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Better safe than sorry? CEO inside debt and risk-taking in bank acquisitions

Better Safe than Sorry?
CEO Inside Debt and Risk-taking in Bank Acquisitions

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Abstract

Widespread bank losses during the financial crisis have raised concerns that equity-based compensation for bank CEOs causes excessive risk-taking. Debt-based compensation, so-called inside debt, aligns the interests of CEOs with those of external creditors. We examine whether inside debt induces CEOs to pursue less risky acquisitions. Consistent with this, we show that acquisitions announced by CEOs with high inside debt incentives are associated with a wealth transfer from equity to debt holders. After the completion of a deal, banks where acquiring CEOs have high inside debt incentives display lower market measures of risk and lower loss exposures for taxpayers.

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Keywords: Banks, inside debt, CEO incentives, mergers and acquisitions

1. Introduction

The risk-taking behavior of senior executives in the banking industry has become a concern for the public and for policymakers. Undue risk-taking jeopardizes the safety and soundness of individual institutions as well as the stability of the entire financial sector. Undue risk-taking also leaves the taxpayer on the hook for the potentially large losses incurred to support a fragile banking sector. One of the lessons drawn from the 2007-09 financial crisis therefore is the need to understand better how to design appropriate risk-taking incentives for bank executives (Bebchuk and Spamann, 2010; Board of Governors of the Federal Reserve, 2010; Fahlenbrach and Stulz, 2011).

The purpose of this paper is to examine whether executive compensation components that offer debt-like payoffs to CEOs align the interests of CEOs with bank debtholders. Debt-like pay is commonly referred to as 'inside debt' (Jensen and Meckling, 1976) and is made up of deferred compensation and pension plans. Inside debt is a substantial component of CEO pay whose value can outrank the value of any other type of compensation. Since inside debt is an unsecured and unfunded form of firm debt which is serviced out of future cash flows, inside debt should align the risk preferences of CEOs with those of outside creditors. Consequently, higher CEO inside debt should be associated with creditor-friendly policies, that is, policies that increase the value of debt by reducing bank risk.

At the heart of our paper lies the conflict of interest between shareholders and creditors over firm risk. Since shareholders hold convex claims over firm assets, the expected payoffs linked to equity rise exponentially with risk. Shareholders therefore prefer companies to take more risk than do other stakeholders. Shareholders can distort CEO incentives in their favor by structuring CEO pay such that it rewards CEOs for greater risk-taking (Hagendorff and Vallascas, 2011; Freixas

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and Rochet, 2013; Bolton et al., 2015), for instance by granting CEOs higher equity-based compensation, in the form of stock grants and stock options (Jensen and Meckling, 1976). It is less well known that CEO pay can also be aligned with the interests of debt holders. A growing literature has shown that compensating CEOs with inside debt can lower the risk-taking preferences of CEOs (Edmans and Liu, 2011; Phan, 2014; Bennett et al., 2015; van Bekkum, 2016). Because inside debt is an unsecured and unfunded form of firm debt, it effectively turns CEOs into creditors of their firm. CEOs with holdings of inside debt are exposed to firm default risk, as their wealth is closely linked to that of external creditors of the firm.

Conflicts of interest between shareholders and lenders are more pronounced in the case of banks than of other companies. First, banks are highly leveraged institutions, and since the benefit to shareholders from increasing risk is positively related to leverage (Parrino and Weisbach, 1999; John et al., 2000), bank shareholders have an unusually strong incentive to shift risk to creditors. Second, a special feature of banks is the presence of a taxpayer-funded financial safety net in the form of deposit insurance and other implicit guarantees. If a bank increases its riskiness, it increases the value of the taxpayer-funded safety net to the benefit of shareholders (Merton, 1977; Ronn and Verma, 1986; Hovakimian and Kane, 2000). The financial safety net feature is an additional reason why shareholders of banks stand to benefit from risk-seeking policies potentially at the expense of taxpayers (Bhattacharya and Thakor, 1993; Benston et al., 1995).

In this paper, we study the value and risk implication of mergers and acquisitions (M&A) for shareholders, debtholders and the taxpayer. Bank M&A are a major corporate investment decision with potentially important implications for different bank stakeholder groups. For instance, bank acquisitions may be motivated by shareholder incentives to increase bank risk to extract benefit from the government and taxpayer funded financial safety net, with creditors and taxpayers

potentially bearing the costs from any increase in post-acquisition bank risk (Carbo-Valverede et al., 2008; 2012; Hagendorff and Vallascas, 2011; Molyneux et al., 2014). However, whilst M&A may be considered fundamentally risky decisions in isolation (Furfine and Rosen, 2011), they may also be associated with reductions in bank risk. For instance, high inside debt may motivate CEOs to engage in diversifying and risk-reducing acquisitions.

We build on existing work on M&A and risk by studying if the relative inside debt ratio[1] of CEOs has implications for bank acquisitions, and if inside debt helps mitigate conflicts of interest between shareholders and debtholders (and taxpayers, by extension). Srivastav et al. (2014) examine why certain banks paid or maintained dividends over the recent crisis period. They show that CEOs with lower inside debt pay out a greater proportion of excess cash in dividends and repurchases. Two further papers also seek to examine how CEO inside debt affects bank risk. Bennett et al. (2015) show that larger CEO inside debt holdings before the crisis are associated with lower bank default risk during the crisis, whilst van Bekkum (2016) reports a negative relation between CEO and CFO inside debt in 2006 and measures of subsequent market volatility and tail risk during 2007-09.

Outside the banking industry, Sundaram and Yermack (2007) identify a positive relationship between inside debt and distance to default, Cassell et al. (2012) find that CEO inside debt is associated with more conservative firm policies, and Phan (2014) shows that CEO inside debt lowers equity volatility post acquisition.

Our sample consists of acquisitions announced by listed U.S. banks between 2007 and 2012. Our sample starts in 2007 so that we can take advantage of the enhanced data disclosure requirements for inside debt mandated by the Securities and Exchange Commission (SEC) from

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[1] CEO inside debt ratio scaled by the debt ratio of the bank (see Section 2.3 for a discussion).

2006. We begin by studying the relationship between inside debt and investor reactions to acquisition announcements.

Our primary event study results indicate that inside debt has a negative impact on abnormal stock returns but a positive impact on debtholder wealth on the announcement of acquisitions. This result is consistent with our expectation that both groups of investors expect that large inside debt holdings incentivize CEOs to engage in acquisitions that result in reducing bank risk. The results are economically significant. A one-standard-deviation increase in our measure of inside debt (*CEO relative inside debt ratio*) implies an increase in debt value of 270 basis points and a reduction in equity value of 91 basis points[2]. Interestingly, CEO inside debt has no effect on total bank value.

The paper proceeds by assessing the impact of pre-merger inside debt ratios on realized changes in various bank risk measures following the completion of M&A[3]: a market-based distance-to-default measure, stock volatility, and debt volatility. The results show that bank risk is negatively related to a CEO's relative inside debt ratio. A one-standard-deviation increase in inside debt implies an increase in a bank's distance-to-default (i.e. a reduction in risk) of 22.9% compared with the pre-acquisition risk value. Moreover, we investigate two key channels through which an acquisition could affect a bank's risk, namely changes in leverage and in asset risk. We find that

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[2] We note that the results in Table 3 imply that inside debt is not associated with a net value increase in firm value for acquiring banks and that the gain to debtholders induced by CEO inside debt arises from a value transfer from equity holders. However, the magnitude of gains to debtholders exceeds the magnitude of losses to shareholders for an average bank. This can be partially explained by the fact that debt makes up more than 90% of bank assets due to which the dollar gains (losses) for debtholders (equityholders) will not be of equal magnitude. We thank one of our anonymous reviewers for highlighting this point.

[3] We adjust our risk measures by industry trends in risk. We do so by subtracting changes in the value-weighted risk measures of a portfolio of all publicly listed banks (on CRSP) which are not involved in M&A during our examination window.

the link between CEO inside debt and the change in risk after an acquisition arises because of changes in both leverage and asset risk.

To further corroborate that CEO inside debt implies greater CEO conservativism, we show that banks with larger CEO inside debt give rise to lower exposure to loss for taxpayers (who underwrite the financial safety net). Our measure for potential taxpayer losses is based on a methodology used by Merton (1977), Ronn and Verma (1986), and Duan et al. (1992), which models the value of the government's financial safety net to shareholders as the value of a put option underwritten by taxpayers. The value of the put, and the expected value of losses to taxpayers, increases with bank risk. We find that there is a negative relation between CEO inside debt and the change in the estimated value of the safety net to bank shareholders. This suggests that CEO inside debt reduces the propensity of bank CEOs to engage in shifting risk to the safety net.

The paper includes a battery of robustness tests. In particular, our results are robust to controlling for possible selection bias, and to an instrumental-variable estimation that controls for the possible endogeneity of CEO pay with respect to acquisition-related risk. We acknowledge, though, that the terms of the CEO's pay, and the bank's policy towards risk, could both be affected by the culture of the board, or that high inside debt and low risk-taking could both be due to the CEO's aversion to risk (noted by Bennett et al., 2015). However, at the very least, our results document a strong relation between debt-based CEO compensation and various indicators of lower bank risk-taking when banks engage in acquisitions.

The paper makes two primary contributions. First, we extend research investigating the impact of CEO pay on bank risk-taking (Hagendorff and Vallascas, 2011; Fahlenbrach and Stulz, 2011; DeYoung et al., 2013; Bennett et al., 2015; van Bekkum, 2016). While we are not the first to

examine the effects of inside debt on bank risk (among others, Bennett et al., 2015, and van Bekkum, 2016, report a negative relationship between inside debt and bank risk), we add to existing evidence in two aspects:

First, we focus on a specific policy in the form of acquisitions, in which the CEO can safely be assumed to have a direct, leading role.[4] Our focus on corporate acquisitions therefore aids a causal interpretation of the effects of inside debt, because acquisitions provide a relatively clear-cut means of testing for the relationship between inside debt and decisions through which a CEO affects bank risk.

Perhaps the closest paper in spirit to ours is Phan (2014), who considers whether acquisitions involving CEOs with higher inside debt lead to change in the risk of non-financial firms. Like Phan (2014), our paper focuses on relationships between CEO inside debt and firm acquisitions. However, our paper contributes novel evidence specific to the banking sector. For instance, we identify changes in both leverage and asset risk linked to inside debt, and we identify specific deal characteristics through which high-inside-debt CEOs influence their bank's risk. Given the presence of safety-net guarantees that is unique to banking, and given that acquisitions can be used to *increase* a bank's risk, the impact of CEO remuneration on the risk of banks is especially pertinent.

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[4] Our paper departs from recent studies examining the relevance of inside debt for various firm polices. For example, Srivastav et al. (2014) focus on bank payout policies. While their work is informative about how inside debt may influence one important type of corporate decision, it relates more to a recent literature seeking to explain banks' dividend choices around the recent financial crisis (e.g., Acharya et al., 2017). In contrast to Srivastav et al. (2014), we argue that bank acquisitions are more directly revealing of CEO preferences, representing a specific strategic corporate policy in which the CEO has a key role and offering a unique perspective into CEO decision making (Graham, et al., 2015; Cain and McKeon, 2016). Cain and McKeon (2016) note that "if managerial risk aversion imposes agency costs through suboptimal project selection ... then acquisition activity is a plausible channel in which we could find systematic differences" (p.141).

Second, we contribute to the literature on bank risk and its implications for taxpayers (e.g. Benston et al., 1995; Carbo-Valverde et al., 2012; Dam and Koetter, 2012; Hovakimian et al., 2012). Our paper is the first to link inside debt and other forms of executive compensation to the exposure to loss of taxpayers caused by deposit insurance guarantees. In effect, we are able to estimate how CEO inside debt and other pay components affect the subsidy which shareholders extract from the financial safety net. This is an important question to address, given concerns regarding excessive bank risk-taking and failures with implications for macro-economic and financial market stability (DeYoung et al., 2009), and given the cost borne by taxpayers in rescuing distressed financial institutions. Specifically, we offer important first evidence that inside debt affects the industry-adjusted insurance price premium (IPP), a measure of the extent to which banks exploit safety-net subsidies and potentially expropriate value from government and taxpayers (Ronn and Verma, 1986).

The rest of the paper is organized as follows. Section 2 describes the research design and sample. Section 3 presents the main results, Section 4 discusses the results for the value of the safety net, and Section 5 shows the robustness of our tests to various checks. Finally, Section 6 concludes.

2. Research design

2.1 Data

We begin by sourcing all acquisitions announced by publicly listed US banks between 2007 and 2012 from the Thomson Financial Mergers and Acquisitions (SDC Platinum) database. Consistent with prior literature, we exclude self-tenders, leveraged buyouts, and recapitalizations.

As we are interested in examining acquisitions that can potentially affect the risk of the acquirer, we require deal values to be at least $10 million. All deals involve U.S. targets.

This gives us an initial sample of 168 deals. Some banks make multiple acquisitions within the same year, and we consolidate such deals into a single deal, following Furfine and Rosen (2011). In these cases, deal characteristics are weighted by the value of each transaction, the announcement date is the date when the first acquisition was announced, and the completion date is the date when the last acquisition was completed. This reduces the sample by 15 deals.

We further require financial information for the acquiring bank to be available from the quarterly FR Y9-C reports, and market data from the Center for Research in Security Prices (CRSP). We eliminate deals where data are not available, and this reduces the sample by a further 53 deals. Our final sample consists of 101 acquisitions by 62 banks over the period 2007-2012. We extract CEO compensation data from Compustat's Execucomp database for 66 bank-year observations and, where missing, supplement Execucomp data with hand-collected data (35 bank-year observations) from proxy statements (DEF 14A) filed with the SEC. Corporate governance data are from the Riskmetrics database, also supplemented with data from DEF 14A filings where data items are missing.

2.2 Dependent variables

2.2.1 Acquisition-related change in bank value

We compute abnormal returns on bank equity and debt using the market model as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{1}$$

where R_{it} is the return of security i on day t and R_{mt} is the return on a bank market index. The bank market index is constructed using value-weighted daily returns data for all public banks. We compute Cumulative Abnormal Returns (CARs) over a [-2, +2] day interval surrounding the deal announcement.

The daily returns on a bank's debt in equation (1) are calculated using the estimated market values of debt. We follow Eisdorfer et al. (2013) to estimate the market value of debt via a two-equation contingent claims model (as originally proposed by Ronn and Verma (1986), see Appendix C).[5] The reason we select this approach over computing CARs on bonds that trade in the secondary market is to preserve a meaningful sample size. Additionally, bonds only make up a small fraction of bank liabilities. Most bank liabilities are in the form of deposits and other non-tradable securities which are not accounted for in an event study on bond prices.

2.2.2 Acquisition-related change in bank risk

Default risk. Our main measure of risk is the Merton distance-to-default (*DD*) measure, where default is viewed as occurring when the market value of a firm's assets falls short of the face value of its liabilities. Gropp et al. (2006) demonstrate that *DD* can be applied to banking firms and that *DD* scores outperform other measures of risk in terms of predicting bank default over most examination periods. Under the *DD* model, the default risk of a firm is calculated as the number of standard deviations by which the market value of its assets needs to fall to reach the default point. Therefore, higher *DD* means a safer bank. Following Gropp et al. (2006), we express *DD* as:

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[5] As a robustness test, we repeat our main analysis using bond data for 31 observations following Bessembinder et al. (2009) and May (2010) and CDS data for 24 observations following Demirguc-Kunt and Huizinga (2013) and Wei and Yermack (2011). We confirm that our main results remain qualitatively similar over this smaller sub-sample.

$$DD_t = (\ln(V_{A,t}/L_t) + (r - 0.5\ \sigma_{A,t})^2 T) / (\sigma_{A,t}\ T) \qquad\qquad (3)$$

where $V_{A,t}$ is the market value of assets at date t, L_t is the book value of the bank's liabilities, $\sigma_{A,t}$ is a measure of asset volatility calculated using the standard deviation of asset values, and T is set equal to 1 to determine the acquirer's default risk in the next year. The calculation of $V_{A,t}$ and $\sigma_{A,t}$ is explained in Appendix C.

To measure the change in risk due to an acquisition, we calculate the average daily *DD* value of each acquirer over the period of 180 to 11 trading days before the deal is first announced, and 11 to 180 days after a deal has been completed, adjusted for industry trends. A change in industry-adjusted distance-to-default (Δ*Distance-to-Default*) between announcement and completion of the acquisition can then be calculated:

$$\Delta Distance\text{-}to\text{-}Default_i\ =\ \Delta DD_i - \text{Average } \Delta DD \text{ of non-acquiring banks} \qquad (4)$$

where a positive value of ΔDD implies a *reduction* in default risk.

Equity and debt risk. To measure the change in risk due to an acquisition, we calculate the equity (debt) volatility as the standard deviation of abnormal equity (debt) returns that are used to compute CARs in Section 2.2.1 above. Volatility measures are computed for each acquirer over 180 to 11 trading days before the deal is announced and 11 to 180 days after a deal has been completed.

Our risk measures also consider general industry trends in risk. For instance, if many acquisitions occur towards the end of distressed periods for the banking industry, we may wrongly attribute a reduction in bank risk in the post-acquisition period to the acquisition rather than to the return of market conditions back to normal levels. General industry trends are calculated by means

of a value-weighted average volatility score, over the same pre- and post-acquisition windows for each deal, across all banks on CRSP which did not engage in an acquisition. The change in the industry-adjusted equity or debt volatility between announcement and completion of an acquisition can then be calculated as follows:

$$\Delta Equity\ risk\ (\Delta Debt\ risk)_i = \Delta Equity\ volatility\ (\Delta Debt\ volatility)_i - \Delta Average\ equity\ volatility$$

$$(\Delta Average\ debt\ volatility)\ \text{of non-acquiring banks} \quad (5)$$

where a negative value of $\Delta Equity\ risk\ (\Delta Debt\ risk)$ implies a *reduction* in bank risk.

2.3 CEO inside debt

The argument that inside debt affects the CEO's incentive to take risk is simply that, other things being equal, the value of the bank's debt, including inside debt, is maximised by taking less risk than the risk required to maximise the value of its equity. This is because some high-risk projects create more value per dollar of equity than per dollar of debt and *vice versa* for some low-risk projects. To measure the incentive effect of CEO inside debt on firm risk, we follow several recent papers in computing CEO inside debt as the CEO inside debt ratio scaled by the debt ratio of the bank (e.g., Cassell et al., 2012):

$$CEO\ relative\ inside\ debt\ ratio \quad = \frac{CEO\ inside\ debt/CEO\ equity}{Bank\ debt/Bank\ equity} \quad (6)$$

where *CEO inside debt* is the sum of the present value of accumulated pension benefits and deferred compensation, as estimated by the bank and shown in its proxy statement; *CEO equity* is

the value of the CEO's holdings of equity and stock, as at the financial year-end of the bank; *Bank debt* is the total of the bank's deposits and debt outstanding; and *Bank equity* is the market value of the bank's equity, adjusted for the value of the stock options, estimated from the Black-Scholes formula using data as at the financial year-end. Data on the stock options outstanding is from the annual 10-K report filings with the SEC. The scaling in (6) means that, if *CEO relative inside debt ratio* is equal to one, the CEO owns the same proportion of the bank's debt as of its equity. In this case, the CEO has no personal incentive to select either high-risk projects that favour equity, or low-risk projects that favour debt.

2.4 Control variables

CEO option-based incentives. Our purpose is to examine the relationship between CEO behavior and the incentive to take risk that arises from the mix of inside equity and debt in CEO wealth. A separate incentive to take risk, one that is not measured by an inside debt ratio, arises as a consequence of the CEO's holding of stock options. We calculate *CEO vega* and *CEO delta* for the CEO's portfolio of inside equity and options, following a standard methodology as set out in Guay (1999) and Core and Guay (2002). Vega is the rate of change of the value of the portfolio of inside equity and options with respect to the volatility of the shares. If there are no options, vega is zero. Delta is the rate of change of the value of the portfolio with respect to the price of the shares. Delta is equal to one for the equity component, and it is a number between 0 and 1 for the stock options. Since vega and delta incentives are highly correlated with bank size, we scale them by total cash compensation following Hangedorff and Vallascas (2011).

Firm-specific variables. We control for bank-specific attributes by including measures of bank size, ln(*Assets*), and profitability, *Net income/Assets*, where assets are measured at book value. We

also include the bank's Charter value, defined as the market value of assets divided by the book value as at the financial year-end. This is a measure of the present value of growth opportunities for the bank (Keeley, 1990; Demsetz et al, 1996; Goyal 2005). Because charter value captures the present value of future profits that a bank is expected to earn as a going concern, it is an important factor in explaining a bank's willingness to assume risks (Demsetz et al, 1996).

We also include a measure of leverage, *Equity/Assets*, since the benefits to shareholders from risk-taking are increasing in bank leverage (John and John, 1993). Our measure of leverage is Tier-1 equity divided by the book value of assets[6]. Finally, we include dummy variable *High return (High risk)* which is one if a bank is in the top (bottom) quartile of return (risk), and zero otherwise. The high risk dummy captures incentives of high risk banks to pursue acquisitions that reduce their risk (Furfine and Rosen, 2011; Vallascas and Hagendorff, 2011). For instance, Furfine and Rosen (2011) show that the pre-merger default risk of firms affects their merger-related changes in risk.

Corporate governance. Prior research has shown that banks with stronger boards, characterised by the quality of board monitoring and advising, make decisions more consistent with shareholder incentives to encourage risk-taking (Andres and Vallelado, 2008; John et al., 2008; Pathan, 2009). We control for the strength of the board by means of a dummy variable which equals one if the CEO also serves as the chairman (*CEO is chair*), and by including the percentage of independent directors (*%boardindep*), and the number of directors on the board (*Board size*). We also include the age of the CEO (Ln(*CEO age*)) since it is possible that older CEOs are more likely to be conservative with respect to risk.

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[6] This regulatory leverage ratio has been employed, amongst others, by Abreu and Gulamhussen (2013) and Rampini et al. (2017). One of the salient features of this leverage measure is that it is of specific significance from a bank regulatory perspective. Large U.S. banks are required to operate with Tier 1 capital of at least 4% relative to unweighted total assets. Focusing on this leverage measure allows us to control for the 'quality' and extent of bank capital, factors which may influence strategic bank decisions, including corporate acquisitions.

Deal characteristics. Deal size and risk could be positively related, due to increased complexity when integrating the target bank into the operations of the acquirer. We control for the relative size of acquisitions (*Relative Size*), defined as the amount paid for the target bank divided by the acquirer's market capitalization at the time of the announcement. Larger deals may lead to more diversification gains that may reduce the risk of firm debt through reductions in default risk (Vallascas and Hagendorff, 2011). In addition, the method of financing a deal can also affect the acquirer's default risk, e.g. a cash-financed deal could increase default risk by depleting the bank's most liquid assets (Choi et al., 2010). To control for this, we include *Method of Financing*, which measures the percentage of the acquisition financed by stock. We also control for diversification, since this should be negatively related to risk. The dummy variable *Diversifying takeover* is equal to one if the target and acquirer have different SIC sub-industry classifications. A private (unlisted) target bank is likely to have a higher degree of opacity (Officer et al., 2009), which could be positively related to post-takeover risk. Thus, we control for whether the deal involved a *Private target*.

Macroeconomic conditions. Since CEOs face fewer restrictions on their choice of bank policies during periods of economic growth, they may be more likely to pursue risky policies during periods of economic growth (DeYoung et al., 2013). Accordingly, we control for macroeconomic conditions. Our measure, *Macro conditions*, is the Federal Reserve Bank of Philadelphia's state-coincident index which summarizes the macroeconomic conditions in the state where the acquirer has its headquarters.

2.5 Descriptive statistics

Table 1 Panel A reports the annual distribution of M&A deals. Nearly 40% of deals were announced in 2007, whilst Table 1 Panel B provides correlations between our dependent variables and key controls (bank CEO pay incentives and financials). Table 2 presents descriptive statistics. The mean (median) announcement CAR is -0.011 (-0.018) for equity, -0.053 (-0.005) for debt, and -0.096 (-0.008) for the value-weighted average of equity and debt combined. The negative market reaction is consistent with extant bank M&A evidence (see DeYoung et al., 2009 for a review of the post-2000 literature).

[Insert Tables 1 and 2 here]

The mean (median) CEO relative inside debt ratio is 0.070 (0.045) which is comparable to those reported in other studies on banks ((see Bennett et al. (2015) and van Bekkum (2016)). The relative figure indicates clearly that the personal incentives of bank CEOs are aligned more towards shareholders than towards creditors. In addition, mean CEO vega is 0.135 (0.035), and mean CEO delta 0.514 (0.158), indicating that the risk-increasing incentive arising from stock options is quite substantial in relation to the incentive to increase shareholder value arising from the CEO's holdings of equity and options.

[Insert Figure 1 here]

Figure 1 provides a first indication as to whether inside debt affects Δ*Distance-to-Default* (ΔDD). The figure shows the average DD for each day in the 180-day event windows before

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acquisition announcement and after completion, for the top and bottom quartile of banks by *CEO inside debt ratio*. An upward shift indicates an increase in the average distance-to-default (i.e. a reduction in default risk). There is a substantial difference across the two samples with respect to the impact of the acquisition on bank risk. Average *DD* for the low-inside-debt sample of acquirers shows no obvious change after the acquisition, whereas average *DD* increases (risk declines) noticeably for the high-inside-debt sample[7].

3. Results

3.1 Inside debt and changes in bank value: market expectations of risk-taking

In this section, we start by exploring the relationship between CEO inside debt holdings and changes in bank equity, bank debt, and total bank value. In each case, our relevant dependent variable is the estimated CAR from an event study computed using daily returns, as previously explained in Section 2.2.1.

We use the estimated equity (debt) CAR in the following regression model:

$$CAR_{i,t} = \beta_0 + \beta_1(CEO\ relative\ inside\ debt\ ratio_{i,t-1}) + \beta_2(Control\ variables_{i,t-1}) + \beta_4(F_t) + \varepsilon_{i,t} \quad (7)$$

where $CAR_{i,t}$ is the cumulative abnormal equity (debt) return estimated from equation 1, and F_t is a dummy variable equal to one each fiscal year t. A positive CAR value implies a positive abnormal merger return to equity (debt) holders from a bank acquisition.

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[7] We also conduct univariate tests to confirm the intuition behind our main results. We find that the directional changes in bank risk between top and bottom deciles is statistically significant (p-value < 10%).

[Insert Table 3 here]

Table 3 presents the results. We begin by discussing results from the OLS regressions presented in columns (1)-(3). In column (1) we find that the coefficient on *CEO relative inside debt ratio* is negative and statistically significant (p-value < 5%), which implies that higher CEO inside debt is associated with a loss in shareholder value following the announcement of a bank acquisition. By contrast, higher inside debt is positively and significantly associated with changes in debt value. These results indicate that abnormal returns to shareholders are negatively associated with our measures of inside debt, while abnormal returns to debtholders are positively related. A one standard deviation increase in *CEO relative inside debt ratio* results in reducing equity value by 91 basis points (column 1), while increasing debt value by 270 basis points (column 2).

Next, we combine equity and debt CARs to examine the impact of CEO inside debt on total bank value using a method employed in Hilscher and Şişli-Ciamarra (2013). We compute changes in total bank value by weighting our previously computed equity CARs by market leverage (measured as the market value of equity divided by the sum of market values of equity and debt[8]) and our debt CARs by one minus market leverage[9]. As shown in column (3), we find no evidence that changes in total bank value are affected by CEO inside debt holdings. Taken together, the results indicate that inside debt promotes a wealth transfer from equity holders to debtholders, or a smaller transfer from debt to equity, with no effect on bank value overall.

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[8] Following Eisdorfer et al. (2013), we compute the market value of debt using the two-equation contingent claims model proposed by Ronn and Verma (1986). Please refer to Appendix C for a detailed discussion.

[9] Our results remain very similar if we use total bank value which is the sum of equity and debt CARs, without any weights.

The results thus far support our *a priori* expectation that inside debt results in closer alignment between managerial and debtholder interests. Specifically, debtholders perceive that CEOs with high inside debt pursue risk-reducing acquisitions that may well result in lower credit risk. By contrast, equity holders bear the expected costs of risk-reducing acquisitions and likely perceive such decisions to be a forgone opportunity to maximise the value of the financial safety net which subsidises risk-taking.

Regarding other variables, we find that the percent of independent directors (*%boardindep*) is negatively associated with changes in equity value, potentially because independent directors may struggle to access detailed, accurate and timely information from managers (Armstrong et al., 2014; Chen et al., 2015). This is also consistent with Pathan and Faff (2013) who show that increases in independent directors leads to declines in bank performance. In addition, we present tentative evidence that increases in the relative size of the deal are associated with positive abnormal returns to equity holders, implying that the merger may create economies of scale for the acquirer (Brewer and Jagtiani, 2013) and benefit from enhanced government safety net protection (Benston et al., 1995).

So far we have discussed OLS results, presented in columns (1)-(3), which examine associations between CEO inside debt holdings and changes in bank equity, bank debt, and total bank value. However, a concern is that banks that choose to make an acquisition are not a random sample from the population of all banks. Our analysis therefore needs to be robust to such potential selection bias.

We deal with self-selection bias by means of the Heckman (1979) two-stage method, and Table 3 columns (4)-(6) repeat our OLS analysis ((columns (1)-(3)) but using the Heckman (1979) two-stage framework. The first stage is a probit regression in which the dependent variable, $Acq_{i,t}$, is

equal to one if bank *i* announces an acquisition in our sample in year *t*, and zero otherwise. We use the same explanatory variables in the probit regression as in our OLS regression model (bar deal-specific controls)[10].

Our preferred instrument is '*Historical Asset Growth*' (measured as historical three-year average growth of assets relative to the industry). A bank with low historical growth may be more likely to initiate acquisitions, but historical asset growth is unlikely to be associated with current merger-induced changes in bank risk[11,12]. Following the first-stage estimations, the second stage subsequently estimates the OLS regressions that explain acquisition-related changes in bank value or risk, with the additional term, the inverse Mills ratio λ_i, included.

The coefficient on λ_i estimates the correlation between the error term of the relevant regression before adding λ_i, and the expected value of the error term of the first-stage regression. Thus, the two-stage procedure controls for the possible impact on bank risk of the decision to make an acquisition[13]. We continue our analysis with the inclusion of the inverse Mills ratio obtained from the first-stage probit regression in order to control for selection bias.

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[10] To conduct the first-stage regression we use data from all publicly listed banks with financial data on FR-Y9C and market data from CRSP. We extract data on CEO compensation variables from Compustat's Execucomp, which results in 98 banks (or, 551 bank-year observations) over our sample period. Bennett et al. (2015) note that the Execucomp sample is biased towards larger banks and hence we supplement this by extracting data from SNL Financial and by engaging in an extensive hand-collection effort for the remaining public US banks. This process results in a final sample consisting of 415 unique banks (or, 1821 bank-year observations), which is broadly consistent with Bennett et al. (2015) and van Bekkum (2016).

[11] Empirical evidence supports the assertion that pre- and post- merger asset growth rates exhibit no significant differences (e.g., Vennet, 1996). Similarly, Anand and Singh (1997) argue that the potential benefits of acquisitions should be independent of the firm's pre-merger growth rate. Since our dependent variable is designed to capture only changes in risk around acquisition window (and by extension because of the target's characteristics), it is unlikely to be associated with historical asset growth.

[12] As shown in Appendix B we find that historical asset growth is negatively related to the probability of acquisitions.

[13] In unreported tests, we also conduct various sensitivity tests for our Heckman model by including our 'Asset Growth' variable in our second-stage regressions, but it is unable to explain acquirer returns or changes in risk. In

Columns (4)-(6) of Table 3 highlights that our main result with respect to the impact of CEO inside debt on wealth transfer between equity and bond holders around bank acquisitions continues to hold. That is, we find that *CEO relative inside debt ratio* is negatively (positively) associated with equity (debt CAR) in column (4) ((column (5)) and statistically significant (p-value < 1% in column (4) and p-value < 1% in column (5)).

Taken together, our OLS and Heckman results in Table 3 indicate that CEO inside debt holdings are associated with a reduction in equity value but an increase in debtholder value. This supports our expectation that inside debt results in closer alignment between managerial and debtholder interests. Specifically, debtholders perceive that CEOs with high inside debt pursue risk-reducing acquisitions that may well result in lower credit risk. By contrast, equity holders bear the expected costs of risk-reducing acquisitions and likely perceive such decisions to be a forgone opportunity to maximise the value of the financial safety net which subsidises risk-taking.

3.2 Inside debt and changes in bank risk: the realized risk implications of acquisitions

Section 3.1 found that inside debt is associated with acquisition announcement returns that are favourable to debtholders, but unfavourable to shareholders. This finding is indicative of investor expectations that investment decisions pursued by CEOs with high inside debt are aimed at reducing bank risk (Edmans and Liu, 2011; Wei and Yermack, 2011). If inside debt incentivizes CEOs to implement more conservative bank policies, we expect inside debt to be negatively associated with acquisition-related changes in bank risk following the completion of an acquisition.

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addition, we confirm that multicollinearity is unlikely to be a problem in our Heckman setup because VIF for all of our regression models is below the threshold value of 10 where multicollinearity is regarded as high (Greene, 2008)

We specify the following regression to examine risk changes around acquisitions:

$$\Delta Risk_{i,t} = \beta_0 + \beta_1(CEO\ relative\ inside\ debt\ ratio_{i,t-1}) + \beta_2(Control\ variables_{i,t-1}) + \beta_3(F_t) + \varepsilon_{i,t}$$

(8)

where $\Delta Risk_{i,t}$ is the change in DD, equity risk, or debt risk, computed as the difference in our risk variable measured over days 11 to 180 after the merger is completed and days 180 to 11 before the merger is announced, after adjusting for industry trends over the same period. F_t is a dummy variable equal to one each fiscal year t. A negative (positive) value of *DD* (*Equity risk* and *Debt risk)* implies an increase in bank risk.

Table 4 presents the results of regressions which consider the risk implications of acquisitions in terms of distance-to-default, equity volatility and debt volatility. Across all models our measures of CEO inside debt are negatively associated with changes in bank risk, which supports the hypothesis that the CEO's remuneration package affects the riskiness of the bank's acquisitions[14]. For example, a one standard deviation increase in *CEO relative inside debt ratio* increases ΔDD by 0.159 units (in model 1). To put this into perspective, the mean level of *DD* before the merger is 0.694 units. Thus, on average, if relative inside debt is one standard deviation higher, default risk decreases by 22.9 percentage points, relative to its pre-merger value. This is an economically meaningful reduction in the acquirer's default risk.

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[14] Throughout our analysis we include a comprehensive set of control variables identified by prior literature on the determinants of acquisition value and risk effects (Phan, 2014). However, other variables may be related to bank risk. In unreported tests we show that our results continue to hold when we control for additional features of banks that are related to bank risk ((see Bennett et al. (2015)): cash and items due from other banks, brokered deposits, loan loss reserves, non-performing assets, and securities held.

[Insert Table 4 here]

Together these findings confirm that bank CEO inside debt holdings are a key mechanism for helping to realign the implicit risk-taking incentives of bank CEOs with the interests of holders of debt and other bank stakeholders (Bennett et al., 2015; van Bekkum, 2016).

3.3 Channels of risk reduction

This section explores relations between CEO inside debt and asset and leverage risk, two channels through which bank CEOs might affect risk when engaging in acquisitions. Prior research has shown that bank acquisitions often affect leverage and asset risk, although predictions differ about the direction of change (Benston et al., 1995; Akhavein et al., 1997; Demsetz and Strahan, 1997).

In contrast to estimations based on market-data, our measures *Leverage Risk* and *Asset Risk* measures are less sensitive to market sentiment and adverse market movements during the crisis. Specifically, the industry-adjusted asset and leverage ratios we employ will partly also reflect pre-crisis risks. This is relevant since market-based indicators of financial stability have recently garnered widespread criticism in the post-financial crisis landscape because they vary considerably during crisis periods compared to normal economic conditions and may fail to capture underlying fundamentals during crisis periods. This could lead to an inaccurate assessment of banks' key risks including default risk (Arregui et al., 2013). Therefore, estimations based on stock return volatility only may prove unreliable in periods such as the recent financial crisis risks.

We follow convention in measuring leverage risk using the total risk-based capital ratio, defined as total equity capital expressed as a fraction of risk-weighted assets. We also follow convention in computing asset risk as the fraction of risk-weighted assets to total assets. Both these

measures are adjusted by industry averages for non-acquiring banks. The dependent variables are the measures of leverage and asset risk one quarter after completion of the takeover, less the relevant measure one quarter before the announcement.

[Insert Table 5 here]

Table 5 presents the results. In Panel A (Panel B), we find that *CEO relative inside debt ratio* is negatively (positively) and significantly related to Asset Risk (Leverage Risk) (p-value < 10% or less). The results suggest that the CEO's incentive to take risk affects bank acquisition-related risk via both leverage and asset risk. This is pertinent since our measure of asset risk is used by bank regulators as a direct means of assessing bank portfolio risk.

Having shown how inside debt holdings affect changes in leverage and asset risk, Table 5 also explores the channels of risk-reduction and assess how merger deal characteristics, including relative deal size and target-firm characteristics, influence acquisition-related changes in asset risk and leverage risk[15]. In Panel A, we find that the term *CEO relative inside debt ratio * Relative Size* is negative and statistically significant (p-value < 1%). This implies that high-inside-debt CEOs are more likely to pursue larger deals, which change a bank's risk profile. We also find some evidence that high-inside-debt CEOs engage in diversifying acquisitions, and acquire a listed target to reduce asset risk. In Panel B, we highlight the positive and statistically significant interaction *CEO relative inside debt ratio * Relative Size*, which implies that relative size affects changes in asset and leverage risk for identically debt-incentivised CEOs. The negative and statistically

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[15] In unreported tests available on request, we also conducted sensitivity analysis, in which we show that inside debt is positively associated with changes in leverage risk components (changes in retained earnings and common equity) and positively associated with measures of asset quality (non-performing assets).

significant (p-value < 10%) coefficient on *CEO relative inside debt ratio * Method of financing* suggests that acquisitions by high-inside-debt CEOs when payment contains a larger proportion of stock financing are associated with reductions in leverage risk.

Taken together, our results so far support the notion that high-inside-debt CEOs are associated with acquisitions that produce significant changes in a bank's risk profile.

4. Inside debt, takeovers, and the loss exposure of taxpayers

In this section, we explore the implications of inside debt for taxpayers by considering the relationship between CEO inside debt and changes in the exposure of taxpayers to loss around bank acquisitions. Our investigation is timely, since in the wake of the 2007-2009 financial crisis much attention has been given to so-called excessive risk-taking by banking institutions and to huge taxpayer-funded bailouts. To the best of our knowledge, the present paper is the first to directly consider the implications of CEO inside debt compensation for the financial benefits that bank shareholders can extract from the financial safety net. Our expectation here is that increases in CEO inside debt negatively influence the per-dollar amount that holders of bank equity can extract from the safety net.

The presence of the safety net, in the form of explicit and implicit government guarantees of bank liabilities, implies that bank shareholders can shift risk to the government and taxpayers who underwrite the safety net (Ronn and Verma, 1986). Carbo-Valverde et al. (2012) present evidence that acquisitions can serve as a means by which banks engage in this form of risk-shifting. We take the enquiry further by testing whether inside debt is negatively related to the change in value of the bank's safety net following an acquisition:

$\Delta IPP_{i,t} = \beta_0 + \beta_1(\textit{CEO relative inside debt ratio}_{i,t-1}) + \beta_2(\textit{Control variables}_{i,t-1}) + \beta_4(\sigma_{A,t}) + \beta_5(F_t)$

$\qquad + \ \varepsilon_{i,t}$ (9)

where $\Delta IPP_{i,t}$ is the change in the industry-adjusted insurance price premium (*IPP*), $\sigma_{A,t}$ is a bank's portfolio risk (see below)*,* and F_t is a dummy variable equal to one each fiscal year *t*. A positive value of ΔIPP implies that the value of the safety net increases after the acquisition. We estimate the value of *IPP* by means of the methodology in Merton (1977). By guaranteeing bank debt, the government implicitly writes a put option for the bank, whose value as a percentage of the bank's debt can be expressed as:

$$IPP \ = \ N(y + \sigma_{A,t}\sqrt{T}) - ((1 - \delta)^n \ (V_{A,t}/B_t) \ N(y)) \tag{10}$$

$$y \ = \ (\ln[B/V_{A,t}(1 - \delta)n] - \sigma_{A,t}^2 T/2)/\sigma_{A,t}\sqrt{T}), \tag{11}$$

where B_t is the book value of liabilities, δ is the fraction of dividend to assets, *n* is the number of dividend payments per year, $N(\cdot)$ is the cumulative standard normal distribution, and *T* is set equal to one based on the assumption that bank deposits mature in the next year when a bank examination or audit occurs. The calculation of $V_{A,t}$ and $\sigma_{A,t}$ is explained in Appendix C. Our measure of the change in the value of the safety net, ΔIPP, is the difference between the average *IPP* during days 180 to 11 before the announcement, and days 11 to 180 after completion, less the changes in *IPP* due to general industry trends. We calculate general industry trends in *IPP* by means of a value-weighted average *IPP*, over the same windows for each deal, across all banks on CRSP which did not engage in an acquisition.

[Insert Table 6 here]

The results in Table 6 show that there is a significant negative relation between Δ*IPP* and CEO inside debt. This result is also significant in an economic sense. Specifically, one standard deviation increase in *CEO relative inside debt ratio* is associated with a relative decrease in the value of *IPP* of 10 basis points.

The negative relation between Δ*IPP* and CEO inside debt implies that higher CEO inside debt results in a lower value extracted from the financial safety net. This finding is noteworthy because it suggests that the incentives resulting from the CEO's remuneration not only affect a bank's overall risk, as measured by distance to default and other measures, but also affect the expected value of the exposure to loss of taxpayers. Such exposure is a consequence of bank risk-taking that is of specific concern to regulators and governments, given a system in which the state protects retail depositors. Changes in taxpayer loss exposure are even more dramatic when banks have *High IPP* pre-acquisition, which is associated with a statistically significant reduction in post-acquisition taxpayer exposure to loss.

Regarding the control variables*,* it is interesting to note that bank size enters with a positive coefficient (significant at the 10% level)[16]. This indicates that larger banks extract more benefits from the safety net when engaging in acquisitions, which is broadly consistent with prior literature

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[16] Bennett et al. (2015) report that inside debt does not have significant effects on the risk of 'mega' banks. In unreported tests available on request, we run regressions on our measures of bank risk using a two-step Heckman estimator in which we introduce an interactive term between inside debt and pre-acquisition size of acquiring banks. We find that this interaction term is positive but not statistically significant at conventional levels, thereby suggesting that bank size pre-acquisition does not significantly affect the sensitivity of changes in bank risk to CEO inside debt.

(John et al., 1991; Benston et al., 1995). Also, banks with higher *Pre-merger Asset Volatility* pursue acquisitions that are associated with increases in post-acquisition *IPP*.

5. Additional tests

5.1 Endogenous CEO pay?

It is possible that CEO pay is endogenous with respect to acquisition risk. CEOs might negotiate their compensation arrangements in anticipation of pursuing an acquisition in the future. For instance, in anticipation of a risk-decreasing acquisition, a CEO might negotiate a higher fraction of compensation to be paid in the form of inside debt. Similarly, boards may preempt possible erosion of shareholder value following acquisitions by high inside debt CEOs, by adjusting CEO pay to mitigate possible future wealth transfer from equity holders to bond holders. In these scenarios, it is not inside debt that is causing the CEO to undertake a risk-reducing acquisition, and our estimates above would be biased.

To buttress a causal interpretation of our results, with respect to the impact of CEO inside debt on changes in value and risk, we run regressions that explicitly control for endogeneity using a Two-Stage least squares (2SLS) regression framework. Our instruments are average CEO pay incentives at a peer group of publicly listed U.S. banks which are in the same size quartile as the acquiring bank.

[Insert Table 7]

Our choice of instruments is based on the view that the variable should be correlated with acquiring bank pay incentives but not have a direct impact on the merger-induced change in bank

risk[17]. The rationale behind these instruments is as follows. If firms design executives' pay incentives by benchmarking their pay against that of peers (Bouwman, 2012; Gande and Kalpathy, 2017), we can expect the level and structure of peer group compensation to be associated with acquiring bank CEO pay. Since board of directors have little control over the external pay of peer groups, pay practices at peer institutions should not be related to the acquisition-related change in bank risk at an acquiring bank, apart from the effect that peer pay has on setting the CEO compensation package at the acquiring bank.

A potential further concern is that the banks in our peer group may also have similar risk profiles, which may be associated with acquiring firm risk. It is therefore worth highlighting that our dependent variable is industry-adjusted, and so is designed to remove any variation in risk that is due to system-wide changes over a portfolio of non-acquiring peer banks.

The results shown in Table 7 are consistent with our prior analysis[18]. *CEO relative inside debt ratio* has the expected sign and is statistically significant at p-value < 10% level or better in three out of seven specifications.

5.2 Do deviations from an optimal level of CEO inside debt levels explain our results?

Our prior findings highlight that inside debt is positively associated with changes in debt value, but negatively associated with changes in equity value around acquisitions. Campbell et al. (2016)

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[17] Peer-based remuneration measures have recently been used as an instrument for CEO remuneration by several other authors (e.g., Cassell et al., 2012; Kini and Williams, 2012). Moreover, remuneration practices at a peer group of similar companies are an important determinant of a given CEO's remuneration (Faulkender and Yang, 2010).

[18] In our first-stage results, peer inside debt compensation has the expected sign and is statistically significant at p-value < 5% level or better.

adopt an optimal contracting view and suggest that investor reactions to CEO inside debt holdings may be conditional on the deviation of inside debt ratios from the optimal level.

[Insert Table 8 here]

Our empirical setup involves estimating optimal inside debt ratios and examining which component (optimal or deviation) explains the value effects of M&A. We obtain the optimal inside debt ratios from the predicted values obtained by regressing inside debt on its determinants, following Campbell et al. (2016). Results reported in Table 8 indicate that the deviation component of inside debt ratios explains the M&A value effects, with banks that have higher inside debt than optimal associated with more negative shareholder returns and positive bondholder returns. This finding further reaffirms our paper's view of the wealth transfer explanation since banks where CEOs have higher inside debt ratios than optimal may be more likely to pursue deals that transfer wealth from shareholders to creditors.

5.3 Which components of inside debt drive changes in risk and value?

Previous studies decompose inside debt into a pension component and a deferred compensation component and find that most of the effect of inside debt is driven by the pension component (e.g., Anantharaman et al., 2013). We conduct sensitivity analysis in which we examine the incremental impact of the components of debt-like compensation (pension benefits and deferred compensation) on bank risk and value. While both components exhibit debt-like features, pension benefits in the form of SERP are largely unsecured and unfunded obligations while deferred compensation may still allow executives to partially cash out before retirement (Wei and Yermack, 2011; Anantharaman et al., 2013).

[Insert Table 9 here]

As a next step, we introduce both components in regression models presented in Table 9. Our results indicate that the conservative behavior of executives induced by inside debt is largely driven by the pension component, which is consistent with Anantharaman et al. (2013).

5.4 Controlling for Chief Financial Officer (CFO) inside debt

Given the importance of a Chief Financial Officers (CFOs) in determining the level and nature of bank risk-taking (Kim et al., 2011; Anatharaman and Lee, 2014), we conduct sensitivity analyses in which we control for the inside debt of bank CFOs. To do so, we extend our dataset on CEO compensation to include CFO pay.

We source the additional data from Execucomp (available for 545 bank-year observations, including 65 bank-year observations for our acquisition sample) and by hand-collecting the remaining data (1,129 bank-year observations, including 33 observations for our acquisition sample) from DEF 14A proxy statements. This data collection effort allows us to construct a new variable: *CFO relative inside debt ratio*.

[Insert Table 10 here]

The results in Table 10 show that our key results for the association between CEO inside debt and changes in value and risk continue to hold, even after accounting for CFO incentives. This can be attributed to the fact that CEOs play a prominent role in deal negotiations and merger characteristics (Graham, et al., 2015; Cain and McKeon, 2016).

5.5 Are crisis deals different?

Many deals in our sample took place during the recent financial crisis period, which was a period with substantial market turmoil. We therefore check whether there are differential effects of inside debt on acquirer shareholder value for deals undertaken during crisis vs. non-crisis years. Recent research finds that inside debt is positively related to firm value during the crisis period (e.g., Bennett et al., 2015; van Bekkum, 2016). In unreported tests, we find that that the interaction term between inside debt and crisis years (2008-09) is not statistically significant in our changes-in-value and changes-in-risk regressions.

However, it may be argued that since estimation windows for our risk measures may overlap with the crisis period, this may result in abnormally large shifts in our dependent variables. To address this concern, in unreported results we re-estimate our main regressions after excluding all bank-year observations where the estimation windows during the pre-acquisition or post-acquisition period overlap with the peak of the crisis. We follow Ivashina and Scharfstein (2010) in computing the banking crisis window as August 2008 till December 2008. Our findings are robust to these changes. Further, we also confirm that our results remain qualitatively similar if we start our crisis window from March 2008 (when Bear Stearns collapsed) or July 2008 (when the SEC announced a naked short selling ban on some financial sector stocks).

5.6 Other tests

We carry out several further final robustness tests in this section. First, the banking literature on M&A argues that financial distress can be a motive for bank mergers that are caused by the weak financial position of the target. These mergers can often be an outcome of regulatory encouragement to take over weaker targets in order to avoid the large social costs associated with a bank failure. The CEO's discretion over bank policy in motivating such acquisitions would be limited in these cases. To exclude deals with possible weak target banks, we exclude all deals completed during the financial crisis (2008-09), and any other deals where the target received funds under the capital assistance program (TARP), or was listed as failed in the FDIC database, or where the takeover premium[19] was negative.

Second, it can be argued that FDIC-insured deposit holders will be in a better position to protect themselves from potential losses than uninsured creditors of the bank. In this case, the impact of any policies that transfer wealth from creditors mainly affects the wealth of uninsured creditors, including the CEO. So, for the purpose of scaling of the relative inside debt ratio ((equation (3)), we exclude the amount of insured deposits from *Bank debt*.

Third, since prior literature on the impact of M&As on firm value and risk changes identifies that method of payment can affect merger changes in risk and value (e.g., Ongena and Penas, 2009; Phan, 2014), we follow Phan (2014) in examining the relationship between inside debt and methods of payment by running a Tobit model in which the dependent variable is the percentage of deal financed with equity. We find that the coefficients on inside debt and other CEO pay

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[19] Brown and Dinç (2011) highlight a too-many-to-fail effect where poor industry conditions in the form of low capital ratios may give rise to more acquisitions of weaker targets due to regulatory forbearance. In additional sensitivity analysis, we run regressions which exclude any deals involving distressed targets, and confirm that our findings remain very similar.

variables are not statistically significant at conventional levels, indicating that differences in CEO compensation do not explain differences in deal payment consideration.

Fourth, throughout our analysis we follow convention in the literature in using *CEO relative inside debt ratio*. To test whether our results are sensitive to this measure, we repeat our main analysis using the simple CEO inside debt, without scaling by her bank's debt-to-equity ratio. Our results are qualitatively unchanged.

Fifth, we perform a variety of additional checks to ensure that our results are robust to outliers. Specifically, we follow van Bekkum (2016) and others by taking the log transformation of CEO inside debt and other CEO pay measures to mitigate the impact of extreme values in our sample. We confirm that our results remain qualitatively unchanged with the log transformation. Next, we confirm that our results hold if we winsorize the sample at top and bottom 5%. These results are shown in Panel B. Finally, we adopt a robust regression approach to account for outliers that use weights based on the influence of potential outliers. Our results continue to hold throughout these approaches. These are available from the authors upon request.

6. Conclusion

The structure of CEO pay is an important determinant of bank risk-taking behavior, which has potential implications for shareholders, debtholders, and taxpayers. It is now a widely-held view that the large losses at some banks during the recent financial crisis were at least in part the outcome of compensation contracts which tied the wealth of senior bank executives to excessive risk-taking. We suggest one solution to mitigate risk-taking behavior may be to calibrate CEO wealth more closely to that of creditors. In this paper, we consider the efficacy of CEO inside debt in incentivizing CEOs to pursue conservative bank policies.

We use acquisitions by banks to test the link between CEO inside debt and bank policy regarding risk. Consistent with the view that inside debt helps align the interests of managers and debtholders, we find that inside debt is associated with positive returns for debtholders but negative returns for shareholders immediately following the announcement of M&A deals. Since we do not find that CEO inside debt affects changes in total bank value, we argue that inside debt promotes a wealth transfer between shareholders and debtholders when CEOs engage in acquisitions. Our results also show a negative relation between CEO inside debt and realized changes in bank risk and extraction of smaller benefits from the financial safety net.

Our results have important implications for bank management, investors, and bank supervision and regulatory policy. We find that high inside debt holdings mitigate CEO incentives to engage in heightened and potentially excessive bank risk-taking. The results support the view that it is beneficial, to creditors and taxpayers, for CEO compensation incentives to be aligned with those of bank creditors. Our findings, with respect to the function of inside debt in mitigating CEO risk-taking incentives, are especially meaningful given recent criticisms of so-called excessive bank risk-taking, and specifically the role of implicit CEO compensation incentives in exacerbating risk-taking behavior (Bebchuk and Spamann, 2010).

Finally, our results carry further weight given post financial crisis legislative changes, which have focused on reforms to bankers' pay. Notably, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank Act), mandates that all financial institutions ensure that compensation arrangements are not unduly risk-rewarding. Taken together, the findings in this paper demonstrate that inside debt is a vital component of CEO compensation contract design; we advocate a more widespread use of inside debt in bank executives' remuneration contracts.

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Figure 1: Default risk before and after acquisition, for banks with high and low CEO inside debt. Acquisition risk on the vertical axis is measured by Δ*Distance-to-default* (*DD*). The circles (diamonds) show mean daily *DD* for the sample of acquiring banks in the top (bottom) quartile by *CEO relative inside debt*. The pre-acquisition window ends 11 days before the first announcement of the acquisition; the post-acquisition window starts 11 days after the announcement that the deal has been completed.
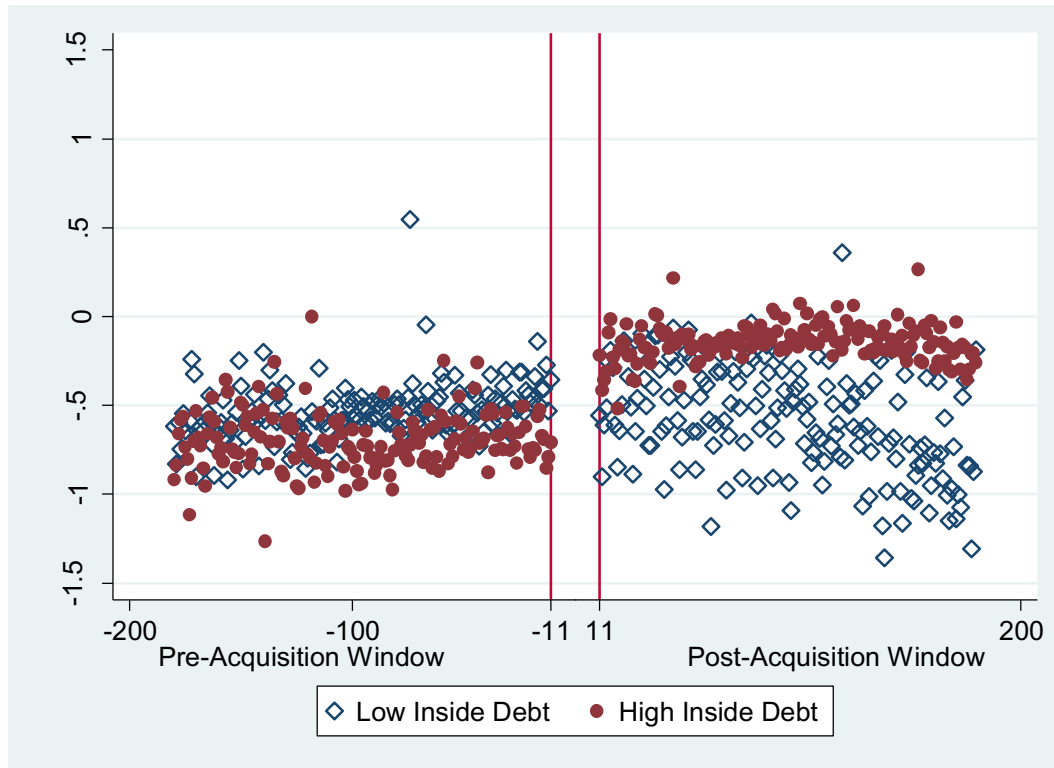
Table 1 This table shows the sample distribution of acquisitions by 62 unique banks from 2007-2012 in Panel A and correlation coeff
Panel B.

Panel A: Sample Distribution.

Year	N	%
2007	40	39.
2008	19	18.
2009	7	6.9
2010	12	11.
2011	10	9.9
2012	13	12.
Total	*101*	*10*

Panel B: Correlation Table for Key Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(
(1) Equity CAR	1.000												
(2) Debt CAR	-0.077	1.000											
(3) Total CAR	-0.105	0.848	1.000										
(4) ΔDistance-to-Default	0.018	0.170	0.136	1.000									
(5) ΔEquity risk	0.019	-0.138	-0.194	-0.544	1.000								
(6) ΔDebt risk	-0.032	-0.002	0.113	-0.446	0.241	1.000							
(7) ΔLeverage Risk	0.126	-0.111	-0.191	-0.110	0.126	-0.176	1.000						
(8) ΔAsset Risk	-0.200	0.024	0.106	0.124	-0.038	-0.021	-0.355	1.000					
(9) ΔIPP	-0.103	0.275	0.325	-0.049	0.120	0.458	-0.107	0.123	1.000				
(10) CEO relative inside debt ratio	-0.143	0.111	0.060	0.135	-0.208	-0.171	0.016	-0.154	-0.109	1.000			
(11) CEO vega	0.067	0.073	0.028	-0.245	0.254	-0.155	0.119	-0.070	0.022	-0.042	1.000		
(12) CEO delta	0.042	0.005	0.026	-0.117	0.105	-0.150	0.095	0.098	0.002	-0.213	0.514	1.000	
(13) Ln(Assets)	0.076	0.046	-0.021	-0.188	0.234	-0.043	0.203	-0.153	0.039	-0.062	0.702	0.548	1
(14) Charter value	-0.038	0.067	0.020	0.374	-0.139	-0.369	-0.049	0.047	0.185	0.112	0.048	0.047	-(
(15) Net income/Assets	-0.054	0.062	0.130	0.200	-0.075	-0.175	-0.030	0.144	0.191	0.100	-0.028	0.051	-(
(16) Equity/Assets	0.118	-0.128	-0.076	-0.025	-0.209	0.127	-0.268	0.028	0.006	0.039	-0.405	-0.323	-(

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Table 2: Descriptive statistics. The sample includes 101 acquisitions by 62 banks over the period 2007 to 2012. All variables are described in Appendix A.

	Mean	Minimum	25th percentile	Median	75th percentile	Maximum	Standard deviation
Risk variables							
Equity CAR	-0.011	-0.063	-0.035	-0.018	0.015	0.054	0.035
Debt CAR	-0.053	-0.325	-0.113	-0.005	0.038	0.101	0.128
Total CAR	-0.096	-1.036	-0.104	-0.008	0.028	0.144	0.268
ΔDistance-to-Default	-0.365	-2.648	-0.613	-0.342	0.248	2.056	1.091
ΔEquity risk	0.077	-1.893	-0.268	-0.001	0.270	3.024	0.764
ΔDebt risk	0.041	-2.377	-1.097	0.324	1.078	2.760	1.224
ΔIPP	0.229	-1.587	-0.162	0.156	0.689	1.812	0.816
CEO Pay variables							
CEO relative inside debt ratio	0.070	0.000	0.003	0.045	0.092	0.525	0.087
CEO vega	0.135	0.000	0.013	0.034	0.094	0.750	0.218
CEO delta	0.514	0.008	0.058	0.158	0.465	4.401	0.899
Other controls							
Ln(Assets)	16.429	13.191	14.855	15.776	18.244	21.500	2.243
Net income/Assets	0.961	-0.510	0.798	1.025	1.214	1.576	0.415
Charter value	1.558	0.496	1.139	1.495	2.004	3.088	0.575
Equity/Assets	8.643	6.190	7.470	8.590	9.670	12.960	1.587
CEO is chair	0.545	0	0	1	1	1	0.500
%boardindep	0.867	0.714	0.833	0.889	0.917	0.944	0.064
Board size	13.020	7	11	13	16	20	3.194
Ln(CEO age)	4.016	3.689	3.931	4.025	4.111	4.304	0.112
Relative size	0.135	0.008	0.034	0.096	0.197	0.364	0.118
Method of financing	0.413	0	0	0.314	1	1	0.404
Diversifying takeover	0.693	0	0	1	1	1	-
Private target	0.238	0	0	0	0	1	-
Macro conditions	1.468	1.219	1.366	1.428	1.536	1.892	0.136

Table 3: Changes in equity value around acquisitions and CEO inside debt. The dependent variable is the Cumulative Abnormal Return (CAR) for equity estimated over a -2 to +2 window centred on the acquisition announcement in columns (1) and (4); the CAR for debt estimated over the same window, following Eisdorfer et al. (2013), in columns (2) and (5); and the weighted average of equity CAR and debt CAR in columns (3) and (6), where the weight for equity is the market value of equity divided by the sum of market value of equity and market value of debt, and the weight for debt is one minus the weight for equity, following Hilscher and Şişli-Ciamarra (2013). We control for selection bias using Heckman's two-step estimator by including the inverse Mills ratio, *Lambda*, obtained from the first-stage probit regression (Appendix B). All variable definitions are given in Appendix A. Year fixed effects are included and robust standard errors clustered by bank are presented in parentheses. * (**) (***) = significant at 10% (5%) (1%) level.

	Equity CAR	Debt CAR	Wt. Avg. CAR	Equity CAR	Debt CAR	Wt. Avg. CAR
	(1)	(2)	(3)	(4)	(5)	(6)
CEO relative inside debt ratio	-0.104**	0.309*	0.492	-0.115***	0.280**	0.459
	(0.040)	(0.160)	(0.359)	(0.034)	(0.130)	(0.307)
CEO vega	0.008	0.043	0.157	0.008	0.063	0.178
	(0.025)	(0.107)	(0.269)	(0.023)	(0.097)	(0.237)
CEO delta	-0.005	0.009	0.032	-0.005*	0.011	0.035
	(0.004)	(0.025)	(0.048)	(0.003)	(0.021)	(0.040)
Ln(Assets)	0.005	0.001	-0.012	0.005	-0.001	-0.014
	(0.004)	(0.012)	(0.032)	(0.003)	(0.012)	(0.030)
Net income/Assets	0.008	0.004	0.074	0.018	0.012	0.088
	(0.011)	(0.049)	(0.112)	(0.011)	(0.059)	(0.125)
Charter value	0.008	-0.020	-0.056	0.005	-0.028	-0.068
	(0.010)	(0.036)	(0.084)	(0.009)	(0.031)	(0.076)
Equity/Assets	0.005*	-0.015	-0.025	0.004	-0.016*	-0.026
	(0.003)	(0.010)	(0.021)	(0.002)	(0.009)	(0.020)
High return	0.011	0.027	0.090	0.011	0.022	0.032
	(0.008)	(0.029)	(0.108)	(0.008)	(0.026)	(0.100)
CEO is chair	-0.004	-0.008	-0.007	-0.003	0.003	0.005
	(0.008)	(0.034)	(0.088)	(0.006)	(0.032)	(0.083)
%boardindep	-0.100**	0.141	0.357	-0.086**	0.242	0.485
	(0.049)	(0.244)	(0.517)	(0.044)	(0.210)	(0.464)
Board size	0.002	-0.010*	-0.015	0.002	-0.011**	-0.017**
	(0.001)	(0.006)	(0.010)	(0.001)	(0.005)	(0.008)
Ln(CEO age)	0.041	-0.050	-0.183	0.046	-0.047	-0.182
	(0.031)	(0.153)	(0.301)	(0.030)	(0.136)	(0.267)
Relative size	0.087**	-0.047	-0.353	0.084**	-0.034	-0.326
	(0.041)	(0.137)	(0.315)	(0.035)	(0.114)	(0.257)
Method of financing	0.019	-0.003	-0.110	0.018	-0.014	-0.128*
	(0.013)	(0.040)	(0.092)	(0.012)	(0.033)	(0.076)
Diversifying takeover	-0.009	-0.019	-0.055	-0.010	-0.021	-0.058
	(0.008)	(0.029)	(0.049)	(0.007)	(0.025)	(0.044)
Private target	0.005	0.019	0.018	0.005	0.025	0.031
	(0.008)	(0.034)	(0.068)	(0.007)	(0.029)	(0.059)
Macro conditions	-0.020	0.104	0.153	-0.022	0.106	0.165
	(0.022)	(0.089)	(0.183)	(0.018)	(0.079)	(0.159)
Lambda				0.006	0.002	0.008
				(0.005)	(0.025)	(0.061)
Observations	101	101	101	99	99	99
R^2	0.280	0.211	0.197	0.269	0.231	0.209

Table 4: Changes in risk around acquisitions and CEO inside debt. The dependent variable is ΔBank risk, computed using ΔDistance-to-Default in columns (1) and (4), ΔEquity risk in columns (2) and (5), and ΔDebt Risk in columns (3) and (6). ΔDistance-to-Default is the average daily distance-to-default (DD) value of the acquirer (equation (1)) from 11 to 180 trading days after completion is announced, less the average from 180 to 11 days before the deal is announced, after subtracting the value-weighted average DD score over the same windows across non-acquiring banks on CRSP. ΔEquity Risk is the standard deviation of daily equity (debt) returns of the acquirer from 11 to 180 trading days after completion is announced, less the average from 180 to 11 days before the deal is announced, after subtracting the value-weighted average equity volatility over the same windows across non-acquiring banks on CRSP. We control for selection bias using Heckman's two-step estimator by including the inverse Mills ratio obtained from the first-stage probit regression. All variable definitions are given in Appendix A. Year fixed effects are included. Robust standard errors clustered by bank are in parentheses. * (**) (***) = significant at 10% (5%) (1%) level.

	ΔDistance-to-Default	ΔEquity risk	ΔDebt risk	ΔDistance-to-Default	ΔEquity risk	ΔDebt risk
	(1)	(2)	(3)	(4)	(5)	(6)
CEO relative inside debt ratio	1.819*	-1.701**	-1.812*	2.271**	-1.693***	-2.110**
	(1.039)	(0.713)	(1.011)	(0.961)	(0.605)	(0.871)
CEO vega	-1.071***	0.668**	-0.419	-1.254***	0.795***	-0.394
	(0.392)	(0.320)	(0.439)	(0.340)	(0.265)	(0.343)
CEO delta	0.166	-0.123*	-0.094	0.170**	-0.104	-0.102
	(0.103)	(0.070)	(0.081)	(0.087)	(0.065)	(0.070)
Ln(Assets)	0.020	0.000	0.112**	0.034	-0.026	0.108**
	(0.078)	(0.064)	(0.054)	(0.073)	(0.057)	(0.049)
Net income/Assets	0.054	-0.249	-0.042	-0.331	-0.439**	0.120
	(0.270)	(0.168)	(0.351)	(0.305)	(0.184)	(0.285)
Charter value	0.408	-0.289	0.245	0.587***	-0.282	0.177
	(0.256)	(0.200)	(0.218)	(0.226)	(0.173)	(0.197)
Equity/Assets	-0.050	-0.018	0.137**	-0.016	0.008	0.118**
	(0.077)	(0.054)	(0.060)	(0.067)	(0.046)	(0.055)
High risk	1.177***	-0.582***	-0.986***	1.038***	-0.587***	-0.958***
	(0.289)	(0.197)	(0.236)	(0.240)	(0.174)	(0.211)
CEO is chair	-0.009	-0.062	0.060	-0.126	0.005	0.096
	(0.260)	(0.176)	(0.191)	(0.231)	(0.146)	(0.168)
%boardindep	-1.006	0.178	0.205	-2.059	0.394	0.612
	(1.884)	(1.304)	(1.153)	(1.602)	(1.171)	(1.094)
Board size	0.025	-0.006	0.009	0.035	-0.013	0.006
	(0.037)	(0.023)	(0.027)	(0.031)	(0.022)	(0.023)
Ln(CEO age)	-1.236	0.631	-0.582	-1.497	0.616	-0.463
	(1.259)	(0.797)	(0.803)	(1.024)	(0.722)	(0.704)
Relative size	1.371	-0.045	-0.341	1.468*	0.081	-0.346
	(1.026)	(1.011)	(0.832)	(0.882)	(0.908)	(0.739)
Method of financing	0.396*	-0.418**	-0.120	0.507***	-0.410**	-0.147
	(0.233)	(0.203)	(0.219)	(0.189)	(0.180)	(0.198)
Diversifying takeover	-0.183	0.087	-0.251	-0.139	0.096	-0.279*
	(0.198)	(0.172)	(0.183)	(0.169)	(0.150)	(0.162)
Private target	0.018	0.373*	0.137	0.026	0.345*	0.137

Table 5: Changes in asset risk and leverage risk, and CEO inside debt. The dependent variable in Panel A is Asset Risk, meas... weighted assets to total assets. The dependent variable in Panel B is leverage risk, measured as the industry-adjusted change in total equ... assets. We control for selection bias using Heckman's two-step estimator by including the inverse Mills ratio obtained from the first-s... variable definitions are given in Appendix A. Year fixed effects are included. Robust standard errors clustered by bank are in parenthese... at 10% (5%) (1%) level.

Panel A: Asset risk	(1)	(2)	(3)	(4)	
CEO relative inside debt ratio	-0.143*	-0.120*	0.052	-0.216**	-(
	(0.085)	(0.068)	(0.084)	(0.095)	(0
CEO relative inside debt ratio * Relative size			-0.996***		
			(0.377)		
CEO relative inside debt ratio * Method of financing				0.178	
				(0.131)	
CEO relative inside debt ratio * Diversifying takeover					-0
					(0
CEO relative inside debt ratio * Private target					
Relative size	-0.073	-0.076	0.046	-0.071	-0
	(0.065)	(0.053)	(0.032)	(0.052)	(0
Method of financing	0.003	-0.001	-0.016	-0.027	-(
	(0.016)	(0.014)	(0.012)	(0.019)	(0
Diversifying takeover	-0.023	-0.015	-0.016	-0.004	0
	(0.016)	(0.013)	(0.013)	(0.012)	(0
Private target	-0.006	-0.005	-0.001	-0.003	-(
	(0.014)	(0.012)	(0.014)	(0.014)	(0
CEO vega	0.030	0.020	-0.003	0.017	0
	(0.043)	(0.038)	(0.037)	(0.039)	(0
CEO delta	0.006	0.005	0.007	0.005	0
	(0.009)	(0.008)	(0.008)	(0.008)	(0
Lambda		-0.008	-0.007	-0.009	-(
		(0.011)	(0.010)	(0.011)	(0
Other controls	YES	YES	YES	YES	Y
Observations	101	99	99	99	
R^2	0.313	0.282	0.404	0.392	0

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Panel B: Leverage risk	(1)	(2)	(3)	(4)	
CEO relative inside debt ratio	0.029*	0.032**	-0.014	0.052**	0.0
	(0.017)	(0.016)	(0.020)	(0.021)	(0
CEO relative inside debt ratio * Relative size			0.197**		
			(0.087)		
CEO relative inside debt ratio * Method of financing				-0.062*	
				(0.035)	
CEO relative inside debt ratio * Diversifying takeover					-(
					(0
CEO relative inside debt ratio * Private target					
Relative size	0.006	-0.003	-0.011	-0.009	-(
	(0.019)	(0.016)	(0.010)	(0.014)	(0
Method of financing	0.004	0.004	-0.002	0.001	-(
	(0.004)	(0.004)	(0.004)	(0.005)	(0
Diversifying takeover	0.002	-0.003	0.000	-0.003	-(
	(0.005)	(0.005)	(0.003)	(0.003)	(0
Private target	-0.001	-0.002	0.005	0.005*	0
	(0.004)	(0.003)	(0.003)	(0.003)	(0
CEO vega	-0.011	-0.015*	-0.003	-0.001	-(
	(0.008)	(0.008)	(0.008)	(0.006)	(0
CEO delta	0.007	0.009	-0.001	-0.001	-(
	(0.007)	(0.006)	(0.002)	(0.002)	(0
Lambda		0.010**	0.009**	0.007*	0.0
		(0.004)	(0.004)	(0.004)	(0
Other controls	YES	YES	YES	YES	Y
Observations	101	99	99	99	
R^2	0.338	0.259	0.285	0.224	0

Table 6: Changes in taxpayer loss exposure around acquisitions and CEO inside debt. The dependent variable is ΔIPP, given by the average IPP between days 11 to 180 after completion less the average during days 180 to 11 before the announcement, less the value-weighted average IPP, over the same windows for each deal across all non-acquiring banks on CRSP. ΔIPP is expressed in percentage points for ease of interpretation. We control for selection bias using Heckman's two-step estimator by including the inverse Mills ratio obtained from the first-stage probit regression. All variable definitions are given in Appendix A. Year fixed effects are included. Robust standard errors clustered by bank are in parentheses. * (**) (***) = significant at 10% (5%) (1%) level.

	(1)	(2)
CEO relative inside debt ratio	-1.191***	-1.247***
	(0.326)	(0.295)
CEO vega	0.196	0.211
	(0.279)	(0.229)
CEO delta	-0.067	-0.067
	(0.047)	(0.044)
Ln(Assets)	0.066*	0.065*
	(0.035)	(0.037)
Net income/Assets	0.044	0.066
	(0.120)	(0.118)
Charter value	-0.136	-0.148
	(0.114)	(0.108)
Equity/Assets	0.021	0.020
	(0.032)	(0.031)
High IPP	-0.362***	-0.360***
	(0.114)	(0.102)
CEO is chair	-0.120	-0.105
	(0.115)	(0.117)
%boardindep	0.501	0.626
	(0.463)	(0.414)
Board size	0.001	-0.001
	(0.012)	(0.011)
Ln(CEO age)	0.387	0.404
	(0.404)	(0.342)
Relative size	0.253	0.267
	(0.478)	(0.439)
Method of financing	-0.002	-0.012
	(0.092)	(0.077)
Diversifying takeover	0.079	0.073
	(0.079)	(0.069)
Private target	-0.006	-0.001
	(0.098)	(0.086)
Macro conditions	-0.102	-0.102
	(0.216)	(0.188)
Pre-merger Asset Volatility	0.118***	0.117***
	(0.011)	(0.009)
Lambda		0.012
		(0.091)
Observations	101	99
R^2	0.849	0.847

Table 7: Change in bank risk and CEO inside debt controlling for potential endogeneity of CEO remuneration.
This table shows second-stage results from a two-stage regression framework using the predicted values of *CEO relative inside debt ratio* and *CEO vega and CEO delta* from the first stage. The dependent variable is change in bank value or change in bank risk. Robust standard errors clustered by bank are in parentheses. All models include year fixed effects. * (**) (***) = significant at 10% (5%) (1%) level.

	Equity CAR	Debt CAR	Total CAR	ΔDD	ΔEquity risk	ΔDebt risk	ΔIPP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Instrumented CEO relative inside debt ratio	0.019	0.198	1.262	8.990*	-6.629*	4.874	-3.491*
	(0.148)	(0.527)	(4.824)	(5.395)	(3.616)	(3.794)	(1.857)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	101	101	101	101	101	101	101
Hausman endogeneity test (p-value)	0.402	0.838	0.849	0.198	0.181	0.050	0.167
Underidentification test (p-value)	0.005	0.004	0.006	0.006	0.005	0.006	0.003

Table 8: Changes in bank value and risk, and CEO inside debt. This table shows the results using optimal contracting inside debt v al. (2016). We obtain Optimal (CEO Inside Debt) as fitted values from running a panel regression where dependent variable is CEO level and executive-level determinants. Deviation (CEO Inside Debt) is the difference between CEO inside debt ratio and optimal CEO i for selection bias using Heckman's two-step estimator by including the inverse Mills ratio obtained from the first-stage probit regressi are given in Appendix A. Year fixed effects are included. Robust standard errors clustered by bank are in parentheses. * (**) (***) = si level.

	Equity CAR	Debt CAR	Wt. Avg CAR	ΔDistance-to-Default	ΔEquity risk
	(1)	(2)	(3)	(4)	(5)
Optimal (CEO relative inside debt ratio)	-0.194	0.938	1.809	6.275	-10.123***
	(0.163)	(0.954)	(2.163)	(4.638)	(3.530)
Deviation (CEO relative inside debt ratio)	-0.113***	0.416**	0.605	3.218***	-2.665***
	(0.041)	(0.171)	(0.392)	(1.146)	(0.698)
CEO vega	0.004	0.072	0.176	1.013***	0.733***
	(0.024)	(0.095)	(0.236)	(0.336)	(0.225)
CEO delta	-0.004	0.013	0.038	-0.164**	-0.131**
	(0.003)	(0.021)	(0.042)	(0.074)	(0.062)
Lambda	0.006	0.003	0.004	0.213*	-0.161*
	(0.005)	(0.025)	(0.060)	(0.115)	(0.087)
Other controls	YES	YES	YES	YES	YES
Observations	98	98	98	98	98
R^2	0.255	0.248	0.216	0.504	0.397

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Table 9: Changes in bank value and risk, and CEO inside debt: Components of Inside Debt. The table shows estimation results u
debt, where CEO Pension-based inside debt is defined as the ratio of CEO pension benefits to CEO equity-based compensation scaled
ratio, and CEO deferred pay-based inside debt is defined as the ratio of CEO deferred compensation to CEO equity-based compensati
to-equity ratio. We control for selection bias using Heckman's two-step estimator by including the inverse Mills ratio obtained from the f
All variable definitions are given in Appendix A. Year fixed effects are included. Robust standard errors clustered by bank are in p
significant at 10% (5%) (1%) level.

	Equity CAR	Debt CAR	Wt. Avg CAR	ΔDistance-to-Default	ΔEquity risk
	(1)	(2)	(3)	(4)	(5)
CEO Pension-based inside debt	-0.124**	0.356**	0.516	2.104*	-2.020***
	(0.044)	(0.171)	(0.360)	(1.278)	(0.636)
CEO Deferred Pay-based inside debt	-0.204	-0.204	0.142	4.145	0.418
	(0.440)	(0.440)	(0.806)	(3.631)	(2.432)
CEO vega	0.007	0.064	0.163	1.468***	0.788***
	(0.023)	(0.100)	(0.247)	(0.366)	(0.262)
CEO delta	0.005*	0.012	0.037	-0.100	-0.109
	(0.003)	(0.022)	(0.040)	(0.121)	(0.067)
Lambda	0.006	0.003	0.005	0.304**	-0.155**
	(0.005)	(0.025)	(0.059)	(0.130)	(0.075)
Other controls	YES	YES	YES	YES	YES
Observations	98	98	98	98	98
R^2	0.273	0.237	0.209	0.383	0.366

Table 10: Changes in bank value and risk, and CEO inside debt: Controlling for CFO inside debt incentives. This table shows controlling for CFO inside debt incentives. We control for selection bias using Heckman's two-step estimator by including the invers the first-stage probit regression. All variable definitions are given in Appendix A. Year fixed effects are included. Robust standard err parentheses. * (**) (***) = significant at 10% (5%) (1%) level.

	Equity CAR	Debt CAR	Wt. Avg CAR	ΔDistance-to-Default	ΔEquity risk	
	(1)	(2)	(3)	(4)	(5)	
CEO relative inside debt ratio	-0.109***	0.278**	0.432	1.981**	-1.666***	
	(0.035)	(0.129)	(0.306)	(0.967)	(0.640)	
CFO relative inside debt ratio	-0.047	0.213	0.356	2.807**	-0.366	
	(0.047)	(0.205)	(0.403)	(1.171)	(1.076)	
CEO vega	0.010	-0.050	-0.069	-0.874***	0.348**	
	(0.012)	(0.072)	(0.156)	(0.234)	(0.164)	
CEO delta	-0.006**	0.024	0.059	0.182	-0.121*	
	(0.003)	(0.023)	(0.048)	(0.124)	(0.069)	
Lambda	0.005	0.008	0.015	-0.328**	-0.122*	
	(0.005)	(0.024)	(0.060)	(0.141)	(0.071)	
Other controls	YES	YES	YES	YES	YES	
Observations	98	98	98	98	98	
R^2	0.272	0.211	0.173	0.422	0.365	

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Appendix A: Variable definitions

Variable	Definition
Equity CAR	Estimated cumulative abnormal return (CAR) for the bank's equity.
Debt CAR	Estimated CAR for the bank's debt.
Total CAR	Weighted average of the CARs for equity and debt.
ΔDistance-to-Default	Average daily distance-to-default (*DD*) value of acquirer over 11 to 180 trading days after completi average over 180 to 11 days before the deal is announced, after subtracting the value-weighted averag windows across non-acquiring banks on CRSP.
ΔEquity risk	Standard deviation of excess equity returns over 11 to 180 trading days after completion is announced, over 180 to 11 days before the deal is announced, after subtracting the standard deviation of value-we over the same windows across non-acquiring banks on CRSP
ΔDebt risk	Standard deviation of excess debt returns over 11 to 180 trading days after completion is announced, over 180 to 11 days before the deal is announced, after subtracting the standard deviation of value-we over the same windows across non-acquiring banks on CRSP
ΔIPP	Average industry-adjusted insurance price premium (IPP) during days 180 to 11 before the announce after completion, less the changes in value-weighted IPP over the same window across non-acquiring
CEO relative inside debt ratio	Ratio of CEO's inside debt to equity holdings, scaled by the bank's debt-to-equity ratio.
CEO vega	*Vega* is the rate of change of the value of the CEO's portfolio of inside equity and options with resp shares, scaled by total cash compensation
CEO delta	*Delta* is the rate of change of the value of the portfolio with respect to the price of the shares, scaled by
Ln(Assets)	Natural log of the book value of bank assets.
Net income/Assets	Net income scaled by book value of bank assets.
Charter value	Market value of assets scaled by book value of assets.
Equity/Assets	Tier-1 equity scaled by book value of assets.
CEO is chair	Equal to one if the CEO also serves as Chairman, and zero otherwise.
%boardindep	Percentage of independent directors on the bank board.
Board size	Number of directors on the bank board.
Ln(CEO age)	Natural logarithm of CEO age.
Relative size	Dollar amount paid for the target bank divided by the acquirer's market capitalization at the time of the a
Diversifying takeover	Equal to one if the target and acquirer have different SIC sub-industry classifications and zero otherwi
Private target	Equal to one if the acquisition involved a private target and zero otherwise.
Method of financing	% of stock financing to fund the acquisition
Macro conditions	State-coincident index provided by the Federal Reserve Bank of Philadelphia's which captures macroe state where the acquirer is headquartered.

Appendix B: Explaining banks' propensity to acquire. The table shows the first stage probit estimation results from a Heckman estimation framework. The first step estimates the likelihood that a bank becomes an acquirer. The dependent variable is equal to one if a bank makes an acquisition in the relevant financial year, and zero otherwise. *Historical Asset Growth* is a new variable intended to proxy for a bank's propensity to acquire, but not its risk after acquisition. It is computed as the three-year growth in bank assets relative to the industry prior to the year in which the acquisition was announced. The coefficient of *Net income/Assets* is expressed in percentage points for ease of interpretation. All variable definitions are given in Appendix A. Robust standard errors clustered by bank are in parentheses. All models include year fixed effects. * (**) (***) = significant at 10% (5%) (1%) level.

	(1)	(2)	(3)
Historical Asset Growth	-0.036***	-0.032***	-0.033***
	(0.010)	(0.011)	(0.011)
CEO relative inside debt ratio		0.943	0.960
		(0.801)	(0.816)
CEO vega		0.393	0.439
		(0.671)	(0.684)
CEO delta		-0.137	-0.141
		(0.120)	(0.125)
Ln(Assets)		0.233***	0.239***
		(0.041)	(0.046)
Net income/Assets		1.623***	1.627***
		(0.414)	(0.416)
Charter value		-0.242***	-0.241***
		(0.067)	(0.066)
Leverage		-0.057	-0.058
		(0.040)	(0.041)
CEO is chair			-0.093
			(0.171)
%boardindep			-0.263
			(1.013)
Board size			0.001
			(0.027)
Ln(CEO age)		-1.116*	-1.039
		(0.576)	(0.643)
Macro		0.583	0.569
		(0.461)	(0.467)
Observations	1,772	1,772	1,772
Pseudo R^2	0.006	0.399	0.400

Appendix C: Calculation of variables required for market value of debt, *Default Risk* and *IPP*

Vassalou and Xing (2004) and Hillegeist et al. (2004) show that, under the assumption that market value of assets follows a geometric Brownian motion, the market value of equity can be derived from the Black and Scholes (1973) option pricing formula for call options as:

$$V_{E,t} = V_{A,t}N(d_{1,t}) - Be^{-rT}N(d_{2,t}) \tag{C.1}$$

where

$$d_{1,t} = (\ln(V_{A,t}/B) + (r + (\sigma^2_{A,t}/2))T)/\sigma_{A,t}T \tag{C.2}$$

$$d_{2,t} = d_{1,t} - \sigma_A T^{0.5} \tag{C.3}$$

where $V_{E,t}$ is the market value of equity, $V_{A,t}$ is the market value of assets, B is the book value of liabilities updated quarter by quarter, r is the risk-free rate on one-year T-bills as at the bank's financial year-end, T is the horizon over which we predict distance-to-default of the bank and is set to one year, $\sigma_{A,t}$ is the standard deviation of the market value of assets, and N(.) represents the cumulative density function of the standard normal distribution. We solve for two unknowns, $V_{A,t}$ and $\sigma_{A,t}$, by using an iterative procedure as outlined in Hilleigeist et al. (2004). This involves simultaneously solving equation C.1 and the following optimal hedge equation:

$$\sigma_{E,t} = V_{A,t}N(d_1)\sigma_{A,t}/V_{E,t} \tag{C.4}$$

where $\sigma_{E,t}$ is the standard deviation of the daily stock return measured over the rolling period t-90 to day t. The above estimates of $V_{A,t}$ and $\sigma_{A,t}$ are used in the calculation of market value of debt and distance-to-default DD.

For the market value of debt, we follow Eisdorfer et al. (2013) and calculate it as the difference between market value of assets ($V_{A,t}$) and market value of equity ($V_{E,t}$).

For the insurance price premium *IPP*, the procedure for calculating $V_{A,t}$ and $\sigma_{A,t}$ is similar to the above. The only difference is that the book value of liabilities B is now multiplied by an additional parameter, ρ, which takes into account regulatory forbearance wherein the regulator (FDIC) might not liquidate the bank immediately. ρ is set at 0.97, which means that the regulator is assumed to proceed with liquidation if the market value of assets falls below 97% of the bank's liabilities. The regression estimates are not sensitive to the chosen value for ρ.