
		(-34.2500)		(-51.2996)		(30.7758)
Log(1+ Credit Limit)	NO	NO	YES	YES	NO	NO
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
BHC Characteristics (Lagged one quarter)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,468,338	1,468,338	1,491,358	1,491,358	1,491,358	1,491,358
R-squared	0.581	0.582	0.754	0.754	0.852	0.852

Panel H2: Additional Rewards/Promotion Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables:	% Rewards: Cash Back		% Rewards: Miles		% Promotions	
Stress Test Measures						
Tier 1 Capital GAP	0.0062***		0.0049***		0.0064***	
	(22.8898)		(42.4420)		(19.2794)	
Total Capital GAP		0.0058***		0.0045***		0.0026***
		(23.1464)		(38.5122)		(9.1450)
Consumer & Loan Characteristics at Origination	YES	YES	YES	YES	YES	YES
Bank Characteristics (Lagged one period)	YES	YES	YES	YES	YES	YES
County × Month-Year FE	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Cluster by County	YES	YES	YES	YES	YES	YES
Observations	1,491,358	1,491,358	1,491,358	1,491,358	1,491,358	1,491,358
R-squared	0.763	0.763	0.442	0.442	0.770	0.769

Table A.6: Effects of Stress Tests Capital Gaps on Consumer Credit — Firm-Level Analysis

This table reports regression estimates for analyzing the effects of stress tests on consumer credit card balances using the portfolio data at firm-month level. The data come from the supervisory FR Y-14M data set and cover the period June 2013–December 2017.The dependent variables are: *CC UPB/ Total Loans*, the ratio of total credit card balances (new and existing accounts) to BHC total loans; *CC UPB/ Total Assets*, the ratio of total credit card balances (new and existing accounts) to BHC total assets at the firm level. The key explanatory variables are *Tier 1 Capital GAP* and *Total Capital GAP*, which represent the lowest projected capital ratio in the BHC's own exercise (Y-14A) minus the lowest projected capital ratio in the Fed's stress test exercise (publicly announced) both under the severely adverse scenario for tier 1 capital and total capital ratios, respectively. We include a number of BHC characteristics, all lagged one quarter: the BHC capital adequacy, the ratio of BHC non-performing loans, earnings, the liquidity ratio, BHC size, the ratio of consumer loans, the ratio of residential real estate loans, and the ratio of trading assets. In addition we also control for other retail credit balances such as for first lien (FL) mortgages and home equity (HE). All regressions include BHC fixed effects. The variables are defined in Table A.2. Heteroskedasticity-robust *t*-statistics clustered at county level are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)
	CC UPB	CC UPB	CC UPB	CC UPB
Independent Variables:	/ Total Loans	/ Total Loans	/ Total Assets	/ Total Assets
Stress Test Measures				
Tier 1 Capital GAP	-0.0003***		-0.0002***	
	(-4.0399)		(-3.8265)	
Total Capital GAP		-0.0004***		-0.0003***
		(-4.5129)		(-4.3345)
Other Retail Credit Controls				
FL UPB/ Total Loans	-0.0012**	-0.0012**		
	(-2.3747)	(-2.4065)		
HE UPB/ Total Loans	-0.0071***	-0.0067***		
	(-3.1278)	(-3.0029)		
FL UPB/ Total Assets			-0.0017***	-0.0017***
			(-3.6653)	(-3.7785)
HE UPB/ Total Assets			-0.0059**	-0.0056**
			(-2.3873)	(-2.3063)
BHC Characteristics (Lagged one quarter)				
Capital Adequacy	-0.0005	-0.0054	0.0039	0.0005
	(-0.0270)	(-0.2875)	(0.2713)	(0.0359)
Non-performing Loans	0.0700***	0.0671***	0.0478***	0.0464***
	(4.3625)	(4.3249)	(4.7587)	(4.7689)
Earnings	-0.0014	-0.0015	-0.0005	-0.0005
	(-0.6056)	(-0.6321)	(-0.2983)	(-0.3229)
Liquidity	0.0000	-0.0015	-0.0004	-0.0014
	(0.0032)	(-0.4439)	(-0.1694)	(-0.5839)
BHC Size	0.0017*	0.0019*	0.0004	0.0005
	(1.7679)	(1.9002)	(0.6429)	(0.7485)
Trading Assets	0.0159*	0.0161**	0.0080	0.0081
	(1.9545)	(1.9886)	(1.4852)	(1.5200)
Constant	-0.0330	-0.0348*	-0.0081	-0.0089
	(-1.6194)	(-1.7048)	(-0.5820)	(-0.6367)
BHC FE	YES	YES	YES	YES
Month-Year FE	YES	YES	YES	YES
Observations	3,105	3,105	3,105	3,105
R-squared	0.197	0.199	0.230	0.232