

Bank Financial Restatements and Market Discipline

By W. Blake Marsh and Raluca A. Roman

When banks misreport financial information, they receive extensive scrutiny from regulators, investors, and the financial press. Banks may reissue financial statements for several reasons, ranging from simple accounting or clerical errors to fraud. But regardless of the reason, financial restatements send negative signals to the public, creating uncertainty about bank stability and potentially damaging banks' reputations. Bank stakeholders—including shareholders, depositors, and loan customers—may interpret misreporting as increased risk and take actions that impose costs on the restating bank. These actions constitute “market discipline” and may incentivize banks to report financial information accurately.

Whether financial restatements impose discipline on banks is an empirical question. Shareholders may respond to the perception of increased risk by selling stocks of restating banks, which may reduce stock prices and increase the bank's cost of equity. At the same time, depositors may withdraw funds or require higher interest rates on deposits, thereby increasing the bank's cost of deposits. In addition, loan customers may demand fewer loans or lower interest rates from the restating bank, reducing its earnings. Together, these actions could be very costly to banks.

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However, regulatory considerations may blunt these disciplinary effects. Strict bank regulations might reduce concerns arising from financial restatements if stakeholders believe these regulations prevent excessive risk-taking. In addition, some stakeholders might view large banks as “too big to fail,” shielding them from potential losses. Finally, most bank deposits are federally insured, potentially relieving depositor concerns about safety.

In this article, we investigate whether shareholders, depositors, and loan customers discipline banks that misreport financial statements. We find strong empirical evidence that they do. First, we find that bank stock returns decline following a restatement, suggesting that shareholders respond to financial restatements. The effects are stronger for large banks, which are likely owned by more sophisticated institutional investors. Second, we find that depositors withdraw funds at restating banks. The deposit outflow is larger for uninsured depositors, who have greater monitoring incentives, and smaller at larger banks, perhaps due to implicit and explicit government guarantees. Third, we find some limited evidence that restatements affect loan growth, as consumer lending slows marginally. However, these effects could be due to changes in funding availability. Overall, stakeholders’ reactions to bank restatements are economically important, resulting in significantly higher costs for the restating banks, consistent with market discipline.

Section I discusses market discipline in banking and bank stakeholders’ reactions to financial restatements. Section II discusses the data sources and presents the empirical framework relating bank restatements to shareholder reactions. Section III shows that stock returns, deposits, and loan growth slow after banks reissue their financial statements.

I. Responses to Misreporting and Market Discipline

Accurate financial reporting is critical for well-functioning financial markets. When banks release inaccurate information or do not comply with accounting rules or standards, they may restate their financial disclosures, either voluntarily or at the request of an auditor or regulator. These restatements are publicly announced, informing stakeholders that prior financial statements may have contained errors or omissions. Restatements may damage banks’ reputations by raising concerns about their internal controls as well as the reliability of future

reports. Moreover, restatements may cause stakeholders to reassess firm value in light of new information.

Because banks are informationally opaque—that is, difficult for outsiders to assess and monitor—financial misreporting may trigger market discipline (Furfine 2001; Morgan 2002). Market discipline describes how market participants respond to news of an institution's bad or risky behavior by undertaking actions that are costly to the institution (Berger 1991; Peria and Schmukler 2001). Market discipline promotes market efficiency by encouraging transparency and incentivizing institutions to avoid risky behaviors that increase their costs.

It is unclear, though, whether market discipline imposes sufficient costs on banks to discourage misreporting. If errors are perceived as unintentional or if they have little effect on current and future earnings, the costs of misreporting may be limited. However, if errors increase uncertainty and risk or diminish firm reputation, the costs could be much higher. Restatements due to weak accounting and internal control systems may indicate broader operational and managerial problems that presage future losses. Restatements that interfere with stakeholders' ability to project future profitability may be perceived as signaling increased bank risk. And restatements that disclose managerial attempts to fraudulently cover up financial problems or “cook the books” may create uncertainty about the firm's current and future financial condition while broadly reducing public trust and diminishing firm reputation.

In general, effective market discipline must satisfy three requirements (Crockett 2002).¹ First, information provided to market participants must be easily accessible, relevant, and timely. Second, market participants must be properly incentivized to monitor firms, and regulators must be supportive of their monitoring efforts. And third, participants must be able to use market-based mechanisms to exercise discipline.

However, these conditions may not be sufficient for effective market discipline in banking. While regulators require banks to disclose details about their activities and profits, certain elements of a bank's risk profile—such as the riskiness of a bank's loan customers—can remain opaque, making risk assessments difficult for stakeholders.² In addition, regulations that impose explicit or implicit government guarantees may lead to complacency among stakeholders and allow banks to incur less than the full costs of their decision-making (Laeven and Levine 2009;

Srivastav, Armitage, and Hagedorff forthcoming). For example, since the advent of deposit insurance, deposit flows have typically *increased* at banks during times of financial distress (Gatev and Strahan 2006). Moreover, stakeholders may not monitor banks and instead rely on regulatory monitoring if they believe that regulators can effectively limit weak management practices and controls. Finally, impediments to stakeholder reactions may make market discipline less effective. For example, in the absence of a liquid and competitive financial market, market participants have difficulty adjusting the composition of their portfolios as risk and return assessments change (see, for example, Lambert and Verrecchia 2015).³

Furthermore, responses to financial restatements—and, therefore, market discipline—may differ substantially depending on whether stakeholders are shareholders, depositors, or loan customers. Shareholders may react to perceived changes in firm value by buying shares or selling their holdings, which in turn may change share prices. The reactions of large, institutional investors likely have a greater effect on bank stock prices—given the sheer volume of potentially traded shares—than the reactions of smaller, individual investors. Depositors, on the other hand, provide a large proportion of a bank’s funding and may withdraw funds when risk increases—especially if their deposits are uninsured. Finally, loan customers may exercise market discipline by choosing not to apply for a loan with a misreporting bank or refinancing an existing loan with another institution. These responses may be amplified if banks reduce credit supply after a restatement due to funding strains or a desire to improve their condition.

Stakeholder responses may also differ depending on the restating bank’s size. But whether these responses are likely to be stronger for large banks or small banks is an empirical question. On the one hand, large banks may be more prone to market discipline because they are subject to greater reporting requirements, possibly making them more transparent. Similarly, large banks may have more sophisticated investors that hold them accountable for even minor errors. On the other hand, larger institutions might be *less* prone to market discipline due to investors’ expectations of government guarantees or their increased complexity, which might make them more informationally opaque. Moreover, larger institutions have more in-house legal and accounting

expertise to finesse the language in financial restatements, potentially dampening stakeholder reactions. Discipline may be more pronounced among smaller institutions, which are more closely held by small investor groups and tend to be informationally opaque due to fewer regulatory reporting requirements and less analyst coverage.

II. Data and Empirical Approach

To determine whether bank shareholders, depositors, and loan customers exert market discipline when banks issue financial restatements, we compare stock returns, deposit growth rates, and loan growth rates before and after a restatement. We examine firm restatements from 1997 to 2006, the entire period for which restatement data are publicly available.

Bank restatements data

We draw bank restatement data from the restatements database of the Government Accountability Office (GAO), which includes 2,705 material firm restatements issued from January 1, 1997, to June 30, 2006.⁴ We identify 167 firm restatements by 136 unique financial institutions.⁵ Table 1 shows that financial firm restatements increased over the full sample period, mirroring a similar increase in nonfinancial firm restatements (GAO 2003, 2006a). These increases likely reflect the passage of the 2002 Sarbanes-Oxley Act, which sought to improve corporate transparency and accountability.

Reasons for financial firm restatement range from unintentional accounting errors to more severe misreporting cases that likely influence market outcomes or unduly benefit management. Table 2 reports the classification of bank restatements into 10 categories defined by the GAO. Separating restatements into categories is important, as shareholder reactions may differ depending on the type and severity of the restatement. The categories are not mutually exclusive, and a single restatement may fall into multiple categories. Detailed definitions of all reasons for restatement are in Appendix A.

Table 2 shows that the most common reason for restatement is securities related, which includes restatements related to improper accounting for derivatives, warrants, stock options, and other convertible securities. About 27 percent of all financial firm restatements are securities related.

Table 1
Financial Firm Restatements

Year	Number of restatements
1997	6
1998	5
1999	9
2000	12
2001	6
2002	25
2003	28
2004	26
2005	32
2006	18

Notes: Year 2006 data end June 30, 2006. Restatements are for 136 unique institutions.
 Source: GAO.

Table 2
Restatement Categories for Banks

Category	Number	Percent of total events
Securities related	45	27
Loan losses and reserves/allowances	35	21
Cost or expense	33	20
Related-party transaction	33	20
Revenue recognition	23	14
Restructuring, assets, or inventory	14	8
Acquisition and merger	11	7
Tax related	4	2
Other unspecified	2	1
Reclassification	1	1

Source: GAO.

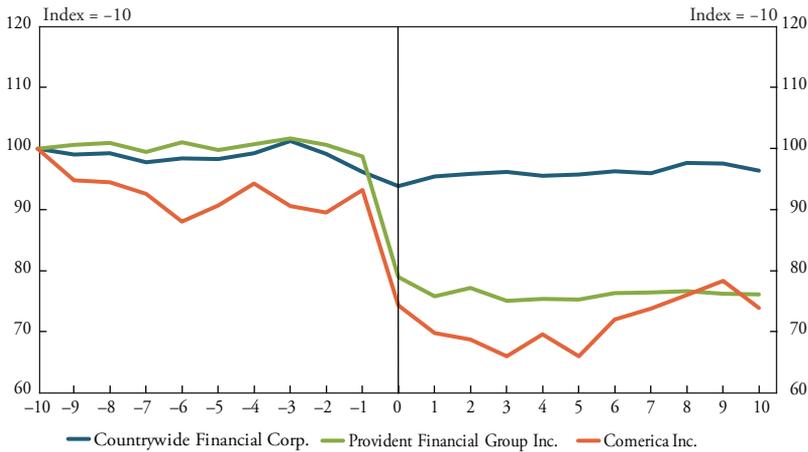
The second most common reason for restatement is related to loan losses and provisioning. These restatements may be due to banks improperly recognizing loan losses, inadequately reserving funds for future loan losses, or over-reserving funds to smooth earnings. Restatements related to loan loss reserves and provisioning account for 21 percent of all restatements among financial firms.

The third and fourth most common reasons for financial firm restatements relate to expense accounting and related-party transactions. Expense-related restatements are issued when a bank under- or overstates its costs or expenses, improperly classifies its expenses, or uses other improper accounting treatments that lead to misreported costs. Related-party transactions restatements are issued when banks inadequately disclose or improperly account for revenues, expenses, debts, or assets involving transactions or relationships with related counterparties such as subsidiaries, customers, or service providers. Each of these two categories account for 20 percent of all restatements.

The fifth most common restatement category is revenue recognition. Revenue recognition restatements are issued when banks improperly recognize or report questionable revenues. This category accounts for 14 percent of all restatements. Other, less common reasons for restatement include accounting for restructuring, asset impairment, inventory, merger and acquisition, tax-related issues, reclassification of accounting items, and other unspecified issues that do not fit into the previously mentioned categories.

To infer the effect of a restatement on stockholder behavior, we use daily stock price data. We calculate bank and market-level stock returns using data from the Center for Research in Security Prices (CRSP) for all financial firm restatements that have valid returns around the event dates. Chart 1 examines shareholder reactions to three selected restatements. On February 22, 2005, Countrywide Financial Corporation revised its financial statements to reflect gains on the sale of certain mortgage-backed securities that were originally recognized in 2004. Countrywide's stock price declined modestly following this event, as average income was mostly unaffected and the restatement resulted in only small, offsetting changes in earnings in 2004 and 2005. In another example, Provident Financial Group announced on March 6, 2003, that it had overstated earnings on loans by 18 percent from 1999

Chart 1
Selected Stock Prices Following Restatements



Note: Prices in the chart are indexed to 10 days prior to the restatement event.
Sources: Center for Research in Security Prices (CRSP) and authors' calculations.

to 2002 due to a modeling error. This restatement suggested internal control weaknesses, and as a result, Provident's share price declined by about 19.9 percent following the event. Similarly, on October 2, 2002, Comerica Inc. announced that it would restate its financials due to additional credit loss provisions of \$1.21 per share. The restatements indicated that the bank's loan losses were worse than previously communicated, resulting in a share price decline of about 20.3 percent.

Other data and sample selection

In addition to restatement and daily stock price data, we use data on commercial bank balance sheets and income from the Federal Financial Institutions Examination Council (FFIEC) Reports of Condition and Income (Call Reports) from 1995:Q1 to 2008:Q4 to infer the effect of a restatement on depositor and loan customer behavior. Because the restating institution is nearly always a bank holding company, we sum all bank subsidiaries within a holding company.⁶ In total, we identify 98 financial restatements by 82 commercial bank holding companies with valid CRSP and Call Report data to use in our analyses. To test whether the effects of restatement differ between banks (which are heavily regulated) and nonfinancial firms (which are only

Table 3
Summary Statistics

Statistic	No restatement		Restatement	
	Mean	Std. dev.	Mean	Std. dev.
Equity ratio	9.35	3.75	9.13	4.23
Asset quality	0.93	1.33	1.00	1.09
Overhead	6.11	4.20	6.28	2.34
Return on assets	0.99	1.89	0.94	1.46
Liquidity	6.22	41.39	5.26	3.41
Sensitivity to market risk	0.81	4.50	1.28	2.16
Log size (deflated)	14.02	1.64	15.00	2.01
Gross total assets (\$ billions) (defaulted)	10.81	65.03	35.14	143.01
Observations	23,534		3,027	

Notes: Variable definitions and descriptions are available in Appendix B. Observation counts are for the full bank-quarter panel from 1995:Q1 to 2008:Q4.

Sources: FFIEC Call Reports and authors' calculations.

minimally regulated) we also include in our stockholder analysis 1,974 nonfinancial firm restatements by 1,536 unique firms that have valid returns around the event dates.⁷

One challenge in using restatement data over a 10-year period is that a single financial institution might issue multiple restatements during that period. In our shareholder activity analysis, we are able to include all restatements due to the daily data frequency. However, data on deposits and loans are only available at the quarterly frequency. As a result, in our analysis of depositor and loan customer activity, we consider only the first restatement for each bank. If we included multiple restatement announcements for the same bank, the pre-announcement window of the second restatement could overlap with the post-announcement window of the first restatement, confounding our analysis and interpretation.⁸ Summary statistics for our final, untrimmed bank-level sample are shown in Table 3.

Overall, banks that have issued restatements are somewhat weaker financially than banks that have not. Restating banks have a higher average delinquent loan share, higher expenses, and lower profitability. Restating banks are also somewhat less well-capitalized, less liquid, more sensitive to market risk, and larger, on average, than banks that have not restated.

III. Analyzing Stakeholders' Reactions to Bank Restatements

To understand stakeholders' reactions to bank restatements, we conduct two analyses. We first conduct an event-study analysis of bank stock returns around restatement dates to assess shareholder reactions. Because we do not have daily data on deposits and loans, we then turn to a regression analysis to test depositors' and loan customers' reactions.

An event study measures the valuation effects of a corporate event—in our case, financial restatements—by examining the response of the stock price around the event announcement. One important underlying assumption of event studies is that the market processes the announcement in an efficient and unbiased manner. If this assumption is valid, and if no other market-moving event occurs at the same time, the change in the stock price around the event reflects the effect of the event on stockholder behavior.

In our event study, we calculate abnormal returns (ARs)—the forecast error between a stock's predicted and actual return—and cumulative abnormal returns (CARs)—ARs aggregated over a specific event window period—for each restatement using the capital asset-pricing model (CAPM) estimated using CRSP firm and market return data.⁹ We calculate CARs as the cumulative difference between the realized return and the forecast expected return during the event window (for details on the event-study methodology, see Appendix C). If investors exert no market discipline, then the AR and CAR would be zero. To account for some investors responding to news of restatement with a delay and to ensure robustness to different days, we test several event windows around the event date ranging from one to three days.

To test whether bank depositors and borrowers exert market discipline after financial restatements, we compare deposit and loan growth rates before and after a restatement. If depositors and borrowers engage in market discipline, then growth rates should be lower after restatement. We estimate the restatement effects using a fixed-effects ordinary least squares (OLS) model on a panel of bank-level financial data (for complete model details and information about bank characteristics, see Appendix C).¹⁰ We measure deposit and loan customer reactions using year-over-year, merger-adjusted growth rates. For each restatement, we construct a set of restatement indicators for the four quarters prior to

the restatement, the quarter of the restatement, four quarters after the restatement, and five to eight quarters after the restatement, which allow us to compare growth rates before and after restatements.¹¹ Our model includes a series of variables including proxies for CAMELS examination ratings to control for differences in bank characteristics.¹² We also include bank and time fixed effects to control for time-invariant bank characteristics and common, time-specific shocks, respectively. Detailed definitions and measurement details for all variables are included in Appendix B. In each model specification, we interact bank size with the set of restatement indicators to determine the effect of bank size on market discipline.

Stockholder reaction

Estimates from the CAPM model in our event-study analysis suggest short-term, equity market restatement effects. Panel A of Table 4 shows that restating banks experience 1.26 to 1.50 percent lower ARs during the day of and the day following the restatement, respectively. No effects are observed before the event, suggesting no information was leaked in advance. Cumulating returns across several daily windows shows 2.00 to 2.75 percent lower CARs in the days after a restatement. These results suggest that shareholders perceive higher risk and uncertainty at restating banks. Restating nonfinancial firms experience 2.08 to 2.23 percent lower ARs and 4.07 to 4.80 percent lower CARs. The overall more negative reactions of nonfinancial firms' stocks than banks' stocks likely reflect the additional regulatory monitoring and safety net benefits that banks receive. The results are robust across several daily event windows.

Market discipline appears to be stronger for large banks than small banks. Panel B presents the results of the event-study analysis after splitting banks by median market capitalization as a proxy for institution size. We find that both large and small banks experience significantly lower CARs after restatement. However, the effect at large banks is 0.57 to 1.94 percentage points larger than at small banks, suggesting shareholder discipline is greater for large banks. The results may reflect large bank shareholders' greater ownership power and sophistication in analyzing market information.¹³ They may also reflect large banks' wide variety of shareholders; small banks are more likely to have a

Table 4
CARs Using the Adjusted Market Model: Short-Term Effects

Panel A: Main Effects

Estimation	Bank events		Nonbank events	
Day relative to the event	Mean AR (percent)	N	Mean AR (percent)	N
-2	0.13	98	-0.26***	1,974
-1	0.28	98	-0.19	1,974
0	-1.26***	98	-2.08***	1,974
1	-1.50***	98	-2.23***	1,974
2	0.35	98	-0.05	1,974
Event window (days)	Mean CAR (percent)	N	Mean CAR (percent)	N
[-2, 2]	-2.00***	98	-4.80***	1,974
[-1, 1]	-2.48***	98	-4.49***	1,973
[0, 1]	-2.75***	98	-4.33***	1,963
[0, 3]	-2.04***	98	-4.07***	1,964

Panel B: Large versus Small Banks

Estimation	Large bank events		Small bank events	
Event window (days)	Mean CAR (percent)	N	Mean CAR (percent)	N
[-2, 2]	-3.00***	49	-1.06***	49
[-1, 1]	-2.90***	49	-2.07**	49
[0, 1]	-3.04***	49	-2.47***	49
[0, 3]	-2.68***	49	-1.40***	49

Panel C: Large-Loss versus Small/No-Loss Bank Events

Estimation	Large-loss bank events		Small/no-loss bank events	
Event window (days)	Mean CAR (percent)	N	Mean CAR (percent)	N
[-2, 2]	-3.45***	43	-1.09	42
[-1, 1]	-4.08***	43	-1.20**	42
[0, 1]	-4.66***	43	-1.22***	42
[0, 3]	-3.38***	43	-1.00	42

* Significant at the 10 percent level

** Significant at the 5 percent level

*** Significant at the 1 percent level

Sources: CRSP and authors' calculations.

narrow group of shareholders with close ties to the institution who are less likely to divest their holdings.

Market discipline also appears to be stronger for banks with more severe restatements. To proxy for event severity, Panel C shows the results for banks separated into large- and small-loss groups based on the median relative loss rates announced in their restatements. Again, consistent with market discipline, both large- and small-loss bank groups experience significantly negative CARs following a restatement. However, banks that announce large losses incur 2.36 to 3.44 percentage points lower CARs up to three days around the event, and the effect is consistent across all time windows. This result supports the view that bank shareholders analyze the information contained in restatements and respond more strongly to less favorable news.

Depositor reaction

Because detailed deposit and loan flow data are not available on a daily basis, we are unable to conduct an event study for depositors and loan customers. Instead, we use quarterly data and a regression analysis to gauge these customers' reactions to restatements. Table 5 shows changes in deposit growth following a restatement. The results suggest that the typical bank experiences a quick and significant slowdown in total deposit growth that persists for nearly two years after a restatement (column 1). However, the effect weakens as the size of the bank increases, as shown by the positive and significant coefficients on size interacted with the restatement indicators. For the average bank, the size offset is about 12.0 percent (0.8 coefficient \times 15.0 average bank size), making the total annual difference between restating and nonrestating banks' deposit growth about 2.4 percentage points (-14.4 coefficient $+ 12.0$ offset) following a restatement.

Our regression results also show that depositors with balances exceeding the FDIC insurance threshold are more likely to exert market discipline. In columns 2 and 3, total deposits are split into insured deposits and uninsured deposits. Insured deposits are deposits that fall within the FDIC insured deposit limit. Uninsured deposits are all deposit balances above the FDIC insured deposit limit that are also assessable plus any deposits held by foreign offices. The results indicate that the timing of depositors' reactions differs depending on whether the

Table 5

Bank Financial Restatements and Changes in Deposit Flows

Panel A: Main Effects and Bank Size

	(1) Change in total deposits	(2) Change in insured deposits	(3) Change in uninsured deposits
Restatement (t-4, t-1)	-4.44	-1.65	10.63
Restatement t(0)	-15.24**	-9.64	-33.14
Restatement (t+1, t+4)	-14.38**	-5.94	-41.72**
Restatement (t+5, t+8)	-14.18**	-18.55*	-9.24
Size × restatement (t-4, t-1)	0.37	0.25	-0.5
Size × restatement t(0)	0.94*	0.6	2.13
Size × restatement (t+1, t+4)	0.79**	0.31	2.62***
Size × restatement (t+5, t+8)	0.74*	1.10*	0.48
Size	-1.95***	-1.65***	-2.48**
Observations	23,012	22,968	22,919
Clusters	921	920	914
Average quarters	24.99	24.97	25.08
Adjusted R ²	0.11	0.07	0.19

Panel B: Additional Effects by Loss Rate

	(1) Change in total deposits	(2) Change in insured deposits	(3) Change in uninsured deposits
Restatement (t-4, t-1)	0.58	0.83	4.16*
Restatement t(0)	-0.66	-0.92	2.17
Restatement (t+1, t+4)	-1.86*	-0.73	-0.73
Restatement (t+5, t+8)	-3.22***	-2.33*	-1.97
Loss × restatement (t-4, t-1)	0.01	-0.39	2.43**
Loss × restatement t(0)	-0.17	-0.89	3.36*
Loss × restatement (t+1, t+4)	-0.49	-0.25	0.94
Loss × restatement (t+5, t+8)	-0.82	-1.71*	2.37**
Loss	-1.90***	-1.69***	-2.40**
Observations	22,700	22,663	22,606
Clusters	912	911	905
Average quarters	24.89	24.88	24.98
Adjusted R ²	0.11	0.07	0.19

* Significant at the 10 percent level

** Significant at the 5 percent level

*** Significant at the 1 percent level

Note: Regression coefficients are estimated according to the methodology described in Appendix C.

Sources: FFIEC Call Reports and authors' calculations.

deposits are insured or uninsured, although bank size offsets the negative effect for both deposit classes.

Uninsured deposit growth slows quickly and sharply in the year following a restatement, although the effect is significantly moderated by the size of the restating institution. On average, the slowdown in uninsured deposit growth is offset by about 2.6 percentage points per log point in bank size. For the average restating bank, uninsured deposit growth slows by about 2.4 ($-41.7 + 2.6 \times 15.0$) percentage points in the year after a restatement. Unreported results with indicators for each of the four quarters before and after a restatement reveal that deposit growth begins to slow in the first quarter after a restatement, and the effect remains economically and statistically significant for about three quarters.

Insured deposit growth also slows after a restatement, but the effect is not statistically significant for the first year after a restatement is issued, and is only marginally significant in the second year. During the second year after a restatement, insured deposit growth slows, but less than for uninsured deposit growth. Moreover, the large bank offset is smaller for insured deposits than for uninsured deposits. For the average-size restating bank, insured deposit growth slows by about 2.0 ($-18.5 + 1.1 \times 15.0$) percentage points in the second year.

Insured and uninsured deposit growth differences likely reflect the influence of deposit insurance protection. When a bank fails, uninsured depositors may lose their funds, while insured depositors are protected against loss by the FDIC's insurance fund. Thus, when restatements signal weak management controls, uninsured depositors rationally withdraw funds rapidly and in large volumes. However, this effect may be mitigated by implicit government guarantees for large banks that are more likely to be perceived as "too big to fail." Indeed, the results indicate that for banks just 1.5 standard deviations above the average bank size in our sample, the uninsured deposit effect is completely eliminated. Explicit and implicit guarantees for large banks may explain why uninsured depositors withdraw fewer funds as bank size increases.

To account for the severity of restatements, Panel B reports the results of a model specification that interacts the restatement indicators with reported loss rates. This specification tests whether the severity of the restatement matters for our results by considering the restatement

amount relative to the income produced by the bank in the restatement quarter. We find that while bank restatements still appear to engender market discipline, depositors' reactions are not always statistically and economically significant. For uninsured depositors in particular, we find little statistically and economically significant evidence for market discipline. Uninsured depositors react significantly to the restatement in the second year, but only large loss amounts would constitute economically significant results. For example, a loss of 10 percent of total net income in the quarter of restatement translates to an uninsured deposit growth rate that is only 23 ($-.10 \times 2.37$) basis points lower in the second year. This suggests that market discipline from depositors may be relatively weak for institutions with larger restatements.

Loan customer reaction

Unlike depositors, loan customers' responses to restatements do not vary with bank size. Table 6 shows loan customers' reactions after financial restatements. In the year following a restatement, total loan growth slows by more than 11 percent; bank size does not mitigate this effect. These results appear to be largely driven by changes in consumer lending. Overall, nonrevolving consumer loan growth—including auto, student, and other consumer installment debt—slows sharply in the two years after a restatement. For the average bank, nonrevolving consumer loan growth slows from 3.5 percent ($-33.5 + 2.0 \times 15.0$) to 4.8 percent ($-39.3 + 2.3 \times 15.0$) in the first and second year, respectively, following a restatement.

Our analysis cannot determine whether consumers seek loans elsewhere or banks respond to increased funding pressure by reducing loan growth to consumers. Negative customer reactions would be most expected among borrowers with lines of credit, such as business or home equity borrowers, who fear that the restating bank cannot honor its commitments. But our results may be due to banks simply issuing fewer loans after a restatement due to tighter funding conditions. Restating banks may choose to offset higher equity costs and slower deposit growth by slowing asset growth, particularly for consumer loans. Consistent with the funding availability interpretation, unreported results using quarterly indicators for each of the four quarters before and after the restatement indicate that loan growth does not begin to slow until the end of the first year, well after the slowdown in funding growth has begun.

Table 6
Bank Financial Restatements and Changes in Loan Flows

	Firms			Households				
	(1) Change in total loans	(2) Change in CRE loans	(3) Change in C&I loans	(4) Change in RRE 1-4 family loans	(5) Change in RRE HELOC loans	(6) Change in total consumer loans	(7) Change in consumer credit card loans	(8) Change in other consumer loans
Restatement (t-4, t-1)	-8.37	21.69	-4.31	-23.24	-54.03***	-31.01***	-61.81*	-44.08***
Restatement t(0)	-9.30	-3.70	-5.55	2.37	-41.79	-28.00**	-52.30*	-26.40*
Restatement (t+1, t+4)	-11.46*	-8.58	-15.00	-19.89	-24.16	-23.49**	31.50	-33.52**
Restatement (t+5, t+8)	-0.22	18.05	-13.19	1.58	-0.07	-23.07	-13.35	-39.32**
Size × Restatement (t-4, t-1)	0.55	-1.42	0.31	1.66	3.48***	1.90***	3.03	2.75***
Size × Restatement t(0)	0.59	0.21	0.52	-0.24	2.86	1.62**	2.64	1.53*
Size × Restatement (t+1, t+4)	0.63	0.39	0.98	1.18	1.68	1.29*	-2.15	1.97**
Size × Restatement (t+5, t+8)	-0.14	-1.26*	0.85	-0.16	-0.27	1.23	0.58	2.25*
Size	-1.74***	-2.57***	-1.08	-2.75**	-2.16	-2.00**	4.90	-1.85*
Observations	22,997	22,622	22,612	22,145	13,942	17,904	1,207	17,293
Clusters	918	903	897	872	531	663	58	634
Average quarters	25.05	25.05	25.21	25.40	26.26	27.00	20.81	27.28
Adjusted R ²	0.33	0.15	0.21	0.04	0.18	0.3	0.09	0.3

* Significant at the 10 percent level
 ** Significant at the 5 percent level
 *** Significant at the 1 percent level
 Note: Regression coefficients are estimated according to the methodology described in Appendix C.
 Sources: FHJEC Call Reports and authors' calculations.

IV. Conclusion

In this article, we investigate whether three types of stakeholders—shareholders, depositors, and loan customers—discipline banks that restate financial documents. We find strong evidence that shareholders and depositors exercise market discipline. We also find evidence that consumer loan growth slows after a restatement, though we cannot disentangle whether banks or their customers drive this effect. While these latter results may not reflect market discipline by loan customers specifically, market discipline from depositors and shareholders could be motivating banks to slow their loan growth.

The strength of market discipline varies by stakeholder as well as bank size and type. Our results suggest that shareholders hold non-financial firms more accountable than banks, perhaps due to banks' greater supervisory oversight or government safety net benefits. Our results also suggest that shareholders hold large banks more accountable than small banks, possibly reflecting differences in shareholder ownership size and type. In contrast, depositors and some loan customers appear to hold large banks *less* accountable than small banks, possibly due to implicit government guarantees. Finally, our results suggest higher loss rates, as announced in the restatements, increase market discipline from shareholders but do not have a significant effect on depositors, likely reflecting differences in stakeholder incentives. Thus, although depositors and loan customers are less likely to abandon large banks and those with higher expected losses after restatements, equity holders are more likely to hold them accountable.

Stakeholder responses to bank restatements are economically large, suggesting restating banks face significantly higher funding costs. These costs may incentivize banks to prepare financial documents more carefully. More broadly, effective market discipline may encourage accurate financial reporting. However, weaker results for large banks and weak responses to higher loss rates from depositors suggest potential roles for policy and regulation, particularly regarding large banks.

Overall, effective market discipline for misreporting banks may help reduce excessive risk-taking and curtail financial misbehavior. In addition, stakeholder actions may provide warning signs to regulators about a bank's financial condition that can be used in the examination

process. In these ways, market discipline appears to complement the formal regulatory regime.

Appendix A

Restatement Category Descriptions

Category	Description
Cost or expense	Restatements due to improper accounting for costs or expenses. This category generally covers understating or overstating costs or expenses, improperly classifying expenses, or other mistakes or improprieties that lead to misreported costs. The category also includes improper treatment of expenses related to tax liabilities and tax reserves as well as improper treatment of financing arrangements, such as leases, when a related asset is improperly capitalized or expensed as part of the financing arrangement. Improperly reserved litigation restatements are also included in this category.
Revenue recognition	Restatements due to improper revenue accounting. This category includes instances in which firms improperly recognize revenue, recognize questionable revenues, or make other mistakes or improprieties that lead to misreported revenue. This category also includes transactions with nonrelated parties that artificially inflate volume and revenues through the simultaneous purchase and sale of products between colluding companies (known as “round-trip” transactions).
Securities-related	Restatements due to improper accounting for derivatives, warrants, stock options and other convertible securities.
Restructuring, assets, or inventory	Restatements due to asset impairment, errors relating to accounting treatment of investments, timing and amount of asset write-downs, goodwill and other intangibles, restructuring activity and inventory valuation, and inventory quantity issues.
Reclassification	Restatements due to improperly classified financial statement items—specifically, current liabilities classified as long-term debt on the balance sheet, or cash flows from operating activities classified as cash flows from financing activities on the statement of cash flows.
Other	Restatements due to issues not covered by the listed categories, including inadequate loan-loss reserves, delinquent loans, loan write-offs, other allowances for doubtful accounts or accounting estimates, fraud, or accounting errors left unspecified.
Acquisition and merger	Restatements due to improper accounting for or a complete lack of accounting for acquisitions or mergers. These include instances in which the wrong accounting method was used, or losses or gains related to the acquisition were understated or overstated.
Related-party transaction	Restatements due to inadequate disclosure or improper accounting of revenues, expenses, debts, or assets involving transactions or relationships with related parties.
In-process research and development	Restatements due to instances in which improper accounting methodologies were used to value in-process research and development at the time of an acquisition.

Source: GAO.

Appendix B

Variable Descriptions

Dependent variable	Description
Shareholders' discipline	
AR	Stock abnormal returns using the market-adjusted model and stock return and market return data from CRSP. See Appendix C for details of the calculation.
CAR	Cumulative abnormal returns calculated for several daily time windows using the market-adjusted model and stock return and market return data from CRSP. See Appendix C for details of the calculation.
Variables in additional tests	
Size	Bank stock market capitalization (stock price × shares outstanding).
Loss	The ratio of earnings loss/change announced to bank stock market capitalization.
Depositors' discipline	
Change in total deposits	Year-over-year merger-adjusted growth rate in total deposits booked in domestic and foreign offices.
Change in insured deposits	Year-over-year merger-adjusted growth rate in total insured deposits. Insured deposits include total domestic nonretirement deposit balances of \$100,000 or less (1995:Q1–2008:Q4) plus domestic retirement balances less than \$100,000 (1984:Q1–2006:Q1) and less than \$250,000 (2006:Q2–2008:Q4). It also includes balances over \$250,000 for noninterest-bearing transaction accounts included in the transaction account guarantee program for 2008:Q4.
Change in uninsured deposits	Year-over-year merger-adjusted growth rate in uninsured deposits. Uninsured deposits include total domestic non-retirement deposit account balances greater than \$100,000 (1995:Q1–2008:Q4) plus total domestic retirement account balances greater than \$100,000 (1995:Q1–2006:Q1) and greater than \$250,000 (2006:Q2–2008:Q4) plus total deposits held in foreign offices.
Customers' discipline	
Change in total loans	Year-over-year merger-adjusted growth rate in total loans and leases gross of allowance for loan and lease losses and unearned income.
Change in CRE loans	Year-over-year merger-adjusted growth rate in commercial real estate loans. Commercial real estate loans include nonfarm nonresidential, construction and land development, and multifamily housing loans.
Change in C&I loans	Year-over-year merger-adjusted growth rate in commercial and industrial loans to U.S. and non-U.S. addresses.
Change in 1–4 family RRE	Year-over-year merger-adjusted growth rate in loans secured by closed-end 1–4 family housing.
HELOC loans	Year-over-year merger-adjusted growth rate in revolving, open-end loans secured by 1–4 family housing.
Change in consumer loans	Year-over-year merger-adjusted growth rate in credit cards and other related plans, auto loans, and all other consumer loans.
Change in credit cards loans	Year-over-year merger-adjusted growth rate in all revolving credit card loans (excluding other related plans).
Change in nonrevolving loans	Year-over-year merger-adjusted growth rate in other related plans, auto loans, and other consumer loans.

Dependent variable	Description
Control variables in bank-level analyses	
Equity ratio	Total bank equity capital divided by gross total assets.
Asset quality	Sum of loans 90 days or more past due plus non-accrual divided by gross total assets.
Overhead costs	Total interest and noninterest expenses divided by gross total assets.
ROA	Net income in the quarter divided by gross total assets.
Liquidity	Total cash and balance due from depository institutions divided by gross total assets.
Market risk sensitivity	Total noninterest income less income from fiduciary activities and deposit service charges divided by gross total assets.
Gross total assets	Total assets gross of loan and lease losses plus allocated transfer risk reserve.
Size	Log of gross total assets deflated by the GDP implicit price deflator.
Loss	The ratio of earnings loss/change announced to bank quarterly earnings.
Bank fixed effects	Dummy variables for each of the banks.
Time fixed effects	Quarter-year dummy variables for all time periods.

Appendix C

Event Study and Regression Methodology

This appendix describes the statistical methodology for the event study and regression analyses. We use the event-study analysis to test shareholders' market discipline and use the regression analyses to test depositors' and loan customers' market discipline.

Event study

In all cases, market returns are based on the CRSP value-weighted daily return on all NYSE, AMEX, and Nasdaq stocks. A stock's return is the trading-day change in a stock's closing value plus any earnings from reinvested shareholder distributions. The capital asset pricing model (CAPM), or the "market" model, forms the basis of the event-study analysis. According to the market model, we assume that the normal return to firm stock i on day t can be expressed as a linear function of the returns from the market portfolio on day t as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

where R_{it} is the daily stock price return for firm stock i on day t ; R_{mt} is the market portfolio return on day t ; α_i is the intercept, the value of R_{it} when R_{mt} equals 0; β_i is the beta or systematic risk of stock i , a measure of the sensitivity of R_{it} on the reference market; and ε_{it} is the regression error term with an expected value equal to 0 (reflecting firm-specific surprises).

The abnormal return AR_{it} of firm stock i on day t is then calculated as follows:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad (2)$$

If there is no market discipline effect, the efficient markets hypothesis implies that AR_{it} is a random variable with mean equal to 0, because the deviations between the actual returns to stock i and the expected values, conditional on all available information at time $t-1$ should not be systematically different from 0.

Cumulative abnormal returns (CARs) are the sum of abnormal returns (ARs) over the event window as given by equation (3), where

CAR_i is bank stock i 's cumulative abnormal return between the event window start date ($t=I$) and the event window end date ($t=T$).

$$CAR_i = \sum_{t=I}^T AR_{it} \quad (3)$$

We test for statistical differences between restated and nonrestated company returns using Patell's (1976) z -statistic calculated as the standardized abnormal return (SAR) divided by a scaling factor, as given by equations (4) and (5). In the equations below, i denotes firm stock, t denotes time, ε_{AR_i} is the residual from the market model estimation for firm stock i , N is the estimation window length, M is the number of stocks in the portfolio, and K denotes the number of nonmissing return observations in firm stock i 's estimation period. $Var(\varepsilon_{AR_t})$ is the forecast error variance calculated from a pre-estimation sample of returns from 260 to 10 trading days before the event. The null hypothesis is that the abnormal return is zero, which implies that investors exert no market discipline.

$$SAR_{it} = \frac{AR_{it}}{\sqrt{Var(\varepsilon_{AR_t})}} \quad (4)$$

$$t_{patell} = \frac{\sum_{i=1}^M SAR_{it}}{\sqrt{\sum_{i=1}^M \frac{K_i - 2}{K_i - 4}}} \quad (5)$$

Regression methodology

To test whether bank depositors and borrowers exert market discipline after financial restatements, we use a fixed-effects ordinary least squares (OLS) regression model on a panel of bank-level financial data. The OLS estimation model is given by:

$$\begin{aligned} \gamma_{it} = & \alpha + \gamma_1 Restatement_{i,j-4 \rightarrow j-1} + \gamma_2 Restatement_{i,j0} + \\ & \gamma_3 Restatement_{i,j+1 \rightarrow j+4} + \gamma_4 Restatement_{i,j+5 \rightarrow j+8} + \\ & \gamma_6 Size \times Restatement_{i,j-4 \rightarrow j-1} + \gamma_7 Size \times Restatement_{i,j0} + \\ & \gamma_8 Size \times Restatement_{i,j+1 \rightarrow j+4} + \gamma_9 Size \times Restatement_{i,j+5 \rightarrow j+8} + \\ & \gamma_{10} Size_{it-1} + \gamma_{11} Other Bank Controls_{it-1} + Bank_i + Time_t + \varepsilon_{it}. \end{aligned} \quad (6)$$

In this model, Y is the response variable (growth in deposits or loans) for bank i at time t , and j is the time when the restatement (event) occurred for the i th bank. Four binary variables termed *Restatement* enter the main estimated equations: the first equals 1 for the quarters $j-4$ to $j-1$ for the bank that issues a restatement at j , the second equals 1 for quarter j of the restatement event, the third equals 1 for the quarters $j+1$ to $j+4$, and the fourth equals 1 for the quarters $j+5$ to $j+8$.

The coefficients on the *Restatement* terms capture the response of depositors and loan customers to bank financial restatements, while the interaction terms *Size* x *Restatement* capture the reaction of stockholders to financial restatements of large versus small banks.

We control for the log of real gross total assets to account for bank size (*Size*) and many other bank characteristics (*Other Bank Controls*), including proxies for CAMELS examination ratings constructed similar to prior research: equity to total gross assets proxying for capital adequacy (C), total loans 90 days or more past due or non-accrual to total gross assets proxying for asset quality (A), overhead costs to total gross assets proxying for management quality (M), return on assets proxying for earnings (E), cash and due from other depository institutions to total gross assets proxying for liquidity (L), and a measure of sensitivity to market risk proxying for (S) (Duchin and Sosyura 2014; Roman 2016). We also include a lagged dependent variable to control for persistence in the dependent growth rate. Finally, we control for two sources of unobserved heterogeneity, *Bank* and *Time*, that could affect stockholder discipline as shown in the equation above.

In an additional test for restatement severity, we reestimate the regression model when interacting the restatement indicators with the reported loss ratio (*Loss*), defined as the total restatement loss amount announced divided by the bank total income in the restatement quarter. The OLS estimation model is now given by:

$$\begin{aligned}
 Y_{it} = & \alpha + \gamma_1 \text{Restatement}_{i,j-4 \rightarrow j-1} + \gamma_2 \text{Restatement}_{i,j0} + \\
 & \gamma_3 \text{Restatement}_{i,j+1 \rightarrow j+4} + \gamma_4 \text{Restatement}_{i,j+5 \rightarrow j+8} + \\
 & \gamma_6 \text{Loss} \times \text{Restatement}_{i,j-4 \rightarrow j-1} + \gamma_7 \text{Loss} \times \text{Restatement}_{i,j0} + \\
 & \gamma_8 \text{Loss} \times \text{Restatement}_{i,j+1 \rightarrow j+4} + \gamma_9 \text{Loss} \times \text{Restatement}_{i,j+5 \rightarrow j+8} + \\
 & \gamma_{10} \text{Loss}_{it-1} + \gamma_{11} \text{Other Bank Controls}_{it-1} + \text{Bank}_i + \text{Time}_t + \varepsilon_{it}.
 \end{aligned} \tag{7}$$

Endnotes

¹The international Basel Capital Accords, which provide an outline for the U.S. bank regulatory regime, establish three pillars for effective bank supervision and regulation: minimum capital requirements, supervisory review, and market discipline. The Basel Committee considers market discipline a critical complement to the supervisory and minimum capital elements. By establishing minimum transparency criteria, supervisors enable market participants to make their own judgments about institutional risk and thus become a key part of the capital adequacy determination (BIS 2005, p. 226).

²Publicly traded bank holding companies (BHCs) file several balance sheet and income statements at various reporting levels including FR Y-9 reports for BHCs required by the Federal Reserve System, Call Reports for all bank subsidiaries required by federal bank regulatory agencies, and quarterly and annual financial statements required by the Securities and Exchange Commission, among other publicly available supervisory and regulatory filings. Additional disclosures may be required for specific activities or for material managerial and organizational changes.

³For example, shareholders in non-publicly traded banking companies may exert less market discipline because their shares are less liquid and may be difficult to sell.

⁴These data were collected from three separate reports. GAO (2003) collected 919 restatements, GAO (2006a) collected 1,390 restatements, and GAO (2006b) collected 396 restatements. The GAO's definition of restatements only includes material restatements of previously reported financial information, excluding announcements related to changes in accounting principles and stock splits.

⁵These institutions are identified based on standard industrial classifications (SIC). We select firms by using the two-digit SIC industry codes 60 and 61—which, from a legal standpoint, are mostly bank holding companies—and by merging the Center for Research in Security Prices (CRSP) and the Federal Reserve Bank of New York's lists of publicly traded institutions.

⁶We match Call Report data to restatement data with the Federal Reserve Bank of New York's PERMCO-RSSD match available at https://www.newyork-fed.org/research/banking_research/datasets.html.

All financial variables in the bank-level analysis are merger-adjusted to account for large changes related to acquisitions. Balance sheet growth rates are further trimmed at the 97.5 and 2.5 percentiles to account for non-merger driven outliers likely caused by large portfolio acquisitions not recorded as mergers, data errors, or changes to small outstanding balances. Furthermore, banks with less than a 2 percent average share of a given loan or deposit category as a percent of total assets or deposits are dropped to screen for banks not engaged in a given banking market.

⁷Nonfinancial firms are all firms with an SIC industry code that does not start with 6. We exclude nonbank firms with SIC codes starting with 6 from both the bank and nonfinancial firm group to cleanly distinguish between banks and nonfinancial firms.

⁸In unreported results, we rerun our tests considering additional restatements after the first restatement and obtain consistent results.

⁹In unreported results, we rerun tests using alternative models—the adjusted market model, the Fama-French three-factor model, and the Carhart four-factor model—and find consistent results.

¹⁰Because the restatements occur from 1997 to 2006, we collect our bank-level sample from 1995 to 2008 to allow enough time for the data to reflect depositor and loan customer reactions following any restatements. As a robustness check, we exclude 2008:Q4, which marks the introduction of the Transaction Account Guarantee (TAG) Program that temporarily raised insured deposit limits. The results are qualitatively similar.

¹¹In unreported results, we estimate a model with indicators for each individual forward and lagged quarter up to four quarters. Differences from the main results are noted throughout our results discussion.

¹²CAMELS ratings are aggregate measures that take into account a bank's capital adequacy (C), asset quality (A), management quality (M), earnings (E), liquidity (L), and sensitivity to market risk (S).

¹³To test this conjecture, we check the institutional ownership (percent of shares held by institutional investors) for the banks in our sample and find that over 73 percent of the large banks also have high institutional ownership (above the sample median). In untabulated results, we also check shareholder reactions for banks with high and low institutional ownership and find the reactions to be stronger for banks with high institutional ownership, supporting our conjecture.

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