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Does managerial pay disparity influence BHC default risk?☆

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Abstract

This study investigates the relationship between managerial pay disparity (i.e., pay inequality of the CEO with other top executives and other employees) and default risk (measured using an innovative market-based credit default swap spread). The research relies on panel data for 1992 to 2018 from 198 U.S. bank holding companies (BHCs). We find that managerial pay disparity is negatively related to BHC default risk, suggesting greater pay disparity does not necessarily contribute to excessive risk-taking and instability in the banking sector. However, additional analysis reveals that managerial pay disparity is associated with higher default risk among BHCs with assets of less than USD 50 billion. We also find that greater managerial pay disparity is detrimental to BHC stability in the presence of weaker board monitoring (in the form of less gender-diverse boards and higher board co-option). Overall, these findings suggest that BHC size and board monitoring mechanisms are important factors in understanding the influence of managerial pay disparity on BHC stability.

JEL classification: G01, G20, G21, G30, G34

Keywords: Executive compensation; managerial pay disparity; Bank risk-taking; Default risk; Credit default swap spread; Co-opted board; Women on board.

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Abstract

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1. Introduction

Empirical studies examining managerial pay disparity largely focus on the disparity between the CEO and other top executives, with very few studies exploring the implications of the pay disparity between the CEO and the average employee in addition to other top executives (see, e.g., Faleye et al., 2013; Rouen, 2020). In 2018, the average compensation of CEOs of S&P 500 companies was USD 14.5 million, and the average S&P 500 company CEO-to-worker pay ratio was 287 to 1.[1] In the wake of the inclusion of a provision in the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) requiring companies to disclose the CEO to median employee pay ratio, it is timely and important to assess whether this disclosure provides useful information to stakeholders. For instance, a higher pay ratio may indicate that executives reap the lion's share of compensation and value promotion within the firm. In contrast, a lower pay ratio could indicate that companies value the creation of high-wage jobs and seek to invest in their employees for the company's long-term health (Rouen, 2020).[2]

Previous literature argues that the complex nature and large size of financial institutions provide access to subsidies and incentivize becoming even larger and more complex (see, e.g., Ueda & Weder di Mauro, 2013; Dávila & Walther, 2020). Brewer and Jagtiani (2013) argue that it is desirable for banks to become larger in order to obtain subsidies arising from "too-big-to-fail" (TBTF) status. With this view, large financial institutions should have more incentives in place, especially for the top management, to adopt policies that facilitate the achievement of TBTF status. Further, among several explanations offered for the collapse of the stock market

[1] See AFL-CIO executive Paywatch (https://aflcio.org/paywatch).
[2] This subject was also prominent during the testimony of seven CEOs of U.S. financial institutions before the House Financial Services Committee in April 2019.

capitalization of the banking industry during the global financial crisis (GFC), one is the compensation level of top executives in large financial institutions.[3] Hence, the Dodd-Frank Act and the Securities and Exchange Commission (SEC) rule to disclose the ratio of CEO compensation to the median total annual compensation of all other employees (to infer inequality in pay) effective as of January 1, 2017, can be attributed to public outcry.[4] The Act also places enhanced supervision on banks and bank holding companies (BHCs) with assets greater than USD 50 billion. Previous studies argue that excessive risk-taking in the financial industry—prompted by managerial incentives generated by executive compensation in addition to the TBTF phenomenon—contributed to the recent global financial crisis (see Bebchuk & Spamann, 2010; Bebchuk, Cohen & Spamann, 2010; Fahlenbrach & Stulz, 2011; Bolton, Mehran & Shapiro, 2015; Guo, Jala & Khaksari, 2015).[5] Accordingly, we investigate whether the spread of CEO pay relative to the pay of other top executives and average employee salaries is associated with the default risk of BHCs.

Two competing views predict the relationship between CEO pay disparity and risk-taking. One is that greater pay disparity encourages tournament incentives among top management teams, where executives compete to become the next CEO, thus increasing the overall risk in the firm

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[3] *"Compensation practices at large financial institutions are one factor among many that contributed to the financial crisis that began in 2007. High short-term profits led to generous bonus payments to employees without adequate regard to the longer-term risks they imposed on their firms. These perverse incentives amplified the excessive risk-taking that severely threatened the global financial system and left firms with fewer resources to absorb losses as risks materialized. The lack of attention to risk also contributed to the large, in some cases extreme absolute level of compensation in the industry"* (Financial Stability Forum, 2009).

[4] Rule 9-04 of Regulation S-X requires bank holding companies to report salaries and benefits of employees in the income statement if this amount is greater than one percent of the aggregate of total interest income and other income. Further, regulatory reporting requirements on Form Y9-C also require banks to report the total amount of employee salaries and benefits.

[5] Several other studies relate managerial compensation to the firm-risk and choice of risky projects (see Stulz, 1984; Smith & Stulz, 1985; Core & Guay, 1999; Guay, 1999; Coles, Daniel, & Naveen, 2006). For a detailed review of literature on executive compensation, and risk-taking in banks, see de Haan and Vlahu (2016).

(Kini and Williams, 2012). The other is that greater pay disparity is attributed to powerful CEOs who may adopt more calculative and conservative corporate policies (Bebchuk, Cremers & Peyer, 2011) to protect their undiversified human capital and wealth invested in the firm, thus decreasing the overall risk in the firm. Empirical studies also report contradictory findings on CEO pay disparity and risk-taking. For instance, using financial firms (SIC6000–6999) from the pre-Dodd-Frank period (i.e., 1994–2009), Kini and Williams (2012) document a positive relationship between CEO pay inequality relative to the total compensation of median Vice President levels and risk-taking measured by cash flow volatility and return volatility. In contrast, Bai and Elyasiani (2013) use a sample of 132 BHCs from the pre-Dodd-Frank period (i.e., 1992–2008) and document that CEO pay inequality relative to other top executives is negatively associated with bank risk-taking measured using accounting-based data (i.e., non-interest income ratio, volatility of return on assets, and z-score). Given these contradictory evidences, the role of managerial pay disparity in default risk for BHCs remains an empirical question.

Using an unbalanced panel dataset of 198 U.S. BHCs spanning the period 1992 to 2018, we find that the managerial pay disparity in a particular year is negatively and significantly associated with default risk in the following year. These results are robust to alternative proxies of managerial pay disparity, default risk, and endogeneity bias using bank fixed effects, lagged independent variables, and propensity score matching estimation techniques. The findings are consistent with those of Bai and Elyasian (2013) in indicating that when the proportion of CEO pay rises relative to other top executives and employees, CEOs become more powerful and implement less risky policies to protect their undiversified human capital and financial wealth, resulting in greater stability among BHCs. We assess the validity of this argument by constructing the CEO power index based on three parameters (CEO duality, tenure, and shareholdings) and find that CEO power is associated with less default risk in BHCs. We also show that BHCs with greater CEO pay disparity engage in traditional and less risky activities (i.e., deposits and real estate loans as a proportion of total assets) leading to lower default risk.

Additional analysis reveals that managerial pay disparity is associated with lower default risk among TBTF BHCs (i.e., firms with assets greater than USD 50 billion). Interestingly, we find contrasting results among BHCs with assets of less than USD 50 billion, where managerial pay disparity is associated with higher default risk. Consistent with Kini and Williams (2012), these results suggest that in small BHCs, higher CEO pay incentivizes other top executives and employees to accept more risk, thereby improving the chance of achieving TBTF status. The rationale is that TBTF BHCs have access to a greater safety net. Finally, we investigate the role of two important monitoring mechanisms – co-opted and women directors - in the association between managerial pay disparity and default risk of BHCs. Prior literature documents that CEOs are more accountable for poor performance in firms with strict monitoring (Adams & Ferreira, 2009; Coles et al., 2014). Therefore, we argue that in the absence of strict monitoring, the negative effect of managerial pay disparity on default risk should be weakened or reversed. Accordingly, we find that the relation between managerial pay disparity and default risk becomes positive for firms with a higher level of board co-option and less gender diversity on the board. Overall, our additional findings suggest that BHC size and monitoring mechanisms are important factors in understanding the influence of managerial pay disparity on BHC stability.

Our study contributes to and extends the prior literature in several important ways. While previous studies focus on the risk equity holders are exposed to (Bebchuk et al., 2011; Kini & Williams, 2012; Bai & Elyasian, 2013; Vo & Canil, 2019), we extend this stream of literature by empirically investigating the effect of managerial pay disparity on the risk debtholders face. We measure that risk with an innovative market-based credit default swap spread (CDS) and Merton's *distance to default* (DD) over the period from 1992 to 2018, spanning the post-Dodd-Frank period. Moreover, apart from the commonly used measure of pay inequality between the CEO and other top executives (i.e., CEO pay slice) introduced by Bebchuk et al. (2011), this is the first study to relate pay inequality between the CEO and other employees with default risk in the banking industry. We also investigate whether managerial pay disparity and default risk differ between TBTF BHCs and small bank holding companies. Following Erel, Nadauld, and Stulz (2014) and Minton, Stulz, and Taboada (2019), we define TBTF BHCs as having assets greater than USD 50 billion (which are the largest BHCs according to the Dodd-Frank Act). Lastly, we investigate the moderating effect of board monitoring on the relationship between managerial pay disparity and the default risk of BHCs.

The remainder of the paper proceeds as follows. Section 2 reviews the related literature on executive managerial pay disparity and risk-taking. Section 3 describes the data and introduces the variables used in the empirical analysis. Section 4 presents the methodology and reports our main and additional empirical findings on the association between managerial pay disparity and the BHC default risk. Finally, Section 5 concludes the paper.

2. Previous Literature and theoretical background

Executive compensation literature offers two opposing views (tournament vs. power) regarding pay inequality among top firm executives. Our main hypothesis is that BHCs with greater managerial pay disparity should have a greater default risk. This is because, according to tournament theory, an executive's rank in the firm determines their compensation (Lazear & Rosen, 1981). Ang, Lauterbach and Schreiber (2002) argue that CEOs deserve high pay to reflect their competence and greater responsibility to the firm (in line with CEO power theory). However, tournament theory opposes this view and argues that the CEO's compensation should not be very high relative to that of other executives. In this regard, Lazear and Rosen (1981) propose a tournament model where workers in the firm are compensated based on their ranks. In this way, not only are monitoring costs reduced for shareholders, but workers are incentivized. Ang et al. (2002) argue that greater CEO pay encourages other top executives to strive to become the next CEO (and thus win the tournament). To achieve that, executives may adopt riskier policies to improve their performance (Goel & Thakor, 2008; Kini & Williams, 2012), leading to an increase in overall firm risk. Tournament incentives are analogous to the efficient contracting hypothesis, whereby a high managerial pay disparity reduces shareholder monitoring costs and provides a mechanism for the board of directors to better align the interests of managers with those of shareholders (Vo & Canil, 2019). Previous studies document that high managerial pay disparity is not only positively related to risk-taking (Kini & Williams, 2012) but also to firm performance (Kale et al., 2009; Bebchuk et al., 2011), firm value (Chang et al., 2010), and firm operations (Masulis & Zhang, 2013).

It follows that if high managerial pay disparity encourages managers to accept more risk and maximize shareholders' value, it is justified for a CEO to receive higher compensation (Bugeja, Matolcsy, & Spiropoulos, 2017; Vo & Canil, 2019). In this way, a high managerial pay disparity mitigates the agency problem and acts as a mechanism for the board of directors to benefit shareholders. However, this increased risk-taking by managers may not be viewed favorably by debtholders who prefer safer policies from management. Accordingly, a conflict arises where a high pay disparity benefits shareholders while sacrificing the interests of debtholders (Huang, Huang & Lee, 2019).

Furthermore, pay inequality between the CEO and other top executives in the banking industry is even greater than in other sectors (Ang et al., 2002). That greater pay inequality might encourage increased or excessive risk-taking, which can also adversely affect a bank's stability. Therefore, in line with tournament theory, greater managerial disparity may result in higher BHC default risk owing to the tournament incentive or efficient contracting hypothesis.

In contrast to tournament theory, Bebchuk et al. (2011) argue that a wide pay gap between the CEO and other top executives may indicate CEO power. That CEO power might indicate additional factors that other formal-status-based power proxies cannot capture (e.g., if the CEO is also the founder and chair of the board).[6] Recently, Vo and Canil (2019) supported the notion of CEO pay disparity reflecting CEO power as opposed to the tournament incentive. The study identified that CEOs have significant decision-making power and can choose to alter the pay process to raise their level of pay slice to a level greater than is ideal. Therefore, an excess CEO pay slice may indicate an agency problem in terms of more opportunistic behaviors by CEOs, reduced sensitivity of CEO turnover to poor performance (Bebchuk et al., 2011), and a higher implied cost of equity (Chen et al., 2013). Overall, these studies suggest that the CEO pay disparity resulting from CEOs governing the remuneration process is not in the interest of shareholders; however, whether it is in the interest of debtholders has received relatively little attention in the literature. For example, using CEO pay disparity as a measure of CEO power for non-financial firms, Liu and Jiraporn (2010) show that yield spreads of newly issued bonds are higher for firms with greater CEO pay disparity. Huang et al. (2019) show a positive relationship between the

[6] CEO power is "the power the CEO has over the board and other top executives" (Adams, Almeida, & Ferreira, 2005, p 1408). Using 'formal status' proxies in a sample of non-financial firms, prior literature suggests that powerful CEOs can pursue their own benefits at the expense of shareholders (Adams, Almeida, & Ferreira, 2005), resulting in lower firm value (Bebchuk, Cohen, & Ferrel, 2009) and lower credit ratings (Ashbaugh-Skaife, Collins, & Lafond, 2006)

CEO pay gap and the yield spreads of seasoned corporate bonds for non-financial firms, suggesting that the CEO pay gap is viewed negatively in the credit market. However, in the case of BHCs, the CEO pay gap may not be viewed as risky by creditors because of intense regulations to avoid negative consequences from any 'systemic risk' (Flannery, 1998). In addition, bank CEOs have fiduciary and fiduciary-like duties to their shareholders, their creditors (i.e., depositors), and their regulators (Macey & O'Hara 2003), and these legal responsibilities could dampen the incentives of BHC managers to engage in risk.

Furthermore, several studies suggest the contestants in the tournament competition have different risk preferences owing to their relative positions (Ehrenberg & Bognanno, 1990; Brown et al., 1996). The contestants in the lower ranks (i.e., other top executives) are more likely to take additional risks because the upside gains available to them outweigh potential downside losses; however, for contestants in the top rank (i.e., CEOs) the opposite is true. Since CEOs exert more influence over the corporate decision-making process than other executives, an increase in the pay gap they may mean become risk-averse to avoid any diminution of their current pay if a risky strategy fails (Bai & Elyasian, 2013).[7]

These arguments are consistent with overly conservative managerial behavior by CEOs motivated by undiversified human capital and concentration of wealth in the firms they control (Wright et al., 1996). Risk-taking requires more effort to manage new ventures and a failure to manage risk can cause significant downside losses, including their own CEO position. Baysinger and Hoskisson (1990) argue that CEOs are more concerned about their career (e.g., loss of reputation in the labor market) than the maximization of shareholder profit. Amihud and Lev

[7] Further, tournament incentives may not be powerful enough to motivate the average employee because of the large number of potential winners (Faleye et al., 2013).

(1981) show that powerful managers are motivated to engage in risk reduction activities (e.g., diversifying conglomerate mergers). May (1995) argues that risk-averse managers may reject risky value-enhancing projects and accept safe value-reducing projects. Pathan (2009) finds a negative relation between CEO power (measured by CEO duality and internally hired CEO) and bank risk-taking. He argues that powerful CEOs take less risk because their undiversifiable human capital leads them to develop a greater propensity for risk aversion, resulting in less risky bank strategies. Consistent with these arguments, we conjecture our alternative hypothesis that BHCs with greater pay disparity have lower default risk (managerial power hypothesis).

3. Data and variables

Consistent with previous U.S. banking literature (see e.g., Adams & Mehran, 2012; Bai & Elyasiani, 2013; Ellul & Yerramilli, 2013; Erel, Nadauld, & Stulz, 2014; Khan, Scheule, & Wu, 2017), our sample consists of publicly listed U.S. BHCs and data harvested for the period 1992–2018. Following Minton et al. (2019), we collect BHCs' quarterly financial data from the Federal Reserve Bank of Chicago's website. Those BHCs with assets greater than USD 500 million are required to file a FRY-9C report quarterly. This threshold for filing the FRY-9C report was USD 150 million before March 2006. We start our sample period in 1992 because the compensation data from S&P Capital IQ's ExecuComp database is available from 1992. We exclude BHCs with data on their assets missing. We then merge the BHC financial data with executive compensation data from the ExecuComp database. We only include BHCs where the total compensation for the CEO and the next four most highly paid executives was available. Finally, we collect the debtholder-facing default risk data from the Credit Research Initiative (CRI) database of the National University of Singapore (NUS). After merging with default risk data, our final sample comprises data on 198 BHCs, which is comparable to previous studies (e.g., Bai & Elyasiani, 2013; Erel, Nadauld, & Stulz, 2014; Minton et al., 2019) and represents 90% of total banking system assets as of December 2018.[8]

3.1. Measures of default risk

This study employs market-based debtholder-facing default risk measures because they circumvent the criticism of accounting-based models by being forward-looking market data that reflect expectations of a firm's future cash flows, and hence should be more appropriate for prediction purposes (Beaver, McNichols, & Rhie, 2005). We used two proxies of default risk, a strategy consistent with prior studies (Ali et al., 2018; Kabir et al., 2020). The main proxy of default risk is the Credit Default Swap (*CDS*) spread. A CDS is a credit derivative that permits the transfer of a firm's default risk between two agents for a predetermined time period. In a typical CDS contract, the protection seller offers the protection buyer insurance against the default of an underlying bond issued by a certain company (the reference entity). In the event of default by the reference entity, the seller commits to buy the bond for a price equal to its face value from the protection buyer. The buyer pays a quarterly premium called the CDS spread as consideration for the insurance, which is quoted as an annualized percentage of the notional value insured. A higher CDS spread signals greater default risk.[9] The alternative proxy of default risk is distance to default (DD), a concept originating from the structural credit risk model of Merton (1974). The DD measure is a popular way to gauge how far away a limited-liability firm is from default (e.g.,

[8] The total banking system assets as of December 2018 are $17,942.995 billion which represents the total assets of the 5,477 FDIC-insured commercial banks and savings institutions in the U.S (FDIC Quarterly banking profile).

[9] CRI refers to CDS spread as "Actuarial Spread". Actuarial spread is constructed using the traditional CDS design but without an upfront fee on the assumption that market participants are risk-neutral. Thus, actuarial spread has the same features as the standard CDS spread. This adjustment allows calculation of the CDS spread for a large number of firms.

Duan, Sun, & Wang, 2012; Duan & Wang, 2012). A higher DD measure signals lower default risk (i.e., more firm stability). A detailed method for estimating DD can be found in Duan et al. (2012).

3.2. Pay Disparity

The main variable we use to measure managerial pay disparity is the CEO pay slice (*CEO PaySlice*), a choice driven by strong precedent in prior literature (see e.g., Bebchuk et al., 2011; Kini & Williams, 2012; Bai & Elyasiani, 2013; Huang, Huang, & Lee, 2019; Vo & Canil, 2019) Bebchuk et al. (2011) define the CEO pay slice as "the percentage of the total compensation to the top five executives that goes to the CEO." It is calculated as follows:

$$CEO\ PaySlice_{i,t} = \frac{Total\ CEO\ Compensation_{i,t}}{Total\ Compensation\ of\ top\ five\ executives\ (including\ CEO)_{i,t}} \tag{1}$$

Following prior studies, our additional measures of managerial pay disparity include CEO to employee pay ratio (*CEO-emp PayRatio*) and executives to employee pay ratio (*Exec-emp PayRatio*) (Faleye et al., 2013; Crawford, Nelson, & Rountree, 2016; Rouen, 2020). They are calculated as follows:

$$CEO - Emp\ PayRatio_{i,t} = \frac{Total\ CEO\ Compensation_{i,t}}{Average\ Employee\ Compensation_{i,t}} \tag{2}$$

$$Exec - Emp\ PayRatio_{i,t} = \frac{Total\ Compensation\ of\ top\ five\ executives_{i,t}}{Average\ Employee\ Compensation_{i,t}} \tag{3}$$

We take the natural logarithm of these ratios to normalize the data. Total compensation includes salary, bonus, value of restricted stock grants, long-term incentive pay, value of option grants, and other annual pay. To calculate average employee compensation, we first obtain the annual total compensation of all employees in a BHC by subtracting the total compensation of the CEO from the reported total compensation expense in the income statement. We then divide the result by the total number of employees to obtain the average employee compensation.

3.3. Control variables

Following prior literature on bank risk-taking (e.g., Pathan, 2009; Fortin et al., 2010; Brunnermeier et al., 2012; Berger et al., 2014; Mayordomo et al., 2014; Iqbal et al., 2015; Danisman & Demirel, 2019; Al-Shboul, Maghyereh, Hassan, & Molyneux, 2020), we mitigate potential omitted variable bias by controlling for several BHC-specific variables that may simultaneously influence BHC stability and managerial pay disparity. First, we controll for BHC size because larger banks may pursue riskier strategies if they are too big to fail (TBTF). We measure BHC *Size* as the natural logarithm of the total assets of the bank. Second, we account for bank performance (i.e., *Return on assets)*, measured as the ratio of net income to total assets.[10] Third, we controll for the bank's business model and asset structure with the ratio of net loans to total assets (*Loans to assets*) and the ratio of deposits to total assets (*Deposits to assets*). Fourth, we controll for *Capital ratio* calculated as a ratio of total book value of equity divided by the book value of total assets. Fifth, we use the ratio of non-interest income to total income (*Non-interest income*) to control for the level of income diversification and non-traditional banking activities. Sixth, we controll for age of the BHC (*Firm age*), which is measured as the time between the first year a BHC has asset data available in the Federal Reserve Bank of Chicago's database and the

[10] Because *Return on assets* is in the ratio form (or decimal points), the coefficients in Table 2 are larger compared to the other variables. When we use the *Return on assets* in a percentage form, the coefficient becomes similar to the coefficients on other variables.

present time (in years). We also controll for CEO characteristics such as *CEO age* (measured in years), *CEO tenure* (measured as the number of years a CEO had served in a BHC), and *CEO duality* (measured as whether the CEO is also the chairman of the board). Appendix A provides the definitions of all the variables used in the study.

4. Empirical analysis

4.1. Descriptive statistics

Table 1 reports the descriptive statistics of the dependent and independent variables used in the main empirical analysis. With regard to pay disparity, the mean *CEO Pay Slice* of 0.37 indicates that the average amount a CEO earns annually is 37% of what is paid to the top five executives in the bank. This amount is slightly higher than the 35.7% Bebchuk et al. (2011) recorded for a non-bank sample and is comparable to the mean value of 38% Bai and Elyasiani (2013) found for a bank sample over the period 1992–2008. Further, the mean *CEO-Emp PayRatio* is 119.87, which suggests that the average BHC CEO in our sample earns almost 120 times the average employee's pay. This amount is higher in BHCs than the mean value of 95.47 Faleye et al. (2013) recorded for a financial and non-financial firm sample. The mean *Exec-Emp PayRatio* is 329.57, which means that the top BHC management team (consisting of the five most highly paid executives) collectively earns almost 330 times the average worker's pay.

With regard to BHC default risk proxies, the mean *CDS* spread and *DD* is 3.163 and 2.666, respectively. In terms of bank-specific variables, the median asset value is USD 12.6 billion, and the mean asset value is USD 105.192. The distribution of BHC assets is highly skewed, with assets varying from a minimum of USD 89 million to over USD 2.5 trillion. The mean *Return on assets* is 0.07%, which is lower than the 1.20% and 1.78% found in Fahlenbrach and Stulz (2011) and Bai and Elyasiani (2013), respectively. The mean value for *Loans to assets* is 62.30% and *Deposits to assets* is 70.50%. Finally, on average, the *non-interest income* is 26.60%, and the *capital ratio* is 10.10%, which are slightly higher than the 25% and 8.11% reported by Bai and Elyasiani (2013). Overall, these statistics are not surprising because we examined a large sample of BHCs over a long sample period (1992–2018).[11]

(Insert Table 1 about here)

4.2. Baseline regression results

To empirically test the relationship between managerial pay disparity and default risk of BHCs, we use equation (4) as the baseline model:

$$\begin{aligned} Defalut\ Risk_{i,t} = \alpha + \ & \beta_1 Pay\ Disparity_{i,t} + \beta_2 Size_{i,t} + \beta_3 Return\ on\ assets_{i,t} \\ & + \beta_4 Loans\ to\ assets_{i,t} + \beta_5 Deposits\ to\ assets_{i,t} \\ & + \beta_6 Non-interest\ income_{i,t} + \beta_7 Capital\ ratio_{i,t} + \beta_8 Firm\ age_{i,t} \\ & + \beta_9 CEO\ age_{i,t} + \beta_{10} CEO\ Tenure_{i,t} + \beta_{11} CEO\ duality_{i,t} + \sum_{k=1}^{n-1} \alpha_k Bank_i^k \\ & + \sum_{y=1992}^{2018} \omega_y Period_i^y + \varepsilon_{i,t} \end{aligned} \quad (4)$$

where the dependent variable *Default risk* is either *CDS* or *DD* and *Pay disparity* is *CEO PaySlice*, *CEO-Emp PayRatio* or *Exec-Emp PayRatio*. As discussed above, several BHC-specific financial variables and CEO characteristics that may affect the managerial pay disparity and BHC risk are included. We use period fixed effects to eliminate common business cycle effects across

[11] The correlation analysis reported in online appendix suggests that default risk is significantly lower in BHCs with greater managerial pay disparity and the multicollinearity does not appear to be an issue among the independent variables.

all BHCs and bank fixed-effects to resolve the issue of omitted variable bias. In all regressions, standard errors are clustered by BHC.

(Insert Table 2 about here)

Panel A of Table 2 reports the results for equation (4), where CDS is the proxy of default risk. Models 1–3 include only period fixed effects and Models 4–6 include both period fixed effects and bank fixed effects. As noted in Models 1 and 4, *CEO PaySlice* has a negative and statistically significant (at 1% level) relationship with *CDS*, suggesting a lower level of default risk in BHCs that have greater CEO pay relative to other top executives. Specifically, a 1% increase in *CEO PaySlice* decreases *CDS* by 0.60 in Model 4. In order to gauge economic significance, we multiply the standard deviation of *CEO PaySlice* (i.e., 0.087) with the coefficient of *CEO PaySlice* (i.e., -0.60) in Model 4 to get -0.052, suggesting that one standard deviation increase in the CEO pay slice decreases CDS spread by 0.052 points. As the mean *CDS* is 2.66, a decrease by 0.052 denotes a 1.95% change of the average default risk. However, this magnitude of economic significance reduces slightly to 1.64% without the bank fixed effects in Model 1. Consistent with Bai and Elyasian (2013), these results provide support to the CEO power hypothesis (Bebchuk et al., 2011); that is, greater CEO pay disparity decreases default risk.

In addition, the results in Table 2 (Panel A) show that the *CEO-Emp PayRatio* (Models 2 and 5) and *Exec-Emp PayRatio* (Models 3 and 6) have a negative and significant influence on *CDS* at the 1% level, suggesting a lower level of default risk in BHCs that have greater CEO and executive pay relative to other employees. These results are more economically significant than those of CEO pay slice. For instance, one standard deviation increase in the *CEO-Emp PayRatio* decreases CDS spread by 0.0927 points, which denotes a 3.48% change of the average CDS spread in Model 5.[12] This magnitude of economic significance is slightly lower than that in Model 1 (i.e., 3.77%) without bank fixed effects. Similarly, one standard deviation increase in *Exec-Emp PayRatio* decreases *CDS* by 2.97% in Model 6, which is slightly lower than 3.71% without bank fixed effects in Model 1. These findings further assert that greater managerial pay disparity is viewed favorably in the credit market.

The coefficients on the BHC-specific variables also provide important insights. For instance, BHC *Size* is positively linked to CDS spread, suggesting that larger BHCs have more credit default risk. This finding is consistent with excessive risk-taking by large banks due to the too-big-to-fail (TBTF) phenomenon. As expected, return on assets has a negative relationship with CDS spread, suggesting that bank stability increases when the bank is more profitable. Moreover, income diversification (non-interest income), more assets financed with equity (capital ratio), and firm age decrease default risk as these three variables are negatively related to CDS. Finally, we find that having an older CEO increases default risk, whereas a situation of CEO duality decreases default risk.

Panel B of Table 2 presents the results for equation (4) where *DD* is the proxy of default risk. Models 1–3 include only period fixed effects and Models 4–6 include both period fixed effects and bank fixed effects. The results confirm that *CEO PaySlice* (Models 1 and 4)*, CEO-Emp PayRatio* (Models 2 and 5), and *Exec-Emp PayRatio* (Models 3 and 6) have a positive relationship with *DD* at the 1% level of significance, suggesting a lower level of default risk in BHCs that have greater CEO pay relative to other top executives and also greater CEO and other

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[12] We multiply the standard deviation of *CEO-Emp PayRatio* (i.e., 1.03) with the coefficient of *CEO-Emp PayRatio* (i.e., -0.09) in Model 5 to get -0.0927, suggesting that one standard deviation increase in the *CEO-Emp PayRatio* decreases CDS spread by 0.0927 points. As the mean *CDS* is 2.66, a decrease by 0.0927 denotes a 3.48% change of the average default risk.

top executive pay relative to other employees. These results are also economically significant. We multiply the standard deviation of *CEO PaySlice* (i.e., 0.087) with the coefficient of *CEO PaySlice* (i.e., 0.84) in Model 4 to obtain 0.073, suggesting that one standard deviation increase in the CEO pay slice increases DD by 0.073 points. As the mean *DD* is 3.163, an increase by 0.073 denotes a 2.31% change to the average default risk. This magnitude of economic significance is almost similar to that calculated without bank fixed effects in Model 1 (i.e., 2.26%). Likewise, one standard deviation increase in *CEO-Emp PayRatio* and *Exec-Emp PayRatio* raised *DD* by 5.45% (7.1%) and 5.46% (7.7%) in Models 5 (Model 2) and 6 (Model 3), respectively. These results provide additional support to our alternative hypothesis; a greater managerial pay disparity decreases BHC default risk.

4.3 Endogeneity checks

It is possible that the relationship between bank default risk and managerial compensation may be affected by endogeneity (Bebchuk et al., 2011; DeYoung et al., 2013; Ellul & Yerramilli, 2013). Among others, two sources of endogeneity (i.e., omitted variable bias and reverse causality) are likely to bias our main results on how managerial pay disparity influences default risk. First, omitted variables (time-varying and time-unvarying; observable and unobservable) may simultaneously affect both managerial pay disparity and default risk. It is extremely challenging, if not impossible, to capture all the determinants of bank default risk in the empirical models, which leads to the omitted variable bias. Second, the direction of causation between managerial pay disparity and default risk is not clear. It is possible that managerial pay disparity and default risk are determined simultaneously; that is, not only do managers alter the firm's risk based on their compensation, but the board of directors also adjusts managerial compensation based on the current risk exposure of the firm (Coles et al., 2006). In such circumstances, current managerial compensation is likely to be influenced by a past realization of default risk. Hence, as part of our identification strategy, we address these endogeneity concerns in several ways. To control for unobserved heterogeneity due to time-unvarying omitted variables, we include various BHC and CEO characteristics alongside BHC fixed effects in our baseline regression. In addition, to address the endogeneity bias originating from reverse causality, we employ lagged independent variables and propensity score matching (PSM).[13]

4.3.1. Lagged variables

Regressions based on contemporaneous variables are susceptible to endogeneity bias due to reverse causality. In contrast, a regression based on lagged values of independent variables helps control for reverse causality, and thus tends to be less susceptible to endogeneity effects. To overcome this concern, we follow Huang et al. (2019) and re-estimate equation (4) by using managerial pay disparity and control variables in the prior period (t-1) and the *CDS* (*DD*) in the current period (t). The results reported in Table 3 are virtually indistinguishable from those reported in Table 2. The relation of managerial pay disparity with default risk is significantly

[13] To further overcome the endogeneity problem, prior managerial pay disparity studies have also used various instrumental variables including managerial pay disparity in the earliest sample year, number of vice presidents (VPs) within the top 5 executives, and the duality of Chief Financial Officer (CFO) and VP (see e.g., Bebchuk et al., 2011; Kini and Williams, 2012; Chintrakarn et al., 2018). However, we could not use these instrumental variables in our study to address endogeneity bias. It is primarily because these instrumental variables used in the previous studies are related to the *CEO pay slice* but not to other important proxies of managerial pay disparity (i.e., *CEO-Emp PayRatio* and *Exec-Emp Pay Ratio*). Furthermore, we find that these instruments suffer from the over-identification problem when used in our setting where default risk is the dependent variable. Despite the over-identification problem, the unreported results from the instrumental variables show that managerial pay disparity has a significantly negative influence on default risk (results available upon request). Overall, we acknowledge that it is often difficult, if not impossible, to eliminate endogeneity. However, the various tests, based on bank fixed effects, lagged independent variables, and propensity score matching should provide a degree of reassurance that the main findings on managerial pay disparity and default risk are salient, even when addressing endogeneity due to an omitted variable and reverse causality.

negative with *CDS* and positive with *DD* at one period lag specification. This evidence supports the interpretation that current default risk is influenced by a past managerial pay disparity, rather than the interpretation that the current managerial pay disparity is influenced by past default risk. These results provide additional support to the baseline results and suggest that managerial pay disparity can predict default risk, that is, a high level of managerial pay disparity in the current period prompts a lower level of default risk in the next period.

(Insert Table 3 about here)

4.3.2. Propensity score matching

We further address the problem of endogeneity bias using two-step propensity score matching (PSM) approach following existing studies (Casu et al., 2013; Pana et al., 2015; Hasan et al., 2020; Kabir et al., 2020). In the first step, we create the dummy variables for *CEO Pay Slice, CEO-Emp PayRatio, and Exec-Emp PayRatio.* The new dummy variables, *High CEO PaySlice, High CEO-Emp Pay Ratio, and High Exec-Emp Pay Ratio*, take the value of 1 if the respective pay disparity is greater than the sample median, and zero otherwise. Subsequently, we run a logit regression for each of these dummy variables with all the explanatory variables as specified in equation (4) except the main variables of interest (i.e., *CEO Pay Slice, CEO-Emp PayRatio, and Exec-Emp PayRatio*). Table 4 Panel A reports the logit regression results using the pre-match sample in Models 1, 3, and 5. The Pseudo R^2 for the regression carries a value of 0.0687 (*High CEO PaySlice*), 0.3182 (*High CEO-Emp Pay Ratio*), and 0.3813 (*High Exec-Emp Pay Ratio*).

In the second step, we form one-to-one matched sample using the predicted estimates from the logit regression. Specifically, we use the closest propensity score to match each BHC with a greater managerial pay disparity (i.e., treatment sample) to a BHC with lower a managerial pay disparity (i.e., control sample). Following Kabir et al. (2020), we adopt the nearest neighbor matching without replacement and required the propensity scores for each matched BHC pair to be within a caliper of 0.1%.[14] With the application of these criteria, we effectively match 5,824 bank-period observations for *CEO PaySlice*, 3,338 for *CEO-Emp PayRatio*, and 2,910 for *Exec-Emp Pay Ratio*; hence, our treatment and control groups are nearly identical along all explanatory variables except the managerial pay disparity.

We run two diagnostic tests to verify that the treatment and control samples were indistinguishable in terms of observable characteristics. In the first diagnostic test, we re-estimate the logit regression for the post-match sample and reported the results in Models 2, 4, and 5 of Table 4 Panel A. We find that all the regression coefficients are statistically insignificant and smaller than those in the pre-match sample (Models 1, 3, and 5), suggesting that both groups are similar in terms of observable characteristics. We also find that the Pseudo R^2 dropped substantially for the post-match sample (i.e., 0.0013 for *High CEO PaySlice*, 0.0025 for *High CEO-Emp Pay Ratio*, and 0.002 for *High Exec-Emp Pay Ratio*) compared to the pre-match sample, implying that the propensity score matching removed all observable differences other than the difference in the managerial pay disparity.

In the second diagnostic test, we estimate the statistical difference between the treatment and the control samples for each observable characteristic. The results reported in Table 4 Panel B reveal insignificant difference in the observable characteristics between the two samples. These

[14] Our results hold when we increase the caliper from 0.1% to either 1% or 5% and change the method of matching to radius.

results further suggest that propensity score matching has removed other observable differences and increased the probability that any difference in the default risk between the treatment and control sample of BHCs can be attributed to differences in managerial pay disparity.

Table 4 Panel C reports the propensity score matching estimates for the matched sample. The results indicate significant differences in default risk between the treatment and the control groups.[15] Specifically, we find that *CDS* spread is lower and *DD* is higher in those BHCs with greater managerial pay disparity than in the otherwise indistinguishable BHCs with a relatively lower managerial pay disparity. Finally, Table 4 Panel D reports the regression results of equation (2) based on the matched sample derived from the second step of PSM approach. We find that the regression coefficients of *CEO PaySlice*, *CEO-Emp PayRatio*, and *Exec-Emp Pay Ratio* are negative and statistically significant at 1% level for both *CDS* (Models 1–3) and *DD* (Models 4–6), suggesting that BHCs with a greater managerial pay disparity have a lower default risk. From these results, we conclude that our main results reported in Table 2 are unaffected by endogeneity bias.

(Insert Table 4 about here)

4.4. When does managerial pay disparity reduce default risk?

So far, our results strongly support that managerial pay disparity has a negative effect on default risk. These results are consistent with those of Bai and Elyasiani (2013) stating that CEO pay inequality relative to other top executives is negatively associated with bank risk-taking measured using accounting-based data (i.e., non-interest income ratio, volatility of return on

[15] The differences in the means between treatment and control groups is the propensity score matching of the average treatment effect on the treated (ATT).

assets, and z-score). However, our results contrast with those of Kini and Williams (2012) reporting a positive relationship between CEO pay inequality relative to the total compensation of median VPs and risk-taking measured by cash flow volatility and return volatility. This contradictory evidence warrants further attempts to identify conditions in which managerial pay disparity reduces default risk. This section examines the role of BHC size and board monitoring on the effect of managerial pay disparity on default risk.

4.4.1 Managerial pay disparity, BHC size, and default risk

The association between managerial pay disparity and BHC default risk is particularly important when it comes to the largest or BHCs, the TBTF kind. Any such BHC failing could prove detrimental for the whole economy and could even result in a global crisis similar to that of 2007–2009 (Bai & Elyasiani, 2013). Previous studies also argue that banks benefit from becoming bigger as they have access to a greater safety net (Ueda & Weder di Mauro, 2013). Secondly, shareholders also have an incentive to encourage greater risk-taking to increase their wealth. Therefore, increased/suboptimal risk-taking incentives generated by top management compensation can lead to the failure of the largest BHCs (Fahlenbrach & Stulz, 2011). This discussion raises two important concerns. First, does managerial pay disparity increase with BHC size? Second, does bank size affect the relationship between managerial pay disparity and default risk for BHCs?

To answer these questions, Table 5 illustrates a piecewise linear approach similar to that of Erel et al. (2013) and Minton et al. (2019) we used to estimate the relationship between managerial pay disparity and default risk in TBTF BHCs (BHCs with assets greater than USD 50 billion in 2010 constant dollars). For BHC size, we use two piecewise linear specifications to break up the asset size. First, the *Small BHC (<=$50 billion)* variable captures the first USD 50 billion in assets and takes the value *min* [BHC asset size, $50 billion].[16] Second, the *Large BHC (>$50 billion)* variable captures an asset size greater than USD 50 billion and takes the value *max* [BHC asset size - $50billion, 0].

Table 5 reports the results of four different analyses. First, Panel A of Table 5 illustrates that generally BHC size has a positive (negative) and significant relationship with *CDS* (*DD*) in Model 1 (Model 4), suggesting that default risk increases with BHC size. However, interestingly, we find that default risk increases with size only for *Small BHCs* and we do not find a significant and positive relationship between size and default risk in *Large BHCs* (Models 2–3 for *CDS*; Models 5–6 for *DD*). Second, Panel B of Table 5 illustrates that managerial pay disparity increases with size for *Small BHCs* (Models 2–3 for *CEO PaySlice*; Models 5–6 for *CEO-Emp PayRatio*; Models 8–9 for *Exec-Emp Pay Ratio*). These findings suggest that pay disparity is greater in BHCs with assets of less than USD 50 billion. In these *small* BHCs, pay disparity may offer an incentive to managers to increase the overall firm risk (i.e., pay disparity provides tournament incentives to managers to increase the risk of the firm) (Kini & Williams, 2012).

Third, Panel C of Table 5 illustrates that the managerial pay disparity that increases with size in *small* BHCs also increases default risk (Models 1–3 for *CDS*; Models 4–6 for *DD*). These findings further suggest that *small* BHCs incentivize top executives to take on more risk, which is observable in the overall increased default risk of BHCs. These findings imply that greater pay disparity in *small* BHCs results in high default risk levels, suggesting that *small* BHCs offer higher

[16] Our results are also qualitatively similar when using the *$10-$50 billion* variable introduced by Erel et al. (2013).

risk-taking incentives for top managers. Moreover, the results indicate that *small* BHCs actively seek risk in order to achieve a status similar to that of *large* BHCs.

(Insert Table 5 about here)

4.4.2 Managerial pay disparity, board monitoring, and default risk

The corporate board, the apex body of a firm's internal governance system (Fama & Jensen, 1983), is considered to be the first line of defense (Hermalin & Weisbach, 1988) of shareholders against incumbent management. The board can counter opportunistic and rent-seeking managerial behavior (Jensen, 1986). Consequently, in this section, we examine the role of board monitoring on the relationship between managerial pay disparity and default risk. We consider two important board monitoring variables: 1) gender-diverse boards and 2) co-opted boards.

4.4.2.1. Role of women on the board

"What if Lehman Brothers had been Lehman Sisters?"

[Christine Lagarde, former IMF Managing Director]

Female representation on the board of directors is one of the most important governance issues currently faced by corporations around the globe. Empirical evidence suggests that female directors improve the effectiveness of the board in monitoring the opportunistic behavior of management. For instance, Carter et al. (2003) show that female directors are likely to display more independent thinking and to ask questions that directors with more traditional backgrounds would not, which is crucial for effective board monitoring. Adams and Ferreira (2009) find female directors are tough monitors and positively contribute to board effectiveness. Specifically, they show that women are likely to serve on board monitoring committees, and their presence improves overall board meeting attendance. They also document that CEOs are more accountable for poor performance in firms with more gender-diverse boards. Likewise, Banerjee et al. (2018) show that women on boards can help offset the negative effects of having overconfident CEOs. Given these findings, we argue that the absence of women from the board is likely to weaken or reverse the negative effect of managerial pay disparity on default risk.

(Insert Table 6 about here)

To test this conjecture, we use the percentage of the board made up of women directors as a proxy for boardroom gender diversity.[17] We create a dummy variable *Low_WOB* which takes the value of one if the percentage of women on the board is lower (higher) than the sample median, and zero otherwise. The variable of interest is the interaction between managerial pay disparity proxies (i.e., *CEO PaySlice, CEO-Emp PayRatio,* or *Exec-Emp Pay Ratio*) and *Low_WOB*. The results are reported in Table 6 without BHC fixed effects in Models 1–3 and with BHC fixed effects in Models 4–6. Consistent with our expectation, we find that all the interaction terms are positive and statistically significant with *CDS*, suggesting that for BHCs with lower boardroom gender diversity, higher managerial pay disparity leads to higher default risk. An alternative reading of these findings suggests that the higher level of managerial pay disparity reduces default risk only in the presence of a high proportion of females sitting on the board. Our findings indicate that BHCs intent on addressing managerial pay disparity should consider boardroom gender diversity to benefit from the reduction of default risk.

4.4.2.2 Role of co-opted boards

[17] For the purpose of this analysis our sample is restricted to the period 2002-2018 due to availability of gender diversity data from Thompson Reuters DataStream.

"Members of the boards are cronies appointed by the very CEOs they're supposed to be watching."

[Carl Icahn, activist investor, *Business Week Online*, November 18, 2005]

Conventional wisdom holds that monitoring by the board is more effective when the board includes a majority of independent directors. However, independent directors (as traditionally measured) may establish close ties with CEOs that are likely to reduce board effectiveness over time. Coles et al. (2014) provide a refined measure of board independence: the percentage of directors appointed after the CEO assumes office, known as board co-option. Coles and colleagues argue that CEOs pack an otherwise independent board to reduce the occurrence of strict monitoring and accountability so as to permit the CEO to retain their position, even in the case of poor performance. The agency problem and rent-seeking behavior of CEOs can thus be more prevalent in firms with more co-opted directors. Given these findings, we argue that the negative effect of managerial pay disparity on default risk should be weakened or reversed in the presence of a less independent board (i.e., a highly co-opted board).

(Insert Table 7 about here)

Following Coles et al. (2014), a co-opted board is measured as the ratio of the number of directors appointed after a CEO assumes the role to the total number of directors on a board. Co-opted board data were obtained from the personal website of Lalitha Naveen.[18] We create a dummy variable *High_co-option* which takes the value of one if the percentage of co-opted directors is higher (lower) than the sample median and zero otherwise. The variable of interest is

[18] For the purpose of this analysis our sample is restricted to the period 1996-2014. The data is available at: https://sites.temple.edu/lnaveen/data/

the interaction between managerial pay disparity proxies (i.e., *CEO PaySlice, CEO-Emp PayRatio,* or *Exec-Emp Pay Ratio*) and *High_co-option*. The results are reported in Table 7 without bank fixed effects in Models 1–3 and with bank fixed effects in Models 4–6. As expected, we find that all the interaction terms are statistically significant and positive with *CDS*, suggesting that for BHCs with more co-opted boards, higher managerial pay disparity leads to higher default risk. Alternatively, these findings suggest that a higher level of managerial pay disparity reduces default risk only in the presence of a minimally co-opted board. Our findings suggest that BHCs addressing managerial pay disparity should consider board independence to benefit from the reduction of default risk.

4.5. How does managerial pay disparity reduce default risk?

A BHC, particularly a large one, engages in a range of activities. An important consideration is that non-interest income increases with BHC size. Therefore, we investigate whether business activities can help understand why managerial pay disparity reduces default risk in BHCs. Following prior studies (Bai & Elyasiani, 2013; Ellul & Yerramilli, 2013; Erel et al., 2014; Minton et al., 2019), we identify important BHC activities that could potentially affect the association between managerial pay disparity and BHC default risk. Following Bai and Elyasiani (2013), the model is described as:

$$BHC\ activity_{i,t} = \alpha + \beta_1 Pay\ disparity_{i,t} + \beta_2 Size_{i,t} + \beta_3 Capital\ ratio_{i,t} + \beta_4 Loan\ loss\ provisions_{i,t} + \beta_5 Asset\ concentration_{i,t} + \sum_{y=1992}^{2018} \omega_y Period_i^y + \varepsilon_{i,t} \quad (5)$$

Several alternative versions of equation (5) are estimated where the dependent variable *BHC activity* is proxied by five alternative BHC activities: 1) *Non-interest income* (the ratio of non-interest income to total income); 2) *RE loans to assets* (the ratio of real estate loans to total assets); 3) *CI loans to assets* (the ratio of commercial and industrial loans to total assets); 4) *Securities to assets* (the ratio of total securities to total assets); and 5) *Trading to assets* (the ratio of total trading assets to total assets). Following Bai and Elyasiani (2013), we also control for BHC-specific characteristics that can affect different BHC activities. These include *Size* (the natural logarithm of total assets); *Capital ratio* (the ratio of equity to total assets); *Loan loss provisions* (the ratio of the BHC's loan loss reserve to total assets); and *Asset concentration* (the Herfindahl-Hirschman index (HHI) of bank loans). The HHI measures the concentration of BHC assets across different categories of loan. We also include period-fixed effects.

(Insert Table 8 about here)

Table 8 reports the results for BHC activities. The results suggest that CEO pay slice significantly affects the business activities of BHCs. That CEO pay slice is negatively and significantly associated with *Non-interest income,* suggesting that greater CEO pay slice reduces the level of non-traditional BHC activities. These results are consistent with the view that CEO pay slice affects the CEO's risk preference and thus CEOs engage in a greater level of traditional, less risky activities (Bai & Elyasiani, 2013; Ellul & Yerramilli, 2013).[19] Furthermore, CEO pay slice is also positively and significantly associated with other traditional BHC activities, including *RE loans to assets* and *CI loans to assets*. Overall, the results suggest that greater CEO pay slice

[19] Following Beltratti and Stulz (2012), we also use deposit funding and find (results unreported) that CEO pay slice is positively associated with *Deposits to assets* which further lends support to this argument.

can encourage CEOs to be more risk-averse and thus implement less risky investment policies, leading to lower default risk.

4.6. Is the CEO power explanation correct?

In this section, we examine whether the CEO power explanation of our main results is valid. Hermalin and Weisbach (1998) suggest that assigning the role of CEO and Chairperson to a single person invests considerable power in that individual. The same study also suggests that the length of the CEO's tenure is a source of CEO power because long tenure allows the CEO to influence the selection of other board members. Similarly, Combs et al. (2007) suggest that CEOs with significant ownership power could extend their tenure on the board beyond the point of effectiveness. Given these findings, we construct the CEO power index based on three parameters: *CEO duality*, *CEO tenure*, and *CEO shareholdings* (Veprauskaitė & Adams, 2013). We assign a value of one if the CEO is also the chairperson of the board and zero otherwise. We assign a value of one if CEO tenure and CEO shareholdings are greater than the sample median and zero otherwise. Our CEO power index ranges from zero to three. A higher score indicates that the CEO is more powerful. The results reported in Table 9 show that *CEO power* is negatively (positively) associated with *CDS* (*DD),* suggesting lower default risk in BHCs with greater CEO power, confirming the validity of our explanation of the main results.

(Insert Table 9 about here)

4.7. Additional tests

We perform additional robustness tests to ensure the main findings are reliable and robust. First, we examine the effect of alternative proxies of managerial risk-taking incentives generated by executive compensation on default risk. We measure managerial risk-taking incentives using the sensitivities of CEO compensation to changes in stock prices and stock return volatility (i.e., *CEO delta*, *CEO Vega*). Our (untabulated) results show that risk-taking incentives generated by executive compensation are negatively related to the default risk of BHCs. These results show that CEO risk-taking incentives do not necessarily lead to increased or excessive default risk. Second, we check the robustness of our results using an alternative sample specification by excluding observations from the years 2007, 2008, and 2009 to avoid the GFC effect and because the TBTF notion contributed to the financial crisis to at least some extent. Fahlenbrach and Stulz (2011) show that banks employing CEOs whose incentives were better aligned with those of the shareholders performed worse during the financial crisis. Our (untabulated) results indicate that our main findings are not driven by the extreme observations made during the GFC. Third, we test the effect of managerial pay disparity on BHC default risk using an alternative proxy: the probability of default. We use one month, three months, six months, one year, two years, three years, and five years probability of default in our analyses. The (untabulated) results again show that managerial pay disparity is negatively and significantly associated with the probability of default, suggesting that greater managerial pay disparity is associated with reduced BHC default risk.

5. Conclusion

Regulators, politicians, and bank supervision authorities have highlighted the important role of executive compensation policies in banking organizations, particularly in the wake of the global financial crisis. This study investigates whether managerial pay disparity is associated with BHC default risk. Using a comprehensive dataset of large U.S. BHCs, we contribute to the existing BHC risk literature by documenting an inverse relationship between managerial pay disparity and default risk. Additional tests reveal that higher managerial pay disparity leads to higher default risk for small BHCs. We further find that greater managerial pay disparity is detrimental to BHC stability in the presence of weaker monitoring mechanisms, such as less gender-diverse boards and higher levels of board co-option. Overall, our findings show that greater managerial pay disparity renders a CEO more risk-averse and incentivizes less risky investment policies, leading to lower default risk for larger-sized BHCs with strong board monitoring. However, these findings are specific to the BHCs owing to their unique operating and regulatory requirements and should not be generalized to enterprises in all industries. Future studies could examine the pay disparity and default risk relationship for a broader range of industries.

The findings of this study have important implications for both researchers and practitioners. Most of the existing research focuses on the composition of CEO remuneration, whereas this study highlights the importance of compensation spread among the CEO, top executives, and employees. For BHCs with larger size and for those with strict board monitoring, the inverse relationship between managerial pay disparity and default risk strengthens the notion of managerial power and possible risk aversion (i.e., powerful management might pursue less risky strategies to protect their human and financial investments, leading to lower BHC default risk). Our findings caution researchers against considering powerful CEOs as merely risk-seekers. Moreover, shareholders and the board of directors can adjust the managerial pay disparity to alter the risk-taking propensity in banks. These findings also have implications for regulations altering the relative CEO pay by imposing differential limits on the total compensations of CEOs and other executives. While the Dodd-Frank Act only requires firms to report median CEO pay relative to employees, we further suggest that BHCs should report CEO pay relative to other top executives.

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Table 1. Descriptive statistics

Variable	Mean	Median	Std. Dev	25th Percentile	75th Percentile	Observations
Default risk:						
DD	3.163	3.122	1.561	2.008	4.345	7969
CDS Spread	2.666	2.632	0.840	2.007	3.275	7969
Pay disparity:						
CEO PaySlice	0.371	0.368	0.087	0.312	0.424	7969
CEO-Emp Pay Ratio	119.87	68.74	127.51	32.19	155.02	7969
CEO-Emp Pay Ratio (ln)	4.27	4.23	1.03	3.47	5.04	7969
Exec-Emp Pay Ratio	329.57	188.48	346.57	92.10	419.31	7969
Exec-Emp Pay Ratio (Ln)	5.31	5.24	0.99	4.52	6.04	7969
Control Variables:						
Assets	105000000	12600000	329000000	5718363	45700000	7969
Return on assets	0.007	0.006	0.004	0.003	0.010	7969
Loans to assets	0.623	0.664	0.148	0.556	0.727	7969
Deposits to assets	0.705	0.725	0.113	0.645	0.793	7969
Non-interest income	0.266	0.231	0.154	0.151	0.346	7969
Capital ratio	0.101	0.098	0.025	0.081	0.118	7969
Firm age	22.046	22.000	10.256	14.000	30.000	7969
CEO age	57.358	57.000	5.640	53.000	61.000	7969
CEO tenure	8.015	6.227	6.183	3.000	11.858	7969
CEO duality	0.563	1.000	0.496	0.000	1.000	7969

This table reports the descriptive statistics for the variables used in this study. The sample consists of 198 U.S. BHCs from 1992 to 2018. See appendix 1 for variable definition.

Table 2. Managerial pay disparity and default risk

	Panel A: Credit default swap spread						Panel B: Distance to default					
Variables	CDS	CDS	CDS	CDS	CDS	CDS	DD	DD	DD	DD	DD	DD
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Pay disparity												
CEO PaySlice	-0.4936***			-0.6012***			0.8216***			0.8394**		
	(-6.23)			(-3.42)			(5.23)			(2.54)		
CEO-Emp Pay Ratio		-0.0974***			-0.0859***			0.2179***			0.1653***	
		(-11.18)			(-5.58)			(12.73)			(6.09)	
Exec-Emp Pay Ratio			-0.0998***			-0.0778***			0.2461***			0.1744***
			(-9.89)			(-4.77)			(12.45)			(5.66)
Controls												
Size	0.0690***	0.1074***	0.1086***	0.2587***	0.2705***	0.2698***	0.0067	-0.0795***	-0.0915***	-0.4468***	-0.4695***	-0.4719***
	(10.33)	(13.83)	(13.47)	(5.44)	(5.75)	(5.66)	(0.51)	(-5.44)	(-6.01)	(-5.06)	(-5.38)	(-5.37)
Return on assets	-35.8142***	-43.7386***	-44.3669***	-19.6384***	-28.8581***	-28.3394***	78.1835***	95.4394***	98.6168***	45.7412***	63.1346***	64.6936***
	(-21.40)	(-24.20)	(-23.71)	(-12.02)	(-11.02)	(-10.60)	(22.76)	(26.38)	(26.41)	(14.70)	(13.15)	(12.59)
Loans to assets	-0.1582***	-0.1679***	-0.1814***	0.1297	0.1295	0.1142	0.2232**	0.2369**	0.2691**	0.2135	0.2055	0.2349
	(-3.05)	(-3.28)	(-3.55)	(0.55)	(0.56)	(0.49)	(2.08)	(2.24)	(2.55)	(0.49)	(0.47)	(0.54)
Deposits to assets	-0.9084***	-0.9898***	-1.0408***	-0.3874	-0.4234	-0.4709	1.2856***	1.4347***	1.5658***	0.5173	0.5437	0.6357
	(-12.16)	(-13.61)	(-14.23)	(-1.35)	(-1.49)	(-1.63)	(8.43)	(9.66)	(10.51)	(0.94)	(0.99)	(1.15)
Non-interest income	-0.4319***	-0.3375***	-0.3255***	-0.3305	-0.2723	-0.2728	0.9328***	0.7380***	0.6934***	0.5003	0.3923	0.3773
	(-7.33)	(-5.80)	(-5.58)	(-1.12)	(-0.98)	(-0.97)	(7.55)	(6.03)	(5.65)	(0.81)	(0.67)	(0.64)
Capital ratio	-4.8768***	-4.3406***	-4.3382***	-1.4960	-1.2321	-1.2424	9.0531***	7.8193***	7.6765***	-0.1126	-0.6283	-0.6938
	(-14.44)	(-12.68)	(-12.56)	(-1.41)	(-1.17)	(-1.17)	(13.77)	(11.74)	(11.45)	(-0.06)	(-0.32)	(-0.35)
Firm age	-0.0066***	-0.0064***	-0.0063***	-0.0134	-0.0126	-0.0122	0.0139***	0.0136***	0.0133***	0.0199	0.0179	0.0165
	(-9.36)	(-9.14)	(-8.94)	(-1.06)	(-1.01)	(-0.98)	(9.62)	(9.50)	(9.27)	(0.63)	(0.57)	(0.52)

Table 2. *Continued*

Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Additional Controls												
CEO age	0.0033***	0.0027**	0.0029**	0.0031	0.0035	0.0039	-0.0073***	-0.0061**	-0.0063***	-0.0103	-0.0107	-0.0115
	(2.69)	(2.28)	(2.38)	(0.81)	(0.91)	(0.99)	(-2.97)	(-2.51)	(-2.60)	(-1.37)	(-1.43)	(-1.51)
CEO tenure	-0.0004	0.0001	-0.0004	-0.0068	-0.0070*	-0.0075*	0.0031	0.0017	0.0026	0.0207**	0.0203**	0.0211**
	(-0.32)	(0.08)	(-0.38)	(-1.65)	(-1.68)	(-1.75)	(1.33)	(0.72)	(1.14)	(2.26)	(2.24)	(2.28)
CEO duality	-0.0946***	-0.0882***	-0.0938***	0.0100	0.0068	0.0009	0.1899***	0.1707***	0.1810***	-0.0218	-0.0212	-0.0103
	(-6.74)	(-6.32)	(-6.71)	(0.27)	(0.19)	(0.02)	(6.56)	(5.93)	(6.29)	(-0.29)	(-0.29)	(-0.14)
Constant	2.9523***	2.6363***	2.7755***	-0.8522	-0.8967	-0.8100	0.0626	0.7078**	0.4122	8.7658***	8.7655***	8.5336***
	(17.37)	(15.45)	(16.36)	(-0.99)	(-1.07)	(-0.96)	(0.19)	(2.13)	(1.25)	(5.20)	(5.33)	(5.16)
Period Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed effects	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Obs./BHCs	7969/198	7969/198	7969/198	7969/198	7969/198	7969/198	7969/198	7969/198	7969/198	7969/198	7969/198	7969/198
Adj. R^2	0.585	0.590	0.588	0.574	0.576	0.574	0.493	0.501	0.501	0.520	0.523	0.523

The table reports the estimates of six alternative versions of the equation 4 panel regression specification in both Panel A and Panel B. Here the dependent variable *Default Risk*$_{i,t}$ is either Distance to default (*DD*) for BHC *i* at time *t* measured as annual average of distance to default based on stock price variability or Credit Default Swap (*CDS*) Spread for BHC *i* at time *t* measured as the payments made per year by the buyer on CDS. See appendix 1 for variable definition. The reported adjusted R^2s are the overall R^2s that account for the explanatory power of the bank and period fixed effects. The *t*-statistics (reported in parentheses) are based on robust standard errors, which are adjusted for heteroskedasticity and clustered at BHC level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively

Table 3. Lagged managerial pay disparity and default risk.

Variables	CDS	CDS	CDS	DD	DD	DD
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Pay Disparity						
CEO PaySlice	-0.0540***			0.0460***		
	(-3.8403)			(3.7700)		
CEO-Emp Pay Ratio		-0.0594***			0.0243***	
		(-4.0385)			(3.0380)	
Exec-Emp Pay Ratio			-0.0515**			0.0193**
			(-2.1445)			(2.2267)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional (CEO) Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	4.3938***	4.4327***	4.0367***	-1.4353***	-1.3637***	-1.4493***
	(23.2074)	(22.2342)	(5.3125)	(-8.2651)	(-7.7351)	(-8.0565)
Period Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed effects	No	No	No	No	No	No
Obs./BHCs	7650/197	7644/197	7644/197	7455/198	7449/198	7449/198
Adj. R^2	0.57	0.51	0.51	0.44	0.43	0.40

The table reports the estimates of six alternative versions of the following panel regression specification:

$$
\begin{aligned}
Defalut\ Risk_{i,t} = {} & \alpha + \beta_1 Pay\ Disparity_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Return\ on\ assets_{i,t-1} + \beta_4 Loans\ to\ assets_{i,t-1} \\
& + \beta_5 Deposits\ to\ assets_{i,t-1} + \beta_6 Non-interest\ income_{i,t-1} + \beta_7 Capital\ ratio_{i,t-1} \\
& + \beta_8 Firm\ age_{i,t-1} + \beta_9 CEO\ age_{i,t-1} + \beta_{10} CEO\ Tenure_{i,t-1} + \beta_{11} CEO\ duality_{i,t-1} \\
& + \sum_{k=1}^{n-1} \alpha_k Bank_i^k + \sum_{y=1992}^{2018} \omega_y Period_i^y + \varepsilon_{i,t}
\end{aligned}
$$

where the dependent variable *Default Risk*$_{i,t}$ is either Distance to default (*DD*) or Credit Default Swap (*CDS*). See appendix 1 for variable definition. The reported adjusted R^2s are the overall R^2s that account for the explanatory power of the bank and period fixed effects. The *t*-statistics (reported in parentheses) are based on robust standard errors, which are adjusted for heteroskedasticity and clustered at BHC level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively

Table 4. Propensity score matching analysis.

Panel A: Pre-match propensity score matching and post-match diagnostic regression

Variables	Pre-match	Post-match	Pre-match	Post-match	Pre-match	Post-match
	High CEO PaySlice		High CEO-Emp Pay Ratio		High Exec-Emp Pay Ratio	
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Size	0.128***	-0.005	1.007***	-0.013	1.149***	-0.018
	(5.43)	(-0.17)	(31.78)	(-0.32)	(32.81)	(-0.40)
Return on assets	27.531***	-1.057	-191.578***	-5.434	-237.701***	0.530
	(4.46)	(-0.15)	(-23.59)	(-0.53)	(-26.63)	(0.05)
Loans to assets	0.646***	0.005	-0.139	-0.003	-0.761***	-0.424
	(3.19)	(0.02)	(-0.57)	(-0.01)	(-2.91)	(-1.28)
Deposits to assets	2.973***	-0.117	-0.165	-0.238	-1.694***	-0.125
	(10.57)	(-0.36)	(-0.51)	(-0.60)	(-4.92)	(-0.30)
Non-interest income	-1.236***	-0.232	1.678***	-0.102	2.103***	-0.170
	(-5.66)	(-0.94)	(6.56)	(-0.32)	(7.76)	(-0.51)
Capital ratio	3.465***	-0.619	13.023***	0.231	14.787***	-1.449
	(2.88)	(-0.46)	(8.85)	(0.13)	(9.45)	(-0.75)
Firm age	-0.011***	0.004	-0.011***	-0.002	-0.010***	0.000
	(-3.99)	(1.17)	(-3.16)	(-0.57)	(-2.80)	(0.06)
CEO age	0.011**	-0.007	-0.019***	-0.004	-0.013**	0.001
	(2.41)	(-1.38)	(-3.47)	(-0.61)	(-2.27)	(0.11)
CEO tenure	0.049***	0.001	0.037***	-0.004	0.020***	-0.006
	(11.48)	(0.11)	(7.57)	(-0.66)	(3.94)	(-0.87)
CEO duality	0.261***	-0.005	0.400***	0.025	0.276***	0.044
	(4.88)	(-0.08)	(6.38)	(0.32)	(4.16)	(0.53)
Constant	-5.681***	0.418	-15.434***	0.903	-16.156***	0.510
	(-9.45)	(0.60)	(-20.78)	(0.99)	(-20.57)	(0.52)
Period Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8071	5824	8071	3338	8071	2910
Pseudo R^2	0.0687	0.0013	0.3182	0.0025	0.3813	0.002

Table 4. Propensity score matching analysis (*Continued*).

Panel B: Differences in observable bank characteristics

Variables	**Treatment group**	**Control group**	**Difference**	**t-stats**
Size	16.397	16.398	-0.001	-0.04
Return on assets	0.006	0.006	0.000	-0.35
Loans to assets	0.633	0.639	-0.006	-1.14
Deposits to assets	0.712	0.713	-0.001	-0.29
Non-interest income	0.248	0.246	0.002	0.34
Capital ratio	0.102	0.102	0.000	-0.26
Firm age	21.526	21.459	0.067	0.18
CEO age	57.261	57.314	-0.053	-0.25
CEO tenure	8.441	8.604	-0.163	-0.67
CEO duality	0.577	0.573	0.003	0.19

Panel C: Propensity score matching estimator

Variables	**Firm period obs. with high pay disparity (Treatment group)**	**Firm period obs. with low pay disparity (Control group)**	**Difference**	**T-stat**
CEO PaySlice				
CDS	1.456	1.560	-0.104	**-2.56**
DD	3.216	3.124	0.092	**2.26**
CEO-Emp Pay Ratio				
CDS	1.291	1.571	-0.280	**-5.24**
DD	3.360	3.077	0.283	**5.31**
Exec-Emp Pay Ratio				
CDS	1.312	1.576	-0.264	**-4.62**
DD	3.325	3.038	0.287	**5.01**

Table 4. Propensity score matching analysis (*Continued*).

Panel D: Multivariate regression analysis						
Variables	CDS	CDS	CDS	DD	DD	DD
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Pay disparity						
CEO PaySlice	-0.9441***			0.9669***		
	(-4.09)			(3.97)		
CEO-Emp Pay Ratio		-0.2042***			0.2223***	
		(-8.58)			(8.86)	
Exec-Emp Pay Ratio			-0.2277***			0.2531***
			(-8.47)			(8.94)
Controls						
Size	0.1609***	0.1903***	0.1974***	-0.0910***	-0.1227***	-0.1311***
	(6.91)	(8.20)	(8.46)	(-3.70)	(-5.02)	(-5.33)
Return on assets	-96.5013***	-102.2884***	-104.7519***	105.9364***	112.0484***	114.8517***
	(-16.06)	(-17.29)	(-17.62)	(16.71)	(17.96)	(18.34)
Loans to assets	-0.2780	-0.2983*	-0.3129*	0.2150	0.2372	0.2539
	(-1.61)	(-1.74)	(-1.83)	(1.18)	(1.32)	(1.41)
Deposits to assets	-1.4896***	-1.5793***	-1.6682***	1.0084***	1.0992***	1.1977***
	(-6.72)	(-7.25)	(-7.65)	(4.31)	(4.79)	(5.21)
Non-interest income	-0.7846***	-0.6932***	-0.6396***	0.8252***	0.7307***	0.6709***
	(-4.45)	(-4.00)	(-3.68)	(4.44)	(4.00)	(3.67)
Capital ratio	-10.0552***	-9.7888***	-9.6742***	8.9165***	8.6197***	8.4838***
	(-9.99)	(-9.81)	(-9.69)	(8.40)	(8.20)	(8.07)
Firm age	-0.0164***	-0.0166***	-0.0166***	0.0167***	0.0169***	0.0168***
	(-7.19)	(-7.35)	(-7.32)	(6.91)	(7.08)	(7.05)
CEO Age	0.0074*	0.0069*	0.0075**	-0.0086**	-0.0081**	-0.0087**
	(1.96)	(1.86)	(2.03)	(-2.17)	(-2.06)	(-2.23)
CEO Tenure	0.0047	0.0046	0.0035	-0.0031	-0.0031	-0.0020
	(1.38)	(1.36)	(1.06)	(-0.87)	(-0.87)	(-0.56)
CEO Duality	-0.1775***	-0.1673***	-0.1768***	0.2019***	0.1895***	0.1994***
	(-4.08)	(-3.89)	(-4.12)	(4.40)	(4.18)	(4.41)
Constant	2.2492***	2.3846***	2.6731***	1.3397**	1.1719**	0.8411
	(4.31)	(4.65)	(5.16)	(2.44)	(2.17)	(1.54)
Period Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed effects	No	No	No	No	No	No
Obs./BHCs	5824	5824	3338	3338	2910	2910
Adj. R^2	0.544	0.553	0.553	0.496	0.507	0.507

This table reports the propensity score matching estimation results. Panel A reports the parameter estimates from the logit model used to estimate the propensity scores. The dependent variables *High CEO PaySlice* (Models 1 and 2), *High CEO-Emp Pay Ratio* (Models 3 and 4), and *High Exec-Emp Pay Ratio* (Models 5 and 6) of Panel A are the indicator variable set to one if the value is greater than the sample median and zero otherwise. Panel A reports the pre-match propensity score regression (in Models 1, 3, and 5) and post-match diagnostic regression (in Models 2, 4, and 6). Panel B reports the univariate comparisons of bank characteristics between firms with high and low managerial pay disparity and the corresponding t-statistics (bold text indicates statistically significant difference at 5% or lower). Panel C reports the propensity score matching of the average treatment effect on the treated (ATT) in terms of the differences in the means between treatment and control groups. Panel D reports multivariate results relating to managerial pay disparity and default risk as specified in equation (2) based on the matched sample. The dependent variable is *CDS* in Models 1–3 and *DD* in Models 4–6. Definitions of variables are reported in Appendix 1. *t*-statistics are in parentheses. Superscripts ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Table 5. Managerial pay disparity, BHC size, and default risk

Panel A - Size and default risk

Variables	CDS	CDS	CDS	DD	DD	DD
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Assets	0.262***			-0.427***		
	(15.49)			(-12.16)		
Small (up 50B)		0.017***	0.015***		-0.028***	-0.026***
		(14.49)	(12.94)		(-11.87)	(-10.91)
Large (>50B)		0.000	-0.000		0.000	0.000
		(0.55)	(-0.08)		(0.51)	(1.31)
Constant	-1.816***	2.015***	2.639***	9.857***	3.640***	2.589***
	(-6.64)	(21.63)	(17.79)	(17.38)	(18.89)	(8.42)
Controls	No	No	Yes	No	No	Yes
Period Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs./BHCs	7969	7969	7969	7969	7969	7969
Adj. R^2	0.597	0.596	0.622	0.543	0.543	0.570

Panel B - Size and pay disparity

Variables	CEO PaySlice			CEO-Emp Pay Ratio			Exec-Emp Pay Ratio		
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)
Assets	0.004			0.277***			0.281***		
	(0.43)			(5.25)			(7.21)		
Small (up 50B)		0.000	0.001		0.010**	0.010**		0.012***	0.011***
		(0.43)	(0.84)		(2.49)	(2.52)		(4.62)	(4.10)
Large (>50B)		-0.000*	-0.000		-0.000*	-0.000*		-0.000	-0.000
		(-1.91)	(-1.38)		(-1.90)	(-1.81)		(-0.21)	(-0.12)
Constant	0.359**	0.409***	0.287***	0.320	4.340***	3.734***	1.185**	5.307***	5.019***
	(2.58)	(20.87)	(4.68)	(0.40)	(35.35)	(12.50)	(2.04)	(54.29)	(21.64)
Controls	No	No	Yes	No	No	Yes	No	No	Yes
Period Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs./BHCs	8391	8391	8391	8391	8391	8391	8391	8391	8391
Adj. R^2	0.015	0.020	0.039	0.570	0.565	0.577	0.677	0.666	0.676

Table 5. *Continued*

Panel C - Size, pay disparity and default risk						
Variables	CDS	CDS	CDS	DD	DD	DD
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
CEO PaySlice	-0.541***			0.841***		
	(-4.82)			(3.61)		
Small	0.015***	-0.018**	-0.037***	-0.022***	0.028***	0.047***
	(8.51)	(-2.39)	(-4.20)	(-6.00)	(2.59)	(3.55)
Large	0.000*	0.000	0.001	-0.000	-0.001**	-0.002*
	(1.76)	(0.67)	(1.23)	(-0.77)	(-1.98)	(-1.94)
Small* CEO PaySlice	-0.005			0.009		
	(-1.31)			(1.03)		
Large* CEO PaySlice	-0.001***			0.001**		
	(-2.74)			(2.36)		
CEO-Emp Pay Ratio		-0.155***			0.260***	
		(-5.38)			(5.47)	
Small* CEO-Emp Pay Ratio		0.004***			-0.005**	
		(2.92)			(-2.20)	
Large* CEO-Emp Pay Ratio		-0.000***			0.000***	
		(-2.88)			(4.12)	
Exec-Emp Pay Ratio			-0.159***			0.254***
			(-6.13)			(5.87)
Small* Exec-Emp Pay Ratio			0.006***			-0.007***
			(4.82)			(-3.28)
Large* Exec-Emp Pay Ratio			-0.000**			0.000***
			(-1.97)			(2.81)
Constant	2.716***	3.309***	3.497***	2.167***	1.904***	1.659***
	(21.08)	(24.13)	(23.27)	(8.09)	(8.77)	(6.87)
Period Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8281	8281	8281	8281	8281	8281

This table reports the results from OLS regression of Default risk on proxies for BHC size. The dependent variable *Default* $Risk_{i,t}$ is either Distance to default (*DD*) or Credit Default Swap (*CDS*) Spread. The *Small* BHC (<=$50 billion) variable captures the first USD 50 billion in assets and takes the value min [BHC asset size, $50 billion]. The *Large* BHC (>$50 billion) variable captures an asset size greater than USD 50 billion and takes the value max [BHC asset size - $50billion, 0]. See appendix 1 for a detailed variable definition. The reported adjusted R^2s are the overall R^2s that account for the explanatory power of the bank and period fixed effects. The t-statistics (reported in parentheses) are based on robust standard errors, which are adjusted for heteroskedasticity and clustered at BHC level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 6. Managerial pay disparity, women on the board (WOB), and default risk.

Variables	CDS	CDS	CDS	CDS	CDS	CDS
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Pay disparity						
CEO PaySlice	-0.9097***			-1.2665***		
	(-4.76)			(-6.19)		
CEO-Emp Pay Ratio		-0.1282***			-0.1107***	
		(-5.99)			(-4.08)	
Exec-Emp Pay Ratio			-0.0036			-0.1021
			(-0.11)			(-1.60)
Low_WOB	-0.1402	-0.2086*	-0.2243	-0.2581***	-0.3575**	-0.3760**
	(-1.52)	(-1.83)	(-1.60)	(-2.80)	(-2.29)	(-2.12)
Low_WOB_PaySlice	0.4423*			0.6740***		
	-1.83			-2.74		
Low_WOB_CEO-Emp		0.0508**			0.0723**	
		-2.06			-2.28	
Low_WOB_Exec-Emp			0.0443*			0.0604**
			-1.78			-2.08
Full Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Period Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed effects	No	No	No	Yes	Yes	Yes
Obs./BHCs	2182	2182	2182	2182	2182	2182
Adj. R^2	0.693	0.657	0.689	0.67	0.641	0.685

This table reports the regression results for the moderating role of women on the board (*WOB*) on the relationship between pay disparity and default risk. Here the dependent variable $Default\ Risk_{i,t}$ is Credit Default Swap (*CDS*) Spread *Low_WOB* is a dummy variable which takes the value one if the percentage of women on the board is lower (higher) than the sample median, and zero otherwise. See appendix 1 for variable definition. The reported adjusted R^2s are the overall R^2s that account for the explanatory power of the bank and period fixed effects. The *t*-statistics (reported in parentheses) are based on robust standard errors, which are adjusted for heteroskedasticity and clustered at BHC level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 7. Managerial pay disparity, co-opted boards, and default risk.

Variables	CDS	CDS	CDS	CDS	CDS	CDS
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Pay disparity						
CEO PaySlice	-0.8125***			-0.6159***		
	(-6.84)			(-4.96)		
CEO-Emp Pay Ratio		-0.0647***			-0.0712***	
		(-4.46)			(-4.57)	
Exec-Emp Pay Ratio			-0.0324*			-0.0394**
			(-1.88)			(-2.01)
High _co-option	-0.1955***	-0.2221***	-0.2405***	-0.1132*	-0.1743***	-0.2046**
	(-2.99)	(-3.39)	(-2.87)	(-1.72)	(-2.70)	(-2.46)
High _co-option_PaySlice	0.7257***			0.3043*		
	(4.29)			(1.80)		
High _co-option_CEO-Emp		0.0677***			0.0396***	
		(4.50)			(2.80)	
High _co-option_Exec-Emp			0.0576***			0.0380**
			(3.68)			(2.54)
Full Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Period Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed effects	No	No	No	Yes	Yes	Yes
Obs./BHCs	4501	4501	4501	4501	4501	4501
Adj. R^2	0.646	0.644	0.643	0.618	0.617	0.616

This table reports the regression results for the moderating role of board co-option on the relationship between pay disparity and default risk. Here the dependent variable *Default Risk*$_{i,t}$ is Credit Default Swap (*CDS*). *High_co-option* is a dummy variable that takes the value one if the percentage of co-opted directors is higher (lower) than the sample median, and zero otherwise. See appendix 1 for variable definition. The reported adjusted R^2s are the overall R^2s that account for the explanatory power of the bank and period fixed effects. The *t*-statistics (reported in parentheses) are based on robust standard errors, which are adjusted for heteroskedasticity and clustered at BHC level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 8. Managerial pay disparity and bank activities.

Variables	Deposits to assets	RE loans to assets	CI loans to assets	Non-interest income	Derivative Trading
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
CEO PaySlice	0.1763***	0.0878***	0.1275***	-0.1767***	-11.8582***
	(14.09)	(5.83)	(12.95)	(-11.10)	(-16.40)
Size	-0.0401***	-0.0208***	-0.0083***	0.0235***	1.3630***
	(-44.58)	(-18.84)	(-11.50)	(20.14)	(25.79)
Capital ratio	-0.6129***	-0.3971***	0.2619***	0.1590**	-41.0094***
	(-12.03)	(-6.53)	(6.58)	(2.47)	(-14.14)
Loan concentration	-0.0116*	0.5234***	-0.1424***	-0.2459***	-5.5338***
	(-1.86)	(70.38)	(-29.27)	(-31.28)	(-15.59)
CEO age	-0.0004**	0.0013***	0.0009***	-0.0001	-0.0266**
	(-2.09)	(5.49)	(5.40)	(-0.58)	(-2.28)
CEO tenure	0.0003*	-0.0004*	-0.0001	-0.0028***	-0.0197*
	(1.69)	(-1.79)	(-0.87)	(-12.19)	(-1.87)
CEO duality	-0.0008	-0.0094***	-0.0148***	0.0441***	-0.0997
	(-0.34)	(-3.32)	(-8.02)	(14.78)	(-0.74)
Constant	1.4019***	0.4127***	0.2093***	-0.1518	-10.2984***
	(51.95)	(3.44)	(2.67)	(-1.20)	(-7.29)
Period Fixed effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed effects	No	No	No	No	No
Observations	8135	8926	8926	8926	8621
Adj. R^2	0.313	0.540	0.107	0.326	0.242

The table reports the estimates of five alternative versions of the equation 4 panel regression specification. Here the dependent variable *BHC activity* is proxied by alternative BHC activities. See Appendix 1 for variable definition. The reported adjusted R^2s are the overall R^2s that account for the explanatory power of the period fixed effects. The *t*-statistics (reported in parentheses) are based on robust standard errors, which are adjusted for heteroskedasticity and clustered at BHC level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 9. CEO power and default risk.

Variables	CDS	CDS	DD	DD
	Model (1)	Model (2)	Model (3)	Model (4)
CEO Power	-0.0507***	-0.0383***	0.0952***	0.0929*
	(-6.88)	(-3.95)	(6.11)	(1.84)
Size	0.0465***	0.2920***	0.0554***	-0.5405***
	(6.57)	(13.41)	(3.93)	(-5.04)
Return on assets	-73.4677***	-46.8598***	153.5889***	93.4679***
	(-27.96)	(-18.31)	(28.27)	(9.73)
Loans to assets	-0.1247**	0.2171*	0.0719	0.0736
	(-2.38)	(1.95)	(0.66)	(0.16)
Deposits to assets	-0.9894***	-0.3585**	1.4193***	0.4452
	(-12.88)	(-2.57)	(8.78)	(0.63)
Non-interest income	-0.1537**	0.0576	0.3153**	-0.3293
	(-2.44)	(0.52)	(2.38)	(-0.57)
Capital ratio	-3.2690***	-0.7348	5.8061***	-1.9344
	(-9.17)	(-1.60)	(8.10)	(-0.91)
Firm age	-0.0058***	-0.0079	0.0132***	0.0323
	(-8.19)	(-1.00)	(9.03)	(1.05)
CEO age	0.0019	0.0016	-0.0035	-0.0044
	(1.53)	(0.97)	(-1.36)	(-0.62)
Constant	2.8442***	-1.7137***	0.3513	10.6130***
	(8.85)	(-4.41)	(0.58)	(5.18)
Period Fixed effects	Yes	Yes	Yes	Yes
Bank Fixed effects	No	Yes	No	Yes
Obs./BHCs	5664	5664	5664	5664
Adj. R^2	0.657	0.653	0.592	0.629

The table reports the estimates of four alternative versions of the equation 4. Here the dependent variable *Default Risk*$_{i,t}$ is either Distance to default (*DD*) or Credit Default Swap (*CDS*) Spread. Our main variable of the interest is *CEO power* (instead of pay disparity). *CEO power* is an index. See Appendix 1 for variable definition. The reported adjusted R^2s are the overall R^2s that account for the explanatory power of the bank and period fixed effects. The *t*-statistics (reported in parentheses) are based on robust standard errors, which are adjusted for heteroskedasticity and clustered at BHC level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively

Appendix 1. Definition of variables

Variable Name	Notation	Definition	Source
Default risk			
Credit Default Swap Spread	*CDS spread*	Credit derivatives that allow the transfer of the firm's default risk between two agents for a predetermined time period.	RMI-NUS
Distance to default	*DD*	Annual average of distance to default based on stock price variability.	RMI-NUS
Pay disparity			
CEO Pay slice	*CEO PaySlice*	The ratio of the CEO's annual total compensation to the total compensation of the CEO and the next four most highly paid executives in the same bank.	ExecuComp
CEO employee pay ratio	*CEO-emp Pay Ratio*	The ratio of the CEO's total annual compensation to the average employee compensation in a BHC.	ExecuComp & FRY9-C
Executive employee pay ratio	*Exec-emp Pay Ratio*	The ratio of the total compensation of the top five highly paid executives (i.e., the CEO and the next four most highly paid executives) to the average employee compensation in a BHC.	ExecuComp & FRY9-C
Main Controls			
Bank Size	*Size*	Natural logarithm of the total assets of a BHC.	FRY9-C
Performance	*Return on Assets*	Net income divided by total assets.	FRY9-C
Loans to Assets	*Loans to Assets*	Total loans divided by total assets.	FRY9-C
Deposits to Assets	*Deposits to Assets*	Deposits divided by total assets.	FRY9-C
Non-traditional banking activities	*Non-interest Income*	Non-interest income divided by the sum of the non-interest income and interest income.	FRY9-C
Capital Ratio	*Capital Ratio*	Total book value of equity divided by the book value of total assets.	FRY9-C
Firm age	*Firm age*	Difference between the first year a BHC has asset data available in the Federal Reserve Bank of Chicago's database and the present time (in years).	FRY9-C
Additional controls			
CEO age	*CEO age*	Difference between current year and date of birth.	ExecuComp & FRY9-C
CEO tenure	*CEO tenure*	Number of years a CEO serves in a BHC.	ExecuComp & FRY9-C
CEO duality	*CEO duality*	Dummy variable equals 1 if CEO is also the chairman of the board, zero otherwise.	ExecuComp & FRY9-C
Variables used in additional analyses			
\$10-\$50 Billion	*Small*	Captures the first \$50 billion in assets and takes the value of min [BHC asset size, \$50billion]	FRY9-C
>\$50 Billion	*Large*	Captures the bank asset size greater than \$50 billion and takes the value of max [BHC asset size-\$50 billion, 0].	FRY9-C
Dodd-Frank Act		Dummy variable which equals 1 for the years 2011 – 2016 and 0 for other years.	

Women on board	*WOB*	Number of women directors on the board expressed as a percentage of total board size.	Datastream
Co-opted board	*Co-option*	The proportion of directors appointed after a CEO assumes her role.	Datastream
CEO power index	*CEO power*	CEO power index ranges from 0 to 3. We assign value one if the CEO is also the chairperson of the board, and zero otherwise. We assign value one if CEO tenure is greater than the sample median, and zero otherwise. We assign a value of one if CEO shareholdings are greater than the sample median, and zero otherwise.	ExecuComp
Real Estate loans to assets	*RE loans to assets*	The ratio of real estate loans to total assets	FRY9-C
Commercial and industrial loans	*CI loans to assets*	The ratio of commercial and industrial loans to total assets	FRY9-C
Derivative Trading	*Derivative Trading to assets*	The ratio of total trading assets to total assets	FRY9-C