Regulatory Disclosure and Access to Credit*

Jeffrey Jou[1], Anya Kleymenova[2], Andrea Passalacqua[3], László Sándor[4], Rajesh Vijayaraghavan[5]

October 3, 2023

Abstract

We study whether the disclosure of consumer complaints about their banks changes affected banks' provision of consumer credit. Using a novel confidential dataset containing consumer complaints from the Consumer Financial Protection Bureau (CFPB) and matching it with confidential data on mortgages, deposits, and market prices, we find that banks subject to prudential and CFPB oversight, which receive consumer complaints experience a decline in their share prices and an increase in trading volumes. These banks also see a decrease in deposit and mortgage market shares, with more complaints resulting in higher deposit withdrawals. We find limited evidence that banks change deposit rates in response. Finally, we implement textual analysis to study the differential impact of consumer complaints. First, we identify the main topics related to the complaints. Second, we find that consumer disappointment is associated with a decrease in aggregate deposits. Overall, we provide new evidence on the role of information disclosure as a disciplinary mechanism in providing credit.

JEL Classification: G21, G28
Keywords: Disclosure, CFPB, Consumer finance, Access to credit

*We thank seminar participants at the Federal Reserve Board and 2023 AEA for their helpful comments and suggestions. The views expressed in this study are those of the authors and do not necessarily reflect the views of the Federal Reserve Board or the Federal Reserve System. This article is the result of László Sándor's independent research and does not necessarily represent the views of the Consumer Financial Protection Bureau or the United States. This article is the result of Andrea Passalacqua's independent research and the views presented are those of the authors and do not necessarily reflect those of Analysis Group, Inc. or its clients.

[1]The Wharton School, University of Pennsylvania, 3620 Locust Walk, Philadelphia, PA 19104; jouj@wharton.upenn.edu

[2]Federal Reserve Board, 20th Street and Constitution Avenue NW, Washington, DC 20551; anya.kleymenova@frb.gov

[3]Analysis Group Inc.; andrea.passalacqua@outlook.com

[4]Consumer Financial Protection Bureau, 1700 G Street NW, Washington, DC, 20552; laszlo.sandor@cfpb.gov

[5]University of British Columbia, 2053 Main Mall, Vancouver, BC, Canada V6T 1Z2; rajesh.vijayaraghavan@sauder.ubc.ca

1. Introduction

Disclosure of regulatory information about firms could provide a potential disciplinary mechanism and affect firm behavior. In the setting of financial institutions specifically, disclosure might provide a potential disciplining mechanism that affects bank lending. Prior studies document that disclosure could increase monitoring by funding providers and improve bank operations (Anbil, 2018; Diamond & Dybvig, 1983; Kleymenova & Tomy, 2022; Granja & Leuz, 2022; Goldstein & Sapra, 2014; Passalacqua et al., 2019). However, it is unclear whether the disclosure of information provided by consumers in the form of complaints about their financial services providers could have any impact on these firms without specific regulatory action. On the one hand, disclosing consumer complaints could signal potential problems with the firm. On the other hand, it might not have any material impact if there is no regulatory action.

In this paper, we study whether the disclosure of consumer complaints about their financial services providers is material and impacts the affected firms' funding and provision of financial services and consumer credit. To study this research question, we construct a novel dataset containing consumer complaints from the Consumer Financial Protection Bureau (CFPB) and match it with confidential data on mortgages, deposits, and market prices. CFPB was created in 2010 by the Dodd-Frank Act of 2010 to provide oversight of financial consumer markets. It began operations in 2011 and has supervisory authority over banks and nonbanks in three main areas: rule-making, supervision and examination, and enforcement.

Since 2015, CFPB has published consumer complaints about financial institutions that fall under its supervision. Depository institutions and their affiliates with total assets above $10 billion and all financial services providers with retail consumers fall under CFPB's oversight. For firms that the CFPB oversees, it publishes consumer complaints after the affected firm responds, confirming a commercial relationship with the consumer or after 15 days of receiving a complaint, whichever comes first. The complaints provide details about the corre-

sponding financial product and contain the unstructured text of the comments received from consumers. For institutions that do not fall under its supervision, CFPB refers consumer complaints to the corresponding regulator and does not publish them.

We first investigate whether the disclosure of consumer complaints is material. Funding providers, including the equity market participants, discipline firms in response to disclosure (Acharya & Ryan, 2016; Bushman & Williams, 2012; Flannery, 1998; Duro et al., 2019). We evaluate whether there is any reaction to the publication of complaints in the equity market. Conditional on bank characteristics, we find some evidence of a significant market reaction in terms of negative abnormal returns, increased trading volumes, widening bid-ask spreads, and negative abnormal return volatility. We do not find a significant market reaction when the database was first published in March 2015.

Prior studies have documented that depositors react to negative information provided by the regulators (Anbil, 2018; Diamond & Dybvig, 1983; Chen et al., 2021; Kleymenova & Tomy, 2022). Therefore, we next check if depositors withdraw funds from banks with complaints, especially for banks that receive many complaints. We find that banks subject to CFPB oversight that receive consumer complaints experience a decline in their deposits. This effect is also more pronounced for banks with a higher intensity of complaints. When looking at banks' market shares in the residential mortgage market, we find that banks with publicly disclosed consumer complaints experience a decline in their mortgage shares. This suggests a spillover effect from the disclosure of complaints on banks' overall operations.

In response to declining deposits, banks could attempt to attract more depositors by offering them higher rates. We, therefore, investigate whether banks change the rates they offer on deposit products following the public disclosure of their customers' complaints. We find some suggestive evidence that banks change deposit rates in response to complaints disclosure, especially for longer-term deposits. Offered deposit rates are also higher for banks with a larger number of complaints. Finally, we implement textual analysis to study the differential impact of consumer complaints. Using several techniques, we identify the main

topics discussed in the complaints and create different measures of sentiment intensity. Second, we use these measures to study the impact of the find some evidence of banks responding to complaints containing more negative sentiment. Overall, we provide new evidence on the role of information disclosure as a disciplinary mechanism for financial institutions.

Our paper contributes to several strands of the economics, finance, and accounting literature. First, we contribute to a growing literature on consumer financial protection. For instance, Fuster et al. (2021) study the effect of the introduction of the CFPB on mortgage lending by taking advantage of the size threshold employed to identify which banks are supervised by the CFPB. Our work focuses only on banks that are under CFPB supervision. Hayes et al. (2021) study the different patterns of consumer complaints according to different levels of trust. They distinguish between low and high social trust areas and show that consumers in low-trust areas are less likely to trust banks, be more informed about the current regulations (and the potential violation of a law by a bank), and more likely to submit a formal complaint to the CFPB. As a result, banks are more likely to cut fees in counties with low trust. In our study, we focus on the effect of public disclosure of complaints on other potential consumers in all geographic areas. Second, our paper is closely related to Dou & Roh (2020) and Mazur (2022). Dou & Roh (2020) study the role of complaints disclosure and the impact on mortgage applications, while Mazur (2022) investigates the effect of complaints disclosure on mortgage application approval. We depart from their work by combining confidential data on mortgage applications and consumer complaints. These confidential data provide more granular and detailed information on complaints that allows us to study, among other things, consumer complaints narratives. To the best of our knowledge, we are the first to construct (and study) such a detailed dataset.

More generally, our study relates to the literature investigating the causal effect of bank supervision on bank behavior and outcomes (Kleymenova & Tomy, 2022; Granja & Leuz, 2022; Eisenbach et al., 2017; Passalacqua et al., 2019). While this line of work focuses more on the role of bank supervision and its implication on risk, credit supply to non-financial

firms, and financial stability, we focus our attention on the supervision related to consumer financial protection and its implications for final consumers.

The paper is organized in the following way. Section 2 describes the institutional setting. Section 3 describes the data. Section 4 discusses the empirical model and the results. Section 5 concludes.

2. Institutional Setting

The Consumer Financial Protection Bureau (CFPB or Bureau) is a federal agency created in 2010 as part of the Dodd-Frank Wall Street Reform and Consumer Protection Act. One of the main functions of the CFPB is to receive and resolve consumer complaints related to financial products and services.

The Bureau's consumer complaints process is designed to be user-friendly and accessible to all consumers. Complaints can be submitted through the CFPB's website, by phone, or by mail. Once a complaint is received, it is assigned to a specialist for review and investigation. The specialist will typically contact the financial company to seek a resolution and will also gather additional information from the consumer to help understand the issue. The Bureau also uses data from consumer complaints to identify trends and patterns in the financial marketplace, which can help inform policy decisions and enforcement actions.

The financial company is expected to respond to the complaint within 15 days and to provide a substantive response within 60 days. The CFPB also publishes consumer complaints online, which can be searched by company name, product, and issue to help consumers make more informed decisions. Generally, all complaints that are routed to companies will be published after 15 days, or if the company responds earlier than 15 days, then they will be published on the next day. According to the CFPB website, 98% of complaints sent to companies get timely responses (i.e., a response within 15 days). The Bureau removes personal information, such as name and address, before publishing the complaints. The time frame for when a complaint is published online can vary and depends on the time it takes

for the CFPB to review and process the complaint. Once the complaint is processed, it is published on the CFPB's website.

The CFPB began accepting complaints soon after its creation and publishing them online in June 2012. The first complaint was published on June 19, 2012, and related to credit card products. However, the Bureau does not publish all consumer complaints it receives. The CFPB may not publish a complaint if it contains sensitive personal information, such as Social Security numbers, or if the complaint is determined to be frivolous or without merit. Additionally, the CFPB may also not publish a complaint if it is still under investigation and has not yet been closed. Consumers can close their complaints with or without a response or resolution. They also have the ability to request the complaint not be published. If the consumer chooses to close the complaint or requests it not to be published, the CFPB will not post it in the public database.

The Bureau's supervisory authority applies to all types of entities regardless of their size, as long as they fall under the definition of covered entities, which include banks and credit unions with assets of more than $10 billion and non-bank entities that are larger than participants in a market for a particular consumer financial product or service. Consumers can submit complaints even for companies the Bureau does not directly supervise. These complaints are referred to the appropriate supervisory agency. Complaints about banks are generally forwarded to the correct regulator in near real-time. There are also processes for moving complaints around when mergers, acquisitions, or spin-offs result in changes to a bank that take them in or out of the Bureau's supervisory authority.

3. Data

3.1. Sample Selection

We focus our empirical analyses on commercial banks and savings banks, obtaining financial data from the quarterly Consolidated Reports of Condition ("Call Reports") collected by the Federal Financial Institutions Examination Council (FFIEC). Every national bank, state

member bank, insured state nonmember bank, and savings association is required to file a Call Report as of the close of business on the last day of each calendar quarter. Call Reports contain data on bank income statements, balance sheets, and demographic information, such as institution name, operating city, state, and ZIP code.

We obtain data beginning in 2005 Q1 through 2021 Q2, giving us a fifteen-year panel dataset. We follow the sample construction methodology laid out in Fuster et al. (2021) to construct our sample of banks. In an effort to limit the potential confounding effects of regulations imposed on larger banks, the sample is restricted to commercial banks and savings banks between $1 billion and $25 billion in total assets. This threshold is used to hone in on banks near the $10 billion threshold for CFPB supervision. Furthermore, we exclude banks that are subsidiaries of bank holding companies (BHCs) with total assets greater than $50 billion. After imposing these restrictions, our sample consists of 1,655 banks, 144 of which were ever supervised by the CFPB within the sample period.

3.2. Consumer Complaints Data

The CFPB collects complaints about consumer financial products and services that were sent to companies for response. The public CFPB consumer complaints data includes data from *certain* consumer complaints submitted on or after December 1, 2011. Complaints in the database contain information about the product (e.g., savings account, credit card, or mortgage), the issue (e.g., managing an account or struggling to repay the student loan), the institution, and the geographic location of the complaint (e.g., ZIP code). Starting in March 2015, the CFPB began disclosing the consumer-submitted narrative of the issue. Within the portion of complaints filed against financial institutions after March 2015, 41% of complaints included a narrative.

We download the consumer complaints directly from the CFPB consumer complaints website.[6] More than 2 million complaints were received and disclosed in the database,

[6] https://www.consumerfinance.gov/data-research/consumer-complaints/#download-the-data

ranging from December 1, 2011, to April 4, 2021. From the consumer-reported "Company Name" field, we string-match the name to bank names filed on the Call Reports, keeping only the observations that have non-missing RSSD IDs, effectively filtering out complaints related to non-financial institutions (e.g., credit bureaus). This restriction reduces the number of complaints to 771,928 complaints. Within this subsample, 21,558 complaints were filed about banks within our sample, including asset thresholds. Figure 1 shows that complaints matched to banks within our sample are geographically diverse, with complaints originating in more than 1,300 unique counties, representing more than one-third of the total counties in the United States. Unsurprisingly, complaints are concentrated in the most populous cities such as New York City, Chicago, and Los Angeles (Figure 2). In addition to the publicly available complaints database, we also utilize the confidential version, allowing us to extend our sample to include complaints filed prior to their public disclosure.

3.3. Outcome Measures

To investigate the impact and materiality of consumer complaints, we obtain daily stock price data from the Center for Research in Security Prices (CRSP) and examine the stock market reaction to complaint disclosure. In addition to the closing price for each trading day, CRSP provides information on bid and ask prices (for bid-ask spread computation), trading volume, and stock return. Within our sample, 481 banks had securities data in CRSP.

Next, we examine whether consumers or bank competitors react to complaints. We begin by looking at depositor reactions through deposit data from the Summary of Deposits (SOD) collected by the Federal Deposit Insurance Corporation (FDIC). The SOD is an annual survey of branch office deposits as of June 30 for all FDIC-insured institutions, including insured U.S. branches of foreign banks. All institutions with branch offices are required to submit the survey, while institutions with only a main office are exempt. Beyond deposit data, the dataset contains basic geographic information on the location of the bank branch. The FDIC has SOD data beginning June 30, 1994. For the purposes of our study, we use data from June 30, 2010, to June 30, 2020, to coincide with the release of the CFPB consumer

complaints database in December 2011.

Honing in on consumer reaction, we investigate the effect of consumer complaints on mortgage lending. Prior literature documents a negative relationship between CFPB complaints and home mortgage applications using data from the Home Mortgage Disclosure Act (HMDA) (Mazur, 2022; Dou & Roh, 2020). HMDA requires many financial institutions to maintain, report, and publicly disclose mortgage loan-level information. One limitation to the publicly available HMDA data is that it is reported at an annual frequency and aggregated in ways to protect applicant and borrower privacy. Extending on the extant literature, we use the confidential HMDA (cHMDA) data, which contains more granular data at the mortgage application level and is reported on an application date basis. These additional details in the cHMDA data allow us to more precisely estimate the effects of consumer complaints on mortgage applications and lending.

For competition effects, we utilize quarterly deposit interest rate data from the RateWatch Scholar compiled by S&P Global Market Intelligence. RateWatch contains deposit interest rate data for retail and business products from 2001 to 2020. These data span over 7,500 financial institutions (e.g., banks, credit unions, savings, and loan associations) and across 96,000 locations. Moreover, RateWatch provides deposit interest rate data at the product level (e.g., CD, interest checking accounts, saving accounts, or money markets) and sub-product level, including product term lengths and dollar tiers. This data allows us to estimate rates offered on various financial products at a granular level.

4. Empirical Model and Results

4.1. Does Disclosure of Complaints Matter?

In this section, we study whether the public disclosure of complaints has a material effect on banks. The natural candidate to observe whether public disclosure of consumer complaints has an immediate effect on banks is by looking at metrics related to the bank's stock performance (Boyd et al., 2005).

To estimate the impact of complaints' disclosure, we employ the following regression model:

$$Y_{b,t} = \alpha + \phi_t + \eta_i + \beta_1 Public\ Disclousure_{b,t} + \gamma X_b + \epsilon_{b,t}, \tag{1}$$

where b, t refer to, respectively, *bank* and *date of complaint disclosure*. ϕ_t and η_i are time-fixed effects and bank-fixed effects, respectively. X_b is a set of bank-level controls that include (i) liquidity ratio, (ii) ROA, (iii) capital ratio, and (iv) size. *Public Disclosure* is an indicator for the date of the complaint publication and the subsequent three days. We follow the literature and choose short windows of three days around the disclosure event to avoid the effect of the disclosure being contaminated by other non-related events affecting the same bank. Our outcome variable is $Y_{b,t}$, which corresponds to raw stock prices, bid-ask spreads, the natural logarithm of trading volume, and abnormal returns. Appendix A provides further details on our variable definitions.

Table 3 presents the results of this estimation. Column (1) shows the effect of public disclosure on the affected banks' daily stock prices. In line with other studies looking at the impact of bad news on stock prices, we find that public disclosure has a negative impact on stock prices. However, the results are not statistically significant. Column (2) studies the impact on the bid-ask spread, a commonly used measure of information asymmetry and uncertainty in the literature (e.g., Leuz & Verrecchia, 2000). In line with the idea that complaints may create uncertainty about bank performance, internal controls, or operation risk, we find the coefficient to be positive and statistically significant, suggesting an increase in uncertainty.

Column (3) of Table 3 presents the impact on trading volumes. We find that public disclosure of complaints positively affects trading volumes. This result, combined with the widening bid-ask spreads, indicates potential investor disagreement (Kim & Verrecchia, 1991a,b, 2001; Barron & Karpoff, 2004). Column (4) shows the impact on abnormal returns. In line with other works studying the impact of negative news on returns (Zhang, 2006), we find that the public disclosure of consumer complaints has a negative effect on abnormal

returns. However, the coefficient is not statistically significant. Overall, we find that the impact of public disclosure of consumer complaints is material. Consumer complaints are noticed by the equity market participants and provide a potential disciplining mechanism with investors reacting to the negative information. In the second part of our analyses, we focus more on the impact on depositors as other funding providers who could discipline banks(subsection 4.2) and the potential reaction of banks to this information (subsection 4.4).

4.2. Do Depositors React to Consumer Complaints?

Next, we investigate whether depositors react to the disclosure of complaints. Following our identification strategy, we focus on banks around the threshold of $10 billion (Figure 3) and estimate the following model:

$$\begin{aligned} Y_{b,c,t} = \alpha + \beta_1 CFPB\ Oversight_{b,c,t} + \gamma X_{c,t} + \beta_2 Public\ Disclosure_t \\ + \beta_3 CFPB\ Oversight \times Public\ Disclosure_t + \eta W_{b,c,t} + \epsilon_{b,c,t}, \end{aligned} \tag{2}$$

where b, c, t correspond to *bank*, *county*, and *year-quarter*, respectively. $Y_{b,c,t}$ refers to deposits (in log levels) or mortgage market shares (based on county-level mortgage loan applications). $CFPB\ Oversight_{b,c,t}$ is an indicator for whether bank b is above the $10 billion size threshold. *Public Disclosure* is an indicator equal to one if a bank has a publicly disclosed consumer complaint in a given quarter. Appendix A provides further details on our variable definitions. We also include bank and county level controls (*population, median household income*, and *unemployment rate*). The analysis is at the level of the county where each bank is headquartered. We gradually saturate our specifications with fixed effects and include year, bank, and county fixed effects in the most stringent specifications.

Table 4 presents the results of this estimation. Column (1) does not include bank or county controls or fixed effects. It shows that banks subject to CFPB oversight, on average, have higher levels of deposits. However, without controlling for bank or county characteristics, we do not find statistically significant incremental changes to deposits for banks subject

to CFPB oversight whose complaints are disclosed. The coefficient, however, is negative. When we include bank and county controls (column 2), we observe that banks subject to CFPB oversight see a significant decline in their deposits after the disclosure of customer complaints in the counties where complaints were filed. We also find a significantly negative coefficient if we include year and bank fixed effects, controlling for unobserved time-invariant heterogeneity (column 4). However, we do not find significantly different effects once we include county-level fixed effects (column 5). The coefficient on the interaction term, however, remains negative. Overall, our findings suggest some evidence of depositor reaction in response to the disclosure of consumer complaints consistent with depositors disciplining banks in line with prior studies (Anbil, 2018; Kleymenova & Tomy, 2022; Diamond & Dybvig, 1983).

We also investigate whether the intensity of complaints matters in the next set of tests. In particular, we study whether having a large number of complaints, conditional on receiving a complaint, makes depositors more likely to react. Using a similar specification but changing *Public Disclosure* to complaint intensity, *High Complaint*, we identify banks with an above-median number of complaints in a given year and county and estimate the following:

$$\begin{aligned} Y_{b,c,t} = \alpha + \beta_1 CFPB\ Oversight_{b,c,t} + \gamma X_{c,t} + \beta_2 High\ Complaint_t \\ + \beta_3 CFPB\ Oversight \times High\ Complaint_t + \eta W_{b,c,t} + \epsilon_{b,c,t}, \end{aligned} \tag{3}$$

where $Y_{b,c,t}$ corresponds to the natural logarithm of the level of deposits held by a given bank in a given county in a given year. *High Complaint* is an indicator taking the value of one for banks that receive above median levels of complaints in a given year and county. The rest of the variables are as defined above and can also be found in Appendix A. We also include year, bank, and county-level fixed effects and control for county and bank characteristics.

Table 5 presents the results of this estimation and shows that the complaint intensity matters incrementally. In particular, columns (4) and (5) show that for banks with a large number of complaints that are subject to CFPB oversight, we observe an incrementally larger decline in deposits. While we see negative coefficients in all specifications, they are

only statistically significant in the last two, which include year, bank, and county-level fixed effects and controls for bank and county characteristics. For these two sets of tests in Table 4 and Table 5, we rely on the SOD data (the only data for deposits available at the county level). These data are released annually and, therefore, might not capture some shorter-term reactions from depositors.

4.3. Spillover Effects in the Mortgage Market

Next, we investigate whether mortgage market customers respond to the disclosure of consumer complaints about banks that operate in the residential mortgage market. Specifically, we study whether banks with consumer complaints see any change in the demand for their loans in the residential mortgage market. Utilizing confidential HMDA data, which allows us to match the timing of the complaints to mortgage applications, we investigate the impact of complaint disclosure on bank market shares in the residential mortgage market. In particular, we estimate a variant of Equation 2 with the dependent variable being the share of mortgage market applications received by a given bank in a given county relative to all mortgage applications received by banks in that county and year-quarter.[7]

Table 6 presents the results of this estimation. Columns (4)–(6) show that once we control for bank and county characteristics and include time and county-level fixed effects, we observe that banks that receive consumer complaints also experience a decline in their mortgage market shares in the county where they receive complaints. This effect is statistically and economically significant.

Overall, we find that depositors withdraw their funds from banks with consumer complaints; these withdrawals increase with the intensity of consumer complaints, and banks also see a decline in their market shares in the residential mortgage market.

[7]The cHMDA sample is based on a randomly drawn sample of applications, and our results have been approved for public release. Our analyses based on the full sample of cHMDA are pending approval for public release.

4.4. Do Banks React to Consumer Complaints?

Given that we observe a decline in deposits, we next investigate whether banks try to attract more deposits by increasing offer rates on various deposit products. In particular, we are interested in understanding whether banks with consumer complaints provide higher rates on deposits, especially on deposit products that impose withdrawal restrictions on depositors. Utilizing data available through RateWatch, we estimate Equation 2 with the dependent variable being the natural logarithm of deposit rates offered on 3-, 6-, 12-, 24-, and 60-month certificate of deposits (CD) contracts. In all specifications, we include bank and county controls as well as year-quarter, county, and bank-level fixed effects to control for unobserved heterogeneity.

Table 7 shows the results of this estimation. The table highlights that for all CD products apart from those with the shortest duration of 3 months, banks affected by the public disclosure of complaints increase offered rates, suggesting that these banks are trying to attract long-term deposits that can be locked in for a period of time. Specifically, columns (2)–(5) show that banks subject to CFPB oversight that receive complaints from consumers increase offered rates on all of their longer-term CD products following the public disclosure of complaints. These increases are both economically and statistically significant. We observe the largest increases in the offered rate on the 12-month CD products, the most commonly offered CD products by financial institutions.

We also study whether the intensity of complaints matters for banks that receive complaints from consumers. In particular, we investigate whether banks with an above-median number of complaints increase offered rates on deposits by more. Focusing on a subset of CD rates, we evaluate whether a larger number of complaints and the total number of complaints correlate with increases in CD rates. Table 8 shows that banks increase offered rates following the public disclosure of complaints (column 1). This increase appears to be mostly driven by banks with an above-median number of complaints (column 2). Column (3) suggests that a larger absolute number of complaints in a given quarter also provides

some explanatory power and is positively and significantly associated with higher offered rates on deposits.

Overall, we find that in response to declining deposits, banks appear to increase the rates they offer on long-term deposits to their customers. These findings suggest that banks are willing to increase offered rates on their deposit products to attract more deposits and dampen the potentially negative effect of the public disclosure of consumer complaints.

4.5. Examining Sentiment in Consumer Complaints

This section examines the nature of the complaints in the CFPB database. While our prior empirical analyses focus on the number of complaints, a novel aspect of this setting is that we can directly examine the underlying text of consumer complaints. CFPB discloses the full narrative of complaints posted by consumers, only redacting sensitive information such as consumer names and Social Security numbers or specific details of a product they complain about (e.g., their credit card number or residential address). We focus on the sentiments behind the complaints by deploying a textual analysis algorithm and studying whether these sentiments are associated with changes in consumer deposits. We implement a Natural Language Processing (NLP) technique called BERT (Bidirectional Encoder Representations from Transformers). The technique is described in Kölbel et al. (2020) and Rajan et al. (2022). This technique builds on the underlying text to pre-train a model to recognize the syntax of the English language using the vast amount of data. Given our objective in analyzing complaints, we use a pre-trained model from Demszky et al. (2020) called GoEmotions.

GoEmotions builds from a corpus of close to 60,000 comments extracted from Reddit, with human annotations to 27 emotional categories or Neutral. The emotional categories are *admiration, amusement, anger, annoyance, approval, caring, confusion, curiosity, desire, disappointment, disapproval, disgust, embarrassment, excitement, fear, gratitude, grief, joy, love, nervousness, optimism, pride, realization, relief, remorse, sadness*, and *surprise*. The algorithm assigns three emotions, or neutral, to the textual content based on the estimated

probability of the sentiment.

We restrict our sample to 2017 and after in this analysis, which is the period when the complaints data are publicly available on CFPB's website.[8] We classify the text of the complaints using the GoEmotions technique and, therefore, are able to infer emotions for each complaint for each bank. We retain the top emotion category for each complaint in our sample.

Table 9 presents the results of this analysis at the aggregate bank level. The categories of emotions are primarily disappointment, disapproval, realization, gratitude, annoyance, approval, and confusion. We generally find that emotions are not significantly associated with changes in deposits when looking at the level of the bank overall. Column (4), which includes bank controls, year-quarter fixed effects, and bank fixed effects, suggests that complaint narratives classified as "disappointment" are negatively associated with deposits, statistically significant at the 10% level of significance. In column (1), we find that complaint narratives classified as annoyance are positively associated with the change in deposits. However, in our model with fixed effects, these results become weaker. Given complaints are inherently built on texts with negative sentiment, we interpret these results with caution. A possible interpretation is that our regression model is unable to detect variation in complaint sentiments at the aggregate level when we do not link the geographic location of where complaints are filed to the level of deposits in that county.

We further investigate whether a more granular geographic definition affects our findings. In Table 10, we rely on the county where a bank is headquartered and receives complaints and estimate our regressions at the bank-quarter-county level. We center our analysis on complaint narratives classified as disappointment since it is the most common emotion assigned by the algorithm. The emotion disappointment represents the share of total complaints received by the specific bank-quarter-county observation with the classified emotion (e.g., one

[8] In robustness tests, we extend our analyses to the full sample of complaints based on the confidential version of the complaints database.

disappointment complaint out of 4 total complaints = 0.25). We also include the CFPB Oversight indicator variable in the regression specification. Columns (1)–(4) contain the natural logarithm of deposits, while columns (5)–(8) include a 1-quarter lag to capture any delayed effects arising from the timing of complaints disclosure. Across all specifications, the coefficient on *CFPB Oversight* is positive, suggesting an increase in deposits during the sample period for CFPB banks. However, in column (4), a specification with a stringent set of controls and quarter, county, and bank fixed effects, the interaction between *CFPB Oversight* and *Disappointment* is negative, suggesting that banks with CFPB oversight and a higher percentage of complaints classified as exhibiting disappointment show a relative decrease in deposits. Consistent with our earlier findings that depositors seem to react to the public disclosure of consumer complaints about their bank, our results utilizing specific emotions exhibited in these complaints suggest that specific emotions provide possible insights and that more negative complaints lead to incrementally higher depositor withdrawals.[9]

4.6. Modeling Complaints Based on Topics

In our final set of analyses, we further utilize NLP techniques and infer the main topics contained in the corpus of the text of complaints using the Latent Dirichlet allocation (LDA) method. This method treats each document (in our case, a complaint) as a mixture of topics and each topic as a mixture of words. This approach allows documents to contain multiple topics in terms of content rather than being separated into discrete groups. Following this approach, we identify five main topics that appear throughout the complaints database. Figure 4 aggregates the content of the complaints into topic classes. These can be identified as (i) credit card, (ii) bank services, (iii) bank payment, (iv) bank loan, and (v) bank account.[10]

As Figure 4 shows, the five topics are somewhat distinct, focusing on different types of

[9]We are currently in the process of extending these analyses to the confidential version of the complaints dataset.

[10]We construct a measure of "topic intensity" based on this analysis and are implementing these additional analyses in a regression model framework.

consumer products and services that banks provide. The five plots for each topic show the top ten words appearing in each of the five topics on the vertical axis and their intensity based on the frequency of appearance on the horizontal axis. For example, the first topic has "credit report" and "credit card" as the most frequently appearing words, while topics two and three show "credit card" and "customer services" and "credit card" and "late fee" as the most commonly appearing words, respectively. Topics four and five stand out as they correspond to loans and customer accounts, with "loan modification" and "checking account" as the most frequently appearing words. The distinct nature of these topics highlights the range of consumer complaints in the database as well as bank services that receives the most complaints.

5. Conclusion

In this paper, we investigate the role of consumer complaints as a potential disciplining device for banks. Utilizing the Consumer Complaints data from CFPB, we first study whether the disclosure of consumer complaints is material and find that the disclosure leads to increased trading volumes and widening bid-ask spreads. This finding suggests that this disclosure is material and leads to increased information asymmetry between banks and their funding providers as well as heightened uncertainty. When we turn to the impact on banks' customers, we find that the disclosure of consumer complaints leads to higher deposit withdrawals, especially for banks with an above-median number of consumer complaints. We also find evidence that banks with consumer complaints lose market shares in the residential mortgage market.

When investigating the content of consumer complaints, we find that a large share of these complaints exhibit negative sentiment corresponding to disappointment. We find some suggestive evidence that banks with complaints showing a higher degree of disappointment also see a larger decline in their deposits. In response to this decline in deposits, we find that banks increase their offered rates on deposit products, especially for longer-term deposits.

We hypothesize that banks attempt to stop the flight of deposits by offering higher rates and attempting to lock in depositors.

Our paper provides important insights into the role of regulatory oversight and regulatory disclosure in particular. Utilizing a unique dataset of consumer complaints, we show that collecting and disclosing customer complaints provides a potential information channel to inform funding providers about potential issues at a bank and allow them to discipline banks that receive more complaints from their customers.

References

Acharya, V. V., & Ryan, S. G. (2016). Banks' financial reporting and financial system stability. *Journal of Accounting Research*, *54*, 277–340.

Anbil, S. (2018). Managing stigma during a financial crisis. *Journal of Financial Economics*, *130*, 166–181.

Barron, O. E., & Karpoff, J. M. (2004). Information precision, transaction costs, and trading volume. *Journal of Banking & Finance*, *28*, 1207–1223.

Boyd, J. H., Hu, J., & Jagannathan, R. (2005). The stock market's reaction to unemployment news: Why bad news is usually good for stocks. *The Journal of Finance*, *60*, 649–672.

Bushman, R. M., & Williams, C. D. (2012). Accounting discretion, loan loss provisioning, and discipline of banks' risk-taking. *Journal of Accounting and Economics*, *54*, 1–18.

Chen, Q., Goldstein, I., Huang, Z., & Vashishtha, R. (2021). Bank transparency and deposit flows. Working paper.

Demszky, D., Movshovitz-Attias, D., Ko, J., Cowen, A., Nemade, G., & Ravi, S. (2020). GoEmotions: a dataset of fine-grained emotions. Working Paper.

Diamond, D., & Dybvig, P. (1983). Bank runs, deposit insurance, and liquidity. *Journal of Political Economy*, *91*, 401–419.

Dou, Y., & Roh, Y. (2020). Public disclosure and consumer financial protection. NYU Stern School of Business Working Paper.

Duro, M., Heese, J., & Ormazabal, G. (2019). The effect of enforcement transparency: Evidence from SEC comment-letter reviews. *Review of Accounting Studies*, *24*, 780–823.

Eisenbach, T. M., Haughwout, A., Hirtle, B., Kovner, A., Lucca, D. O., & Plosser, M. C. (2017). Supervising large, complex financial institutions: What do supervisors do? *Economic Policy Review*, *23*, 57–77.

Flannery, M. J. (1998). Using market information in prudential bank supervision: A review of the U.S. empirical evidence. *Journal of Money, Credit and Banking*, *30*, 273–305.

Fuster, A., Plosser, M. C., & Vickery, J. I. (2021). Does CFPB oversight crimp credit? CEPR Discussion Paper No. DP15681.

Goldstein, I., & Sapra, H. (2014). Should banks' stress test results be disclosed? An analysis of the costs and benefits. *Foundations and Trends in Finance*, *8*, 1–54.

Granja, J., & Leuz, C. (2022). The death of a regulator: Strict supervision, bank lending and business activity. European Corporate Governance Institute (ECGI) - Law Working Paper No. 447/2019, LawFin Working Paper No. 4.

Hayes, R. M., Jiang, F., & Pan, Y. (2021). Voice of the customers: Local trust culture and consumer complaints to the CFPB. *Journal of Accounting Research*, *59*, 1077–1121.

Kim, O., & Verrecchia, R. E. (1991a). Market reaction to anticipated announcements. *Journal of Financial Economics*, *30*, 273–309.

Kim, O., & Verrecchia, R. E. (1991b). Trading volume and price reactions to public announcements. *Journal of Accounting Research*, *29*, 302–321.

Kim, O., & Verrecchia, R. E. (2001). The relation among disclosure, returns, and trading volume information. *The Accounting Review*, *76*, 633–654.

Kleymenova, A., & Tomy, R. E. (2022). Observing enforcement: Evidence from banking. *Journal of Accounting Research*, *60*, 1583–1633.

Kölbel, J. F., Leippold, M., Rillaerts, J., & Wang, Q. (2020). Ask BERT: How regulatory disclosure of transition and physical climate risks affects the CDS term structure. *Swiss Finance Institute Research Paper*, .

Leuz, C., & Verrecchia, R. E. (2000). The economic consequences of increased disclosure. *Journal of Accounting Research*, *38*, 91–124.

Mazur, L. C. (2022). *Are the voices of customers louder when they are seen? Evidence from CFPB complaints*. Ph.D. thesis.

Passalacqua, A., Angelini, P., Lotti, F., & Soggia, G. (2019). The real effects of bank supervision: Evidence from on-site bank inspections. Working Paper.

Rajan, R. G., Ramella, P., & Zingales, L. (2022). What purpose do corporations purport? Evidence from letters to shareholders. Working Paper.

Zhang, X. F. (2006). Information uncertainty and stock returns. *The Journal of Finance*, *61*, 105–137.

Appendix A. Variable definitions

Variable	Definition	Source	Code
Dependent Variables			
Abnormal Return	Daily abnormal returns based on the market model.	CRSP and authors' calculations	
Bid-Ask Spread	A daily spread between the bid and ask price as reported by CRSP.	CRSP	
CD rates	The natural logarithm of deposit rate changes on CD products of various maturities.	RateWatch	
Deposits	Natural logarithm of Total deposits (bank-level).	Call Reports or SOD	log(RCFD2200)
Mortgage Share	Total residential mortgage loan applications by a given bank / Total mortgage applications in the county.	HMDA, cHMDA and authors' calculations	
Stock Price	A given bank's equity share price.	CRSP	
Volume	A natural logarithm of daily trading volume for a given bank's equity shares as reported by CRSP.	CRSP	
Control Variables			
BERT Emotions	Indicators inferred from the textual analysis of the complaints narrative using the GoEmotions algorithm and BERT technique. 27 emotions and neutrality are inferred from the text (admiration, amusement, anger, annoyance, approval, caring, confusion, curiosity, desire, disappointment, disapproval, disgust, embarrassment, excitement, fear, gratitude, grief, joy, love, nervousness, optimism, pride, realization, relief, remorse, sadness, and surprise).	Complaints database and authors' calculations	
Capital Ratio	Total equity as a proportion of total assets.	Call Reports	RCFD3210 / RCFD2170

Variable	Definition	Source	Code
CFPB Oversight	An indicator that takes the value of one if a bank is subject to CFPB supervision in a given year or year-quarter and zero otherwise.	Complaints database	
High Complaint	An indicator that takes the value of one if the total number of complaints for a given bank is greater than the median number of complaints in a given year-county pair and zero otherwise.	Complaints database and authors' calculations	
Median household income	Median household income in a county.	Census Bureau	
Liquidity Ratio	Ratio of cash and cash equivalents to total assets, where cash is defined as the sum of interest-bearing balances, noninterest-bearing balances, and currency and coin.	Call Reports	(RCFD0071 + RCFD0081) / RCFD2170
Population	County population.	Census Bureau	
Public Disclosure	An indicator that takes the value of one if a bank received a complaint and the complaint is publicly disclosed and zero otherwise.	Complaints database	
Return on Assets (ROA)	Net income divided by average total assets.	Call Reports	RIAD4340 / RCFD2170
Size	Natural logarithm of total assets.	Call Reports	log(RCFD2170)
Total Complaints	The total number of complaints a bank received in a given bank-county-year.	Complaints database	
Unemployment rate	County unemployment rate.	Census Bureau	

Figure 1: Geographical Distribution of Complaints

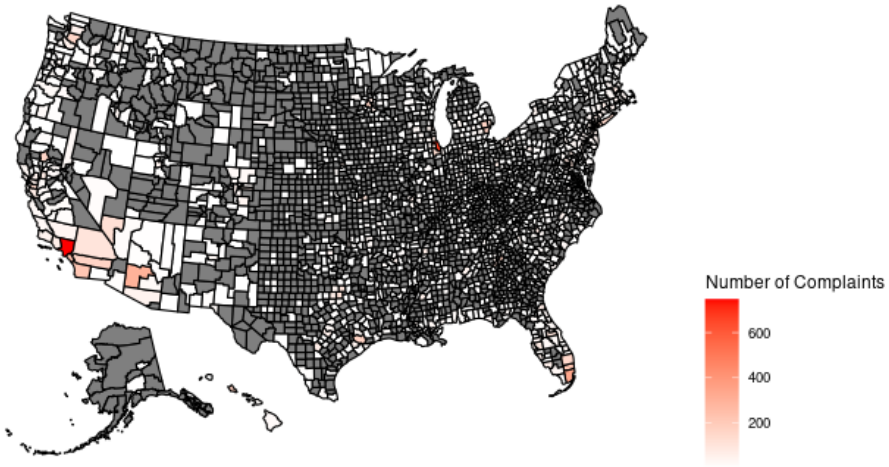
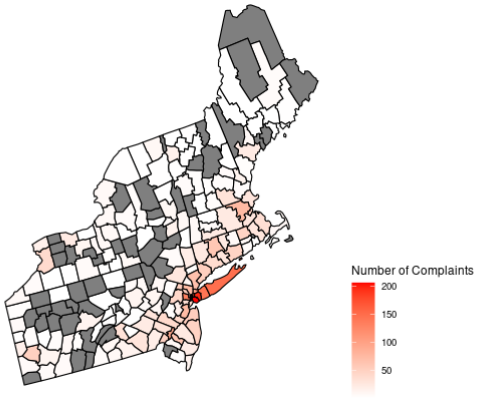
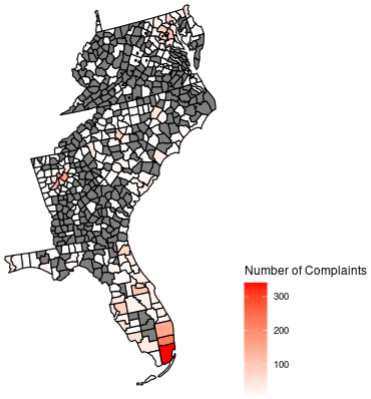


Figure 2: Geographical Distribution of Complaints (by Region)

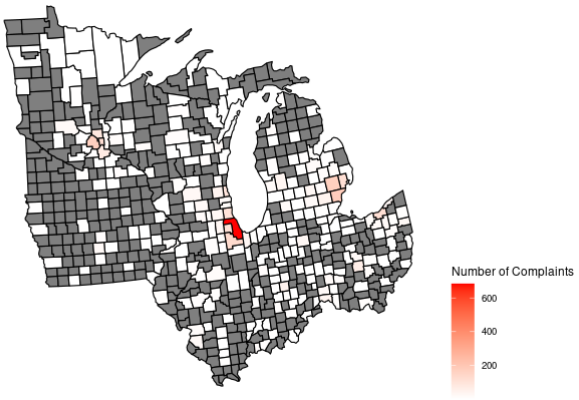
(a) Northeast



(b) Southeast



(c) Midwest



(d) West

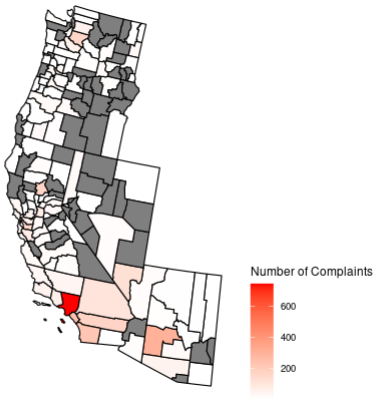
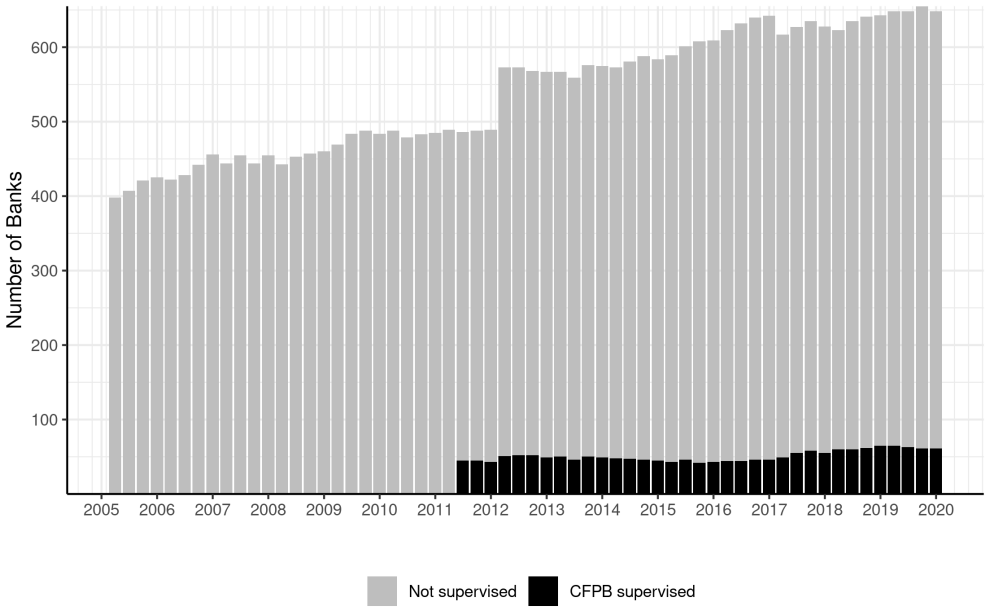


Figure 3: Sample Construction



Note: Count of banks in the sample over time by CFPB supervision. Sample restricted to only banks that have HMDA filing.
Source: Call Report and CFPB.

Figure 4: Topic Results from LDA

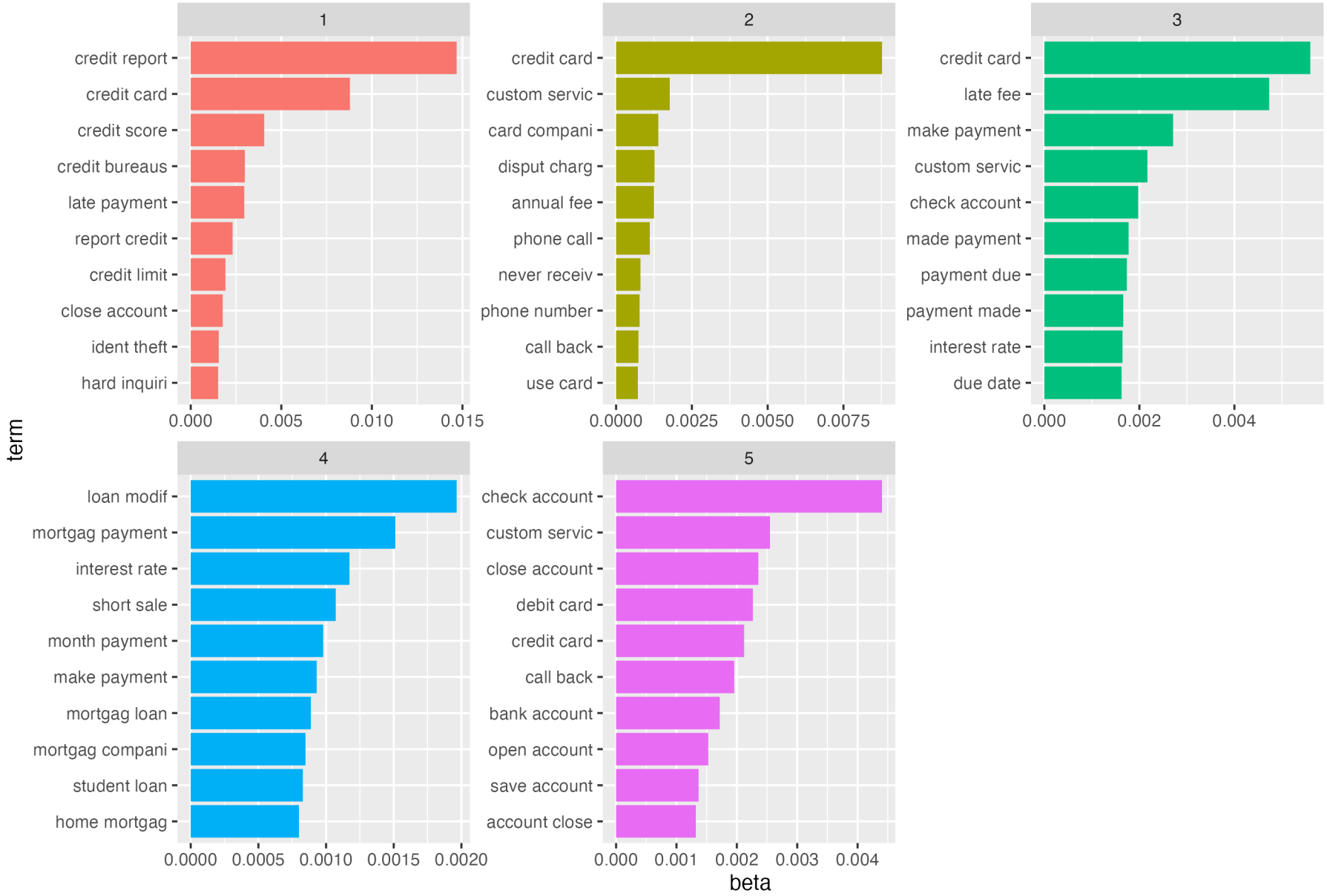


Table 1: Distribution of Complaints by Bank Asset Amount

	$1B-$5B	$5B-$10B	$10B-$15B	$15B-$20B	$20B-$25B	$25B+	Total
CFPB Complaints	134	1,940	6,195	7,407	6,575	609,146	631,397
Sample	134	1,928	6,060	7,089	6,347	-	21,558

Notes: This table shows the distribution of complaints by total bank assets from 2011 Q4 to 2021 Q2. All variables are defined in Appendix A.
Source: Call Reports and CFPB Complaints Database.

Table 2: Descriptive Statistics of Bank Characteristics

	Unique Banks	Observations (N)	Mean	Std. Dev.	Min.	Median	Max.
Banks Supervised by CFPB:							
log(Assets)	143	1,892	16.331	0.643	13.860	16.481	17.033
Capital Ratio	121	1,778	0.129	0.055	0.026	0.121	0.918
Liquidity Ratio	121	1,778	0.072	0.120	0.000	0.037	0.999
ROA	139	1,880	0.008	0.028	-0.64	0.006	0.729
Deposits ($B)	140	2,188	11.24	4.79	0.00	11.27	22.33
Banks Not Supervised by CFPB:							
log(Assets)	1,619	40,723	14.697	0.751	11.211	14.486	17.033
Capital Ratio	1,448	35,553	0.110	0.047	-0.065	0.103	0.959
Liquidity Ratio	1,448	35,551	0.060	0.073	0.000	0.036	0.999
ROA	1,452	35,792	0.006	0.012	-0.296	0.005	0.550
Deposits ($B)	1,453	36,321	2.27	2.09	0.00	1.47	21.56

Notes: This table reports descriptive statistics for log(assets), capital ratio, liquidity ratio, ROA, and deposits for bank-quarter observations included in the analyses. All variables are defined in Appendix A. The sample period is between 2005 Q1 and 2021 Q2.
Source: Call Reports and CFPB Complaints Database.

Table 3: Market Reaction

	Stock Price (1)	Bid-Ask Spread (2)	log(Volume) (3)	Abnormal Return (4)
Public Disclosure	-0.058	0.013**	0.010*	-0.0002
	(0.050)	(0.006)	(0.006)	(0.0002)
Bank Controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	15,658	15,658	15,658	15,658
Adjusted R^2	0.976	0.607	0.742	0.013

Notes: This table shows the results of the following equation: $Y_{b,t} = \alpha + \phi_t + \eta_i + \beta_1 Public\ Disclousure_{b,t} + \gamma X_b + \epsilon_{b,t}$. We include bank fixed effects eta_i, and time fixed effects ϕ_t. We include pre-defined bank-level controls $X_{b,PRE}$: liquidity ratio, ROA, capital ratio, and size (natural logarithm of lagged total assets). Column (1) studies the impact on the stock price. Column (2) looks at the bid-ask spread. Column (3) considers the log(Volume), while column (4) shows the impact on abnormal returns. All variables are defined in Appendix A. * p< 0.10; ** p< 0.05; *** p< 0.01. Source: Call Reports, CFPB Complaints Database, and CRSP.

Table 4: Impact of Disclosure on Bank Deposits

	log(Deposits)				
	(1)	(2)	(3)	(4)	(5)
CFPB Oversight	1.380***	1.469***	1.478***	0.449***	0.423***
	(0.170)	(0.124)	(0.125)	(0.080)	(0.085)
Public Disclosure	1.014***	1.154***	1.150***	0.274**	0.259**
	(0.357)	(0.338)	(0.361)	(0.126)	(0.137)
CFPB Oversight x Public Disclosure	-0.359	-0.600*	-0.613	-0.238**	-0.211
	(0.400)	(0.360)	(0.382)	(0.141)	(0.153)
Bank and County Controls	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Bank FE	No	No	No	Yes	Yes
County FE	No	No	No	No	Yes
Observations	7,192	6,766	6,766	6,766	6,766
Adjusted R^2	0.275	0.314	0.317	0.907	0.901

Notes: This table shows the results of the regression estimates of complaint disclosure on deposit levels in a given county. *Log(Deposits)* is the total level of annual deposits using the SOD data in a specific county where a bank is located in a given year. *CFPB Oversight* is an indicator that takes the value of one if a bank was under the CFPB supervision in any quarter of a given year. *Public Disclosure* is an indicator that takes the value of one if a bank received a complaint during a given year-quarter. Bank controls include averaged 4-quarter liquidity ratio, capital ratio, and ROA (all lagged by one quarter). All variables are defined in Appendix A. The sample contains 134 unique commercial banks in 106 counties that were ever supervised by CFPB from 2010 to 2020. Standard errors reported in parentheses are clustered by the bank. *p < 0.1; **p < 0.05; ***p < 0.01
Source: Call Reports, Census Bureau, CFPB, CFPB Complaints Database, and Summary of Deposits.

Table 5: Impact of Complaint Intensity on Deposits

	log(Deposits)				
	(1)	(2)	(3)	(4)	(5)
CFPB Oversight	1.473***	1.553***	1.159***	0.460***	0.437***
	(0.151)	(0.111)	(0.112)	(0.079)	(0.084)
High Complaint	0.991**	1.144***	1.125**	0.303**	0.288*
	(0.445)	(0.420)	(0.449)	(0.147)	(0.160)
CFPB Oversight x High Complaint	-0.447	-0.695	-0.689	-0.319**	-0.304*
	(0.476)	(0.437)	(0.465)	(0.157)	(0.170)
Bank and County Controls	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Bank FE	No	No	No	Yes	Yes
County FE	No	No	No	No	Yes
Observations	7,192	6,766	6,766	6,766	6,766
Adjusted R^2	0.270	0.311	0.314	0.907	0.901

Notes: This table presents county-level regressions with interactions between CFPB oversight and high complaint. *Log(Deposits)* is the total annual deposits at a specific lender in a given year. *CFPB Oversight* is an indicator that takes the value of one if a bank was under the CFPB supervision in any quarter of a given year. *Public Disclosure* is an indicator that takes the value of one if a bank received a complaint during a given year-quarter. *High complaint* is an indicator that takes the value of one if the total number of complaints to a bank is greater than the median number of complaints in a given year-county pair. Bank controls include averaged 4-quarter liquidity ratio, capital ratio, and ROA (all lagged by one quarter) as reported on Call Reports. All variables are defined in Appendix A. The sample contains 134 unique commercial banks in 106 counties that were ever supervised by CFPB from 2010 to 2020. Standard errors reported in parentheses are clustered by bank. *p < 0.1; **p < 0.05; ***p < 0.01
Source: Call Reports, Census Bureau, CFPB, CFPB Complaints Database, and Summary of Deposits.

Table 6: Impact of Disclosure on Bank Mortgage Shares

	Mortgage Share					
	(1)	(2)	(3)	(4)	(5)	(6)
CFPB Oversight	−0.039***	−0.032***	−0.039***	−0.005***	−0.002**	0.0004
	(0.001)	(0.002)	(0.002)	(0.0009)	(0.001)	(0.0006)
Public Disclosure	−0.064***	−0.043***	−0.036***	0.004*	0.005**	0.007***
	(0.005)	(0.004)	(0.005)	(0.002)	(0.003)	(0.001)
CFPB Oversight x Public Disclosure	0.041***	0.030***	0.027***	−0.006**	−0.006**	−0.007***
	(0.005)	(0.005)	(0.005)	(0.002)	(0.003)	(0.001)
Bank and County Controls	No	Yes	Yes	Yes	Yes	Yes
Quarter FE	No	No	Yes	No	Yes	No
County FE	No	No	No	Yes	Yes	No
County x Quarter FE	No	No	No	No	No	Yes
Observations	36,867	36,867	36,867	36,867	36,867	36,867
Adjusted R^2	0.029	0.188	0.186	0.004	0.004	0.009

Notes: $Y_{bct} = \alpha + \beta_1 CFPBOversight_{bt} + \beta_2 PublicDisclosure_{bt} + \beta_3 CFPBOversight_{bt} \times PublicDisclosure_{bt} + \gamma X_b + \theta Z_c + \epsilon_{bt}$. This table shows the regression results estimating changes in quarterly mortgage application shares as a result of consumer complaints disclosures. Mortgage share is defined as the share of mortgage applications received by a bank in a given county and quarter. *CFPB Oversight* is an indicator that takes the value of one if a bank was under the CFPB supervision in any quarter of a given year. *Public Disclosure* is an indicator that takes the value of one if a bank received a complaint during a given year-quarter. Publication of complaints to the CFPB database is conservatively estimated to be 15 days after the complaint is sent to the company. Bank controls include liquidity ratio, capital ratio, ROA, and log(assets) as reported on quarterly Call Reports. County controls include population, median household income, and the unemployment rate, as reported by the Census Bureau. All variables are defined in Appendix A. The sample contains 120 unique commercial banks that were ever supervised by CFPB between and cHMDA data from January 1, 2010 to December 31, 2019. *p < 0.1; **p < 0.05; ***p < 0.01

Source: Call Reports, cHMDA, CFPB, and CFPB Complaints Database.

Table 7: CD Product Deposit Rates (RateWatch)

	3-month	6-month	12-month	24-month	60-month
	(1)	(2)	(3)	(4)	(5)
CFPB Oversight	0.010	0.040	0.029	0.023	0.005
	(0.034)	(0.031)	(0.031)	(0.026)	(0.023)
Public Disclosure	-0.060	-0.470**	-0.421***	-0.297	-0.187**
	(0.126)	(0.196)	(0.145)	(0.187)	(0.083)
CFPB Oversight x Public Disclosure	0.112	0.472**	0.530***	0.312*	0.191**
	(0.124)	(0.196)	(0.143)	(0.187)	(0.082)
Bank and County Controls	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	3,035	3,067	3,093	3,069	3,062
Adjusted R^2	0.754	0.775	0.761	0.741	0.682

Notes: $Y_{bct} = \alpha + \beta_1 CFPB\ Oversight_{bt} + \beta_2 Public\ Disclosure_{bt} + \beta_3 CFPB\ Oversight_{bt} \times Public\ Disclosure_{bt} + \gamma X_b + \theta Z_c + \epsilon_{bt}$. This table estimates the impact of consumer complaints disclosure on the log changes in deposit rates for CD products. *CFPB Oversight* is an indicator that takes the value of one if a bank was under the CFPB supervision in any quarter of a given year. *Public Disclosure* is an indicator that takes the value of one if a bank received a complaint during a given year-quarter. Publication of complaints to the CFPB database is conservatively estimated to be 15 days after the complaint is sent to the company. Bank controls are lagged by one quarter and include liquidity ratio, capital ratio, ROA, and log(assets) as reported on quarterly Call Reports. County controls include population, median household income, and the unemployment rate, as reported by the Census Bureau. All variables are defined in Appendix A. Data aggregated to bank-county (HQ)-quarter level. The sample contains commercial banks that were ever supervised by CFPB from 2010 Q1 to 2020 Q1. *p < 0.1; **p < 0.05; ***p < 0.01
Source: Call Reports, CFPB, CFPB Complaints Database, and RateWatch.

Table 8: Deposit Rate Regressions (RateWatch), branch rate match

	$\log(\text{Deposit Rate})_{CD}$		
	(1)	(2)	(3)
Public Disclosure	0.007***		
	(0.003)		
High Complaint		0.007***	
		(0.003)	
Total Complaints			0.003***
			(0.001)
Bank and County Controls	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Observations	153,886	153,886	153,886
Adjusted R^2	0.801	0.801	0.801

Notes: $Y_{bct} = \alpha + \beta_1 Public\ Disclosure_{bt} + \gamma X_b + \theta Z_c + \epsilon_{bt}$. This table presents the regression results estimating log changes in bank deposit rates. *Public disclosure* is an indicator variable that takes the value of one if there is a publicly disclosed complaint during that quarter. Publication of complaints to the CFPB database is conservatively estimated to be 15 days after the complaint is sent to the company. Bank controls are lagged by one quarter and include liquidity ratio, capital ratio, ROA, and log(assets) as reported on quarterly Call Reports. County controls include population, median household income, and the unemployment rate, as reported by the Census Bureau. All variables are defined in Appendix A. Data aggregated to bank-county (complaint)-quarter level. The sample contains 931 commercial banks in 2,452 counties from 2010 Q1 to 2020 Q1. *p < 0.1; **p < 0.05; ***p < 0.01
Source: Call Reports, CFPB, CFPB Complaints Database, and RateWatch.

Table 9: 1-qtr Lagged Deposit Results using BERT Emotion Output (bank level)

	log(1-qtr Lagged Deposits)				1-qtr Lagged Deposits/Assets			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Disappointment	-0.001	-0.003	-0.003	-0.014*	5.343	3.280	3.219	-0.173
	(0.020)	(0.014)	(0.014)	(0.007)	(4.698)	(2.428)	(2.359)	(0.121)
Disapproval	-0.012	-0.021	-0.021	-0.003	-4.404	-2.935	-2.937	-0.135
	(0.030)	(0.017)	(0.016)	(0.007)	(3.600)	(2.294)	(2.269)	(0.127)
Realization	0.022	0.022	0.023	-0.006	-0.467	-0.302	-0.212	0.155
	(0.016)	(0.013)	(0.012)	(0.007)	(1.732)	(1.588)	(1.535)	(0.184)
Gratitude	0.007	0.00	0.008	-0.005	1.513	1.212	1.784	-0.271
	(0.029)	(0.024)	(0.024)	(0.006)	(2.243)	(1.887)	(2.195)	(0.276)
Annoyance	0.050**	0.030**	0.033**	-0.007	7.230	6.356	6.748	-0.229
	(0.019)	(0.015)	(0.014)	(0.004)	(6.764)	(4.954)	(5.081)	(0.156)
Approval	-0.042	-0.039*	-0.036*	-0.008	-2.564	-2.735	-2.315	-0.387
	(0.032)	(0.020)	(0.019)	(0.006)	(2.081)	(2.410)	(2.213)	(0.265)
Confusion	0.017	-0.004	-0.001	-0.006	7.646	4.241	4.762	-0.320
	(0.034)	(0.024)	(0.023)	(0.008)	(7.881)	(4.102)	(4.261)	(0.266)
Bank Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Quarter FE	No	No	Yes	Yes	No	No	Yes	Yes
Bank FE	No	No	No	Yes	No	No	No	Yes
Observations	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348
Adjusted R^2	0.001	0.281	0.286	0.931	0.005	0.125	0.131	0.995

Notes: Bank controls include the liquidity ratio, capital ratio, and ROA. All variables are defined in Appendix A. The sample consists of 104 commercial banks in 1,017 counties between 2017 Q1 and 2021 Q1. Deposits are measured at the aggregate bank-quarter level. Standard errors are reported in parentheses and clustered by bank. *p < 0.1; **p < 0.05; ***p < 0.01
Source: Call Reports, Census Bureau, CFPB, and CFPB Complaints Database.

Table 10: Impact on Deposits Using BERT Emotions Output

	log(Deposits)				1-qtr Lagged log(Deposits)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CFPB Oversight	0.599***	0.548***	0.551***	0.163***	0.596***	0.545***	0.545***	0.164**
	(0.087)	(0.104)	(0.102)	(0.060)	(0.088)	(0.104)	(0.101)	(0.063)
Disappointment	-0.011	-0.141	0.118	0.078**	-0.041	0.114	0.094	0.072**
	(0.065)	(0.096)	(0.095)	(0.031)	(0.066)	(0.095)	(0.095)	(0.036)
CFPB Oversight x Disappointment	0.251**	0.039	0.059	-0.076**	0.261**	0.044	0.063	-0.072*
	(0.101)	(0.122)	(0.127)	(0.034)	(0.102)	(0.124)	(0.129)	(0.037)
Bank Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
County Controls	No	No	Yes	Yes	No	No	Yes	Yes
Quarter FE	No	No	No	Yes	No	No	No	Yes
County FE	No	No	No	Yes	No	No	No	Yes
Bank FE	No	No	No	Yes	No	No	No	Yes
Observations	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
Adjusted R^2	0.121	0.201	0.220	0.971	0.116	0.198	0.212	0.967

Notes: *CFPB Oversight* is an indicator that takes the value of one if a bank was under the CFPB supervision in any quarter of a given year. *Emotion* represents the share of total complaints received by the specific bank-quarter-county observation with the classified emotion (e.g., 1 disappointment complaint out of 4 total complaints = 0.25). County controls include population, median household income, and the unemployment rate as reported by the Census Bureau. Bank controls for log(deposit) regressions include liquidity ratio, capital ratio, and ROA. All variables are defined in Appendix A. The sample consists of 99 commercial banks in 74 counties between 2017 Q1 and 2021 Q1. Standard errors are reported in parentheses. Standard errors are clustered by bank. *p < 0.1; **p < 0.05; ***p < 0.01

Source: Call Reports, Census Bureau, CFPB, and CFPB Complaints Database.