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CEO tenure and corporate misconduct: evidence from US banks

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Abstract

We test for a link between CEO tenure and misconduct by US banks. Banks are more likely to commit misconduct when CEOs have a relatively long tenure and banks have relatively poor balance sheets; however, independent corporate boards can mitigate some types of misconduct.

Key words: Corporate misconduct, CEO tenure, US banks, probit, bivariate

JEL: G20, G21, G34

Word count: 2563

1. Introduction

The trend in enforcements by US bank regulators since the late 1990s suggests that banks are serious and growing perpetrators of corporate misconduct. This is of concern for several reasons. First, effective financial intermediation needs savers and investors to have confidence in the integrity of financial institutions and markets; if that confidence is damaged, financial intermediation is likely to be lower than would otherwise be the case, with possible adverse consequences for the real economy (Levine, 2005). Second, financial misconduct may weaken banks and, if the banks are especially large, there may be adverse implications for the stability of the national banking system with possible cross-border spill-over effects. A case in point is Deutsche Bank with widespread press reports in September 2016 that the US Department of Justice was seeking a $14 billion civil settlement for the bank allegedly selling toxic mortgage-backed

securities; the fine was equivalent to about four-fifths of the bank's market capitalization raising doubts about the future viability of the Bank and the systemic consequences should it fail (see, for example, Stewart 2016). Separately, in a letter to the G-20 Ministers and Central Bank Governors dated August 30, 2016, Mark Carney, the Governor of the Bank of England wrote that "The incidence of financial sector misconduct has risen to a level that has the potential to create systemic risk." Third, firms that engage in corporate misconduct experience significant losses in shareholder value and performance (Baucus and Baucus, 1997; Davidson and Worrell, 1988; Palmrose at al., 2004), diminished expectations of earnings and subsequent increases in the cost of capital (Hribar and Jenkins, 2004).

A large empirical literature on the causes and consequences of corporate misconduct is rooted in Becker's (1968) view that economic agents engage in crime when the expected benefits of doing so outweigh the expected costs. Much of that literature has been concerned with the circumstances that can affect those benefits and costs. Cumming et al. (2015) group the literature into three themes: studies of the circumstances that provide opportunities to commit and benefit from misconduct (e.g. under the cover of accounting scandals and M&A announcements, and around the time of option expiry); studies of external factors that impact on the incentives to engage in misconduct (e.g. regulatory enforcement, corporate lobbying, strong auditors and analysts); and studies of internal governance factors that can exacerbate or mitigate the ability to commit misconduct (e.g. promotion-based financial incentives, and board guidance). In the latter group, a still developing area of research focuses on the impact of CEOs on corporate misconduct and stresses the incentives stemming from firm ownership structure, CEO compensation and CEO

turnover.[1] One thread of it focuses on the CEO as a deterrent to corporate misconduct because the penalties involved for CEOs if the misconduct is discovered, including the likelihood of job loss, financial penalties and jail time, with these probabilities increasing as the cost of the misconduct increases for shareholders (Karpoff et al., 2008); CEO turnover also seems to be more likely following contractual lawsuits against the firm (Aharony et al., 2015), and in response to aggressive earnings management (Hazarika, et al., 2012).

A second a thread looks at the incentives for CEOs to be instigators of corporate misconduct. For example, Alexander and Cohen (1999) examine the relationship between ownership structure and corporate misconduct and find that it occurs less frequently among firms in which management has a larger ownership stake, which supports the hypothesis that misconduct reflects an agency cost. Armstrong and Jagolinzer (2010) examine whether CEO equity-based holdings and compensation provide incentives to manipulate accounting reports but find little evidence that this is the case. Chan et al. (2015) explore the association between different types of executive perquisites and the likelihood of financial fraud and find that granting financial and severance perks to CEOs helps alleviate commission of fraud. Hass et al. (2015) find that the relative performance evaluation feature of CEO promotion tournaments results in a higher likelihood of CEO misconduct. Finally, Khanna et al. (2015) report that the connections CEOs develop with top executives and directors through their appointment decisions increase the risk of corporate fraud and decreases the likelihood of detection, including by helping conceal fraudulent activity, which

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[1] In a recent survey, Cumming et al. (2017) state that corporate misconduct has most often been studied in the context of financial regulation and only more recently in the context of ownership structure, CEO equity incentives and CEO turnover.

makes CEO dismissal less likely upon discovery and lowers the coordination costs of carrying out illegal activity.

In this paper, we add to this second thread of the literature on the role of CEOs by identifying an additional important factor that can magnify the risk of corporate fraud—namely the length of a CEO's tenure, which we take as a proxy for a CEO's power within the firm. A quite large empirical literature already attests to the impact of powerful CEO's on firm performance, including by impacting adversely on financial performance (Adams et al. 2005; Veprauskaite and Adams 2013), increasing the likelihood of the firm engaging in earnings management (Ali and Zhang 2015), driving corporate acquisitions (Brown and Sartma 2007; Haynes and Hillman, 2010; Malmendier and Tate 2005, 2008), influencing the composition of boards of directors to prevent a dilution of CEO power (Combs et al., 2007), shaping incentive contract design to their own advantage (Morse et al., 2011), and that more CEO power tends to be associated with lower credit ratings of a firm's debt (Liu and Jiraporn 2010). With this evidence in mind, we take the view expressed by Khanna et al. (2014) that corporate misconduct may be another potential outcome when a CEO has too much authority within the firm. We view CEO power as increasing with length of tenure because tenure builds decision-making autonomy (Hermalin and Weisbach, 1998; Combs et al., 2007) and examine the role of CEO tenure in the likelihood of banks engaging in corporate misconduct.

Our paper makes three contributions to the literature on corporate misconduct in banking. First, we contribute to the debate on governance and risk-taking in the banking industry (e.g. Beltratti and Stulz, 2012; Ellul and Yerramilli, 2013; Minton et al., 2014) by providing the first empirical work (we believe) that studies the role of CEO tenure as a determinant of misconduct by banks. Second, we contribute to the literature on the determinants and economics of corporate misconduct

by demonstrating that powerful CEOs can overcome the moderating influence of boards of directors, which contrasts with previous work that has linked misconduct to a lack of board monitoring (e.g., Agrawal and Chadha, 2005; Khanna et al., 2014; Nguyen et al., 2016). Finally, we contribute to the literature on CEO power more generally, which shows that CEOs can affect many aspects of firm performance and behaviour (as discussed above).

2. Model and Data

For our empirical estimates, we employ a firm clustered probit model to estimate the likelihood of a corporate misconduct having been committed (conditional on detection of the conduct) as follows:

$$Misconduct_{it} = \beta_0 + \beta_1 TEN_{it} + \beta_2 AGE_{it} + \beta_3 GEN_{it} + \beta_4 EXP_{it} + \beta_5 EDU_{it} + \beta_6 BSIZE_{it} +$$
$$\beta_7 BINDEP_{it} + \beta_8 LEV_{it} + \beta_9 ROA_{it} + \beta_{10} LIQ_{it} + \beta_{11} LPROV_{it} + \beta_{12} CAP_{it} +$$
$$\beta_{13} CTI_{it} + \beta_{14} ASSETS_{it} + \beta_{15} CRISIS_{it} + \varepsilon_{it} \tag{1}$$

where $Misconduct_{it}$ is a dummy variable indicating the presence of corporate misconduct and TEN_{it}, is CEO tenure in number of years. The remaining independent variables are commonly used in estimates of corporate misconduct in the literature cited above. They are the CEO characteristics of age, AGE_{it}, gender, GEN_{it}, job experience, EXP_{it}, and education level, EDU_{it}; the corporate governance indicators of board size, $BSIZE_{it}$, and board composition between outside and inside directors, $BINDEP_{it}$; and bank-specific balance sheet variables, including leverage, LEV_{it}, return on assets, ROA_{it}, liquidity, LIQ_{it}, asset quality, $LPROV_{it}$, the capital-asset ratio, CAP_{it}, the cost-to-income ratio, CIT_{it}, and bank size, $ASSETS_{it}$. Finally, we include a 0-1

dummy to control for the impact of the of the 2008-10 financial crisis on corporate misconduct. The definitions of the variables are present in the Appendix.

Our corporate misconduct variable comprises regulatory enforcements and class action litigation against publicly listed US banks. We compile data from the Board of Governors of the Federal Reserve System Enforcement Action database; Office of the Comptroller of the Currency Enforcement Actions database; Federal Deposit Insurance Corporation Enforcement Decisions and Orders database; Stanford Law School Securities Class Action Clearinghouse Filings database; and Office of Thrift Supervision Enforcement Order Archive. For the 960 publicly listed banks for which we have data, our search revealed 867 litigation cases involving 340 banks over 1998-2015. Figure 1 shows the trend in the data: enforcements were on a rising trend throughout the period, peaked sharply during the 2007-10 financial crisis and, though they fell back thereafter, were still well above their levels of the late 1990s by the end of the period. Many banks in the sample were repeat offenders, with about half of them facing more than one enforcement action and a quarter of them facing at least two such actions.

3. Empirical results

Table 1 reports the bank-clustered marginal effects of probit estimates of the likelihood of corporate misconduct. The results in column 1 confirm that the likelihood of misconduct is greater if the CEO has a relatively long tenure, with the coefficient positive and statistically significant at the 1% level. The point estimates indicate that the influence of CEO tenure on the probability of a bank committing a crime is about 13%. Misconduct is also more likely when the CEO is older, has

had previous experience in the industry, and is relatively well educated. The sign and size of the coefficients on the governance variables indicate that board size and independence suggest that only the former has a mitigating role with respect to offset the adverse impact of CEO tenure. The bank specific variables suggest that crime is more likely in banks that are more highly leveraged, less well-capitalized, less efficient, and relatively large. which is larger than the marginal effects of the bank specific variables with the exceptions of asset quality and bank size. To shed some light on the mitigating role of board size, the estimate reported in column 2 includes the interaction of the CEO tenure and board size: the sign is negative but not significant and the sum of the coefficients on CEO tenure and the interaction term attests to the domination of CEO power over board size. In columns 3 and 4, we examine whether our results are driven by the banks that are serial offenders—i.e. in these estimates, the sample of banks is limited to those that have been prosecuted for misconduct on more than one occasion and we are testing the effect of CEO tenure on the likelihood of misconduct if the tendency to engage in these activities is continuous.[2] For example, Dorminey et al. (2012) point out that repeated fraud makes the offender de-sensitized such that misconduct becomes more continuous in time. The results suggest that CEO tenure is an important determinant of continuous bank misconduct with board size again playing a mitigating but not offsetting role; the statistical significance of coefficients on the remaining variables is broadly in line with the estimates reported in columns 1 and 2.

It might be the case that CEO power is more important for some forms of misconduct than for others—for example, if powerful CEOs have less room for maneuver in some areas of bank

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[2] In this sample, there are 300 banks that were involved in misconduct on more than one occasion.

business. For example, Nguyen et al. (2016) suggest that the advice of boards of directors might be particularly relevant for technical types of fraud (e.g. banking practices) and less relevant for non-technical misconduct (e.g. money laundering). To test for this possibility, we re-estimate the probit model separately for technical and non-technical misconduct as defined in Table 2. The estimations are reported in Table 3 and suggest that CEO tenure is highly important in both categories of misconduct. The coefficients on the board size and the interaction variables again suggest that board size does not mitigate CEO power in either type of misconduct. In contrast, board independence would appear to be able to play this role in the case of nontechnical misconduct, where the negative and significant coefficients on board composition are larger than the positive coefficient on the CEO tenure.

Misconduct detection vs. misconduct commission

A common objection to the standard probit model is that it fails to address the 'partial observability problem' because it treats the probability of detecting corporate misconduct as the probability of misconduct taking place. If the detection process is not perfect (i.e. not all misconduct is detected), then the probability of detected conduct will be different from the probability of misconduct taking place. To address the partial observability problem, we follow Wang (2013), Wang et al. (2010), and Nguyen et al. (2015) and use a bivariate probit model that separates committing misconduct from the detection of misconduct conditional upon misconduct having occurred.[3]

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[3] An alternative approach suggested by Cumming et al. (2016) is to use logs to deal with the partial observability problem.

Our specification for the bivariate model contains a set of variables that influence a bank's incentive to engage in misconduct but not the likelihood that misconduct will be detected, and a set of variables that affect the bank's incentives to commit wrongdoing and the likelihood of detection. In the first set, we include CEO tenure, and the other CEO characteristics, governance and bank specific variables included in equation (1). In the second set, we include variables to capture the likelihood of a misconduct being detected. Following Wang et al., (2010) and Wang (2013), the variables are the growth of bank assets, the abnormal return on assets, an adverse shock to stock prices, stock price volatility, and abnormal stock turnover.[4] In general, developments in these variables are expected to alert regulators as to the likelihood of misconduct having taken place. The bivariate results are reported in Table 4 for all banks, repeat offender banks, and for technical and non-technical misconduct. They confirm that misconduct is more likely to be detected in banks with long-tenured CEOs, with the coefficient on the variable positive and statistically significant at the 1% level in all estimates. In these estimates, both board size and board independence play a role in mitigating the impact of powerful CEOs—in particular, the negative coefficient on board independence in each case is larger than the positive coefficient on CEO tenure. Several of the bank specific controls are also statistically significant and suggest that detecting misconduct is more likely in banks that are highly leveraged, illiquid, less well-capitalized, less efficient, and are relatively large. Of the crime detection variables, only asset growth and abnormal stock volatility provide significant results, with increases in both suggesting a greater likelihood that misconduct will be detected.

4. Conclusions

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[4] Definitions of these variables are provided in the Appendix.

Enforcement actions against US banks have been on a rising trend since the late 1990s. We find that the likelihood that a bank will engage in misconduct increases if the CEO is relatively powerful, as measured by greater length of tenure, and if the bank is relatively large, less efficient, less well capitalized and has relatively poor asset quality. However, for some types of crime the adverse impact of CEO power can be mitigated by independent boards. Our results suggest that CEO tenure warrants the attention of bank regulators, investors, and corporate governance specialists, especially when boards of directors are not independent.

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Table 1

Probit estimates of the likelihood that a crime will be committed

	All banks	All banks with interactions	Repeat offender banks	Repeat offender banks with interactions
CEO tenure	0.135***	0.147***	0.062***	0.220***
	(0.008)	(0.059)	(0.007)	(0.050)
CEO age	0.280***	0.236***	0.052	0.023
	(0.062)	(0.062)	(0.055)	(0.054)
CEO gender	0.000	-0.001	-0.033	-0.051*
	(0.039)	(0.039)	(0.032)	(0.030)
CEO experience	0.020**	0.016**	0.026*	0.023**
	(0.007)	(0.007)	(0.006)	(0.007)
CEO education	0.504***	0.051**	-0.023	0.023*
	(0.016)	(0.0	(0.014)	(0.006)
Bank board size	-0.009***	-0.006*	-0.008***	0.001
	(0.003)	(0.004)	(0.002)	(0.003)
Bank board independence	-0.006	-0.082	-0.012	-0.066
	(0.068)	(0.066)	(0.057)	(0.055)
CEO tenure*board size		-0.005		-0.066***
		(0.025)		(0.021)
Bank leverage	0.006***	0.004***	0.002**	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Bank return on assets	0.008	0.012*	0.014**	0.015**
	(0.007)	(0.007)	(0.006)	(0.006)
Bank liquidity	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Bank loan provisions	0.133***	0.124***	0.074**	0.072***
	(0.020)	(0.020)	(0.017)	(0.017)
Bank capital-asset ratio	-0.020***	-0.023***	-0.012***	-0.023***
	(0.002)	(0.002)	(0.002)	(0.002)
Bank cost-income ratio	0.002***	0.001***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Bank assets	0.125***	0.119***	0.091***	0.087***
	(0.007)	(0.007)	(0.005)	(0.005)
Financial crisis dummy	0.061***	0.061***	0.032*	0.030**
	(0.018)	(0.018)	(0.016)	(0.015)
Observations	5144	5144	4302	4302
Log-likelihood	-2977.72	-2995.11	-1908.64	-1916.47
Psuedo R^2	0.165	0.161	0.184	0.182

The table reports the marginal effects of the explanatory variables. The sample is 1998 to 2015. All regressions include year dummies. Robust standard errors are clustered at bank level and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 2

Classification and the number of misconduct cases of publicly listed US banks, 1998–2015

Panel A. Technical misconduct, total	*275*
Loan loss reserve failure	88
Unsafe and unsound banking practice	187
Panel B. Non-technical misconduct, total	*592*
Material omission, misstatement, misrepresentation, incompliance and reclassification	50
Information disclosure failure	67
Managerial misconduct	167
Money laundering	83
Related party transaction failure	90
Total misconduct (Panel A + Panel B)	*867*

Sources: Board of Governors of the Federal Reserve System (FED) Enforcement Action database (https://www.federalreserve.gov/apps/enforcementactions/search.aspx); the Office of the Comptroller of the Currency (OCC) Enforcement Actions database (http://apps.occ.gov/EASearch/); the Federal Deposit Insurance Corporation (FDIC) Enforcement Decisions and Orders database (https://www5.fdic.gov/edo/DataPresentation.html); the Office of Thrift Supervision (OTS) Enforcement Order Archive (https://www.occ.treas.gov/static/ots/enforcement/ots-enforcement-order-listing.xlsx); and the Stanford Law School Securities Class Action Clearinghouse (SCAC) Filings Database (http://securities.stanford.edu/filings.html).

Table 3
Probit estimates of the likelihood of technical and nontechnical misconduct by US banks

	Technical misconduct		Nontechnical misconduct	
CEO tenure	0.131***	0.291***	0.130***	0.122*
	(0.009)	(0.064)	(0.009)	(0.066)
CEO age	0.298***	0.269***	0.177**	0.133**
	(0.064)	(0.064)	(0.068)	(0.068)
CEO gender	0.016	0.013	-0.012	-0.014
	(0.040)	(0.040)	(0.043)	(0.044)
CEO experience	0.018**	0.015*	0.033**	0.029***
	(0.007)	(0.007)	(0.008)	(0.007)
CEO education	0.037**	0.034**	0.042**	0.039**
	(0.016)	(0.016)	(0.017)	(0.017)
Bank board size	-0.007***	0.003	-0.013***	-0.011***
	(0.003)	(0.004)	(0.003)	(0.004)
Bank board independence	0.094	0.045	-0.153**	-0.266***
	(0.071)	(0.069)	(0.074)	(0.072)
CEO tenure*board size		-0.068**		0.003
		(0.027)		(0.028)
Bank leverage	0.005***	0.003***	0.006***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Bank return on assets	0.003	0.007	0.014*	0.017**
	(0.007)	(0.007)	(0.008)	(0.008)
Bank liquidity	-0.002**	-0.002**	-0.001*	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)
Bank loan provisions	0.134***	0.125***	0.093**	0.087***
	(0.020)	(0.020)	(0.023)	(0.023)
Bank capital-asset ratio	-0.020***	-0.022***	-0.020***	-0.023***
	(0.002)	(0.002)	(0.003)	(0.002)
Bank cost-income ratio	0.002***	0.002**	0.002***	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
Bank assets	0.093***	0.085***	0.149***	0.145***
	(0.007)	(0.007)	(0.007)	(0.007)
Financial crisis dummy	0.051***	0.049**	0.059***	0.060***
	(0.019)	(0.019)	(0.020)	(0.020)
Observations	4085	4085	4302	4302
Log-likelihood	-2312.55	-2323.59	-2264.95	-2277.09
Psuedo R^2	0.138	0.135	0.217	0.213

Technical and nontechnical misconduct is defined in Table 2.
The table reports the marginal effects of the explanatory variables. The sample is 1998 to 2015. All regressions include year dummies. Robust standard errors are clustered at bank level and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4
Bivariate probit estimates of the likelihood a crime will be detected

	All crimes and all banks	Repeated crimes in all banks	Technical crimes in all banks	Nontechnical crimes in all banks
CEO tenure	0.122***	0.061***	0.133***	0.154***
	(0.012)	(0.008)	(0.011)	(0.011)
CEO age	0.615***	-0.408***	0.454***	0.334*
	(0.184)	(0.073)	(0.086)	(0.166)
CEO gender	-0.070	0.135***	0.088	0.167***
	(0.055)	(0.050)	(0.065)	(0.056)
CEO experience	-0.006	0.033***	0.001	0.028***
	(0.012)	(0.006)	(0.001)	(0.010)
CEO education	0.0112***	-0.054***	0.045*	0.023
	(0.033)	(0.017)	(0.023)	(0.026)
Bank board size	-0.021***	0.008***	-0.019***	0.003
	(0.008)	(0.003)	(0.006)	(0.007)
Bank board independence	-0.207**	0.089	-0.197*	-0.185*
	(0.087)	(0.063)	(0.104)	(0.099)
Bank leverage	0.003**	0.004***	0.006***	0.007***
	(0.001)	(0.001)	(0.001)	(0.002)
Bank return on assets	0.003	0.009	0.002	0.028***
	(0.009)	(0.007)	(0.010)	(0.010)
Bank liquidity	-0.002*	0.002***	-0.003***	0.004***
	(0.001)	(0.001)	(0.001)	(0.010)
Bank loan provisions	0.158***	0.039**	0.236***	0.080***
	(0.043)	(0.02)	(0.045)	(0.028)
Bank capital-asset ratio	-0.022***	-0.013***	-0.018***	-0.016***
	(0.003)	(0.002)	(0.003)	(0.003)
Bank cost-income ratio	0.000	0.000	0.000	0.001**
	(0.001)	(0.000)	(0.001)	(0.000)
Bank assets	0.122***	0.087***	0.130***	0.155***
	(0.001)	(0.006)	(0.012)	(0.011)
Asset growth	0.001**	0.001***	0.003***	0.001
	(0.000)	(0.000)	(0.001)	(0.001)
Abnormal return on assets	-0.004	0.003	-0.016**	0.001
	(0.004)	(0.004)	(0.007)	(0.007)
Adverse stock prices	0.032	0.084***	0.098**	0.048
	(0.022)	(0.030)	(0.038)	(0.030)
Abnormal stock turnover	-0.009	-0.009	-0.054***	-0.000
	(0.007)	(0.009)	(0.014)	(0.014)
Abnormal stock volatility	0.023***	0.025***	0.029**	0.038***
	(0.009)	(0.008)	(0.012)	(0.012)
Financial crisis dummy	-0.139***	0.025***	0.051	0.483***
	(0.050)	(0.069)	(0.064)	(0.111)
Observations	4622	4400	3761	3840
Log-likelihood	-2662.85	-2006.28	-2039.91	-2037.75
Wald Chi^2	903.33	598.17	555.95	888.32

The table reports the marginal effects of the explanatory variables. The sample is 1998 to 2015. All regressions include year dummies. Robust standard errors are clustered at bank level and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Appendix
Data sources and variable definitions

Variables	Source	Description
CEO tenure	BoardEx	The number of years the CEO has served in position at given year.
CEO age	BoardEx	The age of the CEO at given year.
CEO gender	BoardEx	Binary variable equal to 1 if the CEO is female and otherwise 0.
CEO experience	BoardEx	The number of years the CEO has served in the same entity at given year.
CEO education	BoardEx	Binary variable equal to 1 if the CEO holds at least a post-graduate level degree
Board size	BoardEx	The number of directors sitting on the board at given year.
Board independence	BoardEx	The percentage of independent non-executive directors on the board at given year.
Leverage	Call reports	The ratio of total book value of liabilities to total assets at given year.
Return on assets	Call reports	The ratio of earnings before interest and taxes (to book value of total assets at given year.
Liquidity	Call reports	The ratio of liquid assets to total assets at given year.
Loan provisions	Call reports	The ratio of loan loss provision to total loans at given year.
Capital-asset ratio	Call reports	The ratio of risk-weighted capital to total assets at given year.
Cost-to-income ratio	Call reports	The ratio of operating expenses to total operating income at given year.
Total assets	Call reports	Natural logarithm of total assets at given year.
Asset growth	Bloomberg	The annual percentage change on total assets.
Abnormal ROA	Bloomberg	Residual of the regression: $ROA_t = \alpha_0 + \alpha_1 ROA_{t-1} + \alpha_2 ROA_{t-2} + \varepsilon$.
Adverse stock price	Bloomberg	Binary variable that equals to 1 if annual stock price is below -20% or in the bottom 10% of stocks in sample of publicly listed banks.
Abnormal stock turnover	Bloomberg	The demeaned average monthly stock turnover at given year.
Abnormal stock volatility	Bloomberg	The demeaned standard deviation of the monthly change in the stock price of a bank each year.
Financial crisis dummy	Authors' calculation	Binary variable that equals to 1 in financial crisis years 2008-2010.

Fig. 1. Financial crime cases of publicly listed US banks, 1998–2015.