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Bankers on the Board and CEO Incentives[1]

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ABSTRACT

The Sarbanes-Oxley Act demanded the presence of more financial experts on corporate boards to improve governance. Directors from lending banks require particular attention because of the conflicts of interest between shareholders and debtholders despite their financial expertise. In this paper, we examine whether commercial banker directors work in the best interests of shareholders in providing incentives to the CEO. We find that the CEO's compensation VEGA is lower if an affiliated banker director is on the board. Further, we find that

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commercial banker directors increase debt-like compensation (Sundaram and Yermack, 2007) and make it less sensitive to risk.

Keywords: *bankers on board, financial expertise, conflicts of interest, governance, board of directors, CEO compensation*

JEL classification: *G*14

1. Introduction

Boards of directors play an important role in monitoring and advising chief executive officers (CEOs) in the interests of shareholders (Fama and Jensen, 1983; Hermalin and Weisbach, 1988, 1998; Jensen, 1993; Adams *et al.*, 2008). However, the boards of directors may not always act in the best interests of the shareholders (Bebchuk and Fried, 2003). In fact, US non-shareholder constituency statutes (or stakeholder statutes) allow directors to consider the effects on non-shareholder stakeholders when making board decisions (Adams and Ferreira, 2007), suggesting that directors' preferences could diverge from those of the shareholders, depending on the director's background.

Among the many different backgrounds of boards of directors, commercial banker directors (CBDs) deserve special attention due to their financial expertise and potential conflicts of interest between shareholders and debtholders (Jensen and Meckling, 1976; Booth and Deli, 1999; Kroszner and Strahan, 2001; Güner *et al.*, 2008; Sisli-Ciamarra, 2012; Hilscher and Sisli-Ciamarra, 2013). A CBD is defined as an outside director in a non-financial firm who is also an executive of a commercial bank. The bank *may or may not* have loan exposure to the firm. Because one needs to have adequate expert knowledge and an extensive professional network in financial markets to be promoted as a bank executive, a CBD is assumed to have financial expertise that benefits the company's shareholders (Booth and Deli, 1999). However, because the CBD is employed by the commercial bank, the CBD's interests are aligned with (potential) creditors of the company. The CBD's interests could therefore diverge from the company shareholders' interests.

Prior literature has found that CBDs provide industry-specific knowledge, enhance monitoring and provide debt market expertise to management (Diamond, 1984; Boyd and Prescott, 1986; Booth and Deli, 1999; Kroszner and Strahan, 2001; Byrd and Mizruchi, 2005). In addition, researchers have investigated areas of corporate financial decisions in which the financial expertise of the CBDs and their associated conflicts of interest are salient, such as mergers and acquisitions (M&As; Hilscher and Sisli-Ciamarra, 2013), capital structure (Sisli-Ciamarra, 2012; Kuo *et al.*, 2010), investment decisions (Güner, *et al.*, 2008; Dittman *et al.*, 2010; Mitchell and Walker, 2008; Slomka-Golebiowska, 2012), accounting conservatism (Erkens *et al.*, 2014), and innovative activities (Ghosh, 2016). In this paper, we look at CEO incentives.

CEO incentives have been an important area in corporate finance research in which optimal compensation is understood as a linear function of the aggregate information about the firm's output (Holmstrom and Milgrom, 1987; Jensen and Murphy, 1990; Aggarwal and Samwick, 1999a, 1999b; Murphy, 1999, 2011; Core and Guay, 2002; Coles *et al.*, 2006; Frydman and Jenter, 2010). Financial experts could process the company's financial and operating performance information more effectively. Hence, they could tie the CEO's incentives to the company's financial performance more effectively (Holmstrom and Kaplan, 2003) than non-CBDs could. Therefore, our first research question is as follows: Do CBDs make CEO's incentives more sensitive to firm performance? We hypothesise that the CEO's pay–performance sensitivity (PPS) is higher when CBDs are present (Jensen and Murphy, 1990) and we call this the *financial expertise hypothesis*.

At the same time, since the CBDs come from (potential) lending banks, their decisions could be subject to conflicts of interest between shareholders and debtholders (Jensen and Meckling, 1976). While CBDs have a fiduciary duty to shareholders, that is, people who prefer risk-increasing decisions, the CBDs' incentives arising from their employing banks would induce them to prefer risk-reducing decisions (Black and Scholes, 1973; Jensen and Meckling, 1976; Myers, 1977; Kim and Sorensen, 1986). Therefore, our second research question is the following: Do CBDs influence CEO incentives to be more aligned with creditors' interests? We hypothesize that CBDs could influence the CEO's compensation contract to decrease firm risk. We call this the *conflicts of interest hypothesis*.

The structure of CEO compensation has various components that can have different degrees of incentive alignment with shareholders and debtholders. Some components, such as stock options and restricted stock ownership, would incentivise the CEO to make decisions from the shareholder's perspective. On the other hand, pension or deferred compensation, that is, debt-like compensation, could incentivize the CEO to make decisions from the debtholder's perspective (Sundaram and Yermack, 2007). In addition, the board of directors could make the CEO compensation more or less sensitive to the firm risk to influence the risk taking of the CEO (Core and Guay, 2002; Coles *et al*., 2006). Therefore, under the *conflicts of interest hypothesis*, debt-like CEO compensation, such as pension and deferred compensation, would increase with CBD presence, while the sensitivity of CEO compensation to risk, measured by *VEGA*, would decrease in the presence of CBDs. In addition, under the *financial expertise hypothesis*, CEO compensation sensitivity to performance, measured by PPS, would show a positive relationship with CBD presence and debt-like compensation would increase in accordance with firm performance.

Based on the intersection of ExecuComp and BoardEx data from 1999 to 2007, we find supporting evidence for the *conflicts of interest hypothesis* for CBDs, regardless of whether the CBD is affiliated with a lending bank or not. Following Güner *et al.* (2008), we define an affiliated banker director (ABD) as one who works for the bank that currently has or previously (up to 5 years prior) had some type of loan exposure with the monitored company according to the DealScan database. When ABDs are present, we find that the sensitivity of CEO compensation to firm risk (*VEGA*) is significantly smaller. Further investigation shows that debt-like compensation is more sensitive to performance and less sensitive to risk in the presence of ABDs. We find that the negative correlation between *VEGA* and ABD presence is stronger if the ABD is the chair of the compensation committee. Our finding is robust after controlling for the potential selection bias of having CBDs. We also find that debt-like compensation is significantly higher when CBDs are present, which is the first time this association is reported in the literature. We also find that the industry-relative *VEGA* of CEO compensation significantly decreases after the appointment of CBDs. Lastly, we find that the industry-relative leverage ratio significantly increases after the departure of CBDs.

One thing to note is that the *conflicts of interest hypothesis* and the *financial expertise hypothesis* are not mutually exclusive. Although many of our results support the *conflicts of interest hypothesis*, we still find results that support the *financial expertise hypothesis*. The positive result of our stock market event study on CBD appointment and departure suggests the possibility that outside investors recognise and appreciate the human capital and financial expertise of CBDs. Specifically, for firms that did not previously have any CBDs, investor response to CBD appointment is positive and significant if the prior risk level is high. In addition, when a CBD is dismissed without a replacement CBD on the board, the stock market investors' response is negative, especially when prior performance was good and prior financial risk was high. These results imply that a CBD has a positive effect on firm value by providing financial expertise.

The rest of the paper is organised as follows. Section 2 describes the data collection and methodology. Section 3 reports the results and discusses the endogeneity concern. Section 4 concludes the paper.

2. Data and Methodology

2.1. *Sample*

To identify banker directors of US public firms, we use BoardEx (Management Diagnostics Limited) data that contains information about more than 300,000 unique board members of publicly listed companies in the US and elsewhere. To obtain information on whether a director works (or has worked) for a commercial bank, we use text-matching algorithms on the names of all the banks in the Bank Regulatory Database and the Commercial Bank and Bank Holding Company Database of the Federal Reserve Bank of Chicago. We also use the bank names as shown in the LPC DealScan database for banks with positive loan amounts. Additionally, we use the names of the firms in Compustat whose Fama–French 49-industry group identifies them as commercial banks. Last, we manually check the FDIC (Federal Deposit Insurance Corporation) website to determine whether the identified bank is a bank holding company. To ensure that our classification of banks as investment or commercial banks is accurate, especially after the abolishment of the Glass–Steagall Act, we use the IPO Underwriter Reputation Rankings chart of Jay Ritter (Loughran and Ritter, 2004)[2] to identify investment banks.[3] See Appendix B for a more detailed description.

The CEO compensation data are from ExecuComp, which provides the executive compensation data of Standard & Poor's (S&P) 1500 companies in the US. Our sample period is from 1999 to 2007 because it is the intersection between the BoardEx and ExecuComp data. Most of the CEO characteristics, such as CEO age and CEO tenure, are from ExecuComp. When observations were missing, we hand-collected the information from news articles from the news database Factiva. For firm characteristic variables such as stock returns or return on assets, we use Center for Research in Security Prices (CRSP) and Compustat data.

[2] See http://bear.warrington.ufl.edu/ritter/ipodata.htm.

[3] Huang et al. (2014) find investment banker directors have a positive impact on M&As, such as lower fees and better long-run performance.

2.2. *Sample distribution and summary statistics*

The sample distribution by year and by industry is shown in Table 1. We use 6,945 firm–years in our compensation regressions. We also display the number of firms in which at least one CBD is present (left) and at least one ABD is present (right) in the square bracket of each cell. We use the Global Industry Classification Standard code (GICS) code developed by MSCI and S&P to display the breakdown of firm–years by industry. Since financial institutions are heavily regulated by the government, making standard governance mechanisms less applicable,[4] we exclude financial institutions based on this GICS code. Interestingly, no firm in the information technology sector appears to have an ABD, which supports the previous findings in the literature that bankers sit on less risky firms (Kroszner and Strahan, 2001). In terms of a time trend, the number of firms with CBDs peaked in 2003 and has been decreasing since, consistent with prior literature (Sisli-Ciamarra, 2012; Hilscher and Sisli-Ciamarra, 2013). The time trend is attributable to the Sarbanes–Oxley Act's emphasis on reducing conflicts of interest on corporate boards (Hilscher and Sisli-Ciamarra, 2013).

Table 2 shows the summary statistics of our sample. Approximately 7.3% of all firm–years in our sample have at least one CBD, 1.4% have at least one ABD, and the remaining 5.9% have only non-ABDs (NABDs).[5] The proportion of firms with CBDs is lower than that reported in the literature (31.6% for Kroszner and Strahan, 2001; 27% for Güner *et al.*, 2008 22–27% for Sisli-Ciamarra, 2012 and 29.7% for Hilscher and Sisli-Ciamarra, 2013). We believe the difference is attributable to two facts. First, our sample is from a larger pool that includes smaller firms (1,500 large publicly traded firms in the US). Prior literature focuses on S&P 500 firms (Hilscher and Sisli-Ciamarra, 2013) and Forbes 500 firms (Kroszner and Strahan, 2001; Güner *et al.*, 2008). As Kroszner and Strahan (2001) point out, bankers are more likely to sit on the boards of more stable firms, which are presumably larger. Second, our classification of commercial banker as opposed to investment banker could have been more restrictive than in previous research. Sisli-Ciamarra (2012) reports that the proportion of firm–years that have at least one investment banker was less than 10% throughout the sample period and Hilscher and Sisli-Ciamarra (2013) report 10.1%. We find that 13.8% of firm–years have at least one investment banker on the board. Some of the commercial banks in our DealScan data that are the lead managers of syndicated loans are actually investment banks based on the IPO Underwriter Reputation Rankings chart, even though they are found in the FDIC BankFind database. The increased ambiguity between CBDs and investment banker directors (IBDs) is attributable to the abolishment of the Glass–Steagall Act. Thus, whenever the name of the bank is found in the IPO ranking chart, we classify it as an investment bank even if DealScan lists it as the lead manager of a syndication loan.

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[4] The results are robust when we include financial institutions (untabulated).

[5] A director is classified as an ABD if he or she is an executive of a commercial bank that has extended at least one loan to the company over the previous 5 years as a lender or as a lead arranger in a syndicate. We assign a firm–year the value of one for $1\{ABD\}$ if there is at least one ABD on the board, because the sheer presence of the ABD would trigger conflicts of interest. Only 15% of the firm–years with $1\{ABD\} = 1$ show the presence of both an ABD and an NABD.

Table 1

Sample distribution by year, industry and number of firms with banker directors

This table presents the sample distribution by year, industry and number of firms with banker directors. The sample period is 1999–2007. The firm–years in our sample are the intersection of ExecuComp, Boardex, Compustat and CRSP data. The sample consists of 6,945 firm–years, 647 of which have CBDs on their firm boards. We use Boardex data to identify banker directors on the board. We use the Global Industry Classification Standard (GICS) developed by MSCI and Standard & Poor's to classify firms by industry. In each entry, the first number is the number of observations in the specific industry in the specific year. The first number in square brackets is the number of firms that have at least one CBD in the sector that year and the second number is the number of firms that have at least one ABD in the sector that year.

GICS Code:	10	15	20	25	30	35	45	50	Total
Year	Energy	Materials	Industrials	Consumer Discretionary	Consumer Staples	Health Care	Information Technology	Telecomm. Services	
1999	51 [0,0]	67 [1,0]	137 [1,0]	155 [3,0]	43 [1,0]	101 [2,0]	166 [2,0]	13 [2,0]	733 [12,0]
2000	56 [2,1]	69 [7,2]	139 [17,2]	176 [18,2]	48 [5,2]	103 [4,0]	194 [3,0]	17 [3,2]	802 [59,11]
2001	50 [5,2]	81 [9,3]	151 [17,3]	174 [17,1]	49 [10,1]	114 [8,1]	213 [4,0]	11 [1,1]	843 [71,12]
2002	58 [4,1]	74 [5,1]	127 [19,4]	158 [16,1]	48 [8,1]	120 [9,2]	199 [4,0]	7 [1,1]	791 [66,11]
2003	52 [4,1]	63 [11,4]	125 [19,4]	162 [17,1]	49 [8,0]	118 [11,1]	202 [5,0]	11 [2,1]	782 [77,12]
2004	45 [2,0]	63 [10,3]	116 [13,4]	134 [14,1]	40 [3,2]	113 [5,0]	177 [1,0]	9 [0,0]	697 [48,10]
2005	67 [3,1]	67 [9,3]	155 [16,1]	189 [18,1]	39 [7,2]	126 [6,0]	203 [4,0]	13 [1,1]	859 [64,9]
2006	76 [5,3]	81 [11,5]	168 [22,4]	199 [11,1]	53 [8,3]	140 [6,0]	218 [5,0]	8 [1,0]	943 [69,16]
2007	39 [4,4]	44 [3,1]	107 [14,3]	85 [9,2]	37 [5,3]	71 [2,0]	106 [2,0]	6 [1,1]	495 [40,14]
Total	494 [29,13]	609 [66,22]	1225 [138,25]	1432 [123,10]	406 [55,14]	1006 [53,4]	1678 [30,0]	95 [12,7]	6945 [506,95]

Table 2

Summary statistics of firm characteristics and variables

This table presents the summary statistics of firm characteristics and variables in our regressions. The sample period is 1999–2007. The firm–years in our sample are the intersection of ExecuComp, Boardex, Compustat and CRSP data. The sample consists of 8,926 firm–years, 647 of which have CBDs on their firm boards. The variables of the firm characteristics are from Compustat and the CRSP. The CEO and board characteristics are from Boardex and ExecuComp data and the CEO compensation variables are from ExecuComp data. The superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. Detailed variable descriptions are provided in Appendix A.

Variable Name	N	mean	Std. Dev.	p25	p50	p75
Indep.dir.%	6,945	0.6996	0.1397	0.6250	0.6838	0.8000
1*{IBD}*	6,945	0.1397	0.3467	0.0000	0.0000	0.0000
1*{CBD}*	6,945	0.0729	0.2599	0.0000	0.0000	0.0000
1*{ABD}*	6,945	0.0137	0.1162	0.0000	0.0000	0.0000
1*{NABD}*	6,945	0.0592	0.2360	0.0000	0.0000	0.0000
PPS	6,945	591.9829	770.5891	115.5551	275.7021	690.2772
VEGA	6,945	195.0324	366.3951	33.1420	81.8655	207.9300
1-yr stock performance	6,945	0.2337	0.7629	–0.1214	0.1187	0.3880
ROA	6,945	0.1668	0.1199	0.1021	0.1574	0.2246
ROA volatility	6,945	0.0188	0.0230	0.0081	0.0129	0.0213
Total assets	6,945	6,250.5800	23,666.7700	488.4950	1,274.4970	4,096.6790
M/B	6,945	4.1733	68.1302	1.6536	2.5550	4.0763
Cash/total assets	6,945	0.1058	0.1206	0.0210	0.0623	0.1470
R&D/total assets	6,945	0.0562	0.0695	0.0171	0.0578	0.0578
Capex/total assets	6,945	0.0564	0.0542	0.0223	0.0391	0.0706
Firm age	6,945	25.4901	16.4657	11.0000	20.0000	40.0000
CEO age	6,945	54.4118	7.0655	50.0000	55.0000	59.0000
1*{CEO retirement age}*	6,945	0.0593	0.2362	0.0000	0.0000	0.0000
CEO tenure	6,945	7.1703	7.0058	2.0000	5.0000	9.0000
Stock return volatility	6,945	0.0288	0.0145	0.0188	0.0249	0.0347
KMV EDF	6,875	0.9652	2.9361	0.0680	0.1685	0.5828
Credit rating no	6,945	7.0573	7.1284	0.0000	8.0000	14.0000
Board size	6,945	9.1300	2.1095	8.0000	9.0000	10.0000
Insider %	6,945	0.3004	0.1397	0.2000	0.3162	0.3750
Leverage ratio	6,883	0.5011	0.2251	0.3473	0.5068	0.6340
ST Debt/LT debt	6,052	0.1960	0.2684	0.0093	0.0771	0.2696

Therefore, our more restrictive classification rule could bias against finding our results. Moreover, we control for the presence of IBDs in every regression.

3. Empirical Method and Results

3.1. *PPS and the CEO compensation VEGA*

Since our key hypothesis tests whether CEO compensation is sensitive to firm performance and risk depending on the presence of a CBD, we investigate the PPS and

VEGA of CEO compensation, where PPS is constructed following Core and Guay (2002)[6] and *VEGA* following Coles *et al*. (2006). If the CBD's financial expertise manifests itself, CEO compensation would be more sensitive to company performance and PPS would be higher for firms with CBDs.

If the CBD's conflicts of interest are influential, CEO compensation would be less sensitive to the risk of the firm or even negatively correlated with it. Thus, the *VEGA* of CEO compensation would be lower when CBDs are present. Our empirical specification is as follows:

$$PPS_t = \beta_1 1\{CBD\}_{t-1} + controls_{t-1} + \epsilon \tag{1}$$

$$VEGA_t = \beta_1 1\{CBD\}_{t-1} + controls_{t-1} + \epsilon \tag{2}$$

$$PPS_t = \beta_1 1\{ABD\}_{t-1} + \beta_2 1\{NABD\}_{t-1} + controls_{t-1} + \epsilon \tag{3}$$

$$VEGA_t = \beta_1 1\{ABD\}_{t-1} + \beta_2 1\{NABD\}_{t-1} + controls_{t-1} + \epsilon \tag{4}$$

where $1\{CBD\}$, $1\{ABD\}$ and $1\{NABD\}$ are dummy variables that equal one if the firm has at least one CBD, ABD or NABD on its board, respectively, and zero otherwise. Our performance measure is *ROA*, which is calculated as annual operating income before depreciation divided by total assets. Accounting information, which aggregates performance over time, is sufficient for optimal compensation analysis (Holmstrom and Milgrom, 1987). Our risk measure is the trailing 5-year standard deviation of quarterly *ROA*s. Our controls, based on the CEO compensation literature (Murphy, 1999, 2011; Frydman and Saks, 2010; Benmelech and Frydman, 2015; Deng and Gao, 2013; Chen *et al*., 2015; Humphrey-Jenner *et al*., 2016), are as follows: (1) one-year stock performance over the fiscal year, (2) firm size (natural log of total assets), (3) the market-to-book ratio, (4) the leverage ratio, (5) the cash amount relative to total assets, (6) research and development (R&D) expenditure relative to total assets as a measure of information asymmetry, (7) capital expenditure relative to total assets, (8) the natural log of firm age, (9) a dummy variable that equals one if the CEO is of retirement age, (10) CEO tenure, (11) the percentage of independent directors on the board, (12) a dummy variable that equals one if the firm has at least one IBD, and (13) industry and year fixed effects.

Our key predictions are as follows. The *financial expertise hypothesis* predicts that $\beta_1 > 0$ for equations (1) and (3). The *conflicts of interest hypothesis* predicts that $\beta_1 < 0$ for equations (2) and (4). Since PPS and VEGA are determined simultaneously, we should use the simultaneous equation model (SEM) for equations (1) and (2) and equations (3) and (4), respectively. However, because the right-hand-side variables are the same, the SEM is not identified, so we estimate equations (1) and (2) and equations (3) and (4), respectively, instead, using seemingly unrelated regressions (SURs) (Wooldridge, 2002). Our estimation results are shown in Table 3.

In the first set of regressions in Table 3, we find no significant coefficients for $1\{CBD\}$. However, in the second set of regressions, we find a negative and significant coefficient

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[6] In untabulated analyses, we also measure PPS following Yermack (1995) and find consistent results.

Table 3

Banker directors and PPS and VEGA: SUR framework

This table reports the seemingly unrelated regression (SUR) results for equations (1)~(4). We measure PPS following Core and Guay (2002) and VEGA following Coles *et al.* (2006). Industries are defined using 2-digit Standard Industrial Classification (SIC) codes. Independent variables and control variables are lagged by one year. The *p*-values, based on heteroscedasticity-robust standard errors, are given every second line of each row. The superscripts *, ** and *** indicate the significance at the 10%, 5% and 1% levels, respectively. The variables are defined in Appendix A.

Regression model	(1)				(2)			
Dependent variable:	ln(*PPS*)		ln(*VEGA*)		ln(*PPS*)		ln(*VEGA*)	
1*{CBD}*	0.010		−0.037					
	0.820		0.441					
1*{ABD}*					−0.077		−0.204	*
					0.420		0.053	
1*{NABD}*					0.029		0.000	
					0.539		1.000	
1*{IBD}*	0.079	**	0.066	*	0.081	**	0.069	**
	0.012		0.06		0.011		0.049	
Indep.dir.%	−0.256	***	0.537	***	−0.257	***	0.534	***
	0.002		0.000		0.002		0.000	
1-year stock perf.	0.178	***	−0.026		0.178	***	−0.025	
	0.000		0.270		0.000		0.274	
ROA	1.735	***	1.225	***	1.734	***	1.221	***
	0.000		0.000		0.000		0.000	
ROA volatility	−0.581		−0.699		−0.573		−0.684	
	0.282		0.242		0.288		0.252	
Size: ln(total assets)	0.555	***	0.647	***	0.556	***	0.648	***
	0.000		0.000		0.000		0.000	
M/B	0.053	***	0.047	***	0.053	***	0.047	***
	0.000		0.000		0.000		0.000	
leverage ratio	−0.785	***	−0.575	***	−0.788	***	−0.580	***
	0.000		0.000		0.000		0.000	
Cash/total assets	0.376	***	0.466	***	0.375	***	0.463	***
	0.001		0.000		0.001		0.000	
R&D/total assets	1.559	***	2.924	***	1.554	***	2.915	***
	0.000		0.000		0.000		0.000	
CAPEX/total assets	0.548	*	−1.336	***	0.544	*	−1.344	***
	0.052		0.000		0.053		0.000	
ln(firm age)	−0.179	***	0.001		−0.179	***	0.001	
	0.000		0.947		0.000		0.954	
1*{CEO retirement age}*	0.084	*	−0.099	*	0.084	*	−0.098	*
	0.071		0.055		0.070		0.056	
CEO tenure	0.059	***	0.012	***	0.059	***	0.012	***
	0.000		0.000		0.000		0.000	
constant	0.891	***	−1.561	***	0.891	***	−1.561	***
	0.004		0.000		0.004		0.000	

Table 3
Continued

Regression model	(1)		(2)	
Dependent variable:	ln(*PPS*)	ln(*VEGA*)	ln(*PPS*)	ln(*VEGA*)
Industry & year FE	YES	YES	YES	YES
N	6945	6945	6945	6945
R^2	0.5471	0.5471	0.5285	0.5287
χ^2	1,524.922		1,524.144	

of 1*{ABD}* in the VEGA regression with a *p*-value of 5.3%. This supports our hypothesis of conflicts of interest that ABD provides risk-reducing incentives for the CEO, on average. Starting with a median VEGA of US$ 81,866, having an ABD translates into a reduction in VEGA of US$ 15,507. We also find that the PPS and VEGA are significantly higher when IBDs are present as independent directors. To the extent that directors with financial expertise are controlled for, our results show that the percentage of independent directors is negatively associated with PPS. The result suggests that the most important governance effect of independent directors on CEO compensation comes from directors with financial expertise, proxied by IBD presence in our specification. The convexity of compensation is positively associated with the market-to-book ratio and the R&D investment of the firm and negatively associated with CEO age. In addition, it is negatively associated with the firm's financial leverage and capital expenditure.

3.2. *Debt-like compensation and CBDs*

One way CBDs could incentivise CEO to behave more like creditors is to provide more debt-like compensation (Sundaram and Yermack, 2007). More specifically, pension and deferred compensation are liabilities to the CEO's company, which make the CEO more like the company's creditor because the CEO has been promised to be paid in the future. Therefore, in this section, we hypothesise that when CBDs are present, the amount of CEO debt-like compensation increases. Following Sundaram and Yermack (2007), our empirical model is as follows:

$$Inside\,Debt_t = \beta_1 1\{CBD\}_{t-1} + controls_{t-1} + \epsilon \tag{5}$$

$$Inside\,Debt_t = \beta_1 1\{ABD\}_{t-1} + \beta_1 1\{NABD\}_{t-1} + controls_{t-1} + \epsilon. \tag{6}$$

Inside debt is the sum of pension and deferred compensation. Our controls are as follows: (1) CEO tenure, (2) a dummy variable that equals one if the CEO is an outsider, (3) firm size, (4) leverage ratio, (5) a dummy variable that equals one if operating income is negative, (6) R&D relative to sales, (7) a dummy variable that equals one if the firm has a tax loss carryforward, (8) firm age, (9) a dummy variable that equals one if the CEO is a founder, (10) institutional ownership, (11) a dummy variable that equals one if the institutional ownership data are missing, (12) board size and (13) industry and year fixed effects. Since pension data are available only after 2006, we restrict our sample accordingly. The summary statistics of the sample used in the regressions are shown in Panel A of Table 4. The average inside debt is US$ 4.75 million and the standard deviation is US$ 12.48 million. We control for the dummy variable being one if the CEO is an outsider, where an outsider is defined as one who was not employed by the company one year before the CEO appointment. In our data, 23.6% of the CEOs are outsiders. We also collect data on whether the CEO is the founder of the company; on average, 12.4% of the CEOs are founders.

Panel B of Table 4 shows our baseline regression results. The coefficient of $1\{CBD\}$ in the first column is positive and significant at 1% level. If a company has a CBD, the CEO receives US$ 2.2 million more in debt-like compensation than the CEOs of firms without CBDs. The result is more salient if the banker director is an ABD. In the last regression in Panel B, we find that the coefficient of $1\{ABD\}$ is 4.594 and that of $1\{NABD\}$ is 1.6, which indicates that CEOs in firms with ABDs (NABDs) receive US$ 4.6 million (US$ 1.6 million) more in debt-like compensation than CEOs in firms without banker directors. The coefficients of the controls are generally consistent with the literature. CEOs with longer tenure receive a larger pension. Outsider CEOs receive a smaller pension than insiders do. The CEOs of larger firms receive greater pension compensation than the CEOs of smaller firms.

Given that CBDs are associated with more debt-like compensation overall, we investigate whether CBDs also influence debt-like compensation as a way to increase firm performance and/or to reduce firm risk. We propose the following empirical model:

$$\begin{aligned} Inside\,Debt_t = {} & \beta_1 1\{CBD\}_{t-1} + \beta_2 1\{CBD\}_{t-1} * ROA + \beta_3 1\{CBD\}_{t-1} * \sigma_{ROA} \\ & + \beta_4 ROA + \beta_5 \sigma_{ROA} + controls_{t-1} + \epsilon \end{aligned} \quad (7)$$

$$\begin{aligned} Inside\,Debt_t = {} & \beta_1 1\{ABD\}_{t-1} + \beta_2 1\{ABD\}_{t-1} * ROA + \beta_3 1\{ABD\}_{t-1} * \sigma_{ROA} \\ & + \beta_4 1\{NABD\}_{t-1} + \beta_5 1\{NABD\}_{t-1} * ROA + \beta_6 1\{NABD\}_{t-1} * \sigma_{ROA} \\ & + \beta_7 ROA + \beta_8 \sigma_{ROA} + controls_{t-1} + \epsilon \end{aligned} \quad (8)$$

In equation (7), our prediction is that $\beta_2 > 0$ under the *financial expertise hypothesis* and $\beta_3 < 0$ under the *conflict of interest hypothesis*. In equation (8), our prediction is that $\beta_2\,\beta_5 > 0$ under the *financial expertise hypothesis* and $\beta_3 < 0$ under the *conflict of interest hypothesis*. We do not take positions regarding β_6. The results are shown in Panel C of Table 4 and it confirms our prediction of *conflicts of interest* as well as *financial expertise*. In the first regression, the coefficient of the interaction between *ROA* and $1\{CBD\}$ is positive and significant at the 1% level, which suggests that CBDs increase debt-like compensation when firm performance is good and vice versa. In addition, we find that the coefficient of the interaction between risk and $1\{CBD\}$ is negative with marginal statistical significance. This finding supports our hypothesis that CBDs incentivise the CEO to reduce risk through debt-like compensation when the risk of the firm is high. In the second through fourth regressions, both the coefficients of the interactions between $1\{ABD\}$ and *ROA* and between $1\{NABD\}$ and *ROA* are positive and significant, supporting the evidence that both types of CBDs increase debt-like compensation in accordance with firm performance. We also find that the coefficient of interaction between $1\{ABD\}$ and firm risk, proxied by σ_{ROA}, is negative and significant at less than the 1% level. This result again indicates the conflicts of interest from ABDs. We

Table 4
Banker directors and debt-like compensation

Panel A: Summary Statistics

Variable	N	Mean	Std. Dev.	p25	p50	p75
Inside Debt	2,116	4,754.102	12,484.140	0	265.853	4,132.120
1*{Outsider CEO}*	2,116	0.236	0.425	0	0	0
1*{Operating Income<0}*	2,116	0.064	0.244	0	0	0
R&D/Sales	2,116	0.080	0.182	0.004	0.024	0.105
1*{Tax Loss Carryforward}*	2,116	0.235	0.424	0	0	0
Firm Age	2,116	27.759	17.171	14	21	43
1*{Founder CEO}*	2,116	0.124	0.330	0	0	0

Panel B: Regression Results

Dependent variable:	Inside Debt			
1*{CBD}*	2.198 **			
	0.022			
1*{ABD}*		4.458 **		4.594 **
		0.029		0.025
1*{NABD}*			1.495	1.600
			0.157	0.130
CEO tenure	0.216 ***	0.218 ***	0.216 ***	0.217 ***
	0.000	0.000	0.000	0.000
1*{outsider CEO}*	−1.703 ***	−1.681 ***	−1.699 ***	−1.695 ***
	0.003	0.004	0.003	0.003
Size: ln(total assets)	2.474 ***	2.469 ***	2.501 ***	2.455 ***
	0.000	0.000	0.000	0.000
Leverage ratio	−0.278	−0.215	−0.281	−0.247
	0.849	0.883	0.848	0.866
1*{Operating income<0}*	2.743 **	2.758 **	2.778 **	2.729 **
	0.019	0.018	0.017	0.019
R&D/sales	0.953	0.996	0.952	0.974
	0.522	0.504	0.523	0.513
1*{Tax loss carryforward}*	−1.180 *	−1.200 **	−1.192 **	−1.181 *
	0.051	0.047	0.048	0.050
Firm age	0.124 ***	0.125 ***	0.124 ***	0.124 ***
	0.000	0.000	0.000	0.000
1*{founder CEO}*	−3.340 ***	−3.346 ***	−3.355 ***	−3.334 ***
	0.000	0.000	0.000	0.000
Institutional ownership	−2.268	−2.200	−2.327	−2.200
	0.182	0.196	0.171	0.196
1*{missing institutional ownership}*	−2.165 ***	−2.027 ***	−2.181 ***	−2.091 ***
	0.002	0.004	0.002	0.003
Board size	0.436 ***	0.444 ***	0.442 ***	0.436 ***
	0.005	0.005	0.005	0.005

Table 4

Continued

Panel B: Regression Results

Dependent variable:	Inside Debt							
constant	−19.459	***	−19.678	***	−19.684	***	−19.424	***
	0.001		0.001		0.001		0.001	
Industry & year FE	YES		YES		YES		YES	
N	2,116		2,116		2,116		2,116	
Adj. R^2	0.295		0.295		0.294		0.295	

Panel C: Interactions with ROA and Risk

Dependent variable:	Inside Debt							
1{CBD}	0.832							
	0.798							
*ROA*1{CBD)*	26.997	**						
	0.019							
*ROA volatility*1{CBD}*	−224.749	*						
	0.056							
1{ABD}			−19.476	***			−19.321	***
			0.001				0.001	
*ROA*1{ABD}*			293.873	***			294.138	***
			0.000				0.000	
*ROA volatility*1{ABD}*			−2,433.502	***			−2,436.349	***
			0.000				0.000	
1{NABD}					0.594		0.863	
					0.872		0.815	
*ROA*1{NABD}*					19.152	*	18.794	*
					0.059		0.065	
*ROA volatility*1{NABD}*					−154.006		−157.914	
					0.241		0.229	
Other controls & FE	YES		YES		YES		YES	
N	2,116		2,116		2,116		2,116	
Adj. R^2	0.300		0.313		0.296		0.316	

Note: Panel A of this table presents the summary statistics of the variables used in the regressions for analyzing debt-like compensation. Panel B presents the regression analysis of debt-like compensation. An ordinary least squares regression is used. The dependent variable is the sum of the pension value and deferred compensation in the ExecuComp data, divided by 1,000. Industries are defined using two-digit SIC codes. The independent variables and control variables are lagged by one year. The superscripts *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The *p*-values are given every second line of each row. Panel C presents the regression analysis of debt-like compensation, using interactions between CBD dummies and performance and risk. An ordinary least squares regression is used. The dependent variable is the sum of the pension value and deferred compensation in the ExecuComp data, divided by 1,000. Industries are defined using 2-digit SIC codes. the independent variables and control variables are lagged by one year. The superscripts *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The *p*-values, based on robust standard errors, are given every second line of each row. The variables are defined in Appendix A.

do not find an equivalent negative and significant coefficient for the interaction between 1*{NABD}* and firm risk. Note that the influence of banker directors upon CEO incentives is statistically more significant for debt-like compensation than for non–debt-like compensation. In addition, only the coefficient of the interaction between 1*{ABD}* and σ_{ROA} is significant, whereas the coefficient of the interaction between 1*{NABD}* and σ_{ROA} is insignificant. This contrast suggests that the conflicts of interest are disproportionately stronger for ABDs than for NABDs.

The sign of the ABD dummy is counterintuitive. We believe that it is attributable to a high correlation with the interaction terms (the piecewise correlation with *ROA**1*{ABD}* is 0.8984 and that with *ROA volatility**1*{ABD}* is 0.721). In addition, some of the coefficients have an extremely large magnitude, which we believe results from the very small proportion of ABDs and NABDs in our sample .

3.3. *Stock market event study of CBD appointments*

To determine whether shareholders perceive that CBDs add value, we run a stock market event study of CBD appointments and departures. If CBD's financial expertise is recognised by equity investors, the stock market would respond positively when a commercial banker is appointed an outside director of the firm. Equivalently, the price response would be negative when the CBD departs. On the other hand, if CBDs are perceived as a source of conflicts of interest, the stock market response to the appointment (departure) of CBDs would be negative (positive).

The BoardEx database provides the dates of the first announcements of the appointments and departures of directors. We identify 50 (19) announcements of banker directors' appointments (departures) that are not contaminated within [+1, −1] relative trading days by major corporate events, such as earnings announcements, M&A announcements, joint venture announcements, class action lawsuits and restatements (Masulis *et al.*, 2012). We classify appointment announcements into three different subgroups by manually reading the DEF14-A documents in the US Securities and Exchange Commission's EDGAR system.[7] The first subgroup is formed of cases in which a CBD is appointed to a company that did not have any CBDs the year before ($N = 70$). The second subgroup represents cases in which a CBD is appointed to a company that had at least one CBD the year before ($N = 8$). The reason for using these two groups is that the financial expertise or conflicts of interest associated with the appointed CBD would be more salient if the CBD was not preceded by any CBDs. Our last subsample contains cases that we could not classify into any of the two aforementioned groups due to lack of data in the electronic system ($N = 12$).

Similarly, we classify the departure events into three different subgroups. In the departure setting, financial expertise or conflicts of interest associated with the departing CBDs would be more salient if the CBD is not succeeded by a CBD. The first subgroup represents cases in which the firm has no CBDs after a CBD departure ($N = 10$). The second subgroup represents cases in which there is at least one CBD in the firm after a CBD's departure ($N = 8$). The last group contains cases that we could not classify into any of the two aforementioned groups due to lack of data in the electronic system ($N = 1$).

[7] We greatly thank the anonymous referee for suggesting this classification approach.

Table 5

Stock market event study of CBD appointments and departures

The table below presents the event study results about the appointment and departure announcements of CBDs. The expected returns are calculated based on the CAPM – equally weighted (EW) and value weighted (VW) – the Fama–French three-factor model (FF3F) and Carhart's four-factor model (FF4F). The EW (VW) CRSP index return is used as the market return for the EW CAPM (VW CAPM). The estimation window is [–280, −31] trading days from the announced date. The *t*-statistics are based on the method of Boehmer *et al.* (1991). Events confounded by major corporate events, such as M&As, earnings announcements, restatements and class action lawsuits by +1/–1 trading day of the announcement are excluded from the sample.

Panel A: Appointment Announcement Effects

Appointments		EW CAPM	VW CAPM	FF3F	FF4F
No CBD before	ACAR[0]	−0.42%	−0.38%	−0.33%	−0.40%
	t-Stat	−0.74	−0.67	−0.58	−0.69
	N	30	30	30	30
Had CBD before	ACAR[0]	−0.35%	−0.37%	−0.29%	−0.39%
	t-Stat	−2.37	−1.78	−1.88	−1.88
	N	8	8	8	8
No EDGAR data available	ACAR[0]	−0.46%	−0.41%	−0.42%	−0.41%
	t-Stat	−1.27	−1.17	−1.22	−1.18
	N	12	12	12	12

Panel B: Departure Announcement Effects

Departures		EW CAPM	VW CAPM	FF3F	FF4F
No CBD after	ACAR[0]	−0.75%	−0.88%	−0.93%	−0.85%
	t-Stat	−2.46	−2.65	−2.87	−2.59
	N	10	10	10	10
Have CBD after	ACAR[0]	0.09%	0.08%	0.01%	0.03%
	t-Stat	0.11	0.11	0.02	0.05
	N	8	8	8	8
No EDGAR data available	ACAR[0]	−1.82%	−1.44%	−1.79%	−1.31%
	t-Stat	N/A	N/A	N/A	N/A
	N	1	1	1	1

Expected returns are computed based on various asset pricing models, such as the capital asset pricing model (CAPM), the Fama–French three-factor model, and the Carhart four-factor model. The estimation window is the trading days [−280, −31] from the announced date. Average cumulative abnormal returns on trading day 0 are tabulated in Panels A (appointments) and B (departures) of Table 5. We find equity investors do not favour the appointment of CBDs when the company previously had CBDs (economic magnitude of −0.39% to −0.29%, *t*-stat 1.78 to 2.37). We believe this evidence is supportive of the *conflicts of interest hypothesis*, and the next section adds clarification through regression analysis. In Panel B, we find that the stock market response is negative and significant when there are no more CBDs on the board after the

CBDs' departure (economic magnitude of −0.93% to −0.75%, *t*-stat 2.46 to 2.87). This may suggest that the stock market perceives that the departure of the CBD without a replacement CBD as a loss of a financial expert.[8] However, this is a preliminary result and we will use multiple regressions of cumulative abnormal returns, CAR[0], in Table 6, to understand the price response more precisely.

Using CAR[0] based on the equal-weighted CRSP market index based on the CAPM, we run multiple regressions in Table 6. For the sample of CBD appointments (see Panel A in Table 6), we first run the regression for the whole sample (column (1)) and then run the regression for the sample in which there was no CBD before the appointment (column (2)). Last, we run the regression for the remaining observations (column (3)). Likewise, for the sample of CBD departures (see Panel B in Table 6), we first run the regression for the whole sample (column (1)), the regression for the sample in which there was no CBD after the departure (column (2)), and finally the regression for the rest of the observations (column (3)). Since CBD's financial expertise could manifest itself in the form of risk management, financial performance improvement, or debt capital management, we use the following regression model:

$$\begin{aligned} CAR[0] = {} & \beta_1 Idiosyncratc\, Risk_{t-1} + \beta_2 1yr\, stock\, performance_{t-1} + \beta_3 Size \\ & + \beta_4 leverage\, ratio_{t-1} + \beta_5 Cashflow_{t-1} + \epsilon. \end{aligned} \tag{9}$$

Panel A of Table 6 shows that a CBD appointment is especially welcome for firms with high idiosyncratic risk that did not previously have a CBD. This result could *suggest* that stock market investors perceive CBDs to be experts in risk management. Alternatively, it may be that firms with high idiosyncratic volatility have large magnitude abnormal returns in the first place because CAR[0] is the residual of the daily return net of expected return. Still, the coefficient's positive sign suggests that market perception is positive for the CBD when firm-specific risk is high. For the subsample of firms that previously had CBDs, a new CBD appointment is perceived as adding value when the firm's prior performance was poor and cash flow was negative. These results also support the *financial expertise hypothesis*. Panel B of Table 6 shows that the departure of CBDs is perceived as negative when prior stock performance or cash flow was good or when the prior leverage ratio was high. These results may imply that the CBD's financial expertise or human capital was valued highly by investors for companies that were performing well, had sufficient cash flow, or had a high leverage ratio. Consequently, such highly valued CBDs' departure announcement without any replacing CBDs provokes a negative stock market response, supporting the *financial expertise hypothesis*.

3.4. *Change of VEGA and leverage before and after CBD appointment/departure*

In the previous section, we find interesting responses of stock market investors around the time of a CBD's appointment and departure. Financial leverage is a key driver of firm financial risk (Hamada, 1972) and Chava and Purnanandam (2010) find that a firm's leverage ratio is significantly affected by the CEO's incentives. Therefore, we look at changes in the firm's leverage ratio and the change in VEGA of the CEO's compensation

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[8] The result is largely consistent when we use different event windows, such as the trading days [−1, 1] and [−1, 0].

Table 6

CAR regressions

The tables below present the regression analyses of the stock market response to CBD appointments and departures. The dependent variable is the abnormal return on the day of the announcement (CAR[0]), based on the CAPM, using the EW market index of the CRSP. The result is robust when we use a VW index return or the S&P 500 index return, or when we use a market model using the S&P 500 index return, the Fama–French three-factor model, or the Carhart four-factor model. The estimation window is [−280, −31] trading days before the event. The superscripts *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The *p*-values, based on heteroscedasticity-robust standard errors, are given every second line of each row. The variables are defined in Appendix A.

Panel A: Announcement of the Appointments of CBDs

	All (1)		No CBD before (2)		Others (3)	
Idiosyncratic risk	0.034	***	0.031	***	0.022	
	(0.00)		(0.01)		(0.64)	
1-yr stock performance	−0.007		−0.005		−0.011	***
	(0.36)		(0.78)		(0.00)	
Size: ln(total assets)	−0.001		−0.002		0.001	
	(0.72)		(0.66)		(0.59)	
Leverage ratio	0.011		0.011		0.007	
	(0.38)		(0.69)		(0.40)	
Cash flow	−0.012		−0.013		−0.008	*
	(0.19)		(0.32)		(0.07)	
Constant	0.001		0.013		−0.008	
	(0.92)		(0.72)		(0.43)	
N	48		28		20	
Adj. R^2	0.11		0.024		0.253	

Panel B: Announcement of the Separtures of CBDs

	All (1)		No CBD after (2)		Others (3)	
Idiosyncratic risk	−0.037		0.015		0.16	
	(0.63)		(0.60)		(0.54)	
1-yr stock performance	0.003		−0.016	**	0.113	
	(0.88)		(0.01)		(0.43)	
Size: ln(total assets)	0.005		0		0.018	
	(0.18)		(0.71)		(0.22)	
Leverage ratio	−0.022		−0.096	***	0.054	
	(0.70)		(0.00)		(0.84)	
Cash flow	−0.002		−0.016	***	−0.009	
	(0.78)		(0.00)		(0.90)	
Constant	−0.036		0.027		−0.19	
	(0.36)		(0.12)		(0.14)	
N	19		10		9	
Adj. R^2	−0.005		0.783		0.082	

around the CBD's appointment and departure time. For each leverage ratio and VEGA of CEO compensation, we compute the industry-relative variables by subtracting the industry median based on the two-digit SIC code. Then, with the final sample used in the stock market event study from the previous section, we compute the average industry-relative leverage ratio and that of VEGA as of the fiscal year-end before and after the CBD's appointment (departure) announcements, respectively. We focus on CBD appointments (departures) for firms that did not have any CBDs before (after) the appointment (departures).

Panel A of Table 7 shows that the industry-relative leverage ratio increases by 3.27% after the departure of CBDs. The result is statistically significant at the 8.5% level. On the other hand, we find that the industry-relative leverage ratio decreases surrounding the appointment of CBDs. One could question why we do not see a subsequent decrease in the industry-relative leverage ratio in Panel A after the appointment of CBDs. In response, we find a consistent decrease in the industry-relative leverage ratio (–2.14%) that has only a marginally significant p-value of 0.135. In addition, the magnitude of decrease is significantly larger than that of the increase of the industry-relative leverage ratio surrounding the departure of CBDs (p-value = 0.065). The contrast is shown in Panel A of Figure 1.

Panel B of Table 7 shows that the CEO compensation VEGA decreases significantly, by US$ 38.86, for each percentage change in volatility (p-value = 0.0945), which suggests that CBDs, once appointed, influence the CEO compensation structure so that

Table 7

Leverage ratio and VEGA surrounding CBD appointments and departures

Panel A below displays the industry-relative leverage ratio before and after the appointment and departure of CBDs and tests. We compute the industry-relative variable by subtracting the industry median based on the 2-digit SIC code. Panel B displays the industry-relative VEGA before and after the appointment and departure of CBDs and tests. We compute the industry-relative variable by subtracting the industry median based on the 2-digit SIC code.

Panel A: Industry-relative leverage ratio surrounding the appointments and departures of CBDs

	Before	After	Chg. Ind. Rel. Leverage	p-value of t-test	N
Appointment of CBD	0.0406	0.0225	−0.0214	0.1353	29
Departure of CBD	−0.0126	0.0202	0.0327	0.0852*	10
Difference			−0.0541		
p-value of t-test			0.0654*		

Panel B: Industry-relative CEO compensation VEGA surrounding the appointments and departures of CBDs

	Before	After	Chg. Ind. Rel. VEGA	p-value of t-test	N
Appointment of CBD	514.84	427.11	–38.86	0.0945*	29
Departure of CBD	323.25	399.42	76.18	0.1500	10
Difference			−115.04		
p-value of t-test			0.0378**		

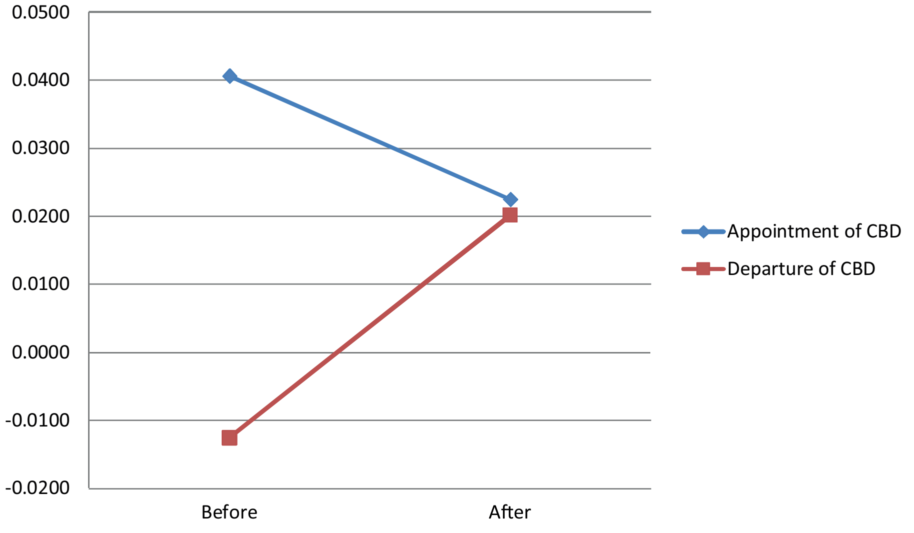

Fig. 1. Industry-relative leverage ratio surrounding the appointments and departures of CBDs

This figure displays the industry-relative leverage ratio before and after the appointment and departure of CBDs. We compute the industry-relative variable by subtracting the industry median based on the 2-digit SIC code.

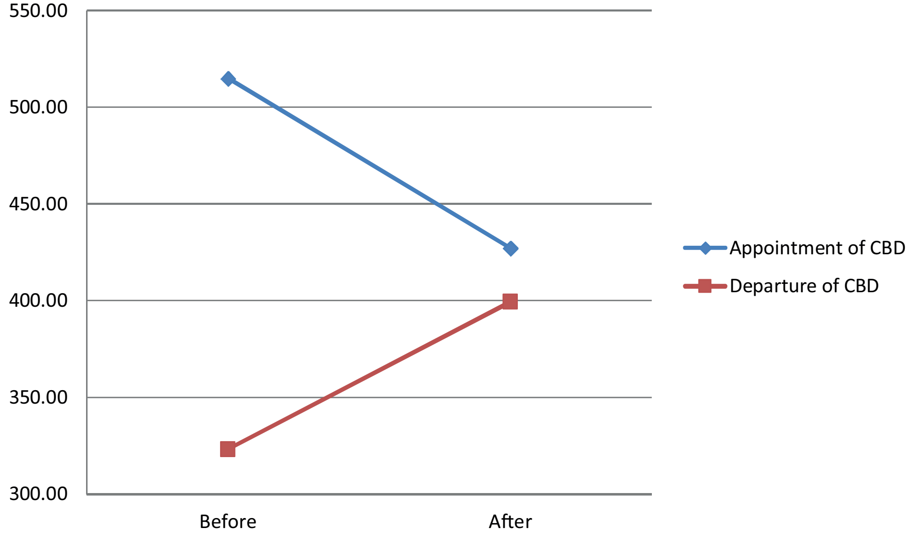

Fig. 2. Industry-relative VEGA of CEO compensation surrounding the appointments and departures of CBDs

This figure displays the industry-relative VEGA of CEO compensation before and after the appointment and departure of CBDs. We compute the industry-relative variable by subtracting the industry median based on the two-digit SIC code.

the compensation's sensitivity to volatility decreases significantly. We also find that the industry-relative VEGA increases after the departure of CBDs (p-value = 0.15). Again, we compare the difference between the changes of VEGA surrounding CBDs appointments and departures and find a statistically significant difference (p-value = 0.0378). Figure 1 and Figure 2 shows our results graphically.[9]

Overall, we find that CBDs, once appointed, work to reduce the company's financial risk. In addition, the company's leverage ratio and CEO pay–risk sensitivity (VEGA) rises after the CBDs leave. These results provide evidence consistent with the *conflicts of interest hypothesis*.

3.5. *Endogeneity concern and selection bias*

Since the assignment of CBDs is not random, endogeneity is a valid concern (Hermalin and Weisbach, 2003; Adams *et al.*, 2008). More specifically, it is possible that a board of directors that is focused on reducing the financial risk of the firm could be systematically hiring commercial bankers as outside directors. To the extent that the concern arises from omitted time-invariant or time-specific variables, we control for industry fixed effects and year fixed effects for all our regressions. If the source of bias is measurement error, we run regressions using the percentage of CBDs (and the percentages of ABDs and NABDs, similarly) and find similar results.

Our most serious concern is the self-selection of commercial bankers to sit on the boards of non-financial companies due to *their* legal risk of equitable subordination and lender liability. Kroszner and Strahan (2001) find that bankers sit on the boards of companies with a medium risk level to avoid bankruptcy. In addition, the authors find that bankers sit on the boards of companies with a large size and low information asymmetry, a high leverage ratio, and a low short-term to long-term debt ratio.

We control for selection bias using Heckman's (1979) selection model. Specifically, we first run a probit regression for predicting CBDs on the board using firm characteristics. Then we obtain the inverse Mills ratio (*IMR*) for the probit model. Last, we use the *IMR* in the second-stage regressions to control for selection bias.

For the first-stage selection regression, we borrow from the literature (Booth and Deli, 1999; Kroszner and Strahan, 2001; Byrd and Mizruchi, 2005; Santos and Rumble, 2006; Sisli-Ciamarra, 2012; Hilscher and Sisli-Ciamarra, 2013) and use the following determinants of the presence of CBDs: (1) the short-term debt to long-term debt ratio, (2) firm size, (3) the leverage ratio, (4) cash to total assets, (5) stock return volatility, (6) the market to book, (7) R&D expense divided by total assets, (8) the default probability measured by KMV's Expected Default Frequency (EDF),[10] (9) the S&P credit rating, (10) a dummy variable that equals one if the firm does not have a credit rating and zero otherwise, (11) the ratio of insiders on the board, and (12) board size. All

[9] We also performed a similar study for PPS, because it is an important component of compensation. However, we do not find significant results (untabulated).

[10] We obtained the KMV EDF data of S&P 1500 firms over the sample period from Moody's KMV to measure firm credit risk. Moody's KMV EDF measures the actual default probabilities of a company using Merton's (1974) structural model of default, where the estimates range from the safest credit for 0.01% to imminent default at 35%.

the explanatory variables in the first-stage equation are averaged over the previous 3 years because the board composition is typically staggered and changes slowly over time. Here we argue that the short-term debt to long-term debt ratio works as an instrumental variable. Even though it is correlated with the assignment of CBDs, it is not related to CEO incentives, based on the findings of Chava and Purnanandam (2010). These authors find that the debt maturity structure is not correlated with a CEO compensation contract.

Panel A of Table 8 shows the result of the first-stage probit regression. We find that the probability of having a CBD is negatively correlated with the short-term debt to long-term debt ratio, which reaffirms that bankers are more likely to sit on the board of a company that is less likely to suffer from a short-term debt burden. We also find that the likelihood of having a CBD is positively correlated with firm size and board size. The results are largely consistent with the literature.

In Panel B of Table 8, we run the second-stage regression based on the SUR of the *PPS* and *VEGA* in Table 3. The results are consistent, in that *VEGA* is reduced when an ABD is present in the year before. We find that controlling for selection bias improves the statistical significance of the coefficient from 5.3% to 4.4%. In Panel C, we run the second-stage regression of debt-like compensation as in Table 4. The previous results are robust.

3.6. *Compensation committee membership of the CBD*

What is the empirical channel through which CBD influence affects CEO compensation? In this section, we examine the compensation committee of the board because it is the organisational body that designs the CEO's compensation contracts. We hypothesise that the effect of a CBD on the convexity of CEO compensation would be stronger when the CBD is on the committee or when the CBD is the committee chair. For most of the firm–years in our sample, BoardEx classifies board members by committee membership for any given fiscal year. Furthermore, it provides information about whether the director is the chair of the committee. Based on the compensation committee information subset, we find that 6.54% of firm–years have at least one CBD (Panel A of Table 9). However, not all CBDs are on the compensation committee. In our committee subsample, CBDs are not on the compensation committee for 3.09% of firm–years (about half of the time with CBDs). We find that for 2.43% of firm–years, all the CBDs are involved as compensation committee non-chair members. For 1.03% of firm–years, we find that one of the CBDs is the chair of the compensation committee. Therefore, we modify the set of explanatory variables in our original empirical model (1) and (2) as follows:

$$\begin{aligned} PPS_t\ or\ VEGA_t = {} & \beta_1 1\{CBD\,Mem\}_{t-1} + \beta_2 1\{CBD\,Chair\}_{t-1} \\ & + \beta_3 1\{CBD\,NoMem\}_{t-1} + controls_{t-1} + \epsilon \end{aligned} \tag{10}$$

where $1\{CBDMem\}_{t-1}$ is a dummy variable that equals one if the CBDs in the firm are involved in the compensation committee only as members, $1\{CBDChair\}_{t-1}$ is a dummy variable that equals one if any of the CBDs in the firm works as the chair of the compensation committee, and $1\{CBDNoMem\}_{t-1}$ is a dummy variable that equals one if none of the CBDs in the firm are on the compensation committee. In the second set of equations, we run equivalent regressions by constructing dummy variables for ABDs and

Table 8

Selection bias issue: Determinants of having banker directors

For all the panels, industry is defined using two-digit SIC codes. The independent variables and control variables are lagged by one year. The superscripts *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The variables are defined in Appendix A.

Panel A: First-stage selection model

This table shows the first stage selection probit regression to predict the possession of CBDs on the board. The dependent variable is a dummy variable that equals one if the company has a CBD. Among the control variables, those with a prime (′) indicate that the variables are trailing the 3-year moving average. The *p*-values, based on industry clustering using one-digit SIC code standard errors, are reported every second line. The variables are defined in Appendix A.

Dependent variable:	1{*CBD*}	
STDebt/LTDebt	−0.209	***
	0.000	
Size: ln(total assets)′	0.13	***
	0.000	
Leverage ratio′	0.392	
	0.143	
Cash/total assets′	−0.738	
	0.441	
Stock return volatility′	−5.652	
	0.154	
M/B′	0.004	
	0.740	
R&D/total assets′	−1.809	
	0.487	
KMV EDF′	−0.033	
	0.167	
credit rating′	0.008	
	0.677	
1*{missed credit rating}′*	0.332	
	0.296	
Ratio of insiders′	−0.261	
	0.239	
board size′	0.105	***
	0.000	
constant	−7.625	***
	0.000	
Industry & year FE	YES	
N	5,728	
Pseudo-R^2	0.169	

Panel B: PPS and VEGA: SUR approach, controlling for selection bias

The table below presents the second stage regression results about PPS and VEGA of CEO compensation, controlling for the selection bias. The PPS is measured following Core and Guay (2002) and VEGA is measured following Coles *et al.* (2006). The *p*-values, based on heteroscedasticity-robust standard errors, are given every second line. The variables are defined in Appendix A.

Regression Model	(1)			(2)		
Dependent variable:	ln(*PPS*)	ln(*VEGA*)		ln(*PPS*)	ln(*VEGA*)	
1*{CBD}*	0.01	−0.045				
	0.826	0.348				
1*{ABD}*				−0.077	−0.212	**
				0.419	0.044	
1*{NABD}*				0.029	−0.008	
				0.544	0.875	
IMR	−0.003	−0.074	***	−0.003	−0.074	***
	0.875	0.000		0.876	0.000	
Other controls & FE	YES	YES		YES	YES	
N	6,945	6,945		6,945	6,945	
R^2	0.5471	0.5295		0.5471	0.5297	
χ^2	1,527.770			1,526.993		

Panel C: Debt-like compensation regression, controlling for selection bias
The table below presents the second stage regression results about debt-like compensation, controlling for the selection bias. The dependent variable is the sum of the pension value and deferred compensation in the ExecuComp data, divided by 1,000. The *p*-values, based on robust standard errors, are given every second line. The variables are defined in Appendix A.

Dependent variable:	Inside Debt							
1*{CBD}*	0.877							
	0.787							
*ROA**1*{CBD)*	26.850	**						
	0.019							
*ROA volatility**1*{CBD}*	–224.821	*						
	0.056							
1*{ABD}*			−19.560	***			−19.401	***
			0.001				0.001	
*ROA**1*{ABD}*			293.816	***			294.084	***
			0.000				0.000	
*ROA volatility**1*{ABD}*			−2,431.013	***			−2,434.044	***
			0.000				0.000	
1*{NABD}*					0.692		0.954	
					0.851		0.795	
*ROA**1*{NABD}*					18.939	*	18.593	*
					0.061		0.067	
*ROA volatility**1*{NABD}*					−155.496		−159.295	
					0.236		0.224	

Table 8

Continued

Dependent variable:	Inside Debt							
IMR	−0.504	**	−0.483	**	−0.512	**	−0.492	**
	0.017		0.020		0.016		0.020	
Other controls & FE	YES		YES		YES		YES	
N	2,116		2,116		2,116		2,116	
Adj. R^2	0.301		0.314		0.296		0.316	

NABDs being a member or the chair of the compensation committee, respectively. Control variables include the *IMR* from Table 8, Panel A, and the same controls used in Table 3 or Table 8, Panel B. Likewise, in Table 3 or Table 8, Panel B, the regression model (10) is analysed under the SUR framework.

The result in Panel B of Table 9 shows that ABDs reduce the VEGA of CEO compensation significantly with a *p*-value of near zero when the CBD is the chair of the compensation committee. The coefficient is −1.283, which suggests that nearly three-quarters of the VEGA value (US$ 59,195) disappears when the ABD serves as the chair of the compensation committee. Instead, we find that PPS significantly increases from the median PPS of US$ 591,983 by US$ 716,309 when an ABD serves as the chair of compensation committee, which shows a trade-off between the *conflicts of interest* and *financial expertise* hypotheses.

Lastly, we also replicate Panel C of Table 4 to check the impact of CBDs on CEOs' debt-like compensation when CBDs are a member of the compensation committee:

$$\begin{aligned} Inside\,debt_t = {} & \beta_1 1\{CBD\,Mem\}_{t-1} + \beta_2 1\{CBD\,Mem\}_{t-1} * ROA_{t-1} \\ & + \beta_3 1\{CBD\,Mem\}_{t-1} * \sigma_{ROA_{t-1}} + \beta_4 1\{CBD\,Chair\}_{t-1} \\ & + \beta_5 1\{CBD\,Chair\}_{t-1} * ROA_{t-1} \\ & + \beta_6 1\{CBD\,Chair\}_{t-1} * \sigma_{ROA_{t-1}} + \beta_7 1\{CBD\,NoMem\}_{t-1} \\ & + \beta_8 1\{CBD\,NoMem\}_{t-1} * ROA_{t-1} \\ & + \beta_9 1\{CBD\,NoMem\}_{t-1} * \sigma_{ROA_{t-1}} + controls_{t-1} + \epsilon. \end{aligned} \tag{11}$$

The control variables include the IMR from Table 8, Panel A, and the same controls are used as in Table 4, Panel C. Our prediction based on the *financial expertise hypothesis* is that $\beta_2, \beta_5 > 0$. In addition, our prediction based on the *conflicts of interest hypothesis* is that $\beta_3, \beta_6 < 0$.

We find that the CBDs make debt-like compensation more sensitive to firm performance if they are members of the compensation committee. However, we also find that CBDs serving as a member of the compensation committee are negatively associated with inside debt, while CBDs not serving as a member are positively associated with inside debt. Moreover, the negative correlation between risk and inside debt is more pronounced when the CBD is not a member of the compensation committee. Because of this slightly puzzling result, we further investigate by splitting the CBD dummies into ABD dummies and NABD dummies and by interacting both sets of dummies with performance and risk, respectively.

Table 9

Compensation committee membership/chair position of CBDs

Panel A: Compensation committee involvement (in the regression subsample)

This table shows the breakdown of the firm-years by classifying whether the CBD serves as a compensation committee member or as the chair of the committee.

CBD is the chair of compensation committee	1.03%
CBD is only a member of compensation committee	2.43%
CBD is not in compensation committee	3.09%
Total firm–years that has CBDs in the regressions below	6.54%

Panel B: PPS/VEGA regressions, controlling for selection bias

This table presents the regression analysis about PPS and VEGA using the detailed information about whether the CBD is serving as the chair of the compensation committee or just a member of the compensation committee. The PPS is measured following Core and Guay (2002) and VEGA is measured following Coles *et al.* (2006). Industries are defined using 2-digit SIC codes. The independent variables and control variables are lagged by one year. The superscripts *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The *p*-values, based on heteroscedasticity-robust standard errors, are given every second line. The control variables are defined in Appendix A.

Regression Model:	(1)			(2)			
Dependent Variable:	ln(*PPS*)	ln(*VEGA*)		ln(*PPS*)		ln(*VEGA*)	
1*{CBD Mem}*	0.010	0.012					
	0.886	0.884					
1*{CBD Chair}*	0.207	0.012					
	0.103	0.932					
1*{CBD No Mem}*	−0.066	−0.105					
	0.274	0.113					
1*{ABD Mem}*				−0.174		0.265	
				0.360		0.209	
1*{ABD Chair}*				0.793	**	−1.283	***
				0.012		0.000	
1*{ACBD No Mem}*				−0.084		−0.208	
				0.507		0.140	
1*{NABD Mem}*				0.024		0.028	
				0.768		0.757	
1*{NABD Chair}*				0.175		0.338	**
				0.227		0.036	
1*{NABD No Mem}*				−0.060		−0.117	
				0.353		0.102	
IMR	−0.003	−0.075	***	−0.003		−0.074	***
	0.872	0.000		0.867		0.000	
Other controls & FE	YES	YES		YES		YES	
N	6,899	6,899		6,899		6,899	
R^2	0.5476	0.5275		0.5480		0.5290	
χ^2	1,520.615			1,533.450			

Panel C: Inside debt regressions, controlling for selection bias
This table presents the regression analysis about debt-like compensation (i.e., inside debt) using the detailed information about whether the CBD is serving as the chair of the compensation committee or just a member of the compensation committee. Industries are defined using 2-digit SIC codes. The independent variables and control variables are lagged by one year. The superscripts *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The *p*-values, based on heteroscedasticity-robust standard errors, are given every second line. The control variables are defined in Appendix A.

Dependent variable:	Inside Debt			
1*{CBD Mem}*	−8.356	*		
	0.051			
*ROA**1*{CBD Mem}*	58.510	***		
	0.000			
*ROA volatility**1*{CBD Mem}*	147.965			
	0.442			
1*{CBD Chair}*	−1.508			
	0.772			
*ROA**1*{CBD Chair}*	1.936			
	0.936			
*ROA volatility**1*{CBD Chair}*	−40.675			
	0.797			
1*{CBD No Mem}*	8.041	**		
	0.015			
*ROA**1*{CBD No Mem}*	17.791			
	0.219			
*ROA volatility**1*{CBD No Mem}*	−510.688	***		
	0.001			
1*{ABD Mem}*			−102.967	***
			0.000	
*ROA**1*{ABD Mem}*			1,203.930	***
			0.000	
*ROA volatility**1*{ABD Mem}*			−10,900.000	***
			0.000	
1*{ABD Chair}*			−17.186	
			0.302	
*ROA**1*{ABD Chair}*			−13.729	
			0.920	
*ROA volatility**1*{ABD Chair}*			554.135	
			0.698	
1*{ABD No Mem}*			−4.930	
			0.594	
*ROA**1*{ABD No Mem}*			308.095	***
			0.000	
*ROA volatility**1*{ABD No Mem}*			−4,485.309	***
			0.000	
1*{NABD Mem}*			−6.102	

Table 9
Continued

Dependent variable:	Inside Debt			
			0.227	
*ROA*1{NABD Mem}*			33.598	*
			0.052	
*ROA volatility*1{NABD Mem}*			73.842	
			0.731	
1{NABD Chair}			0.503	
			0.948	
*ROA*1{NABD Chair}*			−2.107	
			0.954	
*ROA volatility*1{NABD Chair}*			−53.184	
			0.799	
1{NABD No Mem}			5.626	
			0.110	
*ROA*1{NABD No Mem}*			17.899	
			0.221	
*ROA volatility*1{NABD No Mem}*			−370.962	**
			0.015	
IMR	−0.549	*	−0.498	
	0.080		0.109	
Other controls & FE	YES		YES	
N	2,103		2,103	
Adj. R^2	0.305		0.324	

In the second column of Panel C of Table 9, we find that ABDs make debt-like compensation more sensitive to firm performance and less sensitive to firm risk. We also find such an increase in performance sensitivity and a decrease in risk sensitivity when ABDs are not members of the compensation committee. However, the economic magnitude is about three to four times greater when ABDs are committee members than when they are not. We hardly find any significant results of equivalent economic magnitude for the set of variables using the NABD dummies. Our results in this section strongly support the *conflicts of interest hypothesis*, but they also support the *financial expertise hypothesis*.

4. Summary and Conclusion

There has been an ongoing debate about whether having a banker director would induce conflicts of interest or provide financial expertise by looking at various financial policies: for example, capital structure (Sisli-Ciamarra, 2012), M&As (Hilscher and Sisli-Ciamarra, 2013), and investments (Güner *et al.*, 2008). Given that CEOs, who are subject to economic incentives, make key financial decisions, our contribution to the literature is significant. We empirically find that CEO incentives are significantly affected by CBDs' conflicts of interest, particularly if they are affiliated. Specifically, when ABDs are members of the compensation committee or its chair, they seem to reduce the convexity of CEO compensation (VEGA). Moreover, the influence of CBDs upon CEO incentives seems to manifest itself through debt-like compensation as well. To the best of our knowledge, this is the first paper to document the impact of CBDs on debt-like compensation as increasing sensitivity to performance and decreasing sensitivity to risk.

We recognise the limitations of our study as well. The number of cases in which CBDs are present is clearly declining in the US due to the Sarbanes–Oxley Act, which encourages firms to avoid conflicts of interest arising from the monitoring board of directors. Still, our finding has important implications for the international audience because CBDs are much more prevalent in bank-based economic systems, such as Europe and Japan (Kroszner and Strahan, 2001; Levine, 2002). Lastly, it should be noted again that both the *conflicts of interest hypothesis* and the *financial expertise hypothesis* are not mutually exclusive but, rather, simultaneously supported in our study. In the future, it would be interesting to study the effects of CBDs upon other kinds of risk, such as stock price crash risk (Kim *et al.*, 2011), because of the risk-reducing influence of the directors.

Appendix A: Variable definitions (in alphabetical order)

1{*ABD*}	Dummy variable that is one if the firm has an affiliated CBD on the board and zero otherwise.
1{*ABD Chair*}	Dummy variable that is one if the firm's ABD is the chair of the compensation committee and zero otherwise.
1{*ABD Mem*}	Dummy variable that is one if the firm's ABD is only a member of the compensation committee and zero otherwise.
1{*ABD No Mem*}	Dummy variable that is one if the firm's ABD does not belong to the compensation committee and zero otherwise.
1{*CBD*}	Dummy variable that is one if the firm has a CBD on the board and zero otherwise.
1{*CBD Chair*}	Dummy variable that is one if the firm's CBD is the chair of the compensation committee and zero otherwise.
1{*CBD Mem*}	Dummy variable that is one if the firm's CBD is only a member of the compensation committee and zero otherwise.
1{CBD No Mem}	Dummy variable that is one if the firm's CBD does not belong to the compensation committee and zero otherwise.
1{*CEO retirement age*}	Dummy variable, where the value equals one when CEO age is between 63 and 65 years old and zero otherwise.
1{*Founder CEO*}	Dummy variable that is one if the CEO is a founder of the company and zero otherwise. This variable was constructed by manually collecting information about the CEO using various sources, including Forbes, Fortune, Factiva, Google and company websites. We tracked down the history of the company, identified the names of the founders, and identified a CEO as the founder if the CEO's full name was the same as one of the founders.
1{*IBD*}	Dummy variable that is one if the firm has an investment banker director on the board and zero otherwise.
1{*missing credit rating*}	Dummy variable that is one if the credit rating is missing and zero otherwise.
1{*missing institutional ownership*}	Dummy variable that is one if the institutional ownership variable is missing and zero otherwise.

1{*NABD Chair*}	Dummy variable that is one if the firm's NABD is the chair of the compensation committee and zero otherwise.
1{*NABD Mem*}	Dummy variable that is one if the firm's NABD is only a member of the compensation committee and zero otherwise.
1{*NABD No Mem*}	Dummy variable that is one if the firm's NABD does not belong to the compensation committee and zero otherwise.
1{*NABD*}	Dummy variable that is one if the firm has a non-affiliated CBD on the board and zero otherwise.
1{*Operating Income*<0}	Dummy variable that is one if the operating income of the company is negative in the fiscal year.
1{*Outsider CEO*}	Dummy variable that is one if the CEO was an outsider when appointed. We follow Parrino (1997) in defining outsiders: A CEO is an outsider if that person was not employed by the same company one year before the announcement of the CEO appointment.
1{*Tax Loss Carry Forward*}	Dummy variable that is one if the company had negative income before taxes up to 3 years before the fiscal year.
1-year stock perf.	Annualised monthly stock returns.
Board size	Number of board members of the company.
CAPEX/total assets	Capital expenditure (CAPX) divided by total assets (AT), winsorised at the 1% and 99% levels.
Cash flow	Net income plus depreciation divided by lagged property, plant and equipment.
Cash/total assets	Cash divided by total assets at the end of the fiscal year.
CEO tenure	Number of years the person has been in the position of CEO at the same company. If missing, we manually collected the information using Google, Forbes and Factiva.
Credit rating	Credit rating by S&P, transformed into numbers, with a better credit quality associated with a higher number. We assign 22 to a AAA rating and zero to a CCC rating.
Firm age	Firm age is measured as the number of years since the company's data were available in Compustat.
Idiosyncratic risk	Idiosyncratic risk is the root mean squared error of the market model using monthly S&P 500 index returns over the past 3 years.
Indep.dir.%	Proportion of outside directors out of the total number of board members.
Inside debt	Inside debt is the sum of the CEO's pension compensation and deferred compensation.
Institutional ownership	Aggregate ownership by institutional investors captured in the Thomson 13F filing database.
KMV EDF	Expected Default Frequency estimated by Moody's KMV.
leverage ratio	Total interest-bearing debt divided by total assets, winsorised at the 1% and 99% levels.
ln(*firm age*)	Natural log of firm age.
M/B	Market value of equity, winsorised at the 1% and 99% levels.
PPS	CEO's pay–performance sensitivity, measured following Core and Guay (2002). It measures the dollar value change of a CEO's total compensation when the stock return of the company changes by one percentage point.

R&D/Sales	R&D expense (XRD) divided by total sales (REVT), winsorised at 1% and 99% level.
R&D/total assets	R&D expense (XRD) divided by total assets (AT), winsorised at 1% and 99% level.
Ratio of insiders'	The proportion of insiders out of the total number of board members.
ROA	Operating income before depreciation divided by total assets, from annual Compustat data, winsorised at the 1% and 99% levels.
ROA volatility	Standard deviation of past 5 years of quarterly return on assets, winsorised at the 1% and 99% levels.
Size: ln(*total assets*)	Natural log of total assets, where total assets is the AT variable in the Compustat data .
STDebt/LTDebt	Short-term debt divided by long-term debt.
Stock return volatility	Standard deviation of daily stock returns over the fiscal year.
VEGA	CEO's pay–risk sensitivity measured following Coles *et al.* (2006). It measures the dollar value change of a CEO's total compensation when the volatility of the stock return changes by one percentage point.

Appendix B. Link between BoardEx and Compustat databases and identifying executives

The problem with BoardEx data is that less than 7,185 firm names out of 601,442 organisation names are matched with the Compustat database on a one-to-one basis through the Central Index Key (CIK) number. BoardEx is constructed based on the spelling of the names of the organisations (companies) where each person claims to have worked in their resumé. However, the persons may spell out the same company in a different manner. For example, one may claim to have worked for 'Bank of America N.A.', while another may claim to have worked for 'Bank of America NT&SA' even though they mean the same organisation. BoardEx assigns different organisation IDs for these two, and only one is linked to Compustat data. Likewise, one slightly different name spelling of the same company would fail to have a matching CIK.

Since BoardEx is only partially merged with Compustat, we ran exhaustive fuzzy text/string matches to find firm identification numbers from all the databases to which our institution subscribes. We ran multiple rounds of string matching using the following databases in a recursive manner in the sense that whatever is left over from the current matching round with a certain database is used again in the next matching round with the next database. These databases include Compustat North America, Compustat Global, CRSP, Dealscan, Bank Regulatory Database by Chicago FED (find Bank Holding Company Names), Jay Ritter's IPO Adviser ranking table, SDC Platinum (M&A/IPO adviser names). We use the 'compged' function of SAS.

We obtain identification numbers for 40,434 organisation names in BoardEx from any of the databases listed above, and we were then able to identify whether the company was a commercial bank or investment bank. For these 40,434 matched names, we manually checked whether the two company names (one from BoardEx and the other from one of the listed databases) really are the same business identity using Businessweek and Hoovers databases and checking their websites. In checking whether the companies really are a bank holding company, we use the FDIC's Bankfind database on FDIC's website. After this procedure, 39,370 of the BoardEx company names are matched with the ID numbers of one of the databases above.[11] Focusing on the Global Company Key or GVKEYs, 27,035 unique GVKEYs in the Compustat universe are matched with 33,030 firm names in BoardEx, which is 4.6 times the number of initial matches through CIK.

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[11] This number means that 6.55% different organisation names in BoardEx are linked to standard databases. The reason for such a small matching result is that most of the organisations are non-profit organisations such as universities, clubs, government organisations, international organisations, etc.

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