

## **CEO power and bank risk**

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### **Abstract**

We test for a link in between risk taking by US banks and CEO power, which we proxy by a CEO's length of tenure and network size. We find that banks are more likely to take on excessive risks when CEO's have a relatively long tenure and large network. The result is robust controlling for other risk characteristics of banks, governance mechanisms, and bank ownership structure.

**Key words:** Risk, CEO power, US banks

**JEL:** G21; G15; E58; G32

## 1. Introduction

A growing literature focuses on the relationship between Chief Executive Officers (CEOs) and corporate risk. One strand of it examines stresses how links between CEO compensation, shareholder value, and corporate leverage provide incentives for excessive risk taking (e.g., Chen et al. 2006; Coles et al. 2006; Chakraborty et al. 2007; Chava and Purnanandam 2010; DeYoung et al. 2013; Gormley et al. 2013). More recently, attention has shifted to the innate attributes of managers of CEOs and their risk-taking incentives, such as sensation seeking, overconfidence, education, life experiences, religious belief, and political affiliations (Bertrand and Schoar 2003; Hilary and Hui 2009; Graham et al. 2013; Hirshleifer et al. 2013; Hutton et al. 2014; Malmendier et al. 2011; Cain and Mckeeon 2017). However, the literature has largely ignored the role of powerful CEOs in determining bank risk, which is surprising given the many ways it has been shown to affect firm behavior and outcomes, including financial performance (Adams, et al. 2005), the likelihood of engaging in earnings management (Hu et al. 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 power maintain (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). In this paper, we add to the understanding of the effect of CEOs on corporate risk-taking by examining the role of CEO power. A possible link between powerful CEOs and bank risk is the impact of CEOs on firm culture. Several scholars of organizational behaviour have suggested that the origins of an organizations' culture can be found in the values and personalities of its leaders (Baron and Hannan, 2002; Detert, et al., 2000), and the leadership attributes of the CEO can affect

the culture of the firm (Berson, et al. 2007; Giberson, et al. 2009). It is quite possible that that culture might incline the firm towards greater risk taking, which we would expect to reflect characteristics of the CEO. Hence, we test the hypothesis that bank risk taking is more likely in banks with powerful CEOs. Based on a sample of 908 publicly listed US banks between 1990-2015, we find strong evidence that powerful CEOs are associated with excessive bank risk taking while controlling for other risk characteristics of banks, governance mechanisms, and ownership structure

## **2. CEO power and bank risk**

### *2.1 CEO power*

We focus on two measures of CEO power that have been used previously in the literature. The first measure is CEO tenure, which denotes the number of years the CEO has served in the same position, with power viewed as increasing with length of tenure because tenure builds decision-making autonomy (Hermalin and Weisbach, 1998; Combs et al. 2007). In addition, several studies suggest longer tenure is associated with a decrease in career concerns (Hill and Phan, 1991; Milbourn 2003; Zheng 2010), also suggesting that tenure is positively associated with risk-taking. However, we recognize that the impact of tenure on risk taking is somewhat ambiguous. For example, an entrenched CEO may enjoy larger private benefits from control, which could encourage low-risk projects (Bertrand and Mullainathan 2003; John et al. 2008; Laeven and Levine 2009); in addition, there is some suggestion that inexperienced individuals tend to be more overconfident, and therefore experience may lower the level of overconfidence and reduce risk

taking (Gervais et al. 2011). The second measure of CEO power is network size, where the network denotes the number of other CEO's with whom the CEO overlaps while in employment, social activities, education roles at the same company, organization, or institutions in given year. Networks support CEO power because of the informational advantages that they generate for CEOs (Madhavan et al 1998; Brass et al. 2004; Jackson, 2010; Faleye et al. 2014). By using their broader networks, CEO might benefit from the information advantage they have, increasing information asymmetries within the firm, and exacerbating the adverse selection problem that is one of the reasons of excessive risk taking.

## *2.2 Measuring bank risk*

We employ three commonly uses measures of bank risk. The first measure is the Z score of each bank, which is a measure of distance from insolvency and can be summarized as:

$$(1) Z = (k + ROA)/\sigma_{ROA}$$

where k is equity capital as percent of assets, ROA is the average after-tax return as a percent of assets, and  $\sigma_{ROA}$  is the standard deviation of the after-tax return on assets, as a proxy for return volatility. The Z-score measures the number of standard deviations a return realization must fall to deplete equity, under the assumption of normality of bank returns. A higher Z-score corresponds to a lower upper bound of insolvency risk. denotes the measure of distance from the insolvency. It A higher z-score implies therefore a lower probability of insolvency risk. For an application, see amongst others, Laeven and Levine (2009).

The second measure describes the average stock market reaction of each bank to movements on the overall stock market index and is a measure of *systematic* risk. It is constructed using a simple capital asset pricing model, based on the following equation:

$$(2) R_{it} = \beta_0 + \beta_1 R_t + \beta_2 int_t + \varepsilon_{it}$$

where,  $R_{it}$  is the equity return of bank  $i$  at time (trading day)  $t$ ;  $R_t$  is the return of the S&P 500 index at time (trading day)  $t$ ; and  $int$  is the yield on the three-month Treasury bill rate at time (trading day)  $t$ .  $\beta_0$  is the intercept;  $\beta_1$  is the systematic risk of bank  $i$  at time  $t$ ; and  $\beta_2$  is the interest rate risk. For each bank, the systematic component ( $\beta_1$ ) is calculated from daily data by estimating the individual regressions for every quarter from 1998q1 to 2015q4.

The third measure of bank risk captures the reaction of individual banks to *systemic* events. It measures tail dependence in the stock market returns of individual banks and equates the magnitude of tail dependence estimates as a measure of systemic risk. It is estimated via the marginal expected shortfall (MES) following the model by Acharya et al. (2010) at a standard risk level of 5% as follows:

$$(3) \quad MES_i^{5\%} = 1/days \sum_t R_i$$

where  $MES_i^{5\%}$  is the marginal expected shortfall of bank  $i$  in 5% worst days;  $days$  is the number of 5% worst days in the market;  $R_i$  is the average return of bank  $i$  in 5% worst days.

## 2. Methodology and data

### 2.1 Methodology

We estimate the following model of bank risk:

$$\begin{aligned}
 RISK_{it} = & \beta_0 + \beta_1 TEN_{it} + \beta_2 NET_{it} + \beta_3 AGE_{it} + \beta_4 GEN_{it} + \beta_5 EXP_{it} \\
 & + \beta_6 EDU_{it} + \beta_7 BSIZE_{it} + \beta_8 BINDEP_{it} + \beta_9 LEV_{it} + \beta_{10} ROA_{it} \\
 & + \beta_{11} LIQ_{it} + \beta_{12} LPROV_{it} + \beta_{13} CAP_{it} + \beta_{14} CTI_{it} + \beta_{15} ASSETS_{it} \\
 & + \beta_{16} INSINV_{it} + \beta_{17} NDIVD_{it} + \beta_{18} HHI_{it} + \beta_{19} CRISIS_{it} \varepsilon_{it} \quad (1)
 \end{aligned}$$

In the equation,  $RISK_{it}$  is, alternatively, the bank Z-score, and the measures of systematic and systemic risk discussed in Section 2.  $TEN_{it}$  and  $NET_{it}$  are the CEO power variables tenure and network size, respectively. We also employ other characteristics of CEOs used in firm performance studies, including: age,  $AGE_{it}$ , where older CEOs may reduce firm risk through less risky investment policies (Serfling, 2014); gender,  $GEN_{it}$ , which has been shown to impact on firm risk behavior (Faccio et al. 2016); job experience,  $EXP_{it}$ , where CEOs with job-specific experience in the same or a related industry have been shown to be associated with lower post-succession performance than those without it (Hamori and Koyuncu, 2014); and education,  $EDU_{it}$ , which has been shown to have a beneficial impact on financial performance (King et al. 2016).

The corporate governance literature also emphasizes the role of institutional mechanisms to constrain CEO power that in our context should act to limit bank risk. These include the size of the executive board,  $B_{SIZE}_{it}$ , where larger boards are viewed as likely to improve board monitoring capability and constrain CEOs (Conyon and Peck, 1998) and the composition of executive boards between outside and inside directors,  $B_{INDEP}_{it}$  because as the proportion of outside directors increases so does the independence of the board and the likelihood that it will constrain the authority of CEOs (Hoitash et al. 2009).

The literature on bank risk suggests several bank characteristic control variables. These include leverage,  $LEV_{it}$ , because increased leverage is associated with more risk taking (Dell'Ariccia et al. 2014); return on assets,  $ROA_{it}$ , because powerful CEOs of poorly performing banks could be more likely to take on risky projects to boost profits (Faccio et al. 2011); liquidity,  $LIQ_{it}$ , where banks that have access to liquidity might take on more risk (Myers and Rajan, 1998); loan provisioning,  $LPROV_{it}$ , where increased provisioning might make funds volatile and increase risk (Sinkey and Greenawalt, 1991); the capital-asset ratio,  $CAP_{it}$ , because capital provides a buffer against losses and shareholders with more 'skin-in-the-game' and are expected to take fewer risks (Demirgüç-Kunt and Huizinga, 2010; Berger et al., 2012, 2013; Calem and Rob, 1999); banks cost-to-income ratio,  $CIT_{it}$ , to capture bank efficiency; and bank size,  $ASSETS_{it}$ , because compared to smaller banks, larger institutions could have different incentives due to the "too-big-to-fail" problem that might encourage larger institutions to take more risks than smaller ones (Huang et al., 2012; Tarashev et al., 2009; Laeven et al., 2014), and because bigger institutions might be able to diversify their risks better (Demirgüç-Kunt and Huizinga, 2010).

Finally, there is a substantial literature that relates ownership structure to risk taking. One strand of it sees career and reputation concerns as giving managers an incentive to take less risky projects unless they are pushed by well-diversified, risk-loving large shareholders (Holmstrom and Costa, 1986); Hershleifer and Thakor, 1992; John et al. 2008; Paligorova 2010). We try to capture the impact of investors attitudes towards risk by including the share of institutional,  $NSINV_{it}$ , and individual,  $NDIVD_{it}$ , investors in total bank ownership. Another strand of the literature views shareholders as pushing managers to take conservative projects if the ownership is highly concentrated because this can better serve shareholders incentives for private benefits of control (John et al. 2008). We try to control for this influence by including a Herfindahl-Hirschman index measure of ownership concentration,  $HHI_{it}$ , where a more diversified ownership structure is expected to increase risk taking (Laeven and Levine, 2009).

We present bank and year fixed effect estimates of equation (1), as well as estimates from the dynamic Generalized Method of Moments (GMM) panel methodology to mitigate endogeneity problems (Arellano and Bover, 1991; Blundell and Bond, 1998); the latter methodology also takes account of the heterogeneity of the data caused by unobservable factors affecting individual banks.

## 2.2 Data

Information on publicly listed US banks is from the SNL Financial database. Data on CEO related variables (tenure, network size, age, CEO gender, and experience), board size, and board independence are from BoardEx. Bank specific information (liquidity, leverage, loan loss provisions, capital asset ratio, cost-to-income ratio, return on assets, and size) is gathered from



FED call reports and the SNL Financial database. To calculate the systematic and systemic risk variables, daily stock prices of the banks are collected from Bloomberg. The bank ownership related variables are collected from Thomson One Analytics' Worldscope. The final dataset includes 908 publicly listed US banks for the period 1998-2015. Summary statistics are presented in Table 1.

#### **4. Empirical results**

Estimates for equation (1) in which banks' Z-score is the risk measure are presented in Table 2. The table shows fixed effects and GMM estimates, with the CEO power variables are entered individually and together. The coefficients on the CEO power variables are positive and highly statistically significant in the estimates. That is, longer CEO tenure and larger CEO networks are associated with an increase in bank risk taking. We interpret this as supporting the hypothesis that bank risk increases as CEO power increases. Risk appears to be related to CEO age and experience, with risk taking appearing to decline as CEO's age and gain more experience in the job, which would be consistent with powerful CEOs enjoying larger private benefits from control later in their careers. Less well educated CEOs also appear to favor more risk taking. The results indicate that corporate governance institutions have some effect in constraining CEO power, with larger and more independent executive boards associated with reduced bank risk taking. The bank-specific variables indicate that banks take on less risk if they are more liquid, more highly leveraged, are better capitalized and are more profitable, and that an increase in loan loss provisions and bank size are associated with greater risk taking activities. Except for liquidity, this is broadly in line with what the literature suggests. Finally, the results support the view that a larger share of

institutional investor owners is associated with more risk taking, though greater ownership concentration seems to mitigate risk consistent (though the coefficients are only statistically in the GMM estimates).

The results do not change substantially when the systematic and systemic indicators of bank risk are employed as the dependent variable, as reported in Tables 3 and 4, respectively. Specifically, CEO power, is associated with greater bank risk taking on these risk measures also. However, of the individual CEO characteristics, only age appears to be consistently important in determining (reducing) risk. Board size and board independence also constrain risk taking on these risk measures, and the bank-specific variables act in broadly the same manner as in the results for the Z-score measure of risk. Of the ownership-related variables, only the coefficient on the institutional investors share is consistently significant where it indicates an association with more risk taking.

## **5. Conclusions**

A growing literature focuses on the relationship between Chief Executive Officers (CEOs) and corporate risk. However, it has largely ignored the role of powerful CEOs, which has been shown in several studies to impact on many aspects of firm behaviour and outcomes. In this paper, we examined the link between risk taking by US banks and CEO power, which we proxied by a CEO's length of tenure and network size. Our results indicate that banks are more likely to take on excessive risk when CEO's have a relatively long tenure and large network, which we interpret as

CEOs having more power. The result is robust controlling for firm governance mechanisms, other risk characteristics of banks, and bank ownership structure.

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Variables	N	Mean	Median	Standard deviation	p25	p75	Minimum	Maximum
Z score	6066	23.54	17.06	23.751	6.287	32.42	-3.615	236.4
Systematic Risk	6066	0.485	0.324	0.796	0	0.955	-21.56	13.19
Systemic Risk	6066	-1.24	-0.72	3.163	-2.23	0.01	-20.01	20.01
CEO Network Size	6066	5.26	5.338	1.561	4.263	6.461	0	9.169
CEO Tenure	6066	1.392	1.548	1.058	0.742	2.197	-1.61	3.798
CEO Age	6066	4.036	4.043	0.127	3.951	4.127	3.466	4.477
CEO Gender	6066	0.032	0	0.176	0	0	0	1
CEO Experience	6066	0.74	0	1.166	0	2.097	0	3.932
CEO Education	6066	0.606	1	0.489	0	1	0	1
Board Size	6066	11.04	10	3.869	8	13	3	33
Board Independence	6066	0.765	0.79	0.129	0.686	0.875	0.261	1
Liquidity	6066	23.63	21.92	12.31	15.14	30.12	0.33	86.52
Leverage	6066	79.63	83.03	14.02	74.88	88.39	5.409	96.54
Loan Provisions	6066	0.19	0.07	0.432	0.031	0.164	0.015	5.409
Capital-Asset Ratio	6066	10.33	9.37	5.363	7.83	11.43	0.07	65.42
Cost-to-Income	6066	71.38	66.9	24.18	58.99	76.94	6.36	210
ROA	6066	0.548	0.84	1.784	0.41	1.16	-9.99	9.51
Size	6066	0.317	-0.13	1.917	-0.9	1.023	-4.42	8.027
Institutional Investment	6066	32.32	25.29	26.69	8.89	53.25	0.01	100
Individual Investment	6066	13.24	8.59	13.77	3.45	18.43	0.01	90.21
Herfindahl-Hirschman index	6066	0.044	0.016	0.095	0.006	0.031	0	0.997

Sample period is 1998 to 2015. Variable definitions are provided in the Appendix table.

		Fixed effects			GMM		
CEO power	Lag of dependent variable				0.478*** (0.013)	0.451*** (0.014)	0.484*** (0.012)
	CEO tenure	0.598* (0.321)		0.110* (0.064)	0.260*** (0.047)		0.235*** (0.047)
	CEO network		0.143** (0.059)	0.160** (0.068)		0.129*** (0.047)	0.401*** (0.113)
CEO related	CEO age	-3.937*** (1.053)	-0.483* (0.257)	-1.235** (0.579)	-0.515*** (0.175)	-0.505*** (0.185)	-0.372** (0.181)
	CEO gender	-0.966 (0.613)	0.099 (0.376)	-0.054 (0.433)	-0.052 (0.107)	0.013 (0.106)	-0.038 (0.104)
	CEO experience	-0.198** (0.097)	-0.145** (0.057)	-0.081 (0.075)	-0.048** (0.020)	-0.055*** (0.020)	-0.053*** (0.019)
	CEO education	-0.666** (0.329)	-0.323** (0.155)	-0.419** (0.179)	-0.153 (0.182)	-0.502*** (0.179)	-0.0232 (0.153)
Board related	Board size	-0.022 (0.039)	-0.102*** (0.025)	-0.078** (0.034)	-0.059*** (0.017)	-0.037** (0.018)	-0.063*** (0.017)
	Board independence	-1.854* (1.087)	-0.468 (0.494)	-2.169*** (0.653)	-1.336** (0.582)	-0.919 (0.579)	-1.274** (0.581)
Bank specific	Bank liquidity	-0.055*** (0.012)	-0.009 (0.008)	-0.012 (0.010)	-0.004* (0.002)	-0.003 (0.002)	-0.004** (0.002)
	Bank leverage	-0.144*** (0.022)	-0.059*** (0.010)	-0.066*** (0.013)	-0.008*** (0.002)	-0.008*** (0.002)	-0.007*** (0.002)
	Bank loan provisions	0.359* (0.208)	0.833*** (0.125)	0.949*** (0.136)	0.088*** (0.034)	0.097*** (0.036)	0.103*** (0.034)
	Bank capital-asset ratio	-0.707*** (0.054)	-0.648*** (0.040)	-0.594*** (0.052)	-0.227*** (0.012)	-0.229*** (0.013)	-0.219*** (0.013)
	Cost-to-income ratio	0.001 (0.005)	0.003 (0.002)	0.002 (0.002)	-0.007*** (0.001)	-0.006*** (0.001)	-0.007*** (0.001)
	Bank return on assets	-0.211*** (0.065)	-0.493*** (0.034)	-0.489*** (0.040)	-0.530*** (0.033)	-0.547*** (0.033)	-0.514*** (0.033)
	Bank assets size	0.970** (0.466)	0.983*** (0.176)	0.811*** (0.211)	0.596*** (0.189)	0.548*** (0.200)	0.581*** (0.189)
Ownership related	Institutional investor ownership	0.036*** (0.009)	0.022*** (0.005)	0.020*** (0.006)	0.023*** (0.004)	0.022*** (0.004)	0.023*** (0.004)
	Individual investor ownership	0.002 (0.021)	-0.005 (0.010)	-0.011 (0.011)	-0.006 (0.008)	0.002 (0.008)	-0.005 (0.008)
	Ownership concentration	-1.453 (1.265)	1.093 (0.727)	1.027 (0.876)	0.000** (0.000)	1.732* (1.015)	1.869* (1.040)
	Financial crisis dummy	-2.101*** (0.170)	2.238*** (0.069)	2.232*** (0.084)	1.709*** (0.047)	1.733*** (0.051)	1.719*** (0.047)
	R <sup>2</sup>	0.177	0.176	0.177			
	Hansen test (2nd step; p-value)				0.744	0.948	0.931
	Arellano-Bond test for AR(2) (p-value)				0.106	0.056	0.231
	Observations	4987	4987	4987	3881	3881	3881

Robust standard errors are provided in parentheses. The sample period is from 1998 to 2015. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels respectively.

		Fixed effects			GMM		
CEO power	Lag of dependent variable				0.089** (0.044)	0.150*** (0.042)	0.088** (0.042)
	CEO tenure	0.026* (0.014)	0.031** (0.012)		0.198*** (0.031)		0.191*** (0.028)
	CEO network	0.051** (0.021)		0.030* (0.016)	0.070** (0.034)		0.101*** (0.038)
CEO related	CEO age	-0.425*** (0.162)	-0.184 (0.163)	-0.263* (0.148)	-0.348*** (0.125)	-0.325** (0.128)	-0.314** (0.121)
	CEO gender	0.039 (0.243)	0.019 (0.187)	0.039 (0.161)	0.015 (0.079)	0.056 (0.082)	0.031 (0.078)
	CEO experience	-0.032* (0.018)	-0.014 (0.022)	-0.024 (0.015)	-0.023 (0.015)	-0.009 (0.014)	-0.019 (0.014)
	CEO education	-0.015 (0.054)	-0.053 (0.055)	-0.065 (0.048)	-0.063 (0.175)	-0.287* (0.157)	-0.141 (0.152)
Board related	Board size	-0.021*** (0.008)	-0.020** (0.008)	-0.015** (0.006)	0.002 (0.009)	0.023 (0.010)	0.007 (0.009)
	Board independence	-0.357* (0.181)	-0.394** (0.180)	-0.302** (0.153)	0.023 (0.236)	-0.085 (0.241)	0.072 (0.217)
Bank specific	Bank liquidity	-0.004* (0.002)	-0.005** (0.002)	-0.002 (0.002)	0.001 (0.002)	0.001 (0.001)	0.001 (0.001)
	Bank leverage	-0.009*** (0.002)	-0.009*** (0.002)	-0.003*** (0.001)	0.005 (0.002)	0.004 (0.002)	0.005 (0.002)
	Bank loan provisions	0.034** (0.017)	0.038** (0.017)	0.023 (0.026)	0.225*** (0.072)	0.183*** (0.070)	0.224** (0.069)
	Bank capital-asset ratio	-0.002 (0.010)	-0.006 (0.008)	0.006 (0.006)	-0.013** (0.006)	-0.012** (0.006)	-0.014** (0.006)
	Cost-to-income ratio	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)
	Bank return on assets	-0.026** (0.010)	-0.027*** (0.010)	-0.02** (0.008)	-0.005 (0.019)	-0.014 (0.019)	-0.006 (0.018)
	Bank assets size	0.537*** (0.057)	0.525*** (0.054)	0.431*** (0.054)	0.116*** (0.040)	0.108*** (0.039)	0.122*** (0.039)
	Financial crisis dummy	0.108*** (0.027)	0.115*** (0.027)	0.156*** (0.025)	0.011 (0.031)	0.019 (0.030)	0.010 (0.030)
Ownership related	Institutional investor ownership	0.004** (0.002)	0.003* (0.002)	0.004** (0.002)	0.012*** (0.004)	0.011*** (0.004)	0.013*** (0.004)
	Individual investor ownership	0.003 (0.003)	-0.006** (0.003)	-0.001 (0.002)	0.002 (0.008)	-0.004 (0.007)	0.003 (0.007)
	Ownership concentration	-0.275 (0.288)	-0.233 (0.275)	-0.283 (0.257)	0.652 (0.552)	0.606 (0.494)	0.617 (0.530)
R <sup>2</sup>		0.238	0.237	0.237			
Hansen test (2nd step; p-value)					0.938	0.909	0.922
Arellano-Bond test for AR(2) (p-value)					0.097	0.114	0.094
Observations		4985	4985	4985	3878	3878	3878

Robust standard errors are provided in parentheses. The sample period is from 1998 to 2015. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels respectively.

		Fixed effects			GMM		
CEO power	Lag of dependent variable				0.422*** (0.018)	0.442*** (0.011)	0.426*** (0.014)
	CEO tenure	0.203** (0.086)		0.144* (0.079)	0.075** (0.032)		0.037*** (0.014)
	CEO network		0.301** (0.118)	0.344** (0.174)		0.097*** (0.023)	0.038* (0.020)
CEO related	CEO age	-2.524** (1.068)	-2.164** (0.859)	-1.966** (0.938)	-0.138** (0.058)	-1.065*** (0.373)	-0.599*** (0.200)
	CEO gender	1.357** (0.666)	0.322 (0.768)	-0.659 (0.776)	0.181*** (0.048)	0.067 (0.066)	0.114*** (0.037)
	CEO experience	-0.337*** (0.106)	-0.215* (0.110)	-0.080 (0.100)	0.010 (0.008)	-0.022* (0.012)	0.001 (0.010)
	CEO education	-0.607* (0.331)	-0.641 (0.415)	-0.164 (0.319)	-0.135 (0.116)	0.188** (0.083)	-0.099 (0.095)
Board related	Board size	-0.044 (0.042)	-0.085* (0.048)	-0.009 (0.028)	0.003 (0.007)	-0.030** (0.015)	0.003 (0.007)
	Board independence	-3.800*** (1.371)	-3.895*** (0.956)	-1.901** (0.951)	-2.035*** (0.384)	-1.669*** (0.316)	-1.253*** (0.226)
Bank specific	Bank liquidity	-0.022*** (0.008)	-0.022* (0.013)	-0.027*** (0.008)	0.000 (0.001)	-0.000 (0.004)	-0.000 (0.001)
	Bank leverage	-0.073*** (0.020)	-0.092*** (0.013)	-0.045*** (0.016)	-0.000 (0.001)	-0.008*** (0.002)	-0.005*** (0.002)
	Bank loan provisions	0.619*** (0.119)	0.033 (0.095)	1.151*** (0.217)	0.105** (0.051)	0.326*** (0.066)	0.133** (0.055)
	Bank capital-asset ratio	-0.148*** (0.046)	-0.131*** (0.035)	-0.012 (0.035)	-0.007** (0.003)	-0.047*** (0.014)	-0.029*** (0.009)
	Cost-to-income ratio	-0.005** (0.002)	-0.006* (0.003)	-0.004 (0.003)	0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)
	Bank return on assets	-0.075*** (0.028)	-0.072* (0.040)	-0.074** (0.037)	0.008 (0.012)	0.009 (0.011)	0.014 (0.015)
	Bank assets size	0.902* (0.506)	1.494** (0.581)	1.071* (0.554)	0.166*** (0.062)	0.284*** (0.103)	0.202*** (0.075)
	Financial crisis dummy	0.544*** (0.115)	-0.297*** (0.073)	0.472*** (0.140)	-0.077*** (0.020)	-0.012 (0.024)	-0.066** (0.029)
Ownership related	Institutional investor ownership	0.017** (0.007)	0.026*** (0.009)	0.025*** (0.006)	0.005*** (0.002)	0.007*** (0.002)	0.005*** (0.001)
	Individual investor ownership	-0.031** (0.014)	0.008 (0.015)	-0.021 (0.016)	-0.000 (0.002)	0.005** (0.003)	0.004 (0.003)
	Ownership concentration	1.173 (1.194)	-1.714 (1.109)	-0.637 (1.354)	-0.062 (0.380)	-0.249 (0.477)	0.079 (0.382)
R <sup>2</sup>		0.151	0.151	0.151			
Hansen test (2nd step; p-value)					0.978	0.961	0.904
Arellano-Bond test for AR(2) (p-value)					0.615	0.730	0.257
Observations		4986	4986	4986	3876	3876	3876

Robust standard errors are provided in parentheses. The sample period is from 1998 to 2015. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Appendix Table. Data sources and variable definitions

Variables	Source	Description
Z score	Bloomberg	The inverse of the ratio of return on assets plus capital assets ratio divided by standard deviation of return on assets at given year.
Systematic risk	Bloomberg	The average non-overlapping beta in capital asset pricing model calculated for each bank at given year.
Systemic risk	Bloomberg	The marginal expected shortfall of each bank in 5% worst days of the market at given year.
CEO tenure	BoardEx	The number of years the CEO has served in position at given year.
CEO network size	BoardEx	The number of CEO's with whom the selected CEO overlaps while in employment, other activities, or education roles at the same company, organization, or institution 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.
ROA	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.
Institutional investor ownership	Thomson One Banker	Total ownership percentages of financial institutions at given year.
Individual investor ownership	Thomson One Banker	Total ownership percentages of individuals at given year.
Ownership concentration	Thomson One Banker	Herfindahl-Hirschman Index in which the total of squares of the ownership percentages of each investors at given year.
Dodd-Frank Act dummy	Authors' calculation	Binary variable that equals to 1 after the pass of the Dodd-Frank Act in 2010.