CEO Inside Debt and Industry Specialist Auditor

ABSTRACT: This paper examines whether executive compensation incentives, specifically CEO inside debt holdings, affect the choice of auditor, namely industry specialists. High inside debt holdings are expected to align the interests of managers and outside debtholders, reducing debtholders' expropriation concerns and thus their demand for industry specialist auditor, i.e., high audit quality. However, while inside debt reduces agency conflicts of debt, it might exacerbate agency conflicts between managers and shareholders, increasing the demand for higher audit quality to better monitor managers. Using CEO leverage and CEO relative leverage to proxy for inside debt holdings, we find that firms with higher levels of CEO inside debt tend not to appoint an auditor with industry specialization. This result is consistent with the notion that inside debt mitigates agency conflicts between managers and debtholders, reducing the demand for high quality audit as a monitoring mechanism. Moreover, we show the marginal effect of inside debt on the selection of industry specialist auditor as depending on bankruptcy risk.

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1. Introduction

While corporate controls are the first line of defense against misstatements in financial reporting, external auditors provide yet another layer of investor protection by reducing the risk of misstatement which can impair the value of the firm. The firm's financial reports can be more credible as a result of enhanced audit quality, strengthening the integrity and confidence across the capital markets. Prior studies find auditor attributes such as size and industry expertise are positively associated with reporting quality, documenting that audit quality is not invariant across auditors (e.g., Becker et al., 1998; Francis et al., 1999; Reynolds and Francis, 2000; Balsam et al., 2003; Dunn and Mayhew, 2004; Behn et al., 2008; Reichelt and Wang, 2010). This suggests that the quality of financial reports can be influenced by the firms' auditor choice. In this paper, we examine whether executive compensation incentives, specifically CEO inside debt holdings, affects the choice of auditor, namely industry specialists.

Inside debt holdings consist of pension benefits and deferred compensation which are generally considered unsecured and unfunded liabilities of the firm. Theory suggests that this debt-like compensation can have significant influence on managerial risk-taking incentives, leading to an incentive alignment between CEOs and debtholders that reduces agency conflicts (Jensen and Meckling, 1976; Edmans and Liu, 2011). Supporting this notion, extant studies document that CEOs with more inside debt tend to manage their firms more conservatively, engage in less risky investment and financial policies, and are less likely to misreport (e.g., Sundaram and Yermack, 2007; Cassell et al., 2012; Liu et al., 2014; He, 2015; Dhole et al., 2016). Studies also document positive investor reactions to inside debt holdings, i.e., lower volatility of both stocks and bonds, higher bond prices, lower cost of debt, lower incidence of restrictive bond covenants, and narrower bank credit default swap spreads (e.g., Bolton et al.,

2010; Chava et al., 2010; Anantharaman et al., 2013). These studies suggest that inside debt mitigates agency conflicts between managers and debtholders, reducing the demand for high quality audit as a monitoring mechanism.

Literature on auditor industry specialization argue that specialist auditors have deeper industry knowledge and greater experience to identify misstatements more effectively than non-specialists (e.g., Balsam et al., 2003; Dunn and Mayhew 2004; Reichelt and Wang, 2010). The industry specialist auditors have an incentive to correct and report identified misstatements to maintain their reputation, further enhancing the quality of audit. Given that auditor industry specialization and audit quality are positively related, and there are audit fee premiums associated with industry specialization (Craswell et al., 1995; DeFond et al., 2000), it is plausible the companies with high inside debt holdings are less likely to appoint industry specialist auditors due to reduced agency conflicts with debtholders.

On the other hand, while inside debt reduces agency conflicts of debt, it might exacerbate agency conflicts between managers and shareholders. Bebchuk and Jackson (2005) document that CEO debt compensation reduces pay-performance sensitivity, suggesting that inside debt will likely aggravate agency conflicts between managers and shareholders. If so, shareholders will demand higher financial reporting quality, and thus audit quality, to better monitor managers to curb any rent extraction. It is plausible the companies are more likely to use industry specialist auditors due to increased agency cost of equity from inside debt holdings. A more recent studies, however, suggest that inside debt mitigates shareholders' expropriation concerns. Dhole et al. (2016) find that capital market responds favorably to positive earnings surprise from firms with higher level of CEO inside debt. Shen and Zhang (2020) document a negative relation between CEO inside debt and cost of equity. Whether and how the CEO inside

debt holdings affect the firm's choice of industry specialist auditor is thus an open question, and we empirically test it in this study.

In our setting, endogeneity is an obvious concern. Specifically, one might be concerned the association between CEO inside debt and the choice of industry specialist auditor is spurious because they may both be endogenously driven by fundamental firm risk. It is plausible firms with high agency costs are more likely to utilize debt-like compensation to mitigate executives' risk-taking incentives, while such firms are likely to retain a high-quality auditor. To address this concern, we employ two-stage least squares (2SLS) estimation to control for agency risk in our auditor selection regressions.

Using a sample of 2,944 firm-years of 478 firms during 2006 to 2018, we find that firms with higher CEO inside debt holdings (as measured by CEO leverage and CEO relative leverage) tend not to appoint an auditor with industry specialization. This result is consistent with the notion that inside debt mitigates agency conflicts between managers and stakeholders, reducing the demand for high quality audit as a monitoring mechanism. Moreover, it is plausible that inside debt holdings have a greater mitigation effect when firms are at higher risk of bankruptcy. We further examine whether the marginal effect of inside debt on the selection of industry specialist auditor depends on the increased likelihood of bankruptcy. Using Altman Z-score to measure bankruptcy risk, we find the negative effect of inside debt on the choice of industry specialist is driven by higher risk.

Our study contributes to the literature in several ways. First, this paper extends the audit quality literature by investigating whether demand for audit quality vary with the debt-like executive compensation. Prior literature emphasizes the role of outside debt and equity-based executive compensation on demand for high audit quality (e.g., DeFond, 1992; Lennox, 2005). To the best of our knowledge, we are the first to investigate the relationship between CEO compensation in the form of inside debt and demand for audit quality. The results provide new

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insights into how debt compensation incentives affect auditor selection decision, showing that firms with large CEO inside debt are less likely to choose industry specialist auditor (i.e., have a decreased demand for high audit quality). Second, we provide additional evidence that industry specialization is a differentiable dimension of auditor quality. This study contributes to our understanding of how executive compensations that have an impact on agency problems differentially affect firms' choice of industry specialist auditor. Lastly, DeFond and Zhang (2014) argue that the literature traditionally focuses primarily on the auditor's supply of audit quality, and call for expanding our knowledge of demand-side factors. We answer this call by examining the effect of CEO inside debt on demand for audit quality, specifically auditor industry specialization.

The remainder of this paper is organized as follows. We next review the related literature and develop our hypotheses. The third section discusses the research design, sample selection, and descriptive statistics. We then present the results of our main and additional empirical analyses in the fourth and fifth section, respectively. The sixth section summarizes and concludes.

2. Related literature and hypothesis development

Our research relates to two strands of literature: research on audit quality, and research on executive compensation in the form of inside debt. Defond and Zhang (2014) review archival research in audit quality using a framework that encompasses three key drivers: client demand for high audit quality, auditor incentives to supply high audit quality, and regulatory intervention to improve audit quality. While the literature focuses primarily on the auditor's supply of audit quality, this paper focuses on client demand for audit quality and examines the effect of CEO inside debt holdings on the choice of industry specialist auditor.

2.1   Agency costs and client demand for audit quality

Agency theory predicts a positive association between agency costs and demand for high audit quality (Jensen and Meckling, 1976; Watts and Zimmerman, 1983). Information asymmetry creates agency conflicts between managers and outside stakeholders that, if not sufficiently resolved, can result in inefficiencies in resource allocations and contracting. Thus, managers have incentives to rely on governance mechanisms such as financial reporting and auditing to reduce agency costs that arise from information asymmetry. Since high audit quality is expected to provide greater assurance that the financial statements faithfully reflect the firm's underlying economics, higher agency conflicts are expected to increase the demand for audit quality. The literature, albeit limited, generally find evidence supporting the theory and document a positive relation between agency costs and the level of audit quality demanded by investors and audit clients (e.g., DeFond, 1992; Lennox, 2005; Blouin et al., 2007; Wang et al., 2008; Francis et al., 2009).

Auditor choice studies use management ownership to capture agency problems between managers and shareholders. These studies hypothesize that, as management ownership falls, managers have weaker incentives to act in the interests of outside shareholders, which increases the demand for higher quality audits. DeFond (1992) report that client firms tend to switch to higher quality audit firms as a result of decreases in the percentage of management ownership. Further, client firms tend to switch to higher quality audit firms as a result of increases in firm leverage, suggesting that as the amounts of debt increases, there's a greater demand for monitoring. Consistent with this divergence-of-interests effect, Lennox (2005) documents significant negative associations between management ownership and audit firm size within low and high regions of ownership.

Studies also use unique settings in which there are demand for high quality audits to test the agency cost explanation to the demand. Using a unique dataset of former Arthur

Andersen (AA) clients, Blouin et al. (2007) find that companies that are less transparent and thus more difficult to monitor have a greater demand for a high-quality audit by severing ties with AA. Wang et al. (2008) examine the link between state ownership and auditor choice in China, and find that state-owned entities (SOEs) are less likely than non-SOEs to demand high quality auditors (Top-10 or non-local auditors) due to preferential treatment they receive from the capital market and government that reduce agency costs. Using a unique setting in France where two (joint) auditors are required by law, Francis et al. (2009) study whether a firm's ownership structure affects demand for high audit quality. Consistent with agency theory, a Big 4 auditor is more likely to be appointed by firms with less family control and more diversified ownership structures, i.e., greater information asymmetry.

2.2   *Inside debt and agency costs*

Executive compensation packages typically include equity-based (salaries, bonuses, stocks, and options) and debt-based (pensions and deferred compensation) components. The pensions and deferred compensation are collectively referred to as inside debt, representing unsecured, unfunded debt claims against the firm. In the event of bankruptcy, inside debtholders would stand in line with other unsecured creditors. Jensen and Meckling (1976) and Edmans and Liu (2011) suggest that this debt-like compensation can have significant influence on managerial risk-taking incentives and align interests of managers with those of debtholders, thereby lowering the cost of debt capital to the firm. Managers holding large inside debt are expected to pursue strategies that reduce overall firm risk to alleviate the default risk that is similarly faced by other unsecured creditors. Supporting this notion, Sundaram and Yermack (2007) show that CEOs with more inside debt tend to manage their firms more conservatively. Furthermore, Cassell et al. (2012) find evidence consistent with CEOs with large inside debt engaging in less risky investment and financial policies. Liu et al. (2014)

document a positive relation between CEO inside debt and firm cash holdings, consistent with the view that inside debt encourages greater risk aversion.

Recent studies have linked inside debt and financial reporting quality. Since financial misreporting can increase potential default risk of the firm, firms with high CEO inside debt should be less likely to misreport. Consistent with this expectation, He (2015) finds that higher CEO inside debt is associated with lower abnormal accruals, higher accruals quality, lower likelihood of an earnings misstatement, and lower incidence of earnings benchmark beating, suggesting that inside debt enhances financial reporting quality. Moreover, Dhole et al. (2016) report a negative association between CEO inside debt and both accrual- and real activities-based earnings management, suggesting that inside debt effectively curbs opportunistic management of earnings. Dhole et al. (2016) also report that the capital market responds favorably to positive earnings surprises when CEOs have high inside debt holdings, implying that investors understand the deterrence effect of inside debt on managerial opportunism. More recently, Wang et al. (2018) find that financial reporting is less conservative in firms whose CEO holds high position in inside debt, while Shen and Zhang (2020) document a negative relation between CEO inside debt and cost of equity. These studies suggest that inside debt mitigates shareholders' expropriation concerns.

Prior studies have also documented debt investor reactions to inside debt holdings. Wei and Yermack (2011) document that when large CEO inside debt holdings is disclosed, the volatility of both stocks and bonds falls, while public bond prices react positively, indicating a reduction in firm risk alleviating debt-equity conflict. When CEOs have high inside debt, firms face lower cost of debt (Anantharaman et al., 2013), have a lower incidence of restrictive bond covenants (Chava et al., 2010), and have narrower bank credit default swap spreads (Bolton et al., 2010). These studies suggest that inside debt mitigates agency conflicts between

debtholders and managers, that is, agency costs of debt are expected to decrease as inside debt increases.

2.3   *Audit firm characteristics and audit quality*

Extant accounting studies use auditor size (Big N membership) and auditor industry specialization (client industry concentration) to proxy for audit quality. Auditor size is used because large auditors are expected to have stronger incentives to protect their reputation and have greater competencies to deliver higher quality audits compared to small audit firms (e.g., DeAngelo, 1981). Numerous prior studies provide evidence of less earnings management, greater stock price reactions to unexpected positive earnings announcements, lower cost of debt financing, and higher (lower) analysts' earnings forecast accuracy (dispersion) by clients of large audit firms compared with clients of small audit firms (e.g., Teoh and Wong, 1993; Becker et al., 1998; Francis et al., 1999; Reynolds and Francis, 2000; Mansi et al., 2004; Behn et al., 2008). This literature supports the hypothesis that auditor size is associated with greater audit quality.

Prior studies also use auditor industry specialization to proxy for audit quality because specialist auditors are expected to have greater competency and stronger reputation incentives to provide high audit quality. Craswell et al. (1995) and DeFond et al. (2000) report that there are audit fee premiums associated with industry specialization, attributing this premium to their greater investments in expertise. Dunn and Mayhew (2004) show a positive association between industry specialist auditors and analysts' rankings of disclosure quality, suggesting that industry specialist auditors enhance disclosure quality. Reichelt and Wang (2010) find that auditors who are both national and city-specific industry specialists (1) have clients with the lowest abnormal accruals, (2) are less likely to meet or beat analysts' earnings forecasts, and (3) are more likely to be issued a going-concern audit opinion. Furthermore, after

controlling for brand name (Big N membership), Balsam et al. (2003) find that clients of industry specialist auditors have lower absolute level of discretionary accruals and higher earnings response coefficients than clients of non-specialist auditors. These findings suggest that audit quality is higher when the auditor is industry specialist, and the choice of industry specialist auditors represent demand for audit quality that is higher than that provided by Big N auditors.

It follows from agency theory that if industry specialist auditors provide higher audit quality, the companies with high inside debt holdings are less likely to appoint industry specialist auditors. High inside debt holdings align the interests of managers and outside debtholders, reducing debtholders' expropriation concerns and thus their demand for high audit quality. On the other hand, while inside debt reduces agency conflicts of debt, it might exacerbate agency conflicts between managers and shareholders. Bebchuk and Jackson (2005) document that CEO debt compensation reduces pay-performance sensitivity, suggesting that inside debt will likely aggravate agency conflicts between managers and shareholders. If so, shareholders will demand higher financial reporting quality to better monitor managers to curb any rent extraction. Therefore, the role of inside debt in shareholder-manager conflicts lends support to the notion that inside debt increases the demand for higher audit quality. We leave the association between CEO inside debt holdings and demand for audit quality as an open question and empirically test it in this study. In view of the competing perspectives, we set up the following null hypothesis:

H1: There is no relation between CEO inside debt holdings and demand for audit quality.

3. Research Design

3.1 Proxies for CEO inside debt

We use two variables as proxies for CEO inside debt holdings: CEO leverage and CEO relative leverage. CEO leverage, *CEOLEV,* is measured as the ratio of CEO inside debt-to-equity holdings, where CEO inside debt consists of pension benefits and deferred compensation as reported in the ExecuComp database. Pension benefits are the aggregate actuarial present value of accumulated benefits under defined-benefit pension plans and deferred compensation is the total balance in the deferred compensation plans by the fiscal year end. The value of CEO equity holdings is the fair value of stock holdings, including restricted stock holdings and option holdings at the fiscal year end.[1]

CEO relative leverage, *RELALEV*, is defined as the CEO's inside debt-to-equity ratio divided by the firm's debt-to-equity ratio.[2] The CEO's inside debt-to-equity ratio is the same as defined in our first measure, *CEOLEV*. The firm's debt-to-equity ratio is measured as the sum of long-term debt and debt in current liabilities divided by the market value of equity at the fiscal year end.

3.2 Estimation Model

The choice of industry-specialist auditors and the level of CEO inside debt can be simultaneously determined. To address the potential endogeneity, we employ two-stage least squares (2SLS) estimation. The predicted value of CEO inside debt is obtained from Equation (1) for the first stage estimation.

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[1] Shares owned by the executive includes options that are exercisable or will become exercisable within 60 days. The value of restricted stocks includes vested and not yet vested restricted shares held by the executive as of fiscal year end. The value of all options awarded during the year is based upon the grant-date fair value as detailed in FAS 123R.

[2] Studies have suggested that the CEO's personal debt-to-equity ratio relative to the firm's debt-to-equity ratio is the relevant metric for measuring the CEO's incentive alignment with debtholders versus stockholders (e.g., Jensen and Meckling 1976; Edmans and Liu 2011). *RELALEV* < 1 indicates that the CEO's inside debt-to-equity ratio is lower than the firm's debt-to-equity ratio, potentially incentivizing CEO to engage in risk shifting strategies that transfer value from debtholders to stockholders, and vice versa.

$$CEOLEV \text{ (or } RELALEV) = \alpha_0 + \alpha_1 BMRATIO + \alpha_2 CAPINT + \alpha_3 DERATIO + \alpha_4 RETVOL +$$

$$\alpha_5 RND + \alpha_6 SIZE + \alpha_7 BDMTGS + \alpha_8 CEOAGE + \alpha_9 CEOCHAIR +$$

$$\alpha_{10} CEOTENURE + \alpha_{11} INSTOWN + \alpha_{12} OUTDIR + \alpha_{13} HIGHTECH +$$

$$\alpha_{14} REGULATED + \alpha_{15} INDCEOLEV \text{ (or } INDRELALEV) + \varepsilon \qquad (1)$$

where *CEOLEV* is CEO leverage as measured by the ratio of CEO inside debt-to-equity holdings and *RELALEV* is CEO relative leverage as measured by the ratio of CEO leverage-to-firm leverage. Industry median values of CEO leverage and CEO relative leverage as instrumental variables are included in the first stage estimation. The definitions of other variables are presented in Appendix A.

For the second stage estimation, the predicted value of CEO inside debt is included in the following Equation (2):

$$SPECIALIST = \beta_0 + \beta_1 PCEOLEV \text{ (or } \beta_1 PRELALEV) + \beta_2 BMRATIO + \beta_3 CAPINT +$$

$$\beta_4 DERATIO + \beta_5 FOREIGN + \beta_6 NOBSEG + \beta_7 RETVOL + \beta_8 RND +$$

$$\beta_9 SIZE + \beta_{10} BDMTGS + \beta_{11} CEOAGE + \beta_{12} CEOCHAIR +$$

$$\beta_{13} CEOTENURE + \beta_{14} INSTOWN + \beta_{15} OUTDIR + \varepsilon \qquad (2)$$

where *SPECIALIST* is a dichotomous variable that has a value of one if the auditor is the first-ranked in the industry based on 2-digit SIC codes and audit fees, and zero otherwise. Appendix A presents the definitions of other variables.

If firms with greater amounts of CEO inside debt face less demand to appoint industry specialist auditors, the coefficient on the variable of our interest, *PCEOLEV* or *PRELALEV*, β_1, is expected to be negative. On the other hand, if firms with greater amounts of CEO inside debt tend to appoint industry specialist auditor even with fee premium in order to enhance reporting quality, the coefficient, β_1, is expected to be positive.

3.3 Sample Selection

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Panel A of Table 1 details the sample section process. The initial sample consists of 18,218 firm-year observations of 890 firms in ExecuComp database from 2006 to 2018.[3] We exclude observations with missing data on CEO attributes or compensation. Next, we delete 948 observations of 101 firms with missing governance data on MSCI GMI ratings. After the observations with missing financial data on Compustat and CRSP are excluded, our final sample insists of 2,944 firm-years of 478 firms.

Panel B of Table 1 shows the industry distribution of the sample. Manufacturing industry covers over half of the sample, followed by transportation and utilities industries that cover over 20 percent of the sample firm-years. CEO inside debt holdings is pervasive in all industries, with more than 98 percent of the total firm-years with inside debt holdings. The wholesale and retail industries have the lowest percentage of firm-years with inside debt holdings, around 95 percent.

3.4 Descriptive Statistics

Table 2 presents summary statistics for the variables used in our analyses. First, 11% of the sample firm-observations choose an auditor specializing in an industry based on the 2-digit SIC codes (*SPECIALIST*). The variables for CEO inside debt, *CEOLEV* or *RELALEV*, are right-skewed, indicating that more firm-observations with less than median amounts of CEO inside debt exist in our sample. Other variables, except CEO attributes such as CEO age and tenure and outside director percentage, are also right-skewed.

Table 3 reports Pearson and Spearman correlation coefficients for the variables used in our regression analysis. The explanatory variable of interest, *CEOLEV*, is positively correlated with book-to-market ratio, capital intensity, CEO age, and membership in regulated industry,

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[3] 2006 is the first year firms were required by the SEC to disclose their top executives' deferred compensation plans, pension benefits and other post-employment payments which are reported in the ExecuComp database.

whereas *RELALEV* is negatively correlated with firm size, with Person correlation coefficients greater than 0.10.

4. Empirical Results

4.1 First Stage Regression

Table 4 shows the empirical results for 2SLS estimations. In Panel A of Table 4, we present the first-stage regression of the determinants on CEO inside debt holdings. Among the variables that measure firm characteristics, firm size (SIZE) is highly significant and negative with p-value less than 0.01, while research and development expenditure (RND) is positive and significant at the 5% significance level, for both regressions using *CEOLEV* and *RELALEV* as CEO inside debt measures. That is, large firms tend to compensate their CEOs less with inside debt, whereas, firms with high R&D expenditures provide more debt-like compensation to their CEOs. Book-to-market ratio (BMRATIO) is also positive and significant at the 5% significance level, but only for *CEOLEV* regression. As for variables related to CEO attributes, CEO age is positive and significant at the 1% significance level. That is, the older the CEOs, the higher the CEO inside debt holdings. The most obvious measure of CEO power to influence inside debt compensation, the CEO-chair duality *(CEOCHAIR)*, is positive but weakly significant at the 10% significance level only in the *CEOLEV* regression. Interestingly, the coefficients on the board diligence (BDMTGS) and the board independence (OUTDIR) are positive and highly significant (p-values < 0.01), suggesting that firms with strong boards compensate their CEOs with more inside debt. But the same governance variables lose their significance when CEO relative leverage, *RELALEV,* is used to measure CEO inside debt holdings.

4.2 Second Stage Regression

Table 4, Panel B shows results from the second stage regression for our hypothesis. The coefficient on the variables of interest, *PCEOLEV* and *PRELALEV*, β_1, is significantly negative at the 1% or 5% significance level, suggesting that firms with high CEO inside debt tend not to appoint an auditor with industry specialization. This result is consistent with the notion that inside debt mitigates agency conflicts between managers and debtholders, reducing the demand for high quality audit as a monitoring mechanism.

With respect to the control variables, the results are mixed. The coefficients on capital intensity, firm size, and CEO-chair duality are significantly negative. These results are opposite to expectations that the need for auditors' industry specialization may be greater for larger firms with greater complexities (e.g., Beattie and Fearnley, 1995) and CEO/Chairman duality with greater agency risk (e.g., Tsui et al., 2001). It is plausible that the need for higher audit quality in such cases can be met by retaining Big N auditors without employing industry specialist auditors and paying audit fee premium.[4] The coefficient on *CEOAGE* is significantly positive, which is also inconsistent with the finding that older CEO are less likely to engage in earnings management (Belot and Serve, 2018). It may be that CEOs become more risk averse with age and demand higher quality audit from industry specialist auditors.

The coefficients on return volatility (RETVOL), board diligence (BDMTGS), and institutional ownership (INSTOWN) are positive and significantly associated with selection of industry specialist auditors. This is consistent with the notion that investors demand higher quality audit from risky firms, and firms with greater corporate governance demand higher

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[4] The test results obtained using Big 4 vs. non-Big 4 auditors as a dependent variable are likely to be invalid, because only 13 out of 2,944 observations in our final sample have non-Big 4 auditors. A substantially low number of firms with non-Big 4 auditors in our sample may be explained by the databases that we employ as ready-to-be-used data. Specifically, our initial sample starts with firms that have CEO data on ExecuComp which covers firms on Standard & Poor (S&P) 1500 only. In addition, the database of MSCI GMI ratings for governance data covers firms on Russell 3000 only.

quality auditors as yet another layer of investor protection (e.g., Carcello et al., 2002; Velury et al., 2003).

5. Additional Analyses

In this section, we examine the effect of CEO debt-like compensation on the decision to appoint a specialist auditor when the bankruptcy risk is high. It is plausible the effect of CEO inside debt on curbing managerial risk-taking behavior will be greater when firms face high bankruptcy risk. Managers holding large inside debt with high bankruptcy risk are more likely to pursue strategies that reduce overall firm risk to alleviate the default risk such that bondholders are less likely to demand high quality audit as a monitoring mechanism. Thus, we expect the negative effect of CEO inside debt on auditor choice of industry specialist to be more pronounced for firms with high bankruptcy risk.

Using Altman (1968) Z-score to measure the likelihood of bankruptcy, we find the negative effect of inside debt on the choice of industry specialist is driven by bankruptcy risk.[5] Table 5 shows results from the second stage regressions with the coefficients on the interaction terms of our interest, *BANKRUPT*PCEOLEV* and *BANKRUPT*PRELALEV*, significantly negative at the 1% significance level. The effect of CEO inside debt (*PCEOLEV* and *PRELALEV*) on choosing a specialist auditor, however, is insignificant for firms with low bankruptcy risk. The results suggest that inside debt mitigates agency conflicts between managers and debtholders for firms faced with high bankruptcy risk, reducing the demand for high quality audit as a monitoring mechanism. As for the control variables, the results are similar to those reported in Table 4, Panel B.

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[5] Altman (1968) Z-score is calculated as follows: Z-score=1.2*(working capital / total assets) + 1.4*(retained earnings / total assets) + 3.3*(earnings before interest and tax / total assets) + 0.6*(market value of equity / total liabilities) + 1.0*(sales / total assets). If a firm's Z-score is below mean value of the sample, we assign the value of one to its likelihood of bankruptcy (BANKRUPT), and zero otherwise.

6. Conclusion

This study examines the effect of CEO inside debt (pension benefits and deferred compensation) on demand for audit quality. Inside debt can have significant influence on managerial risk-taking incentives, leading to an incentive alignment between CEOs and debtholders. We posit that a reduction in agency conflicts of debt can influence the demand for audit quality, i.e., industry specialist auditors. Prior studies find audit quality is higher when the auditor is industry specialist, and the choice of industry specialist represents demand for audit quality that is higher than that provided by Big N auditors.

We employ two alternative measures of CEO inside debt: CEO personal leverage and CEO-firm relative leverage to test our hypothesis. Using two-stage least squares (2SLS) estimation to control for agency risk in our auditor selection regressions, we find a significantly negative association between CEO inside debt measures and industry specialist auditor. This result is consistent with the notion that inside debt mitigates agency conflicts between managers and debtholders, reducing the demand for auditors with industry specialization as a monitoring mechanism. We also examine the effect of CEO debt-like compensation on the decision to appoint a specialist auditor when the bankruptcy risk is high. The results suggest that inside debt mitigates agency conflicts between managers and debtholders when firms are faced with high bankruptcy risk, reducing the demand for industry specialist auditor.

Several caveats are in order. First, as with association studies, we cannot demonstrate that the CEO inside debt holdings *causes* the decrease in demand for industry specialist auditor. We can only draw inference from the *associations* between CEO inside debt and specialist auditor after controlling for other factors. Second, auditor industry specialization suffers from a lack of consensus on its measurement (Neal and Riley, 2004), suggesting that specialization captures audit quality with relatively large measurement error. Future studies should focus on

refinements of the specialization measures. Third, since more than 99 percent of the observations in our sample retained Big 4 auditors, we are unable to use the choice of Big 4 auditors to proxy the demand for high audit quality. It is possible that the choice of non-industry specialist Big N auditor ensures high audit quality while avoiding fee premium associated with employing an industry specialist auditor. To the extent that audit quality is higher when the auditor is industry specialist, and the choice of industry specialist represents demand for audit quality that is higher than that provided by Big N auditors, our results may be interpreted as firms with high inside debt tend not to demand audit quality higher than that provided by Big N auditors. Future studies may consider incorporating smaller auditors in their analyses.

Even with these limitations in mind, this study adds to our understanding of how executive compensations that have an impact on agency conflicts of debt differentially affect firms' choice of auditor, specifically industry specialist auditor. For future audit research, it would be valuable to examine how CEO inside debt impacts different aspects of the audit process and how external auditors respond to these executive compensation incentives across the stages (planning, performance, and reporting) of an audit. To the extent the executive compensation in the form of inside debt is seen as an important compensation strategy to curb executives' risk-taking behavior, such studies might help auditors better identify areas of potential risk.

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Appendix A. Variable definitions	
Variable	Definition
BANKRUPT	1 if Altman Z-score is below mean of the sample, and 0 otherwise; Altman Z-score=1.2*(working capital / total assets) + 1.4*(retained earnings / total assets) + 3.3*(earnings before interest and tax / total assets) + 0.6*(market value of equity / total liabilities) + 1.0*(sales / total assets)
BDMTGS	Natural log of the number of board meetings
BMRATIO	Ratio of book-to-market value
CAPINT	Net property, plant, and equipment deflated by revenue
CEOAGE	Natural log of CEO age
CEOCHAIR	1 if the CEO is also the chair in a board of directors, and 0 otherwise
CEOLEV	CEO inside debt divided by equity holdings
CEOTENURE	Natural log of CEO tenure
DERATIO	Debt-to-equity ratio
FOREIGN	1 if foreign exchange income is not zero, and 0 otherwise
HIGHTECH	1 if the firm is in the following high-tech industries and 0 otherwise: Pharmaceutical/biotechnology (SIC codes 2833-2836, 8731-8734), computer (3570-3577, 7370-7374), electronics (3600-3674), or retail (5200-5961)
INDCEOLEV	Median value of CEO leverage in industry based on SIC
INDRELALEV	Median value of relative leverage in industry based on SIC
INSTOWN	Ownership percentage of institutional investors who hold more than five percent of outstanding shares
NOBSEG	Natural log of the number of business segments
OUTDIR	Percentage of outside directors in a board of directors
PCEOLEV	Predicted value of CEO leverage, obtained from Equation (1)
PRELALEV	Predicted value of relative leverage, obtained from Equation (1)
REGULATED	1 if the firm is in the following regulated industries and 0 otherwise: Telecommunication (SIC codes 4811-4899), natural gas (4892-4894), utilities (4931, 4941), or financial (6021-6023, 6035-6036, 6141, 6311, 6321, 6331)
RELALEV	CEO relative leverage, as measured by a ratio of CEO leverage-to-firm leverage
RETVOL	Standard deviation of returns over a fiscal year, multiplied by 100
RND	Research and development expenses deflated by sales revenue, multiplied by 100
SIZE	Natural log of lagged total assets
SPECIALIST	1 if the audit firm is the first-ranked based on market share of audit fees in its 2-digit industry, and 0 otherwise.

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TABLE 1

Sample Characteristics

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Panel A: Sample Selection

	Firms	Firm-years
Initial observations from ExecuComp, 2006 ~ 2018	890	18,218
Less: Missing CEO data in ExecuComp	(237)	(13,099)
Missing data in MSCI GMI ratings	(101)	(948)
Missing data in Compustat	(0)	(2)
Missing data in CRSP	(74)	(1,225)
Final sample	478	2,944

Panel B: Sample Distribution by Industry

Industry	All firm-years	Firm-years with inside debt	Firm-years without inside debt
Agriculture, forestry and fishing	7 (0.2%)	7 (100%)	0 (0.0%)
Mining and construction	91 (3.1%)	91 (100%)	0 (0.0%)
Manufacturing	1,507 (51.2%)	1,483 (98.4%)	24 (1.6%)
Transportation and utilities	603 (20.5%)	601 (99.7%)	2 (0.3%)
Wholesale and retail trade	253 (8.6%)	241 (95.3%)	12 (4.7%)
Finance	261 (8.9%)	260 (99.6%)	1 (0.4%)
Services	199 (6.8%)	194 (99.7%)	5 (0.3%)
Public Administration	23 (0.8%)	23 (100%)	0 (0.0%)
Total	2,944 (100%)	2,900 (98.5%)	44 (1.5%)

This table presents the sample selection process and the sample distribution by industry.

TABLE 2
Descriptive Statistics

Variable	Mean	Std.Dev.	P25	Median	P75
BDMTGS	2.153	0.310	1.946	2.079	2.303
BMRATIO	0.517	0.383	0.270	0.451	0.685
CAPINT	0.986	1.119	0.315	0.542	1.086
CEOAGE	4.197	0.088	4.143	4.205	4.263
CEOLEV	0.451	0.598	0.100	0.257	0.540
CEOTENURE	1.755	0.722	1.386	1.792	2.303
DERATIO	1.144	2.437	0.369	0.689	1.243
INSTOWN	0.222	0.142	0.118	0.203	0.303
NOBSEG	0.751	1.048	0.000	0.000	1.792
OUTDIR	0.789	0.132	0.727	0.818	0.900
RELALEV	2.414	0.282	0.807	2.048	5.719
RETVOL	2.147	1.187	1.320	1.790	2.610
RND	1.520	3.167	0.000	0.000	1.703
SIZE	8.879	1.543	7.763	8.706	9.990
CEOCHAIR	1,851 (63%) firm-years with CEOCHAIR=1 vs. 1,093 (37%) firm-years with CEOCHAIR=0 (χ^2=195)				
FOREIGN	950 (32%) firm-years with FOREIGN=1 vs. 1,994 (68%) firm-years with FOREIGN=0 (χ^2=370)				
HIGHTECH	225 (8%) firm-years with HIGHTECH=1 vs. 2,719 (92%) firm-years with HIGHTECH=0 (χ^2=2,113)				
REGULATED	503 (17%) firm-years with REGULATED=1 vs. 2,441 (83%) firm-years with REGULATED=0 (χ^2=1,276)				
SPECIALIST	331 (11%) firm-years with SPECIALIST=1 vs. 2,613 (89%) firm-years with SPECIALIST=0 (χ^2=1,769)				

This table presents descriptive statistics for the full sample of 2,944 firm-years. Refer to Appendix A for variable definitions.

TABLE 3

Correlations among Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) BDMTGS		**0.12**	**0.08**	-0.04	-0.06	0.05	**-0.12**	0.08	**-0.09**	0.06	0.00	0.02	**0.09**	**0.09**	-0.07	0.05	0.02	**0.27**	0.03
(2) BMRATIO	**0.10**		**0.11**	0.04	-0.03	**0.13**	0.06	-0.02	**-0.12**	**-0.09**	0.03	**-0.10**	-0.03	**0.20**	-0.07	**0.30**	**-0.19**	0.09	0.03
(3) CAPINT	0.09	0.09		-0.02	0.02	**0.19**	-0.06	0.00	**-0.21**	**-0.12**	**-0.09**	0.03	**0.05**	**0.33**	**-0.09**	**-0.15**	**-0.18**	**0.10**	-0.05
(4) CEOAGE	-0.04	0.05	-0.03		**0.24**	**0.12**	**0.26**	-0.06	0.02	-0.02	**-0.19**	**-0.26**	-0.05	-0.01	**0.09**	0.07	0.02	0.01	**0.04**
(5) CEOCHAIR	-0.06	-0.03	0.05	**0.23**		0.07	**0.28**	0.02	-0.06	0.02	**-0.12**	-0.03	**0.17**	0.06	0.02	-0.02	0.02	**0.13**	-0.07
(6) CEOLEV	0.03	**0.14**	**0.21**	**0.13**	**0.10**		0.06	0.01	-0.08	-0.05	-0.05	0.03	**0.05**	**0.15**	**0.29**	0.01	-0.05	0.00	**-0.04**
(7) CEOTENURE	**-0.12**	0.06	-0.07	**0.25**	**0.28**	**0.10**		0.00	-0.01	-0.03	0.03	**0.07**	**0.05**	0.01	0.03	0.01	-0.02	**-0.06**	-0.01
(8) DERATIO	**0.11**	**-0.11**	**0.27**	**-0.12**	0.05	**0.14**	0.02		-0.02	**-0.07**	0.03	0.02	**0.04**	-0.02	**-0.10**	0.00	-0.03	**0.15**	-0.04
(9) FOREIGN	**-0.09**	**-0.14**	**-0.10**	0.01	-0.06	-0.07	-0.01	**-0.12**		0.08	0.04	0.03	**0.08**	**-0.21**	0.05	0.05	**0.19**	-0.06	-0.05
(10) HIGHTECH	0.07	**-0.10**	**-0.07**	-0.01	0.02	-0.06	-0.03	**-0.15**	0.08		0.01	-0.01	0.03	**-0.13**	0.07	0.00	**0.48**	-0.03	-0.02
(11) INSTOWN	-0.03	0.02	**-0.09**	**-0.19**	**-0.12**	-0.08	0.05	-0.02	0.05	0.01		**0.11**	-0.04	**-0.13**	0.00	**0.18**	-0.07	**-0.33**	**0.12**
(12) NOBSEG	0.01	**-0.11**	0.02	**-0.29**	-0.03	0.06	0.09	0.08	0.01	0.01	**0.14**		0.01	0.03	-0.03	**-0.29**	0.04	0.07	0.00
(13) OUTDIR	**0.10**	-0.05	0.08	-0.05	**0.21**	**0.12**	0.04	**0.12**	0.08	0.03	-0.03	0.04		-0.03	-0.02	0.03	**0.08**	**0.15**	-0.07
(14) REGULATED	**0.11**	**0.24**	**0.20**	-0.02	0.06	**0.18**	0.01	**0.10**	**-0.21**	**-0.13**	**-0.15**	0.01	-0.01		**-0.08**	**-0.13**	**-0.22**	**0.22**	-0.04
(15) RELALEV	**-0.11**	**-0.13**	-0.02	**0.16**	0.09	**0.69**	0.06	**-0.31**	0.08	0.06	**-0.11**	0.05	0.03	-0.02		0.00	**0.09**	**-0.13**	0.00
(16) RETVOL	-0.03	**0.24**	**-0.13**	0.08	-0.05	**-0.12**	0.02	**-0.15**	0.09	0.01	**0.19**	**-0.30**	-0.02	**-0.19**	**-0.19**		-0.04	**-0.24**	**0.11**
(17) RND	-0.04	**-0.36**	**-0.15**	0.00	0.06	-0.04	-0.02	**-0.07**	**0.31**	**0.32**	-0.01	0.08	**0.15**	**-0.40**	**0.14**	0.01		0.09	-0.08
(18) SIZE	**0.25**	0.02	**0.04**	0.00	**0.12**	0.04	-0.07	**0.24**	-0.08	-0.03	**-0.34**	0.07	**0.21**	**0.21**	**-0.10**	**-0.35**	-0.04		**-0.19**
(19) SPECIALIST	0.02	0.02	**-0.07**	0.05	-0.07	**-0.08**	-0.01	**-0.08**	-0.05	-0.02	**0.10**	-0.03	**-0.08**	-0.04	**-0.04**	**0.12**	**-0.14**	**-0.19**	

This table reports correlations among variables. Pearson correlations are shown above the diagonal, while Spearman correlations below the diagonal. Bold figures indicate significance at the 5 percent level. See Appendix A for variable definitions.

TABLE 4

2SLS Estimations of CEO Inside Debt on Selection of Industry Specialist Auditor

Panel A: First Stage Estimation

	(A) CEOLEV	(B) RELALEV
Variable	Coef. (p-value)	Coef. (p-value)
BMRATIO	0.090 (0.02) **	-0.170 (0.56)
CAPINT	-0.020 (0.12)	-0.166 (0.04) **
DERATIO	0.006 (0.18)	-0.048 (0.03) **
RETVOL	0.021 (0.20)	-0.186 (0.17)
RND	0.006 (0.05) **	0.123 (0.02) **
SIZE	-0.028 (<.01) ***	-0.294 (<.01) ***
CEOAGE	0.841 (<.01) ***	5.775 (<.01) ***
CEOCHAIR	0.038 (0.06) *	0.298 (0.15)
CEOTENURE	-0.002 (0.91)	-0.117 (0.31)
BDMTGS	0.086 (<.01) ***	-0.081 (0.79)
INSTOWN	-0.077 (0.28)	-1.156 (0.11)
OUTDIR	0.199 (<.01) ***	0.320 (0.72)
HIGHTECH	-0.019 (0.57)	0.051 (0.93)
REGULATED	0.034 (0.39)	0.122 (0.50)
INDCEOLEV	0.990 (<.01) ***	-
INDRELALEV	-	0.888 (<.01) ***
Year fixed effects	Included	Included
Industry fixed effects	Included	Included
Adjusted R^2	0.27	0.30
No. of observations	2,944	2,944

Panel B: Second Stage Estimation

Dependent variable = SPECIALIST

Variable	Coef. (p-value)	Coef. (p-value)
PCEOLEV	**-0.486 (<.01) ***	**-**
PRELALEV	**-**	**-0.031 (0.02) **
BMRATIO	0.026 (0.79)	-0.073 (0.44)
CAPINT	-0.252 (<.01) ***	-0.273 (<.01) ***
DERATIO	0.008 (0.57)	-0.001 (0.96)
FOREIGN	-0.073 (0.39)	-0.065 (0.45)
NOBSEG	-0.064 (0.24)	-0.066 (0.22)

RETVOL	0.173 (<.01) ***	0.163 (<.01) ***
RND	0.003 (0.87)	0.005 (0.77)
SIZE	-0.307 (<.01) ***	-0.301 (<.01) ***
CEOAGE	2.495 (<.01) ***	2.150 (<.01) ***
CEOCHAIR	-0.149 (0.06) *	-0.163 (0.04) **
CEOTENURE	-0.053 (0.32)	-0.061 (0.24)
BDMTGS	0.398 (<.01) ***	0.352 (<.01) ***
INSTOWN	0.705 (<.01) ***	0.740 (<.01) ***
OUTDIR	0.015 (0.96)	-0.111 (0.71)
Year fixed effects	Included	Included
Industry fixed effects	Included	Included
Pseudo R^2	0.29	0.30
No. of observations	2,944	2,944

This table presents the 2SLS estimations. Panel A shows the first stage regression to obtain a predicted value of CEO inside debt measures, while Panel B shows the second stage probit estimation with predicted measures of CEO inside debt. The p-values are based on heteroscedasticity-consistent standard errors. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Refer to Appendix A for variable definitions.

TABLE 5

Bankruptcy Risk and CEO Inside Debt on Selection of Industry Specialist Auditor

Dependent variable = SPECIALIST

Variable	Coef. (p-value)	Coef. (p-value)
BANKRUPT	0.262 (0.07) *	0.220 (0.13)
PCEOLEV	0.048 (0.86)	-
BANKRUPT*PCEOLEV	**-0.801 (<.01) ***	-
PRELALEV	-	-0.023 (0.12)
BANKRUPT*PRELALEV	-	**-0.133 (<.01) ***
BMRATIO	0.029 (0.80)	-0.053 (0.63)
CAPINT	-0.256 (<.01) ***	-0.311 (<.01) ***
DERATIO	0.010 (0.51)	-0.005 (0.75)
FOREIGN	-0.083 (0.35)	-0.072 (0.43)
NOBSEG	-0.071 (0.22)	-0.069 (0.23)
RETVOL	0.173 (<.01) ***	0.157 (<.01) ***
RND	0.001 (0.95)	0.014 (0.42)
SIZE	-0.310 (<.01) ***	-0.322 (<.01) ***
CEOAGE	2.208 (<.01) ***	2.504 (<.01) ***
CEOCHAIR	-0.161 (0.05) *	-0.154 (0.06) *
CEOTENURE	-0.022 (0.70)	-0.048 (0.39)
BDMTGS	0.418 (<.01) ***	0.350 (<.01) ***
INSTOWN	0.661 (0.02) **	0.584 (0.05) **
OUTDIR	-0.393 (0.22)	-0.505 (0.11)
Year fixed effects	Included	Included
Industry fixed effects	Included	Included
Pseudo R^2	0.30	0.30
No.	2,660	2,660

This table presents the second stage probit estimation with bankruptcy risk and predicted measures of CEO inside debt. The p-values are based on heteroscedasticity-consistent standard errors. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Refer to Appendix A for variable definitions.