Does CEO Inside Debt Really Improve Financial Reporting Quality?*

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Abstract

Recent studies conclude that CEO debt-like incentives, such as defined benefit pensions and deferred compensation ("inside debt"), improve financial reporting quality. We challenge this result on conceptual grounds and evaluate its sensitivity to empirical specification. We reexamine the relation between accrual-based measures of financial reporting quality and CEO inside debt variables and find that it is an artifact of correlated omitted factors that prior studies do not effectively control for. Specifically, we show that the relation disappears when we control for factors related to the volatility and uncertainty of firms' operating environments. Using a two-step approach, we illustrate how the relation between inside debt and accrual-based financial reporting quality measures is driven entirely by the portion of inside debt that is correlated with these factors, rather than a direct effect of inside debt itself. Our findings challenge the prevailing consensus on the incentive effects of inside debt and suggest that prior evidence is likely confounded by omitted variable bias.

Keywords: Inside debt; Pensions; Deferred compensation; Executive compensation; Incentives; Financial reporting quality; Accruals; Earnings management; Reexamination; Replication.

JEL Classifications: M41; G32; G33.

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1. Introduction

When their incentives are aligned with those of external stakeholders, the discretion that managers have in disclosure and financial reporting can help alleviate adverse selection problems, improve capital allocation, and reduce financing costs. However, when managers have incentives to influence stock price at the expense of long-term value creation, these incentives can lead to disclosure and financial reporting choices that misrepresent the true underlying performance of the firm. When users are unable to unravel such bias, these choices lead to market frictions.

A long stream of literature examines how managers' compensation incentives shape disclosure and financial reporting (e.g., Healy, 1985; Dechow and Sloan, 1991; Holthausen et al., 1995; Nagar et al., 2003). Some studies find that managers' equity incentives are associated with earnings management and low financial reporting quality (e.g., Bartov and Mohanram, 2004; Cheng and Warfield, 2005; Armstrong et al., 2013). In this study, we examine whether and how *debt*-like compensation incentives—in the form of defined benefit pensions and other deferred compensation arrangements with payoffs similar to the firm's debt ("inside debt")—shape financial reporting quality. Specifically, given its implications for the design of executive compensation contracts, we revisit a recent conclusion that inside debt ownership improves financial reporting quality. We posit that this conclusion is likely an artifact of correlated omitted factors that prior studies do not effectively control for.

Consistent with the idea that inside debt arrangements may alleviate the effects of equity incentives on misreporting, He (2015) and Dhole et al. (2016) conclude that CEO inside debt improves financial reporting quality.[1] These studies find that firms with CEO inside debt have smaller discretionary accruals and accrual estimation errors, and are less likely to meet

[1] At the end of December 2024, He (2015) and Dhole et al. (2016) combined had 280 citations in Google Scholar, and several studies rely on their conclusions when motivating the research question. For instance, Chi et al. (2017, p. 839) assert that, among other outcomes, prior *"research has documented that CEO inside debt holdings have a negative impact on CEO risk-appetite as reflected by [...] higher financial reporting quality ([...], He [2015])."* In a similar vein, Wang et al. (2018, p. 2135) note that *"[t]wo recent studies by He (2015) and Dhole et al. (2016) [...] argue that inside debt reduces managers' incentive to engage in earnings management and find a positive relation between CEO inside debt and financial reporting quality."*

or beat earnings expectations or restate earnings.[2] Dhole et al. (2016) additionally propose an indirect effect and argue that, when inside debt reduces risk-taking incentives and the future volatility of firm performance, managers have less incentives to smooth earnings. Using path analysis, they conclude that 55–90 percent (10–45 percent) of the relation between inside debt and financial reporting quality is explained by the direct (indirect) effect.

We conduct a *reexamination* of the relation between inside debt and financial reporting quality for several reasons.[3] First, the relation is hypothesized to exist based on the notion that equity incentives induce misreporting, but evidence on the link between equity incentives and misreporting is mixed (Armstrong et al., 2024). Some studies find a positive relation (e.g., Bartov and Mohanram, 2004; Cheng and Warfield, 2005; Bergstresser and Philippon, 2006; Armstrong et al., 2013), while others find no consistent relation (Erickson et al., 2006; Armstrong et al., 2010) or challenge prior findings based on measurement concerns (Hribar and Nichols, 2007; Owens et al., 2017). Moreover, most evidence in support of this link comes primarily from samples of U.S. firms before the Sarbanes-Oxley Act of 2002 (e.g., Jiang et al., 2010a) and does not generalize to recent periods (Mayberry et al., 2021). Studies on inside debt are restricted to recent samples given the limited disclosure of executive compensation before 2006, which makes it unclear whether inside debt ownership *should* have a direct effect on financial reporting quality by mitigating misreporting.

Second, prior research is relatively silent on the determinants of firms' inside debt use. However, executive compensation arrangements are endogenously determined (e.g., Edmans et al., 2017) and we predict that inside debt use is related to the volatility and uncertainty

[2] Kohlbeck and Luo (2019) conclude that the relation is relatively stronger for CFOs than CEOs, but find no support for a link between inside debt and restatements.

[3] Our study is an example of a *reexamination*. Because the original studies we seek to revisit make several choices in their sample selection and research design that remain undisclosed and unclear, it is not feasible for us to perform exact replications of the original analyses. Instead, we aim to study the general robustness of the claims made in these studies with respect to a variety of design choices. Welch (2019) defines four categories of reanalysis of research findings, of which reexamination comes closest to our objectives and analyses: (i) reproduction, which attempts to replicate a result with the same sample and code; (ii) extensions and updates, which use the same code but for an extended sample; (iii) replication, which attempts to run the same code on a similar (but different) population, and (iv) reexamination, which attempts to extend the code by using alternative research design choices.

of firms' operating environments. For example, while inside debt arrangements extend the executive's horizon, Gopalan et al. (2014) predict and find that firms increase the duration of executive pay when their operations are less volatile and more profitable. Cadman and Vincent (2015) present supporting evidence and further find that firms with defined benefit CEO pension plans engage less in uncertain R&D activities (e.g., Sundaram and Yermack, 2007). At the same time, prior research shows that these characteristics of firms' operating environments are also systematically associated with accrual-based measures of financial reporting quality—due to either innate firm characteristics or measurement error in the accrual-based measures.[4] We therefore argue that, when this confounding effect is not adequately controlled for in a research design, tests of the relation between inside debt and financial reporting quality are subject to an omitted variable problem.

Third, prior research finds that the incentive effects of inside debt are not clear-cut. For example, Anantharaman et al. (2014) conclude that the incentive effects of inside debt are restricted to defined benefit pension plans, since deferred compensation arrangements often allow for early payments and have properties that are more equity-like. Cadman and Vincent (2015) further find that CEOs with defined benefit pension plans receive total compensation larger than predicted by economic determinants and that these pension plans do not contribute to pay-for-performance sensitivity. They conclude that these pension plans "do not provide incentives" (Cadman and Vincent, 2015, p. 781), which is consistent with concerns that executive pensions may contribute to rent extraction (Bebchuk and Fried, 2004; Kalyta and Magnan, 2008; Kalyta, 2009).

We examine the relation between CEO inside debt and financial reporting quality for firms in the S&P 1500 over the period 2006–2021. We measure our key test variables using four measures that capture either the existence and magnitude of inside debt ownership or the "relative leverage ratio" of CEOs, as identified by comparing the CEO's personal debt-to-equity ratio to the firm's debt-to-equity ratio (e.g., Wei and Yermack, 2011). As dependent

[4]See, for example, Dechow and Dichev (2002), Francis et al. (2005), Hribar and Nichols (2007), Owens et al. (2017), and Christensen et al. (2023).

variables, we follow He (2015) and Dhole et al. (2016) by focusing on accrual-based measures of financial reporting quality. We construct five alternative measures, where higher values of these measures indicate lower quality financial reporting.

In initial descriptive tests, we find that firms using inside debt in CEO compensation (55.5 percent of our sample) are associated with substantially lower values of the five inverse financial reporting quality measures. This result is consistent with the conclusions of He (2015) and Dhole et al. (2016) that inside debt is associated with higher quality financial reporting. However, we also find that inside debt use is associated with a wide range of firm characteristics. For example, firms with inside debt are substantially larger, more mature, and are more likely to have broad-based employee defined benefit pension plans than other firms. We further find systematic differences in firms' operating environments: inside debt firms have less volatile operations, are more profitable, and are less intangible-intensive. These systematic relations extend to other measures of inside debt, such as the relative leverage ratio. We find that a factor constructed based on six variables related to firms' operating environments is strongly correlated with all inside debt variables.[5]

In tests that control for these systematic relations, we find no empirical support for the conclusion that inside debt ownership is associated with financial reporting quality. When estimating 20 regression specifications based on the four inside debt variables and five dependent variables, we find that none of the relations is significantly negative at $p < 0.05$ when controlling for confounding factors (only one is significantly negative at $p < 0.10$). This result is not consistent with the conclusions drawn by He (2015) and Dhole et al. (2016) and suggests that the univariate relations between inside debt and financial reporting outcomes are driven by the effects of confounding factors.

To better understand what drives the differences in conclusions, we investigate the role of the operating environment as a confounding factor in the relation between inside debt

[5]The six variables we focus on are: the volatility of past cash flows, volatility of past sales, idiosyncratic stock return volatility, return on assets, frequency of losses, and R&D intensity. Return on assets has a negative weight, while the other five variables have a positive weight in the combined factor.

and the accrual-based financial reporting quality variables. As discussed, inside debt use is associated with less volatile and uncertain operating environments, while these factors are simultaneously associated with the accrual-based measures of financial reporting quality. When we exclude the six operating environments variables from the regressions, we find a negative relation that is statistically significant at the 0.05 level in 11 of the 20 regressions (13 [8] are significant at the 0.10 [0.01] level). These results are more consistent with the conclusions of He (2015) and Dhole et al. (2016) and suggest that the operating environment characteristics play a key role in explaining the differences in conclusions.

We also conduct a two-step analysis that helps to further illustrate the role of the operating environment as a confounding factor. In the first step, we explain the variation in the inside debt variables based on the six operating environment variables. In the second step, we regress the accrual-based measures of financial reporting quality on the components of the inside debt variables that are explained versus unexplained by these factors (i.e., the fitted versus residual values of the first-step regressions). The results of our tests suggest that the negative relation between inside debt and accrual-based financial reporting quality measures is driven entirely by the portion of inside debt that is explained by the operating environment variables.

Although our primary objective is to present a *reexamination* of the relation between inside debt and financial reporting quality, in the Online Appendix we also present our attempts to *replicate*, as closely as possible, the sample and tests of He (2015) and Dhole et al. (2016) based on the disclosed research design choices. We find for these replications that the negative and significant univariate relations between inside debt and accrual-based financial reporting quality variables are not robust to the inclusion of control variables for the firm's operating environment. Our replication attempts demonstrate how the original research designs do not effectively control for confounding effects, and clarify the consequences of design choices related to outlier treatment, standard error clustering, and the use of weak instrumental variables (Larcker and Rusticus, 2010).

Our study contributes to the literature on the effects of executive compensation incentives on managers' disclosure and financial reporting choices. Dhole et al. (2016, p. 543) recommend that *"because CEO inside debt reduces managerial incentives for earnings management, firms should take this factor into account when designing optimal compensation packages."* Our results challenge this conclusion. Combined with research that links inside debt to inefficient contracting and rent extraction (e.g., Bebchuk and Fried, 2004; Bebchuk and Jackson, 2005; Cadman and Vincent, 2015), our results suggest that compensation policy recommendations concerning the use of inside debt to improve disclosure and financial reporting quality are not robustly supported by the data.

By revisiting prior conclusions, we also contribute to the broader academic debate on the importance of transparency, replication, and reexamination in accounting research (e.g., Basu, 2012; Waymire, 2012; Schrand, 2016; Bloomfield et al., 2018; Hail et al., 2020; Ohlson, 2022; Gow, 2023; Sharma, 2023). The two-step framework we present can help future researchers quantify the role of potential omitted variables. Our attempts at closer replications in the Online Appendix further illustrate the sensitivity of archival research findings to *disclosed* research design choices and the need for greater transparency and code sharing.[6] While we acknowledge that the continuous retrospective changes often made to widely used databases may make it impossible to exactly replicate prior archival studies (e.g., Ljungqvist et al., 2009; Lyle et al., 2024), it is essential for policy-relevant research findings to be robust to (reasonable) adjustments of measurements and/or research samples.

Our study therefore also contributes to the growing body of empirical studies that challenge existing conclusions based on reexaminations. As a few examples, Chen et al. (2018) find that one-step versus two-step estimation changes the relation between Big-N audits and accruals, DeFond et al. (2016) find that the relation between Big-N audits and audit quality is sensitive to the design choices in matching, while Aswani et al. (2024) and Zhang (2025) find that the relation between carbon emissions and stock returns is affected by scaling and

[6] As part of this endeavor, we share the full programming code behind the analyses presented in the paper and Online Appendix in the following repository: `https://github.com/dveenman/insidedebt`.

look-ahead bias. Similar to our study, Reeb and Zhao (2022) focus on the impact of control variables and demonstrate the importance of controlling for previously identified determinants of corporate innovation. In the compensation context, Hribar and Nichols (2007), Owens et al. (2017), and Mayberry et al. (2021) find that the relation between equity incentives and earnings management is sensitive to additional control variables and research design choices, while Daniel et al. (2020) examine a wide range of research design combinations to show that prior conclusions about the asymmetry in pay for luck are not robust.

2. Background and institutional setting

2.1. Pensions, deferred compensation, and inside debt

There is a vast literature in labor economics on pension plans and other forms of deferred compensation (see, e.g., Gustman et al., 1994). The evidence in this literature highlights important features and implications of these components of employee pay that extend to executive compensation. The labor economics literature suggests that pension plans can be considered "implicit contracts," as employees forgo a portion of their total compensation throughout their career in exchange for a pension once they retire (Ippolito, 1985). These implicit contracts can act as sorting devices that help firms select more confident and forward-looking (i.e., less myopic and short-term oriented) employees in the labor market (Ippolito, 2002). They also affect employee retention and influence labor market mobility by increasing the bond between the employee and the firm (Allen et al., 1993).

Corporate pension plans are generally in the form of a defined benefit (DB) or defined contribution (DC) plan. In a DB plan, the employer guarantees to pay specified benefits to an employee after retirement, while in a DC plan the employer contributes a periodic amount to the employee's pension account without a guarantee on the ultimate benefits. A key difference between the plan types is that with DB (DC) plans, the risks are largely borne by the employer (employee). While DB plans used to be the norm in the U.S., cost considerations have made DC plans more common in recent decades (e.g., Kieso et al., 2022).

DB plans are less frequently adopted by younger firms and more prevalent in traditional industries (e.g., Cadman and Vincent, 2015; Garman and Kubick, 2025). In recent years, several large and mature companies have frozen their DB plans and switched to DC plans for new employees (Choy et al., 2014; Anantharaman et al., 2022). Firms often have a combination of DB and DC plans, because of switches to DC plans or due to differences in common practice across the multiple jurisdictions they operate in.[7]

DC plans in the U.S. are often in the form of 401(k) plans that make employees' retirement wealth comparable to equity-like claims on the firm (e.g., Choy et al., 2014). Because our paper studies deferred compensation incentives that are more comparable to debt-like claims, we focus on DB pension plans in the discussions and analyses that follow. Specifically, because DB pensions may at least in part be unfunded, employees *de facto* face the downside risk of the firm—similar to unsecured bondholders—for the portion of their pension exceeding the insured amount. This contingent benefit feature increases productivity, reduces shirking, and mitigates misbehavior by imposing a substantial cost (i.e., pension capital loss) upon detection of malfeasance (Lazear, 1979).[8]

The consequences of (partly) unfunded pension plans are particularly significant for corporate executives. On top of their tax-qualified DB pension plans, executives often have substantial non-qualified supplemental executive retirement plans (SERPs), which are unsecured claims against the firm. Jensen and Meckling (1976) posit that the use of such compensation instruments with debt-like payoffs (i.e., "inside debt") can alleviate conflicts between debtholders and equityholders, especially when managers have significant equity ownership and incentives to transfer wealth from the former to the latter (i.e., the agency

[7]The movement to more DC plans is not confined to the U.S. and is an international phenomenon. For example, many European companies have shown a steady shift towards DC plans as a result of political, socioeconomic, accounting, and other regulatory changes (PensionEurope, 2024). In the Netherlands, pension regulations adopted in 2023 require employers to transition from DB to DC pension plans.

[8]In the U.S., employees' pension benefits are insured by the Pension Benefit Guarantee Corporation (PBGC), up to the limits set by law, in situations of default. For details on the maximum guarantee, see `https://www.pbgc.gov/wr/benefits/guaranteed-benefits/maximum-guarantee`. However, both the PBGC and firms' own pension plans have been substantially underfunded in recent years (Kieso et al., 2022; Garman and Kubick, 2025).

cost of debt). Edmans and Liu (2011) show that, although an equity bias in compensation packages is desirable to incentivize effort when a firm is solvent, a debt bias can improve effort and reduce the agency costs of debt when risk-shifting becomes a concern, e.g., when bankruptcy is more likely (Dewatripont and Tirole, 1994; Jiang et al., 2010b).

Given a lack of disclosure requirements in the past, the executive compensation literature has not paid much attention to the role of defined pension benefits and other forms of deferred compensation until recently. Bebchuk and Jackson (2005) illustrate the importance of pension plans in executive compensation and provide descriptive evidence on the significance of CEO pensions for a set of S&P 500 firms. They find that the exclusion of pensions from the measurement of executive pay leads to inaccurate assessments of pay-performance sensitivity, suggesting the need for enhanced disclosure requirements. In line with this recommendation, since 2006 the U.S. Securities and Exchange Commission (SEC) requires detailed disclosures of deferred compensation and DB pensions.

Studies in the recent inside debt literature have examined a variety of outcomes in relation to inside debt. For example, Wei and Yermack (2011) exploit the disclosure rules of 2006 and find that the initial inside debt disclosures increased bond prices, decreased stock prices, and decreased the volatility of both bonds and stock. Subsequent research by Anantharaman et al. (2014) suggests that as CEOs' relative leverage ratios increase, private loan issuers charge lower spreads and demand fewer covenants in loan contracts. Furthermore, when inside debt aligns managers' incentives with those of debtholders, managers are expected to have a reduced risk appetite and willingness to engage in risky investment and business decisions. In this regard, Cassell et al. (2012) find a negative association between CEO inside debt holdings and future stock return volatility, R&D investments, and firm leverage. Chi et al. (2017) find a negative relation between CEO inside debt holdings and tax sheltering, suggesting CEOs with higher inside debt levels are less likely to engage in tax sheltering transactions that could lead to higher future cash flow volatility.

2.2. Conceptual link between inside debt and financial reporting quality

If equity incentives increase managers' willingness to misreport and reduce financial reporting quality (e.g., Armstrong et al., 2013), inside debt arrangement have the potential to reduce managers' incentives to misreport given the increased exposure to the adverse future outcomes associated with misstatement detection (e.g., Palmrose et al., 2004; Hribar and Jenkins, 2004; Graham et al., 2008; Chava et al., 2018). When incentives to misreport reduce, financial reporting quality may improve.

Since executive pension plans are often unsecured and unfunded, managers effectively "stand in line" with other creditors in the event of bankruptcy. By tying managers' wealth to the long-term liquidation value of the firm beyond their retirement age, inside debt can further weaken incentives to take actions that sacrifice long-term firm value (Graham et al., 2005; Brochet et al., 2015; Ernstberger et al., 2017; Kraft et al., 2018). In addition, the ultimate payment of benefits is conditional on the CEO not having engaged in fraudulent behavior, which reduces the horizon problem (e.g., Dechow and Sloan, 1991) as there is a "next period" with potentially negative consequences for misconduct. If managers have engaged in fraudulent behavior or performed poorly in the past, firms can withdraw their pensions and deferred compensation at any point in time, including after retirement.[9]

Notwithstanding these arguments and the recent empirical evidence of He (2015) and Dhole et al. (2016), the existence of a link between inside debt and financial reporting quality is not obvious. The reason is that evidence of a link between *equity* incentives and misreporting, which the arguments build upon, is mixed (e.g., Armstrong et al., 2024) and raises questions about the conceptual underpinnings of the predicted link.

[9]There are several examples of revoked pensions and deferred compensation benefits. Wei and Yermack (2011) document that the executive pensions of General Motors, Chrysler, and Nortel all experienced substantial wipeouts upon detection of managerial misconduct. In Canada, former Hydro One CEO Eleanor Clitheroe was fired after complaints about her being allegedly overpaid (with $2.2 million salary and expense abuses, which included hundreds of thousands of dollars for expensive cars, club memberships, home renovations, etc.) and experienced a substantial reduction in pension benefits. See "Hydro One CEO Eleanor Clitheroe fired" and "Ex-Hydro One boss loses bid for pension boost" on CBCNews (Available at: http://www.cbc.ca/news/business/hydro-one-ceo-eleanor-clitheroe-fired-1.339806 and http://www.cbc.ca/news/canada/ex-hydro-one-boss-loses-bid-for-pension-boost-1.883219).

2.3. Determinants of inside debt use in executive compensation

Compared to research that examines outcomes related to inside debt, research on the determinants of firms' inside debt use is more limited. This is an important observation, because it is well known that executive compensation arrangements are endogenously determined in response to unobservable firm, industry, and executive characteristics (e.g., Edmans et al., 2017). To the extent that inside debt use in executive compensation is not random, the factors associated with inside debt use could confound inferences of tests that relate inside debt variables to hypothesized outcomes.

Gopalan et al. (2014) find that the horizon ("duration") of executive pay relates to firm characteristics such as operating volatility and firm performance. As inside debt arrangements increase the executive's horizon, these relations are expected to extend to components of inside debt. Indeed, Cadman and Vincent (2015) find that firms with DB pension plans for their CEOs are significantly less volatile and have a higher return on assets. Consistent with Sundaram and Yermack (2007), they further find that these firms have lower R&D expenditures. These results suggest that inside debt is not only related to lower risk and less R&D investments in the *future* (Cassell et al., 2012), but it is likely also *predetermined* by firm characteristics associated with R&D expenses and operating volatility.

3. Research design and data

3.1. Measuring inside debt ownership: the "X" variable

To constrain the sensitivity of our results to the use of any particular measurement approach, we create four different measures of CEO inside debt ownership.[10] We define inside debt as the sum of the actuarial present value of accumulated pension benefits and the total aggregate balance in deferred compensation. Based on this definition, our first variable is an indicator variable ($InsideDebtDum$) that is set equal to 1 for firm-years with nonzero CEO inside debt ownership, and 0 otherwise. Second, we construct a variable

[10] Appendix A and the Online Appendix provide further details on the construction of these variables.

that takes into account the amount of inside debt ownership relative to the CEO's equity ownership. *InsideDebtRatio* is defined as the ratio of inside debt ownership to the sum of inside debt and equity ownership (Lee et al., 2018).

Next, we construct two variables based on the CEO's relative leverage ratio (*RelativeLev*), which compares the CEO's inside debt-to-equity ratio to the firm's debt-to-equity ratio (e.g., Wei and Yermack, 2011). The relative leverage ratio is conceptually appealing because it matches theoretical discussions by Jensen and Meckling (1976) and Edmans and Liu (2011) on the optimal level of inside debt. Following He (2015), our third variable *RelativeLevDum* is an indicator set equal to 1 if the CEO's relative leverage ratio exceeds one, and 0 otherwise. Our fourth variable follows Dhole et al. (2016) and focuses on the continuous relative leverage ratio, which we transform to a decile rank variable (*RelativeLevDec*) because of severe skewness. As Campbell et al. (2016) explain, a logarithmic transformation does not sufficiently eliminate this skewness.

3.2. Accrual-based measures of financial reporting quality: the "Y" variable

Following He (2015), we use the absolute value of discretionary accruals based on the cross-sectional modified Jones model (Dechow et al., 1995) as an inverse measure of financial reporting quality. Specifically, we estimate the following regression using OLS for each two-digit SIC industry group with at least 20 firm-year observations:

$$TACC_{it} = \beta_0 + \beta_1(1/Assets_{it}) + \beta_2(\Delta Rev_{it} - \Delta Rec_{it}) + \beta_3 PPE_{it} + \varepsilon_{it}. \quad (1)$$

We estimate the equation using all firm-years with sufficient data in the intersection of CRSP and Compustat. All input variables are defined following Hribar and Nichols (2007). $TACC$ refers to total operating accruals for the year, defined as income before extraordinary items from the statement of cash flows (Compustat `IBC`) minus cash flow from operations (`OANCF`) and scaled by lagged total assets (`AT`). ΔRev refers to the change in sales (`SALE`) scaled by lagged total assets, ΔRec refers to the change in receivables (`RECT`) scaled by

lagged total assets, and PPE captures gross property, plant, and equipment (PPEGT) scaled by lagged total assets.[11] Discretionary accruals (DA) are measured as the residuals from the regressions. Following He (2015) and Dhole et al. (2016), the absolute value of DA is used as an inverse measure of financial reporting quality ($|DA|$).

Dhole et al. (2016) use an alternative estimation that includes ROA (net income scaled by lagged total assets) in equation (1) (Kothari et al., 2005). From this alternative specification, $|DA^{ROA}|$ is our second measure of inverse financial reporting quality. We also estimate a nonlinear model that controls for CFO (operating cash flows scaled by lagged assets) instead of ROA and allow the relation between accruals and cash flows to differ between firms with positive and negative cash flows (Ball and Shivakumar, 2006): $|DA^{CFO}|$. Next, we construct a fourth measure that does not rely on a first-step estimation by subtracting the industry-year average total accruals from the firm's total accruals in the given year ($|DA^{basic}|$). Finally, our fifth measure is based on Dechow and Dichev (2002) following the implementation of Francis et al. (2005). We estimate the following equation using OLS for each two-digit SIC industry-year combination with at least 20 observations:

$$WCA_{it} = \beta_0 + \beta_1 CFO_{it-1} + \beta_2 CFO_{it} + \beta_3 CFO_{it+1} + \beta_4 \Delta Rev_{it} + \beta_5 PPE_{it} + \varepsilon_{it}, \qquad (2)$$

where the variables are defined as before, except for WCA, which captures working capital accruals and is defined as income before extraordinary items from the statement of cash flows (IBC), minus cash flow from operations (OANCF), plus depreciation and amortization (DPC). Following Dechow and Dichev (2002), all variables are scaled by *average* instead of lagged total assets. Variable DD is measured as the standard deviation of the regression residuals over the five years from $t-4$ through t, requiring a minimum of three years. Higher values of DD are assumed to capture lower quality financial reporting.

[11] Following Francis et al. (2005), we winsorize the extreme values of all input variables to the 1st and 99th percentiles. Because the estimations are performed by industry-year, we winsorize the variables by year.

3.3. Controlling for confounding factors related to "X" and "Y"

He (2015) and Dhole et al. (2016) provide limited discussion of the economic factors associated with firms' choice to use inside debt in CEO compensation. Instead, the studies motivate the inclusion of control variables based on the expected relation of these variables with financial reporting quality, the dependent variable (Y). This practice of motivating control variables based on their relation with a dependent variable is common (Whited et al., 2022), but incurs the risk of omitting factors that are systematically associated with the independent test variable of interest (X). In fact, a critical role of control variables is to ensure that the variation in the *in*dependent variable of interest can be considered exogenous after conditioning on the control variables (Gow et al., 2016; Whited et al., 2022).[12]

This discussion suggests that it is important to control for factors associated with firms' choice to use (more) inside debt in CEO compensation packages. Based on our evaluation of prior theoretical and empirical studies, we identify a subset of six variables that we expect to have a systematic relation with inside debt variables. As motivated in more detail below, these variables are the volatility of past cash flows and sales (σCFO and $\sigma Sales$), idiosyncratic return volatility ($Idioshock2$, see Owens et al., 2017), firm performance (ROA), loss frequency ($Loss\%$), and R&D intensity ($R\&D$).

DB pensions and deferred compensation arrangements are a form of delayed compensation. Gopalan et al. (2014) argue that delayed compensation is risky for executives and that this risk increases with the volatility of firms' cash flows. Accordingly, they predict and find that firms with more volatile stock returns, cash flows, and sales reduce executives' risk by shortening the compensation horizon.[13] In a similar vein, Gerakos (2010) and Cadman and Vincent (2015) find that CEO DB pensions are more likely for firms that have lower

[12] The extensive use of settings with "plausibly exogenous" variation in a test variable further underscores this point. Studies using these settings mitigate endogeneity concerns because variation in their independent variable of interest is often unrelated to observable and unobservable factors. The inclusion of additional control variables correlated with the dependent variable, to the extent they are not "bad" controls (Angrist and Pischke, 2009), has the advantage of increasing the precision of the regression estimation, but this is of secondary concern relative to the omitted variable problem.

[13] A recent study by Kubick et al. (2024, Table 4) similarly documents a negative relation between return volatility and compensation horizon.

stock return volatility, Kalyta and Magnan (2008) find a negative relation with performance volatility, and Chi et al. (2017) find a negative relation between CEO relative leverage and return volatility. Campbell et al. (2016) further predict and find that the CEO relative incentive ratio is higher for less risky firms. Combined, these insights motivate our choice to control for the volatility variables σCFO, $\sigma Sales$, and $Idioshock2$.

Next, Eaton and Rosen (1983) predict that managers at firms with a lower likelihood of bad performance outcomes are more likely to accept delayed compensation arrangements than managers at firms where the probability of bad outcomes is higher. Campbell et al. (2016) further predict that liquidity-constrained firms provide less inside debt incentives (e.g., firms with negative earnings). Consistent with these predictions, Cadman and Vincent (2015) find a positive relation between return on assets and firms' use of CEO DB pension plans and Sundaram and Yermack (2007) find a negative relation between CEO pension values and an indicator for negative operating income. These insights motivate our performance control variables ROA and $Loss\%$.

Prior studies also suggest a link between $R\&D$ expenditures and compensation horizon. On the one hand, Gopalan et al. (2014) predict that CEO compensation horizons are longer for firms with longer-duration projects. For *non-inside debt* compensation, they find a positive relation between compensation horizon and R&D expenditures. On the other hand, Sundaram and Yermack (2007) predict that R&D expenditures are negatively associated with the relative amount of debt- to equity compensation incentives. Consistent with this prediction, Cadman and Vincent (2015) find that firms with CEO DB pension plans have substantially lower R&D intensity, while Campbell et al. (2016) find a negative relation between R&D expenditures and the CEO relative incentive ratio. Given these insights, our sixth control variable is assets-scaled R&D expenses ($R\&D$).

Besides their association with inside debt variables, we specifically choose these control variables because we expect them to be associated with accrual-based financial reporting quality measures as well. Dechow and Dichev (2002) predict and find that accrual estimation

errors are larger for firms with more volatile cash flows and sales and firms reporting losses. Other studies also find systematic relations of these variables with absolute discretionary accruals (e.g., Hribar and Nichols, 2007; Francis et al., 2008), while Owens et al. (2017) find a systematic relation between absolute discretionary accruals and idiosyncratic return volatility. Coefficient estimates on control variables from Armstrong et al. (2013, Table 3) and Liu (2016, Table 2) further suggest a strong negative relation between absolute discretionary accruals and ROA. The expected relation with R&D expenditures is less clear, although $R\&D$ may pick up operating uncertainty associated with the dependent variables that is not captured by the other control variables.

Although these six variables capture different underlying constructs, we also expect them to be related in a systematic way. For example, firms engaged in more R&D activities are likely to have lower earnings and more volatile performance. To evaluate the commonality in these control variables, we perform a factor analysis and extract the first principal component factor. We label this factor the operating environment factor ($OE\ factor$). The results suggest that all six variables have significant weights and are correlated with the common factor in predictable ways. The factor loadings on the standardized variables are 0.270 (σCFO), 0.155 ($\sigma Sales$), 0.271 ($Idioshock2$), -0.248 (ROA), 0.297 ($Loss\%$), and 0.217 ($R\&D$), and produce correlations with the factor of 0.736, 0.422, 0.739, -0.674, 0.808, and 0.591, respectively.

Higher values of $OE\,factor$ capture a more volatile and uncertain operating environment. Consistent with our discussion above, the upper graph in Figure 1 shows a strong negative relation between this factor and each of our inside debt variables. For example, of the firms in the lowest $OE\ factor$ decile portfolio, over 80 percent have inside debt in CEO compensation packages. By contrast, less than 20 percent of firms in the highest $OE\,factor$ decile portfolio have inside debt. At the same time, the bottom graph in Figure 1 reveals a strong positive correlation between $OE\,factor$ and the inverse measures of financial reporting quality. Combined, these patterns highlight the importance of effectively controlling for the

underlying operating environment variables, given their association with inside debt use and the accrual-based financial reporting quality measures.

3.4. Link to control variables in prior research

We argue that the studies of He (2015) and Dhole et al. (2016) only partially control for the confounding variables we introduce in Section 3.3. He (2015) controls for return on assets, an operating loss dummy, and the standard deviations of cash flows and sales, while Dhole et al. (2016) control for the volatility of earnings. However, the inclusion of these variables in the regressions may not be sufficient to adequately condition the analyses on the confounding effects of factors related to inside debt use. If a more comprehensive set of control variables is required to account for the systematic relation between the characteristics of firms' operating environments and inside debt use (see Figure 1), omitted variable problems may persist.

In addition, even when a control variable is included in a regression to account for an expected confounding effect, the control variable might measure the confounding factor with error. For example, even when the confounding effect is correctly identified at a conceptual level (e.g., firm size), measurement error in a control variable (e.g., total assets) may still induce coefficient bias for a variable of interest because the omitted variable problem is not completely addressed (Whited et al., 2022). We conjecture that the results of Dhole et al. (2016) may be subject to this concern to the extent that earnings volatility is a noisy proxy for the construct underlying the six confounding variables we identify.

In a similar vein, a control variable is less effective at conditioning a relation of interest on a confounding factor when the variable is skewed or has extreme values (Gassen and Veenman, 2024). We posit that the results of He (2015) may be subject to this concern. As can be gleaned from He (2015, Table 1), the distributions of several key variables are severely skewed. For example, the standard deviation of sales, which can be a key control variable in studies using unsigned discretionary accruals (Hribar and Nichols, 2007), is highly right-skewed with a mean of 0.302, a median value of 0.078, and standard deviation of 8.771.

While He (2015) winsorizes the input variables to the accrual model estimation and the inputs to the calculation of the inside debt variable, the study did not apply an outlier treatment when estimating the main regressions using OLS.[14]

Arguably, because of this skewness, the standard deviations of sales and cash flows are not significantly related to absolute discretionary accruals in Table 3 of He (2015). Because this result is inconsistent with prior research that finds strong correlations between similar variables and absolute discretionary accruals, these variables may not have been effective at conditioning the analysis on differences in firms' operating environments. In a similar vein, the ROA variable in Table 1 of He (2015) has a relatively high standard deviation (0.7375) and the positive coefficient on ROA in column (1) of Table 3 is inconsistent with the strong negative coefficient found by Armstrong et al. (2013) and Liu (2016). The relatively low adjusted R^2s of 0.024 and 0.057 in Tables 3 and 4 of He (2015), respectively, further suggest that the control variables appear to explain only limited variation in the dependent variables. The more the variation in the dependent variables is left unexplained, the greater the risk of omitted variables bias.[15]

3.5. Additional control variables

Besides the variables introduced above, we control for additional variables that He (2015) and Dhole et al. (2016) include in their analyses. Specifically, we control for firm size ($Assets$), book-to-market (BTM), firm leverage ($Leverage$), firm age ($Firmage$), sales growth ($Salesgr$), institutional ownership ($Inst$), analyst coverage ($Analysts$), and the choice of a Big 4 auditor ($Big4$). We also control for CEO equity ownership and incentives ($CEO\,ownership$, $Delta$, and $Vega$) and cash compensation ($CashComp$). Consistent with the strong association found by Cadman and Vincent (2015) with CEO DB pension plans, we further control for whether the firm has a broad-based employee defined benefit

[14] We thank the author for generously sharing these details with us in private communication.

[15] As discussed in more detail in Section 5.4 and in our Online Appendix, our replications of the samples and tests of both He (2015) and Dhole et al. (2016) confirm the conjecture that the confounding effects of factors associated with inside debt use are not effectively controlled for in the original studies.

pension plan ($PensionPlan$), which is identified based on the presence of nonzero pension service costs in the 10-K notes. Cadman and Vincent (2015) and Chi et al. (2017) further find a positive association between inside debt use and $CEO\,Age$, while Cadman and Vincent (2015) find a negative relation with $CEO\,Tenure$.[16]

3.6. Sample selection and descriptive statistics

Panel A of Table 1 presents the details of our sample selection procedure. The primary restriction is the use of Execucomp, which limits the sample to firms in the S&P 1500. Since data on the pension and deferred compensation components of managers' inside debt ownership are available only since the SEC compensation disclosure requirements in 2006, our sample spans the period 2006–2021.

We start with all unique firms available in the intersection of CRSP and Compustat with USD-denominated financial information and positive total assets for the fiscal year. We remove all financial firms (SIC codes 6000-6999) and observations for which we cannot obtain estimates of discretionary accruals. After removing observations without the required CEO compensation data in Execucomp or data to construct key control variables, our main sample consists of 19,534 firm-year observations comprising 1,944 unique firms. For the tests with the DD accrual quality measure, the sample size drops to 16,612 firm-years due to additional data requirements.

Panel B of Table 1 presents the sample distribution over time. Because inside debt data are available only for fiscal years ending on or after December 2006, the 2006 sample is smaller than the other years (i.e., the fiscal years ending in June-November 2006 are not included). We also note that the sample size decreases over time. Execucomp increased firm coverage in 2006 and 2007 and gradually decreased coverage between 2008 and 2021, resulting in a decreasing number of firms in our sample. There is a slight decline in the

[16]Different from He (2015), we do not control for independent director variables because of the additional data requirements imposed on the sample. In a similar vein, we do not follow Dhole et al. (2016) by additionally controlling for a measure of real earnings management. In the Online Appendix, we present results from our attempts at replicating these studies as closely as possible, including these variables.

frequency with which firms use inside debt in CEO compensation, which is mostly driven by a reduction in the use of DB pensions. The rightmost column also shows how DB pensions become a smaller component of inside debt over time.

Panel C of Table 1 presents the sample distribution across 12 Fama-French industries. Most firms are part of the *Business Equipment* ("Computers, Software, and Electronic Equipment") sector. This sector—which includes firms such as Microsoft, Apple, and Cisco Systems—is associated with the lowest frequency of inside debt use (32.5 percent), driven primarily by the low frequency of defined pension benefits in these firms (13.5 percent). On the other hand, it is very common for firms in the *Utilities* sector to use inside debt (95.0 percent), driven mostly by the high frequency of pensions (88.1 percent).

3.7. Descriptive statistics

Panel A of Table 2 presents descriptive statistics for our inside debt variables, the accrual-based financial reporting quality measures, and all control variables.[17] The descriptive statistics for the inside debt variables suggest that the median inside debt ownership of \$0.22mln is small compared to the median equity ownership of \$14.86mln by CEOs in our sample. The untabulated median value of CEOs' personal leverage (i.e., value of inside debt scaled by the value of equity ownership) equals 0.013, which raises questions about how strong the incentives induced by inside debt can be, on average.[18]

We further find that CEOs have inside debt ownership in the form of pensions or deferred compensation in 55.5 percent of firm-years. The mean for $InsideDebtRatio$ suggests that 12.7 percent of CEOs' total ownership (debt plus equity) is in the form of pensions or deferred compensation, although the median is lower at 1.4 percent. The mean for $RelativeLevDum$ suggests that in 26.1 percent of firm-years, the CEO's inside debt-to-equity ratio exceeds the firm's debt-to-equity ratio. The mean relative leverage ratio ($RelativeLev$) equals 2.0, but this estimate is not representative given the extreme right-skewness in this variable. The

[17] We winsorize all continuous variables at the 1st and 99th percentiles of their distributions.

[18] For an earlier sample period, Chi et al. (2017) also report a low median personal leverage ratio of 0.03.

median value is only 0.103, while the untabulated skewness and kurtosis are equal to 6.5 and 48.4, respectively (note that for a normal distribution, these parameters are equal to 0 and 3, respectively).[19]

Given their skewness, we log-transform the following independent variables when performing our multiple regressions: *Assets*, *Firm Age*, *Analysts*, *CashComp*, *Delta*, *Vega*, *CEOAge*, and *CEOTenure*. As discussed before, we use the decile rank of the relative leverage ratio (*RelativeLevDec*) in our tests.[20] The other variable distributions do not display surprising or noteworthy patterns.[21]

4. Empirical results

4.1. Factors related to inside debt and accrual-based financial reporting quality variables

As discussed earlier, firms' inside debt use and the variation in the accrual measures of financial reporting quality are not random. In Table 3, we present the mean values of our dependent variables and all control variables for firms with and without inside debt (i.e., *InsideDebtDum* equals 1 versus 0). Because the other three inside debt variables are strongly correlated with the mere existence of inside debt in CEO pay, the patterns we document for the split based on *InsideDebtDum* extend to the other variables.

Each of the five accrual-based financial reporting quality variables displays significantly lower values for firms with inside debt. The differences are strong and in line with the conclusion that inside debt is associated with higher-quality financial reporting as measured by these variables. However, Table 3 also clearly shows that inside debt use is associated with a variety of firm-, CEO-, and operating environment characteristics that are known to be associated with the accrual-based measures as well. Firms using inside debt are larger,

[19]The sample size for the relative leverage variables is smaller because the computation of these variables requires firms to have nonzero debt.

[20]Specifically, we decile-rank the nonzero values of *RelativeLev* and set *RelativeLevDec* to zero for cases where *RelativeLev* is zero. We then scale the rank variable by ten to obtain values between 0 and 1.

[21]Following Lewellen (2011), we set the maximum institutional ownership to 100 percent. As Lewellen (2011) explains, the number of shares held by institutions may exceed the number of shares outstanding due to short selling.

more mature, have higher leverage, have lower sales growth, have more analyst coverage and institutional ownership, and are more likely to hire a Big-4 auditor. Consistent with Cadman and Vincent (2015), firms using inside are much more likely to have broad-based employee pension plans more generally. Inside debt use is also correlated with other compensation characteristics and is more likely for older CEOs and CEOs with shorter tenure. Consistent with results from Figure 1 based on the combined factor, inside debt firms are less volatile, more profitable, and spend less on R&D.

Table 4 presents baseline regressions with the accrual-based financial reporting quality measures as dependent variables and all independent variables except the inside-debt variables.[22] The accrual-based measures have higher values for firms with lower book-to-market and leverage and higher sales growth. Three of the five coefficients on the broad-based pension plan indicator variable are significantly negative, while Table 3 suggested a positive relation with inside debt use. The coefficients on the "operating environment" variables confirm that the accrual-based measures have higher values for more volatile firms (Hribar and Nichols, 2007; Owens et al., 2017) and are negatively associated with performance. The sign of the coefficients on the *R&D* variable are ambiguous, but untabulated tests suggest that the coefficients are significantly positive when the other operating environment variables are excluded. Finally, the bottom row shows that the operating environment variables contribute substantial additional explanatory power to the estimations compared to when only the other two sets of control variables are included.

4.2. Effects of (not) controlling for confounding factors

Table 5 presents the results from testing the relation between inside debt variables and the accrual-based financial reporting quality variables after controlling for other variables. Because the combination of different test variables and dependent variables leads to 20

[22]Given the panel structure of the data, we cluster standard errors by firm and year (Gow et al., 2010). We also include untabulated two-digit SIC industry-by-year fixed effects, consistent with the level at which the accrual models are estimated. The industry-year fixed effects allow time trends to vary across industries.

regression specifications, we tabulate the coefficients and their t-statistics only for the inside debt variables (coefficients on the control variables can be inferred from Table 4). The results in Panel A provide a clear picture: despite the strong univariate relation with inside debt, we find no consistent evidence of a systematic negative relation of the accrual-based financial reporting quality variables with the inside debt variables after controlling for all other variables. Only one out of the 20 coefficients is significantly negative at $p < 0.10$. These results are inconsistent with the results of He (2015) and Dhole et al. (2016), who find robust negative and statistically significant relations.

To better understand what may be driving these differences in results, Panel B presents the results from excluding the six operating environment characteristics from the regressions. Recall from Figure 1 that, in combination, these variables are strongly correlated with both the inside debt variables and the dependent variables. Interestingly, after excluding these control variables from the estimations, we find a significant ($p < 0.10$) negative relation in 13 of the 20 specifications. In 11 (8) regressions, the negative coefficient is significant at the $p < 0.05$ ($p < 0.01$) level. These results are more in line with the He (2015) and Dhole et al. (2016) studies and suggest that the six operating environment characteristics play a key role in explaining the differences in results.[23]

To summarize, these results suggest that evidence of a statistically significant negative relation between inside debt variables and accrual-based financial reporting quality variables is sensitive to the inclusion of variables associated with the volatility and uncertainty of firms' operating environments. Our results are not consistent with the conclusions drawn by both He (2015) and Dhole et al. (2016), and suggest that the prior studies likely suffer from omitted variable problems.

[23] We also explore the effect of additionally excluding the indicator variable for broad-based employee pension plans from the regressions. Table 3 suggests a strong relation with inside debt, while the (untabulated) correlation between the $PensionPlan$ indicator variable and our combined $OE\ factor$ variable is -0.2824. Both He (2015) and Dhole et al. (2016) do not control for this firm characteristic. The results presented in the Online Appendix are striking: after additionally excluding the pension-plan variable, the negative relation becomes statistically significant in almost all specifications.

5. Additional analyses

5.1. Explaining the results using a two-step procedure

We also introduce an alternative approach that helps illustrate more clearly how other factors confound a relation of interest. Consider the following equation, which depicts the analysis conducted thus far:

$$FRQ_{it} = \alpha + \gamma I_{it} + \boldsymbol{\delta Controls} + \varepsilon_{it}, \tag{3}$$

where FRQ refers to the measure of (inverse) financial reporting quality, I refers to one of the inside debt variables, and the vector $\boldsymbol{Controls}$ contains control variables and fixed effects. For example, in Panel B of Table 5 we found a significant negative coefficient ($\hat{\gamma}$) in several specifications after controlling for firm- and CEO-characteristics. The purpose of our analysis in this section is to use a two-step procedure that decomposes the estimated coefficient $\hat{\gamma}$ from equation (3) into the parts that are explained versus unexplained by the confounding effects of operating environment characteristics.

In the first step, we obtain the fitted and residual values of our inside debt variables by regressing each inside debt variable on the six operating environment characteristics:

$$I_{it} = \beta_0 + \beta_1 \sigma CFO_{it} + \beta_2 \sigma Sales_{it} + \beta_3 Idioshock2_{it} + \beta_4 ROA_{it} + \beta_5 Loss\%_{it} + \beta_6 R\&D_{it} + \varepsilon_{it}. \tag{4}$$

In the second step, we regress the accrual-based financial reporting quality variables on the fitted and residual values of the inside debt variables:

$$FRQ_{it} = \alpha + \gamma^F I^F_{it} + \gamma^R I^R_{it} + \boldsymbol{\delta Controls} + \varepsilon_{it}, \tag{5}$$

where I^F_{it} (I^R_{it}) refers to the fitted (residual) values of the inside debt variable obtained from estimating equation (4) using OLS. The vector $\boldsymbol{Controls}$ contains firm- and CEO-characteristics but does not include the operating environment variables, because these are included in the estimation through a linear combination in variable I^F_{it}. If inside debt incentives improve financial reporting quality, we expect coefficient γ^R to be negative and

significant. However, if there is no direct link between inside debt and financial reporting quality, we expect only γ^F to be negative and significant.

An important consideration with this procedure is that the fitted values obtained from the first-step estimations are known as "generated regressors." Similar to a two-stage least squares estimation, basic OLS standard errors in a second-stage regression do not reflect the sampling error from the first-step estimations. As a result, standard errors are biased downwards. Following Chen et al. (2023), we use a bootstrap procedure to obtain unbiased standard errors. Specifically, we use a pairs-cluster bootstrap procedure that resamples clusters from the sample and then performs both the first- and second-step estimations on each bootstrap sample. Standard errors are then derived as the standard deviation of the second-step coefficients obtained from 1,000 bootstrap samples.[24]

Table 6 presents the results from this two-step estimation procedure. The results illustrate that the significant negative relations between inside debt and accrual-based measures of financial reporting quality—as found earlier in Panel B of Table 5 after controlling for firm- and CEO-characteristics—are almost entirely driven by the values of the inside debt variables that are explained by firms' operating environments. The unexplained portions of the inside debt variables are not significantly associated with the financial reporting quality variables at the $p < 0.05$ level (only two coefficients remain negative and significant at the $p < 0.10$ level), in sharp contrast to the results reported in Panel B of Table 5. Instead, the results for the coefficients on the residual values are more consistent with the results in Panel A of Table 5 where we control for all variables.[25]

These results further illustrate the role that firms' operating environments play in explaining the relation between inside debt incentives and accrual-based measures of financial reporting quality. The results suggest that inside debt variables are associated with financial

[24]The Stata program we use to bootstrap the two-step estimation is available at https://github.com/dveenman/bootstep.

[25]Note that the coefficient estimates on the residuals in Table 6 are close, but not identical, to those in Panel A of Table 5, because the operating environment variables are included in Table 6 through a linear combination, while they are included as separate variables in Panel A of Table 5.

reporting quality measures in the predicted direction because of their association with the characteristics of firms' operating environments. These results are in line with the notion that firms' use of inside debt in CEO compensation packages is a non-random choice that is correlated with observable and unobservable firm characteristics.

5.2. Alternative outcome variable: restatements

Although our primary focus on accrual-based measures of financial reporting quality follows the studies of He (2015) and Dhole et al. (2016), these variables face substantial measurement error concerns given the two-step nature of their construction (Chen et al., 2018, 2024). Indeed, these measurement error concerns explain, at least partly, the strong correlation with operating volatility variables (Hribar and Nichols, 2007; Owens et al., 2017). Following He (2015), we therefore also examine restatement incidence to measure financial reporting quality. The results in Panel A of Table 7 suggest, consistent with the results of He (2015), that higher relative leverage is associated with a lower likelihood of restatements. In Panel B, however, the negative coefficient becomes smaller and statistically insignificant after we include control variables. Thus, these results are consistent with our earlier conclusion that the documented relation between inside debt and financial reporting quality is sensitive to controlling for confounding factors.[26]

5.3. Quantile regression tests

To further address measurement error and bias concerns associated with the use of absolute discretionary accruals as a measure of financial reporting quality, we follow Chen et al. (2024) by estimating quantile regressions that allow the effects of regressors to vary across the conditional distribution of accruals. These estimations allow for a cleaner test of the prediction that inside debt use in CEO compensation is associated with a less dispersed

[26]In this case, the switch to insignificant results in Panel B is not due to the operating environment variables per se. In the Online Appendix, we also examine (a) restatements related to fraud and/or SEC investigations (as identified in Audit Analytics), and (b) firms' propensity to meet or (just) beat analyst earnings forecasts, and find no significant relations with the inside debt variables.

distribution of accruals after controlling for known determinants of accruals, which is the prediction that He (2015) and Dhole et al. (2016) test by examining absolute discretionary accruals. Our results in the Online Appendix are inconsistent with this prediction and suggest that there is no negative relation between inside debt variables and the dispersion of (unexplained) accruals.

5.4. Reconciliation with prior research

The conclusions we draw in the previous sections are surprising given the prior results from He (2015) and Dhole et al. (2016) that suggest a robust negative relation between inside debt variables and inverse measures of financial reporting quality. In addition, the analyses of He (2015) control for three of our operating environment variables: the standard deviation of cash flows, the standard deviation of sales, and return on assets. Similarly, Dhole et al. (2016) control for operating volatility with the standard deviation of earnings in their tests. Both studies also apply an instrumental variables approach to further address endogeneity concerns induced by the non-random nature of inside debt use.

In our Online Appendix, we present a detailed description of the steps we take to perform an as-close-as-possible replication of the sample and main tests of both studies, as well as our attempts at reconciling the differences between our results and the results presented in those studies. Although we have followed the procedures described in both studies as closely as possible, several differences in the samples and variable distributions, which we are unable to explain fully, remain. Despite these differences, however, our tests do help us to reconcile several differences in the key results.

For the He (2015) study, we are initially able to replicate the baseline results of a negative relation between CEO relative leverage and accrual-based measures of inverse financial reporting quality. This negative relation becomes insignificant, however, when we include the same control variables as He (2015) in the regressions. Compared to the results of He (2015), the substantially higher explanatory power of our regressions suggests that the control vari-

ables in our estimations may be more effective at conditioning the analyses on confounding effects. Further investigations confirm this conjecture. Our tests reveal that the differences in results can be explained by a combination of the following issues: inconsistent results for key control variables in the He (2015) study, the (lack of) winsorization of the regression variables, industry effects, and the combined effects of confounding operating environment variables not included in the regressions.

For the Dhole et al. (2016) study, we are also able to replicate the baseline result of a negative relation of absolute discretionary accruals with the CEO relative leverage and incentive ratios, even after including the same control variables as the original study. However, we only find the same result when we transform the inside debt ratios to account for their extreme skewness. In addition, we find that the significant negative relation disappears after we control for additional aspects of firms' operating environment that were not included in the original estimation. For an outcome variable that captures earnings smoothing, we further find results that are opposite to those of Dhole et al. (2016). Our results suggest that inside debt incentives are associated with smoother earnings. Combined, our results suggest there is limited evidence to support the conclusions of the original study.

Although our primary focus is on accrual-based measures of financial reporting quality, we also follow both studies by examining alternative outcome variables for their samples: firms' propensity to meet or (just) beat analyst earnings forecasts (He, 2015; Dhole et al., 2016), restatements (He, 2015, and Section 5.2), and real earnings management measures (Dhole et al., 2016). We find support for a negative relation between CEO relative leverage and restatement incidence, but only when we define restatements differently from He (2015) to a narrower category related to fraud and SEC investigations.

Finally, for both studies, we also apply the instrumental variables procedures. Our conclusion from this analysis is that the state-level tax rates that are used as instruments are relatively weak and do not pass conventional tests for weak instruments (Larcker and Rusticus, 2010). Combined with concerns that the control variables included in the original

studies may not effectively control for confounding effects, the weak nature of the instruments makes it difficult to conclude that the instrumental variables approach sufficiently addresses the endogeneity concern.

We refer the reader to the Online Appendix for more details and discussions. Overall, we conclude that the differences in results for the accrual-based financial reporting quality variables can be explained by an omitted variable problem. Although the tests in both studies do partly control for the link between inside debt usage and characteristics of firms' operating environments, they do so in ways that are less effective than our tests. As a result, we conclude that the endogeneous nature of inside debt use is not completely accounted for in these prior studies. Combined with our main study, our analyses in the Online Appendix help explain why the results of the original studies are not robust.

6. Discussion and conclusions

Empirical evidence on the relation between CEO compensation and financial reporting quality can have important implications for executive compensation design and corporate governance. For example, recent studies conclude that CEO debt-like incentives, such as defined benefit pensions and deferred compensation, improve financial reporting quality. This result is consistent with the notion that CEO inside debt has the potential to counteract the aggressive financial reporting that can be induced by CEO equity incentives.

In this study, we reexamine the relation between inside debt variables and accrual-based measures of financial reporting quality and evaluate its sensitivity to empirical specification. Assessing the robustness of this result is key to understanding its importance for policy-making and the design of executive compensation. Contrary to prior studies, our results suggest that the relation is not robust when controlling for confounding factors. Specifically, while univariate tests suggest that firms with CEO inside debt exhibit lower magnitudes of discretionary accruals and other proxies for low-quality financial reporting, this relation vanishes when controlling for variables that capture the uncertainty and volatility of firms'

operating environments, which are simultaneously correlated with both inside debt and financial reporting quality measures. A two-step regression analysis further confirms that the relation observed in prior studies is driven entirely by these operating environment factors rather than a direct incentive effect of inside debt.

These results have critical implications for both research and practice. First, they highlight the need for caution in interpreting relations between executive compensation features and firm outcomes without robust controls for omitted variables associated with the compensation variables of interest. Second, our findings challenge the notion that CEO inside debt should be considered an effective mechanism for improving financial reporting quality. Instead, firms' use of inside debt appears to capture broader governance and operational strategies. Thus, although CEO inside debt may theoretically be appealing as a mechanism to enhance financial reporting quality, our findings indicate that its practical effectiveness is not supported by robust empirical evidence.

Our study contributes to the broader literature on executive compensation and financial reporting by demonstrating the limitations of prior conclusions regarding inside debt. It also underscores the importance of rigorous methodological approaches (including reexaminations and replications) and transparency in addressing critical questions in empirical accounting research. In this regard, we contribute to the increasing calls for replication, reexamination, and transparency in accounting and finance research, and the growing empirical literature that reexamines and challenges conventional wisdom obtained from the results of prior archival studies. By presenting both a reexamination and an as-close-as-possible replication attempt, our study further illustrates the differences between these forms of robustness tests and the intricacies and challenges of performing replications.

Appendix A. Variable definitions

Variable	Description
Analysts	Number of analysts in I/B/E/S in the latest consensus forecast (`FPI=1`) of annual earnings per share before the fiscal year t annual earnings announcement.
Assets	Firm size, measured based on total assets at fiscal year-end (Compustat item `AT`).
BTM	Book-to-market ratio measured as the book value of common equity (`CEQ`) divided by the market value of equity at fiscal year-end (`PRCC_F` $\times$ `CSHO`).
*Big*4	Indicator variable set equal to 1 if the firm is audited by a Big 4 auditor, 0 otherwise; specifically, this variable is set equal to 1 if `AUDITOR_FKEY` is between 1 and 4 in the Audit Analytics Audit Opinions Database.
CashComp	Sum of CEO salary and bonus from Execucomp.
CEO Age	CEO age from Execucomp.
CEO Tenure	Tenure of the CEO based on starting year identified from Execucomp.
CEO ownership	Percentage of total shares outstanding owned by the CEO (Execucomp variable `SHROWN_TOT_PCT`).
$\|DA\|$	Absolute value of discretionary accruals, measured based on the regression residual obtained from equation (1).
$\|DA^{Basic}\|$	Absolute value of discretionary accruals, measured as accruals (`IBC` - `OANCF`, scaled by lagged `AT`) minus the two-digit SIC industry-year mean of accruals.
$\|DA^{CFO}\|$	Absolute value of discretionary accruals, measured based on the regression residual obtained from equation (1) with additional cash flow variable included (Compustat: `OANCF` / lagged `AT`) interacted with a dummy variable capturing whether or not cash flows are positive (Ball and Shivakumar, 2006).
$\|DA^{ROA}\|$	Absolute value of discretionary accruals, measured based on the regression residual obtained from equation (1) with additional performance variable included (Compustat: `IBC` / lagged `AT`).
DD	Dechow-Dichev measure of inverse financial reporting quality, defined as the standard deviation of accrual estimation errors (identified as the residuals from equation (2)) over the previous five years, with a minimum of three prior years.
Firm age	Number of years since the firm first appeared in the Compustat Fundamentals Annual data.
*Idioshock*2	Idiosyncratic stock return volatility measured following Owens et al. (2017) based on the mean of the squared market-model residuals calculated over the 24 months period prior to the end of fiscal year t.
InsideDebtDum	Indicator variable set equal to 1 if the CEO has positive ownership of inside debt, 0 otherwise, where inside debt ownership is measured as the sum of the actuarial present value of accumulated pension benefits (Execucomp: `PENSION_VALUE_TOT`) and the total aggregate balance in deferred compensation (`DEFER_BALANCE_TOT`).
InsideDebtRatio	Ratio of inside debt ownership to the sum of inside debt ownership and equity ownership (as defined in more detail in the Online Appendix).
Inst	Percent of shares owned by institutional investors from Thomson Reuters Institutional Managers (13-F filings) data.

Variable	Description
Leverage	Ratio of long-term debt (DLTT + DLC) to total assets (AT).
Loss%	Fraction of the firm's annual earnings numbers (IB) over the years $t-4$ through t that were negative.
PensionPlan	Indicator variable set equal to 1 if the firm has a broad-based employee defined benefit pension plan, 0 otherwise; identified based on a positive value for current-period pension service costs (PPSC) in the Compustat Pension Annual Database.
RelativeLev	CEO relative leverage ratio, defined as the ratio of the CEO's inside leverage to firm leverage (see *RelativeLevDum*).
RelativeLevDec	Variable set equal to the decile rank of nonzero *RelativeLev* and zero when $RelativeLev = 0$, scaled to values between 0 and 1.
RelativeLevDum	Indicator variable set equal to 1 if the CEO's inside leverage ratio exceeds that of the firm, 0 otherwise, where inside leverage is defined as the ratio of inside debt ownership to the value of equity ownership and firm leverage is defined as the ratio of long-term debt (Compustat: DLTT + DLC) to the market value of equity at fiscal year-end (Compustat: PCCF_F × CSHO); this variable is undefined for firm-years with zero long-term debt.
Res	Indicator variable set equal to 1 if any of the quarterly earnings or the annual earnings for the fiscal year are subsequently restated downwards, 0 otherwise; restatement data are obtained from the Audit Analytics Non-Reliance Restatement Database and ignore restatements unrelated to accounting issues and those related to clerical errors.
ROA	Income before extraordinary items (IB) scaled by total assets (AT).
R&D	Research and development expenses (XRD) scaled by total assets (AT), set to zero when negative or missing.
Salesgr	Growth in total sales revenue, calculated as the ratio of current to lagged total revenues (SALE) minus one.
σCFO	Standard deviation of the ratio of operating cash flows (OANCF) to total assets (AT) over the five-year window from fiscal year $t-4$ through t, requiring a minimum of three years.
$\sigma Sales$	Standard deviation of the ratio of sales revenue (SALE) to total assets (AT) over the five-year window from fiscal year $t-4$ through t, requiring a minimum of three years.

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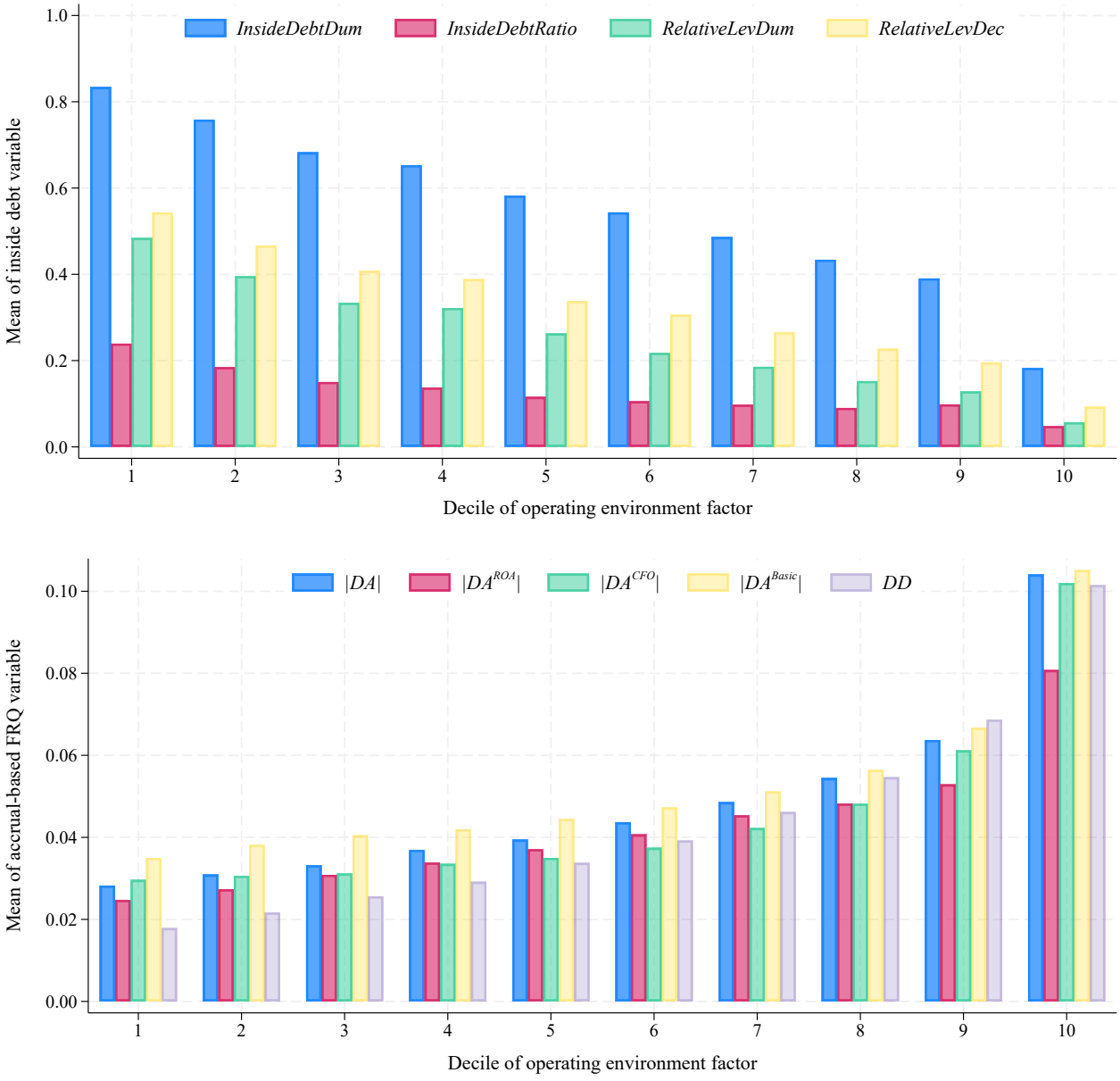
Figure 1

Operating environment and the link with inside debt and accrual variables



These figures partition the sample into ten portfolios based on the first principal component factor of six characteristics of firms' operating environment ($OE\ factor$): σCFO, $\sigma Sales$, $Idioshock2$, ROA, $Loss\%$, and $R\&D$. The factor loadings on the standardized variables are 0.270 (σCFO), 0.155 ($\sigma Sales$), 0.271 ($Idioshock2$), -0.248 (ROA), 0.297 ($Loss\%$), and 0.217 ($R\&D$), and produce correlations with the factor of 0.736, 0.422, 0.739, -0.674, 0.808, and 0.591, respectively. Higher values of $OE\ factor$ capture a more volatile and uncertain operating environment. Each bar represents the mean value of a variable in the given operating environment portfolio. All variables are defined in Appendix A.

Table 1
Sample selection

Panel A: Sample selection criteria

	Firm-years	Unique firms
Firms in CRSP/Compustat with positive total assets (2006–2021)	78,494	10,287
– Financial firms (SIC codes 6000-6999)	-17,718	-1,945
– Missing discretionary accrual data	-9,956	-1,484
– Missing data in Execucomp to compute compensation variables	-30,401	-4,855
– Missing data on control variables	-1,065	-59
Sample with sufficient data for main tests	19,354	1,944
Sample with DD accrual quality measure available	16,612	1,771

Panel B: Sample distribution by year

Year	No. obs.	With inside debt	With DB pensions	With deferred compensation	Pension fraction
2006	960	0.668	0.432	0.557	0.461
2007	1,417	0.594	0.370	0.491	0.442
2008	1,409	0.581	0.364	0.481	0.467
2009	1,370	0.562	0.346	0.473	0.448
2010	1,349	0.574	0.351	0.478	0.451
2011	1,307	0.568	0.340	0.475	0.449
2012	1,287	0.556	0.323	0.464	0.439
2013	1,271	0.549	0.319	0.456	0.421
2014	1,245	0.553	0.305	0.469	0.400
2015	1,203	0.544	0.279	0.468	0.375
2016	1,190	0.528	0.262	0.455	0.355
2017	1,145	0.485	0.233	0.412	0.348
2018	1,122	0.520	0.250	0.460	0.332
2019	1,084	0.526	0.237	0.466	0.311
2020	1,047	0.527	0.225	0.465	0.294
2021	948	0.535	0.220	0.478	0.280

Panel C: Sample distribution by Fama-French 12-industry classification

Industry	No. obs.	With inside debt	With def. ben. pensions	With deferred comp.	Pension fraction
1 Consumer Nondurables	1,052	0.691	0.487	0.584	0.490
2 Consumer Durables	624	0.715	0.383	0.612	0.402
3 Manufacturing	2,787	0.733	0.483	0.596	0.500
4 Oil, Gas, and Coal Extraction and Products	1,113	0.669	0.343	0.574	0.395
5 Chemicals and Allied Products	836	0.801	0.535	0.707	0.450
6 Business Equipment	4,575	0.325	0.135	0.279	0.280
7 Telephone and Television Transmission	613	0.527	0.349	0.467	0.392
8 Utilities	1,095	0.950	0.881	0.753	0.694
9 Wholesale, Retail, and Some Services	2,219	0.569	0.192	0.511	0.240
10 Healthcare, Medical Equipment, and Drugs	2,434	0.378	0.170	0.321	0.320
12 Other	2,006	0.535	0.191	0.464	0.262

Notes: Panel A presents the criteria used to create a sample of firm-years in the intersection of Compustat, CRSP, and Execucomp. Variables are defined in Appendix A. Panel B presents descriptive statistics on the sample composition over time and the fraction of firms per sample year that have "inside debt", identified as CEO defined benefit (DB) pensions (positive value of `PENSION_VALUE_TOT` in Execucomp) and/or deferred compensation (`DEFER_BALANCE_TOT`). "Pension fraction" refers to the ratio of the value of defined benefit pensions to the total value of inside debt. Panel C presents similar descriptive statistics across the Fama-French 12 industry classifications (excluding the finance ("Money") industry). Industry classifications are obtained from http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Table 2

Descriptive statistics

	n	Mean	St.dev.	p1	p25	Median	p75	p99
Inside debt variables								
CEO IDH ($mln)	19,354	4.436	9.664	0.000	0.000	0.223	3.984	57.938
CEO Pen. ($mln)	19,354	2.441	6.299	0.000	0.000	0.000	0.599	36.168
CEO Def. ($mln)	19,354	1.863	4.923	0.000	0.000	0.000	1.337	34.203
CEO Eq. ($mln)	19,354	65.327	193.477	0.197	5.534	14.863	43.011	1,536.5
InsideDebtDum	19,354	0.555	0.497	0	0	1	1	1
InsideDebtRatio	19,354	0.127	0.199	0.000	0.000	0.014	0.192	0.814
RelativeLevDum	16,994	0.261	0.439	0	0	0	1	1
RelativeLev	16,994	1.997	7.201	0.000	0.000	0.103	1.076	59.607
Dependent variables								
$\|DA\|$	19,354	0.048	0.053	0.001	0.015	0.032	0.061	0.303
$\|DA^{ROA}\|$	19,354	0.042	0.042	0.000	0.013	0.029	0.056	0.225
$\|DA^{CFO}\|$	19,354	0.045	0.052	0.000	0.013	0.029	0.057	0.298
$\|DA^{Basic}\|$	19,354	0.053	0.055	0.001	0.017	0.037	0.068	0.316
DD	16,612	0.043	0.040	0.005	0.018	0.030	0.052	0.215
Control variables								
Assets	19,354	9,306	21,333	53	684	2,052	6,963	144,603
BTM	19,354	0.480	0.426	-0.721	0.228	0.402	0.639	2.325
Leverage	19,354	0.250	0.200	0.000	0.078	0.237	0.372	0.900
Firm age	19,354	29.812	18.615	4	15	24	45	70
Salesgr	19,354	0.083	0.234	-0.516	-0.023	0.059	0.153	1.207
Inst	19,354	0.780	0.230	0.000	0.702	0.845	0.942	1.000
Analysts	19,354	10.426	7.721	0	4	9	15	34
*Big*4	19,354	0.863	0.344	0	1	1	1	1
PensionPlan	19,354	0.427	0.495	0	0	0	1	1
CashComp ($000)	19,354	952	624	0	600	849	1,096	4,500
CEO ownership	19,354	0.022	0.049	0.000	0.001	0.006	0.018	0.314
Delta ($000)	19,354	758	2,014	3	70	193	578	15,630
Vega ($000)	19,354	102	180	0	0	30	113	1,040
CEO age	19,354	56.339	6.956	40	52	56	61	76
CEO tenure	19,354	8.216	7.123	1	3	6	11	35
σCFO	19,354	0.044	0.043	0.005	0.019	0.032	0.053	0.275
$\sigma Sales$	19,354	0.129	0.116	0.012	0.052	0.093	0.164	0.644
*Idioshock*2	19,354	0.087	0.048	0.024	0.053	0.076	0.107	0.286
ROA	19,354	0.033	0.115	-0.559	0.013	0.046	0.085	0.274
Loss%	19,354	0.189	0.283	0.000	0.000	0.000	0.333	1.000
R&D	19,354	0.036	0.064	0.000	0.000	0.005	0.046	0.358

Notes: This table presents pooled sample distributional characteristics of the variables underlying the main analyses. Variables are defined in Appendix A. Continuous variables are winsorized at the 1st and 99th percentiles of their distributions.

Table 3

Univariate associations with inside debt use in CEO compensation

	Inside debt:			
	Yes	No	Diff.	t-stat.
Dependent variables:				
$\|DA\|$	0.040	0.058	-0.018	-14.90
$\|DA^{ROA}\|$	0.034	0.052	-0.018	-16.60
$\|DA^{CFO}\|$	0.037	0.055	-0.018	-14.62
$\|DA^{Basic}\|$	0.046	0.062	-0.016	-12.55
DD	0.035	0.054	-0.020	-11.44
Firm characteristics:				
$ln(Assets)$	8.364	6.926	1.438	17.78
BTM	0.483	0.478	0.005	0.37
$Leverage$	0.279	0.214	0.065	8.11
$ln(Firm\ Age)$	3.431	2.844	0.587	20.03
$Salesgr$	0.058	0.114	-0.056	-8.54
$Inst$	0.795	0.762	0.032	3.72
$ln(Analysts)$	2.303	2.010	0.292	8.51
$Big4$	0.924	0.788	0.136	9.14
$PensionPlan$	0.651	0.149	0.502	25.91
CEO characteristics:				
$ln(CashComp)$	6.852	6.393	0.459	12.92
$CEO\ ownership$	0.014	0.033	-0.019	-7.89
$ln(Delta)$	5.437	5.129	0.308	4.57
$ln(Vega)$	3.404	2.512	0.892	11.19
$ln(CEO\ Age)$	4.035	4.010	0.025	4.68
$ln(CEO\ Tenure)$	1.700	1.791	-0.090	-2.94
Operating environment characteristics:				
σCFO	0.034	0.058	-0.024	-14.57
$\sigma Sales$	0.118	0.143	-0.025	-6.13
$Idioshock2$	0.073	0.105	-0.032	-17.81
ROA	0.046	0.017	0.029	6.82
$Loss\%$	0.125	0.268	-0.144	-13.85
$R\&D$	0.019	0.057	-0.038	-11.91

Notes: This table presents the means of the accrual-based financial reporting quality measures and all control variables for firms with ($InsideDebtDum = 1$) and without ($InsideDebtDum = 0$) CEO inside debt. Variables are defined in Appendix A. Continuous variables are winsorized at the 1st and 99th percentiles of their distributions. The t-statistics presented in the rightmost column for the differences in means are based on standard errors clustered by firm and year.

Table 4
Factors associated with accrual-based measures

	$\|DA\|$	$\|DA^{ROA}\|$	$\|DA^{CFO}\|$	$\|DA^{Basic}\|$	DD
Firm characteristics:					
$ln(Assets)$	-0.000	-0.000	-0.001	-0.000	-0.001
	(-0.54)	(-0.53)	(-0.91)	(-0.38)	(-0.86)
BTM	-0.007***	-0.005***	-0.009***	-0.006**	-0.003**
	(-3.92)	(-3.40)	(-5.50)	(-2.78)	(-2.38)
$Leverage$	-0.011***	-0.008***	-0.008**	-0.012***	0.003
	(-3.78)	(-3.02)	(-2.94)	(-3.33)	(0.85)
$ln(Firm\ Age)$	0.000	-0.001	0.001	0.001	-0.001
	(0.12)	(-1.58)	(0.98)	(0.82)	(-1.03)
$Salesgr$	0.024***	0.013***	0.020***	0.021***	-0.004**
	(8.62)	(6.46)	(8.24)	(6.64)	(-2.15)
$Inst$	-0.001	-0.001	-0.003*	-0.002	-0.001
	(-0.54)	(-0.56)	(-1.83)	(-0.91)	(-0.29)
$ln(Analysts)$	-0.001	0.001	-0.001	-0.001	0.001
	(-1.05)	(0.68)	(-0.87)	(-1.06)	(0.60)
$Big4$	-0.002	-0.002	-0.002	-0.002	-0.004**
	(-1.45)	(-1.26)	(-1.46)	(-1.33)	(-2.41)
$PensionPlan$	-0.002	-0.004***	-0.003**	-0.001	-0.003**
	(-1.44)	(-3.18)	(-2.28)	(-1.13)	(-2.19)
CEO characteristics:					
$ln(CashComp)$	0.000	-0.000	0.000	0.001	0.000
	(0.55)	(-0.58)	(0.06)	(0.90)	(1.07)
$CEO\ ownership$	-0.013	-0.008	-0.019	-0.023	-0.013
	(-1.06)	(-0.62)	(-1.48)	(-1.70)	(-1.10)
$ln(Delta)$	0.001	0.001	0.001	0.001*	-0.001*
	(1.40)	(1.70)	(1.45)	(1.87)	(-1.88)
$ln(Vega)$	-0.000	-0.000*	-0.000	-0.000	0.000
	(-1.65)	(-1.99)	(-1.06)	(-1.39)	(1.70)
$ln(CEO\ Age)$	-0.005	-0.004	-0.001	-0.007	0.006
	(-1.15)	(-0.91)	(-0.30)	(-1.53)	(1.60)
$ln(CEO\ Tenure)$	-0.002***	-0.001**	-0.001*	-0.001**	-0.001*
	(-3.02)	(-2.27)	(-1.98)	(-2.73)	(-2.11)
Operating environment (OE) characteristics:					
σCFO	0.227***	0.258***	0.180***	0.221***	0.213***
	(9.51)	(16.31)	(9.31)	(9.45)	(9.46)
$\sigma Sales$	0.023**	0.016***	0.024***	0.026**	0.046***
	(2.90)	(4.32)	(3.03)	(2.86)	(6.44)
$Idioshock2$	0.102***	0.089***	0.075***	0.097***	0.084***
	(4.24)	(5.07)	(3.54)	(4.00)	(5.26)
ROA	-0.106***	-0.017	-0.093***	-0.098***	-0.024
	(-4.21)	(-1.28)	(-3.58)	(-3.47)	(-1.42)
$Loss\%$	0.001	0.000	0.011**	-0.000	0.030***
	(0.26)	(0.04)	(2.30)	(-0.10)	(6.70)
$R\&D$	-0.014	0.041**	-0.002	-0.042**	0.032*
	(-0.92)	(2.78)	(-0.15)	(-2.77)	(1.78)
FE	Ind-Y	Ind-Y	Ind-Y	Ind-Y	Ind-Y
No. obs.	19,354	19,354	19,354	19,354	16,612
Adj. R^2	0.230	0.218	0.236	0.213	0.428
Incremental R^2 OE-chars.	0.102	0.091	0.094	0.080	0.191

Notes: This table reports the results from tests of the association between firm characteristics and accrual-based financial reporting quality variables. Variables are defined in Appendix A. Continuous variables are winsorized at the 1^{st} and 99^{th} percentiles of their distributions. All regressions are estimated using OLS and standard errors are clustered by firm and year. Ind-Y refers to (two-digit SIC) industry-year fixed effects. t-statistics are presented in parentheses below the coefficient estimates. *, **, and *** refer to statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 5

Relation between inside debt and financial reporting quality measures after controlling for (subsets) of confounding factors

Panel A: Results after including all control variables in the regressions

	$\|DA\|$	$\|DA^{ROA}\|$	$\|DA^{CFO}\|$	$\|DA^{Basic}\|$	DD
InsideDebtDum	-0.000	-0.001	0.000	0.001	-0.002*
	(-0.21)	(-1.32)	(0.07)	(0.77)	(-1.77)
InsideDebtRatio	0.002	-0.001	0.003	0.005	-0.002
	(0.74)	(-0.52)	(0.95)	(1.73)	(-0.91)
RelativeLevDum	0.001	0.001	0.003**	0.003*	-0.001
	(0.98)	(1.33)	(2.16)	(1.81)	(-1.04)
RelativeLevDec	0.002	0.000	0.004*	0.004*	-0.002
	(0.84)	(0.23)	(1.93)	(1.79)	(-1.21)

Number of coefficients negative and significant at $p < 0.10$: 1 / 20.
Number of coefficients negative and significant at $p < 0.05$: 0 / 20.
Number of coefficients negative and significant at $p < 0.01$: 0 / 20.

Panel B: Results after excluding six operating environment characteristics from the regressions

	$\|DA\|$	$\|DA^{ROA}\|$	$\|DA^{CFO}\|$	$\|DA^{Basic}\|$	DD
InsideDebtDum	-0.004***	-0.005***	-0.004***	-0.003*	-0.007***
	(-3.58)	(-4.78)	(-3.54)	(-2.07)	(-5.30)
InsideDebtRatio	-0.003	-0.004*	-0.002	0.001	-0.008**
	(-0.70)	(-1.81)	(-0.58)	(0.28)	(-2.62)
RelativeLevDum	-0.004**	-0.002	-0.002	-0.001	-0.006***
	(-2.70)	(-1.74)	(-1.58)	(-1.02)	(-5.70)
RelativeLevDec	-0.007***	-0.005***	-0.005**	-0.004	-0.011***
	(-3.30)	(-3.48)	(-2.31)	(-1.69)	(-6.31)

Number of coefficients negative and significant at $p < 0.10$: 13 / 20.
Number of coefficients negative and significant at $p < 0.05$: 11 / 20.
Number of coefficients negative and significant at $p < 0.01$: 8 / 20.

Notes: This table presents the results from tests of the relation between inside debt and accrual-based financial reporting quality variables after accounting for the effects of confounding variables. All estimations include (two-digit SIC) industry-year fixed effects and varying sets of control variables. The coefficients on the control variables are not tabulated for parsimony. In Panel A, we perform twenty separate estimations and obtain the coefficient estimates on the inside debt variables after including all control variables listed in Table 2. In Panel B, we exclude the six operating environment variables from the control variable list: σCFO, $\sigma Sales$, $Idioshock2$, ROA, $Loss\%$, and $R\&D$. All variables are defined in Appendix A. Continuous variables are winsorized at the 1st and 99th percentiles of their distributions. All regressions are estimated using OLS, and standard errors are clustered by firm and year. t-statistics are presented in parentheses below the coefficient estimates. *, **, and *** refer to statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 6

Two-step results after explaining variation in inside debt variables

	$\|DA\|$	$\|DA^{ROA}\|$	$\|DA^{CFO}\|$	$\|DA^{Basic}\|$	DD
InsideDebtDum:					
Fitted values	-0.069***	-0.067***	-0.066***	-0.057***	-0.089***
	(-11.12)	(-14.55)	(-11.48)	(-9.44)	(-11.66)
Residual values	-0.000	-0.001	-0.000	0.001	-0.002*
	(-0.38)	(-0.96)	(-0.30)	(0.67)	(-1.85)
InsideDebtRatio:					
Fitted values	-0.117**	-0.176***	-0.112**	-0.094*	-0.214***
	(-2.48)	(-6.07)	(-2.40)	(-2.03)	(-6.10)
Residual values	-0.001	-0.002	-0.000	0.003	-0.005*
	(-0.21)	(-0.71)	(-0.10)	(0.77)	(-1.66)
RelativeLevDum:					
Fitted values	-0.129***	-0.094***	-0.127***	-0.113***	-0.150***
	(-12.62)	(-11.51)	(-11.37)	(-10.91)	(-9.96)
Residual values	0.001	0.001	0.002*	0.002	-0.001
	(0.48)	(1.44)	(1.76)	(1.62)	(-1.20)
RelativeLevDec:					
Fitted values	-0.120***	-0.095***	-0.118***	-0.103***	-0.144***
	(-15.38)	(-13.33)	(-13.81)	(-13.33)	(-10.72)
Residual values	0.001	0.000	0.003	0.003	-0.002
	(0.32)	(0.38)	(1.42)	(1.51)	(-1.53)

Notes: This table presents tests of the relation between the four inside debt variables and five accrual-based financial reporting quality variables using a two-step procedure. In the first step, we obtain the coefficient estimates from a regression (estimated using OLS) of the inside debt variable on six operating environment characteristics (σCFO, $\sigma Sales$, $Idioshock2$, ROA, $Loss\%$, and $R\&D$) and store the fitted and residual values. In the second step, we regress the accrual-based financial reporting quality variables on the fitted and residual values of the inside debt variables. The table reports the second-step regression coefficients for the fitted and residual inside debt variables. The second-step estimations include two-digit SIC industry-year fixed effects and control variables, but their coefficient estimates are not tabulated for parsimony. The control variables are the firm- and CEO-characteristics ($ln(Assets)$ through $ln(CEO\,Tenure)$) listed in Table 3. Standard errors are clustered by firm and year. Because OLS standard errors do not account for the sampling error in the fitted values from the first-step estimations (Chen et al., 2023), we use a bootstrap procedure that resamples observations from the sample and performs the two steps for each bootstrap sample. Standard errors are then derived as the standard deviation of the second-step coefficients on the fitted values from 1,000 bootstrap samples. To account for clustering, we use a pairs-cluster bootstrap procedure that samples entire clusters with replacement, and we follow Cameron et al. (2011) and Cameron and Miller (2015) in deriving two-way bootstrapped clustered standard errors and associated significance levels. All variables are defined in Appendix A. Continuous variables are winsorized at the 1st and 99th percentiles of their distributions. t-statistics are presented in parentheses below the coefficient estimates. *, **, and *** refer to statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 7

Alternative outcome variable: restatements

Panel A: Baseline association between inside debt variables and restatement incidence

	Test variable:			
	InsidedebtDum	*InsidedebtRatio*	*RelativeLevDum*	*RelativeLevDec*
	(1)	(2)	(3)	(4)
	Res	*Res*	*Res*	*Res*
Test variable	-0.005	-0.023	-0.027***	-0.038***
	(-0.60)	(-1.08)	(-3.10)	(-3.47)
Control variables	No	No	No	No
FE	Ind-Y	Ind-Y	Ind-Y	Ind-Y
No. obs.	19,354	19,354	16,994	16,994
Adj. R^2	0.023	0.023	0.027	0.028

Panel B: Results after controlling for other variables

	Test variable:			
	InsidedebtDum	*InsidedebtRatio*	*RelativeLevDum*	*RelativeLevDec*
	(1)	(2)	(3)	(4)
	Res	*Res*	*Res*	*Res*
Test variable	-0.000	-0.036	-0.015	-0.021
	(-0.05)	(-1.53)	(-1.59)	(-1.68)
Control variables	Included	Included	Included	Included
FE	Ind-Y	Ind-Y	Ind-Y	Ind-Y
No. obs.	19,354	19,354	16,994	16,994
Adj. R^2	0.035	0.036	0.039	0.039

Notes: This table presents tests of the relation between inside debt variables and accounting restatements before (Panel A) and after (Panel B) controlling for other factors. All variables are defined in Appendix A. Continuous variables are winsorized at the 1st and 99th percentiles of their distributions. All regressions are estimated using OLS (i.e., as linear probability models) and include two-digit SIC industry-year fixed effects ("Ind-Y"). The control variables comprise all control variables listed in Table 2. Standard errors are adjusted for clustering by firm and year. *t*-statistics are presented in parentheses below the coefficient estimates. *, **, and *** refer to statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.