The effect of CEO power on bank risk: Do boards and institutional investors matter?+

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Abstract

We test for a link between CEO power and risk taking in US banks. Banks are more likely to take risks if they have powerful CEOs and relatively poor balance sheets. There is little evidence that executive board size and independence have a dampening effect on the channels through which powerful CEOs influence risk-taking and some evidence that institutional investors reinforce the risk-taking preferences of powerful CEOs.

Key words: Banks, governance, risk, CEO power, boards of directors, institutional investors

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1. Introduction

Banks are prone to risk-taking due to their high leverage, limited creditor market discipline (reflecting deposit insurance and too-big-to-fail guarantees), and the ability to increase rapidly and opaquely the riskiness of their assets. Moreover, bank failures can be costly to the taxpayer and have adverse effects on the real economy. Not surprisingly therefore, there is considerable academic and regulatory debate on the extent to which governance failures have contributed to the risk exposures of banks. For example, it is a widely held view that the vulnerability of banking sector during the crisis that started in 2008 was at caused by a build-up of excessive risk (Brunnermeier, 2009; DeYoung et al., 2013).

In a recent survey of the governance and risk literature, Srivastav and Hagendorff (2016) suggest that shareholder-focused governance exacerbates bank risk-taking and that mechanisms are needed to safeguard the interests of other stakeholders. Building on that literature, we examine whether stakeholders also need protection from the risk-taking preferences of powerful CEOs. Specifically, we examine how the executive board and institutional investor pillars of governance interact with CEO power to mitigate or neutralize the effect of CEO power on bank risk. We find that CEO power is associated with an increase in risk-taking on several measures of bank risk and little evidence that this power is mitigated by banks' board characteristics. We also find evidence that risk-taking by powerful CEOs is encouraged by institutional investors.

Our results contribute to several branches of the banking literature. First, we contribute to the literature on the determinants of bank risk (for a review see Altunbaş et al., 2017) by showing that CEO power is a significant driver of bank risk-taking on several risk measures. Second, we contribute to the debate on governance in banking (see Srivastav and Hagendorff, 2016) by providing evidence suggesting that bank boards do little to dampen risk-taking by banks in the face powerful CEOs. Third, we contribute to the literature on CEO power, which has shown that powerful CEOs can impact financial performance (Adams et al., 2005), earnings management practices (Ali and Zhang 2015), dividend policy (Onali et al., 2017), corporate acquisitions (Malmendier and Tate 2008), incentive contract design (Morse et al., 2011), the composition of boards of directors (Combs et al., 2007), and the likelihood of engaging in financial misconduct (Altunbaş et al., 2018); our results suggest that powerful CEOs also encourage greater bank risk-taking. Finally, we contribute to the 'monitoring v short-termism' debate on the role of institutional investors (see Callen and Fang, 2013) by showing that institutional investors appear to favor greater risk-taking by CEOs.

2. Related literature

The literature on the role of CEO power and the roles of executive boards and institutional investors in bank risk-taking is relatively limited and ambiguous. Agency theory suggests that CEOs have reason to select safer assets than shareholders prefer because CEO wealth comprises tangible and financial assets and human capital concentrated in the firms that they manage, whereas shareholders can diversify their risk in the capital market (Pathan 2009; May 1995). The empirical evidence on the impact of CEOs on bank risk is mixed. For example, Pathan (2009)

reports that powerful CEOs in US bank holding companies can control board decisions in a way that reduces risk-taking; and Victoravich et al. (2011) report that powerful CEOs reduce risk-taking in US banks when controlling for CEO equity compensation; they suggest that CEOs influence board decision-making to reduce risk. On the other hand, Lewellyn and Muller-Kahle (2012) find that powerful CEOs were associated with excessively risky lending practices in a matched pair sample of US firms where half the firms specialized in subprime lending; and Adams et al. (2005) show that firms with more powerful CEOs pursue policies which result in riskier outcomes and suggest that powerful CEOs influence board decisions toward pursuing risky policies.

The board of directors is the cornerstone of the internal governance framework (Fama and Jensen 1983) monitoring executives over the impact of policies on risk and evaluating whether current and future risk-exposure is consistent with risk appetite. However, empirical research on the impact of board characteristics on bank risk-taking is still in its infancy (Srivastav and Hagendorff 2016).[1] Pathan (2009) reports that smaller boards increase bank risk-taking, but that boards characterized by a higher fraction of independent directors pursue less risky policies. Akhigbe and Martin (2006) show that firms with independent boards see a decline in their stock volatility over the long term. Erkens et al. (2012) find no impact of board independence on bank risk during the 2008-2010 financial crisis for a sample of large international banks. Finally, Beltratti and Stulz (2012) show that banks with a shareholder-friendly board are more disposed to risk taking on some measures of risk.

[1] Much of the research in this area has been derived from non-financial firms (e.g., Adams and Ferreira 2008; Harris and Raviv; Hermalin and Weisbach, 1998).

Institutional investors also have an ambiguous role in bank governance. One the one hand, they can contribute to good governance because they have an incentive to collect information and monitor and discipline management to ensure that the firm's investment strategy is consistent with the objective of maximizing long-term value, rather than meeting short term earnings goals (Shleifer and Vishny, 1986, 1987; Monks and Minow,1985). On the other hand, monitoring may be costly such that institutional investors sell off their investments in response to unfavorable developments (Manconi et al., 2012). In addition, institutional investors themselves may place excessive emphasis on short-term performance, causing management to be overly concerned that near-term earnings (Yan and Zhang, 2009; Manconi et al., 2012). Callen and Fang (2013) review empirical evidence that supports both sides of 'monitoring v short-termism' debate.

3. Model and data

Our baseline specification is the following panel regression:

$$(1)\quad r_{it} = \beta_0 + \beta_1 CEOP_{it} + \beta_2 BSIZE_{it} + \beta_3 BINDEP_{it} + \beta_4 IINV_{it} + \delta X_{it-1} + D_t + \varepsilon_i$$

The dependent variable, r_{it}, measures the risk of bank i in period t. We employ three measures of bank risk widely used in the banking literature (see , for example, Altunbaş et al., 2017). The first measure is *default risk* as indicated by the z-score of each bank, which equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns. The z score measures the distance from insolvency where insolvency is defined as a state in which losses surmount

equity (E< -π) (where E is equity and π is profits). Following the literature, we define the inverse of the probability of insolvency as the z-score such that a higher z-score indicates that the bank is more stable. The second measure is *systematic risk*, which describes the average stock market reaction of each bank to movements on the overall stock market index. It is constructed using a simple capital asset pricing model, based on the following equation: $R_{it} = \beta_0 + \beta_1 R_t + \beta_2 int_t +$ and int_t is the yield on the three-month Treasury bill rate at time (trading day) t. β_0 is the intercept; β_1 is the systematic risk of bank i at time t; and β_2 is the interest rate risk. The final measure is *systemic risk*, which captures the reaction of individual banks to systemic events. This is estimated via the marginal expected shortfall (MES) following the model by Acharya et al. (2017) at a standard risk level of 5% as follows: $MES_i^{5\%} = {}^{1}/_{days} \sum_t R_i$ 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.

Of the independent variables, $CEOP_{it}$ is an index of CEO power calculated by applying principal components analysis to four proxies of CEO power: CEO tenure, where a CEOs' power is expected to increase with length of tenure because it helps build decision-making autonomy (Combs et al., 2007); CEO/Chair duality, where the same person holding the CEO and Chair positions simultaneously increases CEO power because it diminishes the role of the board of directors in controlling CEO decisions (Hermalin and Weisbach, 1998); whether a CEO is also an investor in the firm, because the 'convergence of interests' hypothesis predicts that share ownership binds the CEO's economic interests with those of shareholders and provides the CEO with an incentive to maximise firm performance (Fama and Jensen, 1983); and the size of a CEO's network because networks have been viewed as a means for executives to protect each other on

their respective boards (El-Khatib et al., 2015). The coefficients for each component of the CEO power index, their eigenvalues, and the proportion of the variance explained are reported in Table A1. Our executive board characteristics are $BSIZE_{it}$ and $BINDEP_{it}$ which represent board size (the number of directors) and board independence (the percent of outside directors), respectively, and $IINV_{it}$ is the proportion of equity held in a bank by institutional shareholders. X_{it-1} is a vector of other bank-specific characteristics commonly employed in the bank risk literature that includes measures of bank capital, leverage, profitability, liquidity, and asset quality. Finally, D_t is a dummy variable equal to 1 during 2008 to 2010 and zero otherwise to capture the effects on risk of the worst of the financial crisis on measures of risk.

Our dataset focuses on public listed US banks because of the additional information disclosure regulations that apply to them. For each bank, we gather information on the characteristics of CEOs (tenure, ownership, duality, network size) and executive boards (size and independence) from BoardEx. We match this with information on bank level variables (capital, liquidity, loan provisions, leverage, profitability and size) from Federal Reserve call reports and SNL Financial, which uses company filings. Market information on daily stock price shares outstanding to calculate the bank risk proxies is collected from Bloomberg. From these sources, we are able to construct a panel of 960 banks for the period 1998-2015. Summary statistics for the variables are presented in Table 1 and definitions and sources are given in Table A2. We initially estimate equation (1) using fixed time and bank effects with the bank-specific variables lagged one period to mitigate possible endogeneity bias. This might result, for example, from inverse causality between some covariates and the dependent variable (e.g., banks with a reputation for excessive risk-taking might deter powerful CEOs) and omitted variable bias. Accordingly, we also present

results using the dynamic Generalized Method of Moments (GMM) panel methodology to obtain consistent estimates (Arellano and Bond,1991; Blundell and Bond 1998).

4. Empirical results

Table 2 provides the baseline fixed effects and system GMM estimates of equation (1) for each measure of bank risk. In the system GMM results, the Sargan and Hansen test statistics indicate, respectively, that there is no second order serial correlation and that the instruments used are not correlated with the residuals. The overall impression from both sets of results is that the interests of powerful CEOs and institutional investors are aligned in that both favour greater risk-taking, and that executive boards have only a very modest influence in mitigating bank risk taking. The coefficients on CEO power are positive and statistically significant in both sets of estimates and for each measure of risk. The coefficients on board size are negative but only significant in the estimates for default risk; the coefficients on board independence are negative and significant on each measure of risk in the GMM estimates, but only for systematic risk in the fixed effects estimates. Finally, the coefficients on institutional investors are positive and significant for each measure of risk in the GMM estimates and for systematic risk in the case of the fixed effects estimates. The coefficients on the other bank specific variables in Table 2 suggest that bank risk taking is more likely in larger banks that have relatively weak balance sheets (greater leverage, poorer asset quality, less capital and liquidity, and less profitable), and that risk-taking increased during the financial crises. The economic magnitude of the coefficients on CEO power, the board characteristics and institutional ownership is illustrated in Panel A of Table 5. The table shows the impact on risk of a one standard deviation change in each of these variables. For example, such a change in CEO power is associated with a percentage point increase of between 0.13 to 1.18 in

default risk, 0.04 to 0.30 in systematic risk, and 0.31 to 0.07 in systematic risk. In the few cases where the coefficients are statistically significant, the magnitudes of the impact of executive board characteristics is generally smaller than that for CEO power, suggesting that boards have only a modest dampening impact on CEO risk-taking. The positive impact on risk-taking of institutional investors is generally smaller than that of CEO power though in the same direction.

We are also interested in whether the effect of CEO power on risk-taking differs across banks depending on board characteristics and the degree of institutional shareholders—that is, whether they dampen or neutralize the impact of CEO power on bank risk taking as this could have implications for policies aimed at reducing risk taking. To this end, we report regression results that include interaction terms for CEO power and board characteristics and for CEO power and institutional ownership. In these estimates, the coefficients on the interaction terms reflect the conditional effects of board characteristics and institutional shareholders on bank risk taking. The results for the executive board characteristic interactions are reported in Table 3 and provide little evidence of conditional effects of boards on risk-taking by powerful CEOs. The coefficients on the board interaction terms are only statistically significant in the fixed effects estimates for systemic risk. The economic magnitude of these coefficients is shown in panel B of Table 5 which indicates that the impact of a one standard deviation change in CEO power on bank risk is dampened by only about 0.02 percentage points in each case. The results for the CEO power and institutional investor interaction are reported in Table 4; they provide some evidence of a positive conditioning effect of institutional investors on powerful CEOs in the case of systemic risk-taking. In all of these estimates (tables 3 and 4), the coefficient on CEO power remains positive and statistically significant in both sets of estimates for each measure of risk each case.

5. Conclusions

We examine the effect of CEO power on risk-taking in US banks and whether that power is conditioned by executive board characteristics and banks institutional investors with regard to risk-taking. Our results indicate that banks engage in greater risk-taking activity across several measures of risk if the CEO is powerful. We find little evidence that executive board size and independence have a dampening effect on the channels through which powerful CEOs influence risk-taking and some evidence that institutional investors reinforce the risk-taking preferences of powerful CEOs. Our results suggest that the interests of powerful bank CEOs and institutional investors in banks are generally aligned when it comes to risk-taking and that powerful CEOs are able to influence board decisions toward pursuing risky policies.

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Table 1
Descriptive statistics

Variables	N	Mean	p25	Median	p75	Standard deviation	Minimum	Maximum
Default risk (z score)	6405	-7.92	-9.67	-7.66	-5.29	4.800	-76.40	6.06
Systemic risk	6405	0.48	0.00	0.32	0.95	0.796	-21.56	13.19
Systematic risk	6405	-1.24	-2.23	-0.72	0.01	3.163	-20.00	20.00
CEO power index	6405	0.00	-0.92	-0.16	0.67	1.227	3.06	3.94
Board Size	6405	10.77	8.00	10.00	13.00	3.271	4.00	32.00
Board Independence	6405	0.78	0.71	0.80	0.87	0.117	0.26	0.95
Institutional ownership	6405	7.45	0.92	3.79	10.77	9.764	0.00	117.40
Leverage	6405	80.44	75.32	82.86	87.74	10.67	5.41	96.54
Profitability	6405	0.48	0.35	0.78	1.11	1.793	-9.99	9.51
Liquidity	6405	22.61	14.30	20.90	29.02	11.935	0.33	86.52
Loan provisions	6405	0.21	0.03	0.08	0.19	0.459	0.01	5.41
Capital	6405	10.37	8.02	9.64	11.83	4.194	0.14	65.42
Size	6405	0.64	-0.53	0.24	1.39	1.740	-3.22	7.85

Table 2
CEO power and bank risk: baseline estimates

	Default risk		Systematic risk		Systemic risk	
	Fixed effects	GMM	Fixed effects	GMM	Fixed effects	GMM
Lag of risk indicator		0.686***		0.277***		0.402***
		(0.011)		(0.019)		(0.011)
CEO power	0.108	0.961***	0.035*	0.241***	0.253***	0.054**
	(0.050)	(0.164)	(0.020)	(0.036)	(0.069)	(0.024)
Board size	-0.045***	-0.017**	-0.004	-0.012	-0.016	-0.011
	(0.012)	(0.007)	(0.005)	(0.008)	(0.025)	(0.020)
Board independence	-0.032	-0.129***	-0.016*	-0.380**	-0.030	-0.606***
	(0.024)	(0.023)	(0.009)	(0.161)	(0.038)	(0.170)
Institutional ownership	0.002	0.010***	0.006***	0.023***	0.003	0.005***
	(0.004)	(0.003)	(0.002)	(0.002)	(0.006)	(0.001)
Capital	-0.545***	-0.131**	-0.011	-0.021***	-0.022	-0.001
	(0.084)	(0.011)	(0.007)	(0.005)	(0.026)	(0.001)
Liquidity	-0.017**	-0.013**	-0.002	-0.006*	-0.014*	-0.014***
	(0.008)	(0.006)	(0.002)	(0.003)	(0.007)	(0.004)
Loan provision	0.042	1.120***	0.051*	0.034	0.078	0.107*
	(0.161)	(0.126)	(0.027)	(0.065)	(0.071)	(0.046)
Leverage	0.021*	0.006**	0.002	0.013***	0.011	0.007**
	(0.012)	(0.003)	(0.002)	(0.002)	(0.011)	(0.003)
Profitability	-0.047**	-0.290***	-0.010*	-0.011	-0.013	-0.003
	(0.022)	(0.012)	(0.006)	(0.013)	(0.027)	(0.012)
Size	0.255	0.255	0.027	0.082	0.687*	0.222***
	(0.332)	(0.273)	(0.071)	(0.109)	(0.370)	(0.055)
Crisis dummy	4.257***	2.655***	0.038	0.065***	3.297***	0.022
	(0.566)	(0.055)	(0.117)	(0.021)	(0.293)	(0.018)
R^2	0.671		0.291		0.237	
Observations	6405	5658	6330	5719	6327	5605
Arellano-Bond test for AR(2) (p-value)		0.226		0.612		0.461
Hansen test for overidentification		0.883		0.927		0.941

Notes Panel fixed effects estimates are unbalanced panel regressions with bank and time fixed effects; independent variables are lagged one period to mitigate endogeneity problems. GMM estimates are system GMM and the Arellano-Bond test for AR(2) is the test for the absence of autocorrelation of the error terms at first and second order, respectively. ***, **, and * indicate statistical significance at the 1, 5 and 10% levels, respectively.

Table 3
CEO power and bank risk with governance interactions

	Fixed effects						GMM estimates					
	Default risk		Systematic risk		Systemic risk		Default risk		Systematic risk		Systemic risk	
	1	2	3	4	5	6	7	8	9	10	11	12
Lag of risk indicator							0.684***	0.653***	0.295***	0.295***	0.406***	0.400***
							(0.011)	(0.012)	(0.018)	(0.018)	(0.011)	(0.011)
CEO power	0.114*	0.113*	0.050**	0.053**	0.319***	0.310***	0.848***	0.838***	0.170***	0.181***	0.048**	0.050**
	(0.000)	(0.061)	(0.025)	(0.025)	(0.072)	(0.072)	(0.157)	(0.206)	(0.025)	(0.027)	(0.025)	(0.023)
CEO power*board size	-0.002		-0.002		-0.012**		-0.003		-0.002		-0.000	
	(0.005)		(0.001)		(0.005)		(0.003)		(0.002)		(0.000)	
CEO power*board independence		-0.003		-0.003		-0.014**		-0.000		-0.004		-0.001
		(0.006)		(0.002)		(0.007)		(0.004)		(0.003)		(0.002)
Board size	-0.039***	-0.039***	-0.006	-0.006	-0.014	-0.016	-0.013*	-0.010	-0.014**	-0.014**	-0.016**	-0.016**
	(0.012)	(0.012)	(0.005)	(0.005)	(0.025)	(0.025)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Board independence	-0.031	-0.031	-0.015*	-0.015*	-0.031	-0.033	-0.127***	-0.088***	-0.356**	-0.362**	-0.507**	-0.496***
	(0.022)	(0.022)	(0.009)	(0.009)	(0.038)	(0.038)	(0.023)	(0.025)	(0.144)	(0.146)	(0.157)	(0.165)
Institutional ownership	0.000	0.000	0.006***	0.006***	0.003	0.003	0.010***	0.013**	0.022***	0.022***	0.005***	0.005***
	(0.004)	(0.004)	(0.002)	(0.002)	(0.006)	(0.006)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Capital	-0.545***	-0.545***	-0.010	-0.010	-0.029	-0.029	-0.132***	-0.153***	-0.021***	-0.021***	-0.001	-0.001
	(0.088)	(0.088)	(0.007)	(0.007)	(0.026)	(0.026)	(0.011)	(0.013)	(0.005)	(0.005)	(0.001)	(0.001)
Liquidity	-0.018**	-0.018**	-0.002	-0.002	-0.013*	-0.013*	-0.021***	-0.033***	-0.006*	-0.006*	-0.014***	0.015***
	(0.009)	(0.009)	(0.002)	(0.002)	(0.007)	(0.007)	(0.007)	(0.006)	(0.003)	(0.003)	(0.004)	(0.004)
Loan provisions	0.070	0.070	0.054**	0.054**	0.073	0.073	1.185***	1.049***	0.076	0.076	0.101**	0.104*
	(0.171)	(0.171)	(0.027)	(0.027)	(0.072)	(0.072)	(0.131)	(0.131)	(0.062)	(0.062)	(0.041)	(0.042)
Leverage	0.020*	0.020*	0.001	0.001	0.011	0.011	0.006*	0.010***	0.010***	0.010***	0.008***	-0.001
	(0.012)	(0.012)	(0.002)	(0.002)	(0.011)	(0.011)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.001)
Profitability	-0.047**	-0.047**	-0.012**	-0.012**	-0.012	-0.012	-0.287***	-0.259***	-0.004	-0.006	-0.002	-0.007)
	(0.023)	(0.023)	(0.006)	(0.006)	(0.027)	(0.027)	(0.012)	(0.011)	(0.013)	(0.013)	(0.012)	(0.012)
Size	0.242	0.241	0.011	0.012	0.618*	0.609	0.290	0.065	0.076	0.074	0.234***	0.219***
	(0.322)	(0.322)	(0.069)	(0.069)	(0.373)	(0.373)	(0.278)	(0.289)	(0.101)	(0.102)	(0.054)	(0.054)
Crisis dummy	4.242***	4.252***	0.039	0.027	3.262***	3.229***	2.631***	2.554***	0.076***	0.077***	0.025	0.022
	(0.634)	(0.635)	(0.123)	(0.123)	(0.288)	(0.291)	(0.056)	(0.065)	(0.022)	(0.022)	(0.017)	(0.018)
R^2	0.672	0.673	0.293	0.293	0.238	0.239						
Observations	6405	6405	6330	6330	6327	6327	5458	5458	5391	5391	5279	5279
AR(2) p-value							0.296	0.285	0.908	0.913	0.365	0.345
Hansen test							0.845	0.855	0.996	0.996	0.945	0.946

Note: Panel fixed effects estimates are unbalanced panel regressions with bank and time fixed effects; independent variables are lagged one period to mitigate endogeneity problems. ***, **, and * indicate statistical significance at the 1, 5 and 10% levels, respectively. GMM estimates are system GMM. AR(2) is the Arellano-Bond test for the absence of autocorrelation of the error terms at second order. The Hansen test is the is for overidentification of restrictions. ***, **, and * indicate statistical significance at the 1, 5 and 10% levels, respectively.

Table 4
CEO power and bank risk with institutional ownership interaction

	Default risk		Systematic risk		Systemic risk	
	Fixed effects	GMM	Fixed effects	GMM	Fixed effects	GMM
Lag of risk indicator		0.678***		0.283***		0.426***
		(0.010)		(0.019)		(0.012)
CEO power	0.097*	0.628***	0.034*	0.226***	0.206*	0.056*
	(0.053)	(0.117)	(0.020)	(0.037)	(0.075)	(0.024)
CEO power* institutional ownership	0.007	0.002	0.003	0.000	0.003**	0.005**
	(0.010)	(0.002)	(0.004)	(0.001)	(0.001)	(0.003)
Board size	-0.044***	-0.018***	-0.005	-0.014*	-0.016	-0.004
	(0.012)	(0.007)	(0.005)	(0.008)	(0.025)	(0.007)
Board independence	-0.032	-0.130	-0.013	-0.349**	-0.025	-1.087***
	(0.025)	(0.022)	(0.009)	(0.157)	(0.039)	(0.208)
Institutional ownership	0.002	0.010***	0.006***	0.022***	0.003	0.005***
	(0.004)	(0.003)	(0.002)	(0.002)	(0.006)	(0.001)
Capital	-0.550***	-0.131***	-0.009	-0.020***	-0.024	-0.002
	(0.087)	(0.011)	(0.007)	(0.005)	(0.026)	(0.001)
Liquidity	-0.016*	-0.020***	-0.001	-0.006**	-0.015**	-0.010**
	(0.008)	(0.005)	(0.002)	(0.003)	(0.007)	(0.004)
Loan provisions	0.036	1.121***	0.057**	0.063	0.077	0.017
	(0.165)	(0.118)	(0.027)	(0.027)	(0.072)	(0.045)
Leverage	0.023**	0.009***	0.001	0.012***	0.014	0.005
	(0.012)	(0.003)	(0.002)	(0.002)	(0.011)	(0.003)
Profitability	-0.043**	-0.290***	-0.012**	-0.011	-0.018	0.022*
	(0.022)	(0.011)	(0.006)	(0.014)	(0.028)	(0.011)
Size	0.209	0.233	0.007	0.086	0.632*	0.162**
	(0.320)	(0.256)	(0.069)	(0.108)	(0.376)	(0.065)
Crisis dummy	4.268***	2.636***	0.026	0.068***	3.354***	0.017
	(0.560)	(0.051)	(0.120)	(0.022)	(0.294)	(0.019)
R^2	0.673		0.294		0.238	
Observations	6405	5418	6330	5353	6327	5242
AR (2) p-value		0.268		0.816		0.459
Hansen test		0.874		0.993		0.958

Note: Panel fixed effects estimates are unbalanced panel regressions with bank and time fixed effects; independent variables are lagged one period to mitigate endogeneity problems. ***, **, and * indicate statistical significance at the 1, 5 and 10% levels, respectively. GMM estimates are system GMM. AR (2) is the Arellano-Bond test for the absence of autocorrelation of the error terms at second order. The Hansen test is the is for overidentification of restrictions. ***, **, and * indicate statistical significance at the 1, 5 and 10% levels, respectively.

Table 5
The economic impact of CEO power and governance variables on bank risk

	Default risk	Systematic risk	Systemic risk
A. Baseline estimates (Table 2)			
CEO power			
Fixed effect	0.133	0.043	0.310
GMM	1.179	0.296	0.066
Board size			
Fixed effect	-0.147	-	-
GMM	-0.056	-	-
Board independence			
Fixed effect	-	-0.002	-
GMM	-0.015	-0.044	-0.071
Institutional ownership			
Fixed effect	-	0.059	-
GMM	0.098	0.225	0.049
B CEO power and governance interactions (Tables 3 and 4)			
CEO power*board independence			
Fixed effect	-	-	-0.015
GMM	-	-	-0.017
CEO power*institutional ownership			
Fixed effect	-	-	0.293
GMM	-	-	0.488

Panel A of this table shows the impact of a one standard deviation change in CEO power, board size, board independence, and institutional ownership on the measures of bank risk-taking employing the coefficients on these variables reported in Table 2. Panel B shows the impact of a one standard deviation change in CEO power employing the coefficients on the interaction variables reported in Tables 3 and 4.

Appendix Table 1

CEO power measure: principal components analysis

	First component	Second component	Third component	Fourth component
CEO tenure	0.308	0.917	0.198	0.161
CEO ownership	0.573	-0.282	-0.193	0.745
CEO duality	0.514	-0.281	0.749	-0.308
CEO network size	0.559	0.042	-0.601	-0.601
Eigenvalue	1.500	0.961	0.817	0.722
Proportion of variance explained	0.375	0.240	0.204	0.180

This table presents the results of applying principle components analysis to four proxies of power based on CEO ability to exercise decision-making power. CEO tenure is the number of years the CEO has served in position at given year. CEO ownership is a binary variable equal to 1 if the equity-based compensation of the CEO is greater than the direct compensation of the CEO at given year. CEO duality is a dummy variable equal to 1 if the CEO is also the Chairman in a given year. CEO network size is 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 in a given year. The eigenvectors are reported in orthonormal form.

Appendix Table 2
Data sources and variable definitions

Variables	Source	Description
Default risk	SNL Financial	Return on assets plus capital asset ratio divided by total by the standard deviation of return on assets in a given year.
Systemic bank risk	SNL Financial	Coefficient of the return of S&P 500 index in the estimation of the two-index market model in a given year.
Systematic risk	SNL Financial	Marginal expected shortfall in 5 percent worst days at given year.
CEO power	Authors' calculation	Derived from the application of Principal Components Analysis to four proxies for CEO power: CEO tenure; CEO ownership; CEO duality; CEO network size
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.
Institutional ownership	Thompson One Banker	Percent of ownership by institutional investors in a given year
Leverage	Call reports	The ratio of total book value of liabilities to total assets in a given year.
Profitability	Call reports	The ratio of earnings before interest and taxes (to book value of total assets in a given year.
Liquidity	Call reports	The ratio of liquid assets to total assets in a given year.
Loan provisions	Call reports	The ratio of loan loss provision to total loans in a given year.
Capital	Call reports	The ratio of risk-weighted capital to total assets in a given year.
Total assets	Call reports	Natural logarithm of total assets in a given year.
Financial crisis dummy	Authors' calculation	Binary variable that takes the value of one in a year of financial crisis (2008 to 2010) and zero otherwise.