

Unseen Obligations: CEO Risk Taking Incentives and Intangible Liabilities

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Abstract

This study examines whether CEOs' risk-taking incentives shape firms' disclosure of intangible liabilities, defined as economically important obligations not recognized on the balance sheet, such as unresolved litigation, product and environmental exposures, and reputational risks. Using textual analysis of Form 10-K filings and multiple identification strategies, including FAS 123R as an exogenous shock and within-firm variation tests, we find that higher vega is associated with more extensive intangible liability disclosure. Mechanism analyses suggest the effect is driven by R&D intensity, firm volatility, and litigation risk. The relation is weaker for high-ability or extroverted CEOs and in firms with respect-oriented cultures or strong governance committees, but stronger for CEOs approaching retirement. Moreover, high vega interacting with intangible obligations reduces firm value.

Keywords: Vega, delta, intangible liabilities, FAS123R, 10-K.

1. Introduction

Executive compensation contracts play a central role in shaping managerial incentives, corporate policies, and financial reporting outcomes. Among the various components of CEO compensation, option-based incentives—commonly captured by *vega*, the sensitivity of CEO wealth to stock-return volatility—are widely viewed as a key driver of managerial risk-taking (Coles, Daniel & Naveen, 2006). A substantial body of research documents that higher vega induces executives to pursue riskier investment strategies, increase leverage, and undertake innovation strategies (Armstrong, Larcker, Ormazabal & Taylor, 2013; Mao & Zhang 2018; Kara, Mayberry, & Rane, 2023). Beyond real decisions, CEO vega affects financial reporting choices, as risk-seeking managers have stronger incentives to manage information environments, influence market perceptions, and shape disclosures to support risk-taking strategies (Erickson, Hanlon, & Maydew 2006; Efendi, Srivastava, & Swanson 2007). Despite this growing literature, little is known about how CEO risk-taking incentives influence the disclosure of intangible obligations and risks – a largely unexplored yet increasingly important dimension of corporate transparency. This paper addresses this gap by examining the relation between CEO vega and firms’ disclosure of intangible liabilities in 10-K filings.

Intangible liabilities (henceforth, IL) are non-physical and inherently uncertain obligations arising from firms’ past actions, relationships, or strategic choices that may impair future cash flows, constrain strategic flexibility, or elevate risk (Boustanifar & Verriest 2025). Example includes unrecognized commitments, environmental violations, false advertising, patent infringements, reputation risk, and unresolved litigation. Unlike conventional financial liabilities, IL are difficult to quantify, highly uncertain in timing and magnitude, and often fall outside formal recognition criteria under existing accounting standards (Lev & Gu 2016). As a result, their communication relies heavily on managerial judgment and narrative disclosures rather than formal balance-sheet recognition. Although research on IL disclosure remains nascent, emerging evidence indicates that IL are more prevalent among larger, riskier firms with higher share turnover, are negatively associated with accounting performance and abnormal returns, and are incrementally priced by equity investors (Boustanifar & Verriest, 2025).

We argue that understanding how CEO risk-taking incentives shape IL disclosure is timely, important, and theoretically compelling for several reasons. First, the expansion of the knowledge economy has fundamentally altered corporate balance sheets, with intangibles now comprising a substantial share of firm value (Lev & Gu, 2016), rendering

the associated liabilities increasingly material to investors. Second, recent accounting scandals and regulatory developments have heightened scrutiny of off-balance-sheet obligations, intensifying demand for transparent disclosure of uncertain and contingent risks. Third, because IL disclosures are largely discretionary, forward-looking, and difficult to verify, managers have substantial latitude to strategically reveal or obscure risk-relevant information. CEOs with high vega may face competing incentives in this context. While greater risk-taking incentives may increase firms' exposure to IL and, in turn, the extent of IL disclosure, they may also encourage selective disclosure to manage perceptions of risk. This tension is particularly salient amid the growing prominence of intangible risks, heightened regulatory and investor scrutiny of non-financial disclosures, and the increasing use of option-based compensation to incentivize executives.

With this background, we develop two competing hypotheses to establish a reliable link between CEO risk taking incentives and IL disclosure. From an agency theory perspective (Jensen & Meckling, 1976), vega-based compensation increases CEOs' sensitivity to stock return volatility, encouraging riskier and more innovation-intensive activities. These strategies are likely to elevate exposure to contingent legal, regulatory, environmental, and intellectual property obligations that are not fully reflected on the balance sheet (Coles et al., 2006; Mao & Zhang, 2018). Because such liabilities exacerbate information asymmetry and litigation risk, high-vega CEOs may have incentives to increase disclosure of IL to justify risk-taking, enhance the credibility of long-term investments, and mitigate potential legal exposure. Legitimacy theory reinforces this prediction. Literature suggests that firms pursuing riskier strategies face pressure to demonstrate responsible risk management to maintain organizational legitimacy within stakeholder expectations (Suchman 1995; Cho & Patten 2007). We argue that high vega CEOs may strategically disclose IL to signal awareness and oversight of emerging risks, thereby preserving legitimacy while continuing to pursue volatility-enhancing strategies. Together, these arguments predict a positive association between CEO risk-taking incentives and IL disclosure.

An alternative view, however, posits that vega increases the convexity of managerial payoffs, enabling CEOs to benefit disproportionately from upside volatility while bearing limited downside risk (Guay 1999). Such incentives motivate high-vega CEOs to suppress disclosures of IL that could reveal vulnerabilities and expose firms to heightened regulatory and competitive risks. The subjective and unverifiable nature of IL further amplifies managerial discretion in disclosure decisions. Thus, building on

proprietary cost theory (Verrecchia 1983), we predict that high-vega CEOs may strategically withhold IL information when perceived costs of disclosure exceed benefits, thereby preserving strategic flexibility and sustaining information asymmetry that maintains stock price volatility beneficial to their convex compensation structure.

We empirically test these competing predictions using a large sample of U.S. public firms and detailed textual measures of IL disclosures extracted from 10-K filings. We document a robust positive association between CEO vega and the extent of IL disclosures. The magnitude of this effect is economically meaningful: a one-standard-deviation increase in vega is associated with a 3.56% increase in IL disclosures, a sizable shift in a disclosure environment characterized by substantial persistence over time. These findings support the view that CEOs with stronger risk-taking incentives disclose more IL, consistent with agency and legitimacy-based explanations.

A central challenge in our setting is addressing endogeneity, as disclosure practices may influence CEO compensation structure (reverse causality), and firms may jointly determine both compensation packages and disclosure policies as part of an integrated governance strategy (simultaneity). To mitigate these concerns, we exploit the adoption of FAS 123R as an exogenous shock to option-based compensation. Because the standard reduced the attractiveness of stock options by requiring expensing, it disproportionately affected firms that relied heavily on option-based pay, leading to economically meaningful declines in vega. Using a difference-in-differences design, we show that treated firms experienced a significant reduction in IL disclosures relative to control firms following the rule's implementation. Dynamic DiD tests reveal no evidence of pre-trends and show that the effect persists for several years, supporting a causal interpretation (Bertrand, Duflo & Mullainathan, 2004; Chhaochharia & Grinstein, 2009).

We further strengthen identification using within-firm change regressions that examine whether year-to-year changes in vega predict changes in IL disclosure. We find that increases in vega lead to increases in disclosure of IL even after absorbing firm and CEO fixed effects, mitigating concerns about time-invariant unobservables. Entropy balancing estimates yield consistent results. Collectively, these approaches provide strong evidence that the documented relation is causal rather than spurious.

Next, we investigate the mechanisms through which CEO vega leads to greater IL disclosures. Theory predicts that vega incentivizes strategies that increase uncertainty and future cash-flow volatility. Consistent with this view, we identify three channels:

R&D intensity, stock return volatility, and litigation risk. First, R&D investments involve long horizons, uncertain payoffs, and substantial unrecognized commitments (Lev & Sougiannis, 1996). In line with evidence that vega increases R&D investment (Coles, Daniel & Naveen, 2006), we find that R&D intensity amplifies the effect of vega on IL disclosures. Second, stock return volatility reflects both underlying firm risk and the consequences of managerial policies. Because higher vega is associated with greater firm volatility (Armstrong, Larcker, Ormazabal & Taylor, 2013) and volatile firms provide more uncertainty-related disclosures (Campbell et al., 2014), we expect and find that return volatility strengthens the vega–IL disclosure relation. Third, firms facing higher litigation risk issue more precautionary disclosures to mitigate potential liability (Skinner, 1994; Field, Lowry & Shu, 2005). Risk-taking CEOs may pursue strategies that elevate legal scrutiny, thereby intensifying disclosure incentives for contingent obligations. Our findings confirm that litigation risk significantly strengthens the positive vega–IL relation, validating this as a key underlying mechanism.

We also document substantial heterogeneity in how CEOs risk-taking incentives affects IL disclosure. High-ability CEOs exhibit a weaker vega-IL disclosure, consistent with the evidence that executives with superior capabilities can better assess and control risk without resorting to increase disclosures of IL (Bonsall IV, Holzman, & Miller 2017). In contrast, CEOs approaching retirement exhibit a stronger vega–IL disclosure relation, consistent with reduced career concerns argument. Further, extroverted CEOs exhibit a weaker association, consistent with evidence that extroversion is linked to optimism, self-confidence and assertiveness, which may lead CEOs to discount uncertainty and potential adverse outcomes (Bamber, Jiang, & Wang, 2010; Green, Jame, & Lock, 2019). These findings demonstrate that incentive effects depend critically on managerial attributes.

Organizational context also plays an important role. Firms with stronger respect cultures—emphasizing ethical norms and interpersonal fairness—exhibit a weaker vega–IL relation. Similarly, the presence of a corporate governance committee attenuates the extent to which risk-taking incentives translate into IL disclosure. These findings underscore the role of organizational values and oversight mechanisms in constraining managerial behavior.

Finally, our consequence analysis show that while IL on their own have modest valuation implications, the interaction between vega and IL disclosure is strongly associated with lower firm value. These results indicate that investors discount firms in which risk-seeking CEOs disclose high levels of uncertain, judgment-based obligations,

consistent with concerns that excessive managerial risk-taking may erode long-term firm value (Coles, Daniel & Naveen, 2006; Armstrong, Larcker, Ormazabal & Taylor, 2013).

This paper contributes to several strands of literature. First, we extend executive compensation literature by providing first systematic evidence that CEO risk-taking incentives shape disclosure of IL. While prior research establishes the effect of vega on real decisions including investment, leverage, earnings volatility, innovation, and misconduct (Coles, Daniel & Naveen, 2006; Armstrong, Larcker, Ormazabal & Taylor, 2013; Mao & Zhang 2018; Chircop, Tarsalewska & Trzeciakiewicz, 2025), we show that the effects spill over into financial communication, specifically how managers disclose intangible obligations to external stakeholders. Our findings thus establish disclosure of IL as an important yet underexplored channel through which executive risk-taking incentives manifest.

Second, we contribute to the disclosure literature by identifying IL as a distinct and economically meaningful disclosure category that varies with managerial incentives. Prior research establishes that disclosures vary with firm size, performance, and monitoring (Lang & Lundholm, 1993; Bushee & Noe, 2000; Skinner, 1994), and that firms with CEOs facing stronger risk-taking incentives are more prone to financial misreporting (Bergstresser & Philippon 2006; Erickson, Hanlon, & Maydew 2006; Efendi, Srivastava, & Swanson 2007). We reveal that IL disclosures are strongly influenced by CEO incentives and moderated by CEO traits and governance structures. These findings enrich the disclosure literature by offering a more comprehensive understanding of how uncertain obligations enter financial communication.

Finally, we advance the emerging literature on corporate intangibles by shifting attention from intangible assets to IL—an increasingly important yet underexplored component of firms' economic obligations. While extant literature mostly focuses on the valuation and performance implications of intangible assets such as organizational capital, patents, goodwill and brands (e.g., Eisfeldt & Papanikolaou 2014; Ewens, Peters, & Wang 2025), little is known about how firms disclose unrecognized, uncertainty-laden obligations. We provide evidence that IL disclosures reflect managerial choices shaped by CEO risk-taking incentives and governance rather than purely fundamentals alone. Importantly, our consequence analysis reveals that firms with high vega CEOs disclosing more IL experience lower firm value, consistent with investor concerns about excessive risk-taking and opaque obligations (Coles et al., 2006; Armstrong et al., 2013).

The remainder of the paper is organized as follows. Section 2 reviews existing literature and develops hypotheses. Section 3 presents the data and research method. Section 4 discusses empirical results. Section 5 provides additional analyses. Finally, Section 6 concludes the paper.

2. Literature review and hypothesis development

2.1 CEO Equity Incentives and Corporate Policies

The executive compensation literature documents how incentive contracts shape managerial risk preferences in the presence of agency conflicts. Because managers are typically more risk-averse and less diversified than shareholders, they may underinvest in risky but value-enhancing projects (Jensen & Meckling, 1976). To mitigate this divergence, firms design compensation contracts that align managerial incentives with shareholder interests, particularly with respect to risk-taking (Clarkson, Walker, & Nicholls, 2011). Empirical evidence shows that such incentives—captured by CEO delta and vega—affect not only investment decisions but also financing and payout policies (Coles, Daniel, & Naveen, 2006).

A key insight of this literature is that convex compensation structures are a deliberate mechanism for encouraging risk-taking. Stock options introduce convexity into the CEO's payoff function, thereby increasing the marginal utility of volatility and inducing managers to undertake riskier actions (Smith & Stulz, 1985). Subsequent theoretical work distinguishes two channels through which equity incentives operate: *delta*, which measures the sensitivity of CEO wealth to stock price levels, and *vega*, which captures sensitivity to stock return volatility. While vega unambiguously rewards greater volatility, the effect of delta is theoretically ambiguous. Higher delta may promote risk-taking by strengthening pay–performance sensitivity, but it may also discourage risk by increasing managers' exposure to downside risk (Armstrong & Vashishtha, 2012). As a result, vega is widely viewed as the primary compensation-based driver of managerial risk-taking.

A substantial body of empirical research supports these predictions. Early studies document a strong positive relationship between option-based compensation and firm risk (Guay, 1999; Rajgopal & Shevlin, 2002). Quasi-natural experiments using the adoption of

FAS 123R¹ provide further validation. Studies exploiting this regulatory shock show that reduced option-based incentives are associated with lower operating leverage (Aboody, Levi, & Weiss, 2018), increased corporate hedging (Bakke et al., 2016), and changes in debt maturity structures (Hong, 2019), although some evidence suggests muted risk responses in certain settings (Hayes et al., 2012).

More recent research extends this framework to innovation outcomes, highlighting the role of convex incentives in motivating exploratory and uncertain activities. Francis, Hasan, Sharma, and Waisman (2019) find that option-based CEO compensation is positively associated with both innovation inputs and outputs, whereas cash-based compensation has the opposite effect. This relationship is particularly pronounced in R&D-intensive industries (Mezouz & Zhao, 2019; Jung & Park, 2022). Using the adoption of FAS 123R as an exogenous reduction in managerial incentives, Mao and Zhang (2018) show that declines in CEO vega lead to economically significant reductions in innovation output. Collectively, these studies underscore that risk-taking incentives are critical for long-horizon, uncertainty-intensive investment decisions.

Beyond innovation, a broad literature links CEO vega to a wide range of corporate policies. Coles et al. (2006) show that higher vega is associated with greater leverage, while Brockman, Martin, and Unlü (2010) document a preference for shorter debt maturities. Chava and Purnanandam (2010) find that firms with higher CEO and CFO vega rely more heavily on debt financing. Risk-taking incentives also generate spillovers across firm boundaries: Gu, Sanders, and Venkateswaran (2017) show that customer firms' CEO incentives influence supplier investment strategies. Other studies document that incentivized CEOs engage more aggressively in earnings management (Bergstresser & Philippon, 2006), are more likely to pursue conforming tax avoidance (Kara, Mayberry, & Rane, 2023), yet do not systematically engage in tax-motivated income shifting (Mayberry, McGuire, & Rane, 2023).

Finally, CEO risk-taking incentives extend beyond conventional corporate policies to encompass corporate misconduct. High vega is associated with a greater likelihood of accounting fraud, restatements, and abnormal accruals (Bergstresser & Philippon, 2006; Burns & Kedia, 2006; Armstrong et al., 2010, 2013). These findings suggest that convex payoffs encourage strategies that boost short-term firm value at the cost of heightened

¹ FAS 123R is an accounting regulation adopted in 2005 which requires firms to expense all equity-based compensations at their fair values.

detection and enforcement risk. More recent evidence shows that this pattern extends to non-financial domains such as workplace misconduct (Chircop, Tarsalewska, & Trzeciakiewicz 2025).

2.2 Voluntary Disclosure Theories

Voluntary disclosure in accounting is explained by several complementary theories. Information-based theories, including proprietary cost theory, argue that managers balance the capital market benefits of disclosure against potential costs arising from revealing competitively sensitive information (Verrecchia, 1983). Empirical evidence shows that firms in more competitive industries or with greater growth opportunities are more selective in their disclosures (Verrecchia, 1983; Ellis, Fee, & Thomas 2012; Li, Lin & Zhang 2018). Agency and signaling theories suggest that managers of higher-quality firms voluntarily disclose more to reduce information asymmetry, mitigate agency conflicts, and signal superior performance to investors (Healy & Palepu, 2001). From a broader socio-political perspective, legitimacy theory and stakeholder theory posit that firms use voluntary disclosures to maintain organizational legitimacy and respond to stakeholder pressures (Suchman, 1995; Cho & Patten, 2007). Additionally, political cost theory emphasizes that firms may strategically disclose information to reduce regulatory scrutiny or political attention (Watts & Zimmerman, 1986). Collectively, this literature shows that voluntary disclosure is a strategic managerial choice shaped by economic incentives, competitive concerns, and institutional and social contexts.

2.3 Intangible Liabilities: A new dimension

Traditional accounting standards recognize liabilities only when they are both probable and reasonably estimable². Accordingly, many economically significant corporate obligations remain unrecorded on the balance sheet. Boustanifar and Verriest (2025) introduce the concept of IL and defined it as material yet unrecognized obligations that are disclosed qualitatively in SEC filings. These liabilities arise from potential or pending exposure such as product liability, environmental contamination, intellectual property infringement, false advertising, regulatory investigations, class action lawsuits. Although unrecognized, IL represent real economic burdens firms may ultimately bear—creating substantial information risk for investors and general stakeholders.

² Both U.S. GAAP (Generally Accepted Accounting Principles) and IFRS (International Financial Reporting Standards) require firms to recognize liabilities on the balance sheet when outflows are probable (i.e., likely to occur) and estimable (i.e., reasonably and reliably estimable).

Boustanifar and Verriest (2025) find that firms with higher IL exposure face a greater likelihood of future class action lawsuits, experience more severe reputational deterioration and exhibit lower contemporaneous valuation multiples. Moreover, IL predict higher future stock price crash risk, indicating that these unrecognized obligations capture latent downside risk that is not fully impounded into prices. Collectively, IL serve as a forward-looking and economically meaningful proxy for unresolved corporate risk.

Despite their shared focus on firm risk, the literatures on executive risk-taking incentives and IL have evolved largely in isolation. A conceptual synthesis reveals important interactions and therefore, we develop a conceptual bridge between CEO risk-taking incentives and firms' exposure to IL.

2.4 Hypothesis

The disclosure of IL represents a strategic managerial choice rather than a mechanical reporting outcome. While IL remain unrecognized on balance sheets, firms are required to qualitatively disclose material potential obligations in SEC filings (Boustanifar & Verriest, 2025). These disclosures are inherently discretionary, varying substantially in timing, scope, and detail, therefore providing an ideal setting to investigate whether CEO vega shapes IL disclosure.

By increasing the convexity of the CEO's payoff function, higher vega incentivizes riskier strategies including aggressive growth initiatives, uncertain innovation projects, and expansion into competitive or regulated markets. Consistent with this view, Chircop, Tarsalewska, and Trzeciakiewicz (2025) show that vega induces executives to reduce compliance investments and intensify operational workloads, thereby increasing workplace safety, health, and labor violations. While enhancing expected returns and volatility, such strategies push firms toward legal and regulatory boundaries, elevating exposure to product liability claims, environmental contingencies, IP disputes, regulatory investigations—core components of IL. However, vega – IL disclosure relation extends beyond risk-taking to encompass strategic communication.

We argue that high-vega CEOs have stronger incentives to disclose IL for several reasons. First, IL disclosure directly benefits convexity-seeking CEOs. By revealing potential downside exposures, such disclosures increase perceived firm risk and return volatility, thereby enhancing the value of option-based compensation (Coles, Daniel, & Naveen, 2006). Unlike recognized liabilities, disclosed-but-unrecognized IL elevate uncertainty without constraining balance sheet capacity or triggering covenant violations.

This asymmetric payoff structure allows CEOs to enhance compensation convexity while maintaining flexibility to pursue high-variance strategies (Smith & Stulz, 1985). Building on agency and signaling theories, we therefore predict that high vega-CEOs strategically disclose more IL to signal confidence in managing complex risks, differentiate their firms from competitors and rationalize risk- strategic choices.

Second, disclosure of potential obligations signals transparency to capital markets, mitigating information asymmetry, enhancing investor confidence and reducing the likelihood of stock price crash risk (Healy & Palepu, 2001; Boustanifar & Verriest, 2025). By revealing latent downside risks, high-vega CEO can stabilize price dynamics, improve liquidity, and lower the cost of capital, thereby supporting firm value and executives' continuation value. Third, IL disclosure serves as a legitimacy and political cost management tool. For high-vega CEOs operating near regulatory boundaries, IL disclosure demonstrates good faith, compliance, and proactive oversight (Watts & Zimmerman, 1986; Suchman, 1995). This protective function becomes increasingly valuable as vega-induced strategies elevate litigation and enforcement risks.

Hence, we propose the following hypothesis:

H1a: CEO risk-taking equity incentives (vega) are positively associated with firms' disclosure of intangible liabilities.

While the positive association between CEO vega and IL appears theoretically intuitive, such risk-taking incentives may plausibly reduce IL disclosure. Option-based incentives encourage CEOs to favor symmetric, reversible volatility with upside potential that enhances the value of their convex payoff, while avoiding asymmetric and irreversible downside risk that threaten firm value, reputation, or personal wealth (Smith & Stulz, 1985; Coles, Daniel, & Naveen, 2006). IL represent largely asymmetric, non-diversifiable, and forward-looking risks related to legal, regulatory, and reputational contingencies that elevate future crash risk and litigation costs (Boustanifar and Verriest, 2025). Thus, from an agency perspective, CEOs with higher vega have incentives to curb the accumulation or disclosure of IL that would exacerbate such latent exposures and undermine the option value of their compensation.

Further, proprietary cost theory suggests that managers strategically limit disclosure when the expected costs outweigh the benefits of transparency (Verrecchia 1983). Disclosing IL—such as environmental contingencies, legal exposures, or latent product risks—can be particularly costly because it attracts regulatory scrutiny, elevates

litigation risk, and reveals operational weaknesses (Healy & Palepu, 2001). These disclosures also heighten uncertainty about future cash flows and amplify investors' perceptions of downside tail risk. High-vega CEOs are especially sensitive to these effects, as heightened perceived risk raises the likelihood of sharp negative price corrections that erode their equity-based compensation (Gormley, Matsa & Milbourn, 2013; Boustanifar & Verriest, 2025). Because extensive IL disclosure amplifies proprietary costs without immediate valuation gains, high-vega CEOs are more likely to limit or delay such disclosures.

Therefore, we propose the following alternative hypothesis:

H1b: CEO risk-taking equity incentives (vega) are negatively associated with firms' disclosure of intangible liabilities.

3. Methodology and Data

3.1 Data and Sample

We construct our sample at the intersection of the Compustat–CRSP merged file, the ExecuComp database, and the Center for Research in Security Prices (CRSP) database. We begin with the CEO compensation incentives data from Coles et al. (2006), covering the period 1995–2021.³ This initial dataset contains 42,936 firm-year observations with detailed CEO compensation incentives measures. We merge this dataset with ExecuComp to incorporate CEO-level characteristics, with the Compustat–CRSP merged file to incorporate firm-level characteristics, and with the intangible liabilities file to integrate information on firms' off-balance-sheet obligations.

Following prior literature (e.g., Chircop et al., 2025; Kara et al., 2023), we exclude financial institutions (SIC 6000–6999) and utilities (SIC 4900–4999), removing 6,500 and 2,294 observations, respectively. We then eliminate all observations with missing values for the key control variables required for our empirical analyses. After applying these filters, our final sample consists of 27,131 firm-year observations, representing 2,482 unique firms over 1995–2020.⁴

³ We start our sample in 1995 because IL derived from 10-K filings are available from this year onward, and we end in 2021 as this is the final year for which the IL data are available.

⁴ Our empirical design examines how CEO risk-taking equity incentives (*VEGA*) in year t affect intangible liabilities in year $t+1$. Accordingly, while the core sample spans 1995–2020, the one-year lead in the dependent variable extends the effective coverage of the analysis to 2021.

3.2 Variables

3.2.1 Intangible liabilities

We rely on the dataset developed by Boustanifar and Verriest (2025), who construct a text-based measure of intangible liabilities from SEC annual reports. The authors assemble the full universe of 10-K filings, including 10-K405, 10-KSB, and 10-KT variants, and apply standard preprocessing (removing stop words, exhibits, and very short filings) to ensure consistency and comparability. Their approach rests on the premise that annual reports contain extensive qualitative disclosures about risk exposures, regulatory scrutiny, potential litigation, environmental incidents, product safety concerns, reputational issues, and other contingencies that generate economically meaningful but unrecognised obligations.

To quantify these exposures, Boustanifar and Verriest develop a domain-specific dictionary designed to capture references to contingent liabilities. Beginning with the Loughran–McDonald (2011) litigious word list, they remove ambiguous or irrelevant terms and incorporate targeted unigrams and bigrams related to liability risk (e.g., environmental liability, product liability, false advertising, hazardous waste, counterfeit, misrepresentation, fraudulent). The final dictionary contains 569 carefully curated terms and phrases. The authors compute their measure as the natural logarithm of the frequency count of dictionary terms in each annual report, adopting an equal-weighted word-count approach (Henry & Leone, 2016), and include filing length as a control. They further validate the measure using multiple approaches and show that it exhibits the expected properties of a credible proxy for IL exposures.

Using the data provided by Boustanifar and Verriest (2025), we construct our IL measure in the same manner. As a robustness check, we also scale dictionary-word frequency by total word count.

3.2.2 CEO risk taking equity incentives (*Vega*)

In assessing CEO risk-taking incentives, following prior studies (e.g., Coles et al., 2006; Armstrong & Vashishtha, 2012), we employ the standard measure of the sensitivity of a CEO’s wealth to stock-price volatility (*VEGA*). This measure captures the dollar change in the CEO’s option portfolio value for a 0.01 change in stock return volatility. Higher Vega indicates stronger risk-taking incentives because option values increase with

volatility. We use the natural logarithm of one plus Vega in our empirical specifications to reduce skewness and mitigate the influence of extreme values.

Because equity-based incentives stem from the same underlying option holdings, Vega cannot be examined in isolation from Delta. We therefore control for Delta, the dollar change in the CEO’s stock and option portfolio value for a 1% change in stock price, in all regressions. Controlling for Delta enables us to isolate the incremental effect of Vega on IL, independent of pay-for-performance incentives. We also control for CEO-level characteristics, including CEO age, tenure, and cash compensation, to account for individual differences that may influence both equity incentives and firm outcomes (Chircop et al., 2025).

3.2.3 Model specification

To examine the relationship between CEO risk-taking equity incentives (*VEGA*) and firms’ intangible liabilities, we estimate the following baseline regression model:

$$INTAN_LIAB_{i,t+1} = \alpha_0 + \beta_1 VEGA_{i,t} + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}. \quad (1)$$

where *INTAN_LIAB* denotes intangible liabilities and *VEGA* captures the sensitivity of the CEO’s option portfolio to stock return volatility. The vector *X* includes a comprehensive set of CEO- and firm-level control variables commonly used in the literature. We also include firm fixed effects (μ_i) and year fixed effects (λ_t). Standard errors are clustered at the firm level. This lag structure enables us to capture the forward-looking implications of managerial risk-taking incentives while mitigating concerns related to simultaneity and reverse causality.

3.2.4 Controls

Our analysis includes a comprehensive set of firm- and CEO-level controls. We control for firm size (*SIZE*), measured as the natural logarithm of total assets, because larger firms have greater organizational complexity and operational scope, potentially elevating IL (Boustanifar & Verriest, 2025). Market-to-book ratio (*MTB*) captures growth opportunities that may elevate IL through aggressive expansion. Leverage (*LEV*), defined as total debt scaled by total assets, is included because higher leverage enhances creditor monitoring and may constrain managerial discretion. Dividend-paying firms (*DIV*) typically display stronger financial discipline and lower IL.

We control for capitalized intangible capital (INTAN CAP) following Peters and Taylor (2017), as firms with substantial internally generated intangible capital face greater legal, reputational, and regulatory exposure. More profitable firms, measured through return on assets (ROA) and stock returns (RET), have greater resources to manage operational risks and mitigate exposures (Kim & Skinner, 2012). Asset tangibility (PPE), measured as property, plant, and equipment scaled by total assets, is included because firms with more tangible assets typically operate in traditional, less risk-intensive industries. Institutional ownership (INST) is controlled for because institutional investors provide enhanced monitoring and governance oversight, constraining managerial behaviors that generate IL. We control for stock return volatility (VOL) to capture firm risk. Trading volume (TRADE VOL) proxies for market attention, as firms with greater trading activity face greater scrutiny and, consequently, greater disclosure of IL. Filing size (FILESIZE) reflects operational complexity and often corresponds to higher underlying risk exposure (Boustanifar & Verriest, 2025).

At the CEO level, we control for CEO delta (DELTA), CEO tenure, cash compensation, and CEO age, each reflecting managerial incentives, experience, or personal characteristics that may influence risk-taking behavior and IL. Our baseline models include firm and year fixed effects to absorb time-invariant firm characteristics and common temporal shocks. In robustness tests, we add CEO fixed effects to account for time-invariant managerial traits and replace year fixed effects with industry-year fixed effects to capture time-varying industry-specific shocks. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate outlier effects, and the definitions of all control variables are provided in Appendix A.

4. Empirical results

4.1 Descriptive statistics

Table 1 presents the summary statistics for the variables used in our analysis. The sample includes 27,131 firm-year observations. The mean value of IL (INTAN_LIAB) is 4.996, with substantial cross-sectional variation, indicating meaningful dispersion in the frequency of IL disclosures across firms. CEO risk taking incentive measures also show considerable heterogeneity, with mean values of 3.517 for VEGA and 5.380 for DELTA, which are well within the range reported in prior literature (Chircop, Tarsalewska, and Trzeciakiewicz, 2025; Kara, Mayberry, & Rane, 2023). Firm characteristics exhibit

patterns consistent with prior literature. For example, firms are moderately levered (mean LEV = 0.232) and display a wide range of market-to-book ratios (MTB mean = 2.141, p99 = 8.961). Profitability, measured by ROA, averages 0.151, while institutional ownership (INST) is relatively high at 63.3% on average.

[Insert table 1 here]

Additional variables used in other analyses also show substantial variation. For instance, R&D intensity is low on average but highly skewed, while measures such as litigation risk, managerial ability, corporate culture, and governance structures reflect meaningful cross-firm heterogeneity.

4.2 Correlation analysis

Table 2 reports the Pearson correlation coefficients for the key variables used in the analysis. The correlations between INTAN_LIAB and the main CEO incentive variables (VEGA and DELTA) are positive and significant ($p < 0.01$). Additionally, INTAN_LIAB is positively correlated with SIZE, LEV, TRADE VOL, while negatively correlated with DIV, ROA, PPE and RET (all $p < 0.01$). Several correlations align with expectations from the executive compensation and disclosure literature. For example, SIZE is positively correlated with CEO incentives, cash compensation, institutional ownership, leverage, and 10-K file size, reflecting the well-documented tendency of larger firms to exhibit greater disclosure volume and more complex compensation structures. Traditional firm characteristics also display expected relationships. MTB is positively associated with ROA and stock returns, while PPE is negatively associated with INTAN CAP, consistent with the distinction between tangible- and intangible-intensive firms.

[Insert table 2 here]

Overall, most correlations are moderate in magnitude, and none are sufficiently large to raise multicollinearity concerns. These patterns provide assurance that the multivariate regression results are unlikely to be driven by mechanical correlations among the independent variables.

4.3 Baseline results

Table 3 reports the baseline regression results examining the association between CEO risk-taking incentives and firms' disclosure of IL (INTAN_LIAB). Column (1) includes firm and year fixed effects, Column (2) additionally includes CEO fixed effects, and

Column (3) includes firm and industry-by-year fixed effects. Across all specifications, VEGA is positively and significantly associated with IL. The coefficient on VEGA ranges from 0.016 to 0.018, significant at the 1% level. This indicates that CEOs with stronger risk-taking incentives (i.e., higher vega) tend to disclose more IL in their 10-K filings. Focusing on the preferred specification in Column (1), where the VEGA coefficient is 0.018, a one-standard-deviation increase in VEGA leads to a change in IL of 0.035⁵, which can be further translated as an increase of a 3.56%.⁶ Given that the average INTAN_LIAB value is 4.996, this increase corresponds to a meaningful rise in the frequency of IL disclosures. In the context of SEC filings, where disclosure counts are relatively stable within firms, this represents a substantial change in disclosure behavior attributable to CEO incentive structures.

This finding is consistent with the view that higher option-based risk-taking incentives motivate CEOs to engage in more aggressive reporting practices or complex disclosure strategies (Coles et al., 2006; Armstrong, Larcker, Ormazabal, & Taylor, 2013). Because IL often relate to uncertain or hard-to-verify obligations, the positive relation suggests that CEOs with greater risk-taking incentives may rely more heavily on disclosure channels involving judgment or estimation uncertainty. By contrast, DELTA, which captures the sensitivity of CEO wealth to stock price levels, is weakly negative in some specifications, aligning with evidence that high equity-ownership incentives generally promote more conservative reporting.

CEO tenure also exhibits a modest negative association with INTAN_LIAB, consistent with research showing that longer-tenured CEOs may face lower career concerns and thus engage less in aggressive disclosure behavior (Dechow & Sloan, 1991). Among control variables, SIZE is strongly and positively associated with IL disclosure, consistent with prior research documenting that larger firms produce more extensive and complex disclosures (Lang & Lundholm, 1993). ROA is consistently negative, suggesting that poorer-performing firms disclose more IL, potentially reflecting greater financial risk or increased reliance on unverifiable disclosures. The negative association with institutional ownership (INST) aligns with evidence that sophisticated monitors curb managerial opportunism and reduce the use of opaque reporting channels (Bushee & Noe, 2000).

⁵ Change in INTAN_LIAB = $0.018 \times 1.944 = 0.035$

⁶ $e^{0.035} - 1 \approx 3.56\%$

[Insert table 3 here]

Market-based variables show patterns consistent with prior literature. VOL is positively associated with IL disclosure, suggesting that high-risk firms provide more uncertain or complex information. FILESIZE also loads positively, reflecting the broader tendency for longer filings to contain more narrative disclosures and risk-related statements (Li, 2008).

Across specifications in Table 3, the positive coefficient on VEGA remains robust, with adjusted R^2 values ranging from 0.782 to 0.830. These results collectively support the hypothesis that CEO risk-taking incentives are an important driver of variation in IL and align with theoretical predictions regarding managerial incentives and disclosure complexity.

4.4 Identification

4.4.1 Difference-in-differences (DiD) design

To identify the causal effect of CEO risk-taking incentives on IL disclosure, we employ a difference-in-differences (DiD) design exploiting an exogenous regulatory shock to executive compensation incentives. Specifically, following prior literature (e.g., Carline, Pryshchepa, & Wang, 2023; Chircop, Tarsalewska, & Trzeciakiewicz, 2025; Mao & Zhang, 2018), we exploit FAS 123R, effective for periods beginning after June 15, 2005, which mandated expensing stock options at fair value in the income statement. Before FAS 123R, firms could use the intrinsic value method with disclosure in notes or voluntarily recognize expenses. FAS 123R eliminated this discretion by mandating income statement expensing for all share-based payments, including CEO stock options, thereby substantially increasing the accounting cost of option-based compensation. Prior research shows that this reform led firms to reduce option grants and generated an exogenous decline in CEO vega (e.g., Mao & Zhang 2018). Importantly, the reform affected compensation design without directly altering firms' underlying investment opportunities or operating environments, making it a plausibly exogenous shock to managerial risk-taking incentives.

We exploit cross-sectional variation in firms' exposure to the reform to construct treatment intensity. Firms with higher pre-FAS 123R option expensing faced larger anticipated earnings effects from mandatory expensing and therefore adjusted CEO compensation more aggressively following adoption. These firms form the treatment

group, while firms with relatively low pre-reform exposure serve as the control group. This design allows us to compare changes in IL for firms differentially affected by the same regulatory shock, holding constant contemporaneous macroeconomic conditions and time-varying regulatory factors.

We estimate the DiD model using firm-year observations from 2001 to 2009. The pre-reform period spans 2001–2004, and the post-reform period spans 2006–2009. We exclude fiscal year 2005, the transition year in which the standard became effective, to allow firms sufficient time to renegotiate CEO compensation contracts. Following Mao and Zhang (2018), we measure firms’ exposure to the reform as the average pro forma stock option expense scaled by fully diluted shares outstanding during the pre-FAS 123R period (2001–2004). We classify firms as treated if this measure exceeds the sample mean. Accordingly, TREAT equals one for firms with OPTION_EXPENSING_IMPACT above the sample average and zero otherwise.

We estimate the following DiD specification:

$$\text{INTAN_LIAB}_{i,t+1} = \beta_0 + \beta_1(\text{Treat} \times \text{Post})_{i,t} + X_{i,t} + \alpha_i + \lambda_t + \varepsilon_{i,t} \quad (2)$$

where Treat equals 1 for firms with above-average OPTION_EXPENSING_IMPACT, POST equals 1 for 2006–2009, and other variables are defined in equation (1).

Table 4 Panel A reports the difference-in-differences (DiD) estimates. Column (1) presents results from the main DiD specification. The coefficient on Treat $\times$ Post is negative and statistically significant (-0.079 , $p < 0.05$), indicating that the reduction in *Vega* following the adoption of FAS 123R led to a relative decline in the extent of IL disclosures for treated firms—those more exposed to option-expensing under FAS 123R—relative to control firms.

Columns (2) and (3) conduct placebo tests to further validate identification. When treatment status is randomly assigned (Column 2), the coefficient on Treat $\times$ Post is small and statistically insignificant, as expected, suggesting that the main result is not driven by spurious correlations. Similarly, when we adopt an alternative event window that defines the year 2000 as the event year, with 1996–1999 as the pre-event period and 2001–2004 as the post-event period (Column 3), the estimated coefficient is statistically insignificant. This result further reinforces that the documented treatment effect is specific to the timing of FAS 123R rather than to broader temporal trends.

Overall, Panel A provides strong evidence that the relation between CEO risk-taking incentives and IL disclosures is not driven by endogenous compensation design but instead reflects a causal effect.

[Insert table 4 here]

Panel B presents a dynamic DiD specification testing the parallel trends assumption and documenting how disclosure behavior evolves around the implementation of FAS 123R. Coefficients for $\text{Treat} \times \text{Pre-3}$, Pre-2 , and Pre-1 are all statistically insignificant, indicating no pre-trend differences between treatment and control firms. This pattern provides strong support for the identifying assumption that, absent FAS 123R, both groups would have followed similar trajectories (Bertrand, Duflo, & Mullainathan, 2004).

Following implementation, the coefficients for $\text{Treat} \times \text{Post+1}$ through Post+4 are consistently negative and become statistically significant beginning in the first post-treatment year. The magnitude of the effect strengthens over time (e.g., -0.119 in Post+1 and -0.160 in Post+4), indicating a persistent decline in IL disclosures among firms that experienced larger reductions in option-based incentives. This gradual adjustment is consistent with evidence that compensation-related reporting behaviors evolve as executives adapt to new incentive environments (Chhaochharia & Grinstein, 2009). The sustained post-event response reflects durable changes in managerial risk-taking and disclosure preferences rather than temporary reporting adjustments. Together, the dynamic analysis confirms both the validity of the parallel trends assumption and the persistence of the treatment effect, strengthening the causal interpretation of the main results.

4.4.2 Change regressions

Table 5 presents a change-specification analysis that examines whether year-to-year changes in CEO risk-taking incentives (ΔVEGA) are associated with corresponding changes in IL disclosures ($\Delta\text{INTAN_LIAB}$). This specification is more stringent than levels regressions, as it absorbs all time-invariant heterogeneity in reporting style, disclosure norms, CEO preferences, and firm characteristics. As such, the change model mitigates concerns that the baseline results are driven by persistent cross-sectional differences across firms.

Column (1) includes firm and year fixed effects together with baseline control variables. Column (2) further incorporates CEO fixed effects, yielding a more stringent within-firm, within-CEO specification. Across both specifications, coefficient for ΔVEGA is positive and statistically significant (0.006, $p < 0.05$ in Column 1; $p < 0.10$ in Column 2). This implies that increases in CEO risk taking incentives correspond to increases in the frequency of IL disclosures. The result strengthens the baseline evidence by showing that within-firm increases in risk-taking incentives—not merely cross-sectional differences—drive IL.

[Insert table 5 here]

4.4.3 Entropy balancing estimates

To further address potential endogeneity in the relation between CEO VEGA and IL disclosure, we employ entropy balancing. Entropy balancing is a reweighting technique that constructs a synthetic control group by assigning weights to control observations such that the distribution of observable covariates matches that of the treated group (Hainmueller 2012). This approach mitigates selection bias arising from systematic differences between treated and control firms while achieving exact covariate balance without imposing functional form assumptions.

We define firms with VEGA above the sample median as the treated group and those below the median as the control group. Post-balancing diagnostics indicate no statistically meaningful differences in covariates between the two groups, confirming the effectiveness of the reweighting procedure (Panel A, Table OA.1).

We then estimate entropy-balanced regressions using the derived weights. The results in Panel B, Table OA.1 show that VEGA is positively and significantly associated with IL disclosure, consistent with our baseline findings. Overall, these results suggest that our conclusions are not driven by observable firm-level imbalances and provide additional support for a causal interpretation of the VEGA–IL disclosure relation.

5. Further analysis

5.1 Mechanism tests

In this section, we consider three mechanisms through which CEO risk-taking incentives (Vega) influence IL disclosures: R&D intensity, firm volatility, and litigation risk. We first consider and test the role of R&D, which provides a natural mechanism linking CEO risk-

taking incentives to IL disclosure. R&D projects are inherently uncertain, long-term, and heavily reliant on managerial judgment, making them particularly attractive to high vega CEOs whose wealth sensitivity to stock return volatility encourages greater risk-taking. Prior research demonstrates that such incentives significantly increase firms' investment in R&D (Coles, Daniel, & Naveen, 2006). At the same time, R&D activities generate substantial unrecognized intangible assets and related commitments—such as research agreements, licensing obligations, and uncertain future expenditures—that often require narrative disclosure rather than recognition on the balance sheet (Lev & Sougiannis 1996). Because R&D intensifies both operational uncertainty and disclosure complexity, firms led by risk-seeking CEOs need to communicate more IL to external stakeholders as a part of conveying these uncertain commitments.

Column (1) examines this mechanism by interacting VEGA with R&D intensity. The interaction term $VEGA \times R\&D$ is positive and statistically significant ($p < 0.10$), indicating that the positive effect of vega on IL disclosure is stronger for firms that engage more heavily in R&D activities. Importantly, the main effect of VEGA remains positive and significant, suggesting that R&D amplifies rather than substitutes the underlying incentive effect. Overall, these findings support the view that R&D investment serves as a key channel through which CEO risk-taking incentives translate into more extensive IL disclosure, particularly in firms facing greater uncertainty and complexity arising from innovation-intensive activities.

Firm-level volatility represents a second mechanism through which CEO risk-taking incentives affect IL disclosure. High vega encourages CEOs to pursue strategies that increase earnings and return volatility (Coles, Daniel & Naveen, 2006; Armstrong, Larcker, Ormazabal & Taylor, 2013). Greater volatility, in turn, heightens uncertainty surrounding future cash flows and contractual outcomes, which increases the likelihood of contingent obligations, off-balance sheet risks, and other judgment-based liabilities requiring disclosure in narrative form. Prior research shows that firms facing higher volatility tend to provide more risk-related and forward-looking disclosures to inform investors about uncertain obligations (Campbell et al., 2014). Thus, firm-level volatility operates as an important mechanism linking CEO vega to IL disclosure.

Column (2) examines whether volatility amplifies the disclosure effect of vega. The interaction term $VEGA \times VOL$ is positive and statistically significant ($p < 0.05$), suggesting that the effect of CEO risk-taking incentives on IL disclosure is stronger when firms experience higher market-based risk. This finding is consistent with theories

positing that CEOs with high vega actively increase firm volatility, which in turn generates more uncertain or contingent exposures requiring disclosure of IL (Armstrong, Larcker, Ormazabal & Taylor, 2013).

[Insert table 6 here]

Finally, litigation risk provides a plausible mechanism through which CEO risk-taking incentives shape firms' disclosure of IL. CEOs with high vega are incentivized to pursue riskier operational and strategic actions, which heighten both business uncertainty and financial reporting risk, thereby increasing firms' exposure to shareholder litigation and regulatory enforcement (Coles, Daniel & Naveen, 2006). Prior research shows that firms facing greater litigation risk adjust their disclosure practices to mitigate legal exposure, often providing more detailed, precautionary, or forward-looking statements about uncertain liabilities (Skinner, 1994; Field, Lowry & Shu, 2005). Moreover, Kim and Skinner (2012) demonstrate that litigation-prone firms alter financial reporting behavior to reduce expected legal costs. Because IL often involve uncertain or contingent obligations—such as contractual disputes, indemnities, or unrecognized commitments—firms led by high-vega CEOs are more likely to proactively disclose IL as a risk-management strategy aimed at preempting shareholder claims, signaling transparency, and reducing allegations of omission or misrepresentation. In this way, litigation risk provides a credible channel through which CEO vega positively influences the extent of IL disclosures.

Column (3) tests this mechanism by interacting VEGA with firm-specific litigation risk measure of Kim and Skinner (2012). The interaction term $VEGA \times \text{Litigation Risk}$ is positive and statistically significant ($p < 0.05$), indicating that disclosure-enhancing effect of vega is stronger when firms face higher litigation exposure. This finding suggests that litigation risk induces precautionary disclosure behavior, especially among risk-taking executives whose strategies may increase the likelihood of legal disputes, regulatory intervention, or shareholder lawsuits. In such settings, increased disclosure of IL may serve as a defensive reporting strategy aimed at reducing litigation risk and signaling transparency to investors.

5.2 Cross sectional tests: The role of managerial characteristics

In this section, we conduct some cross-sectional tests to examine whether CEO-specific characteristics condition the relation between risk-taking incentives and IL disclosures.

Building on upper echelons theory and the compensation literature, these cross-sectional tests assess whether managerial ability, career horizon, and personality traits moderate how CEO vega translates into disclosure outcomes.

Column (1) investigates whether managerial ability alters the relationship between CEO vega and IL disclosures. We use managerial ability score of Demerjian, Lev, & McVay (2012). The interaction term $VEGA \times \text{Managerial Ability}$ is negative and statistically significant ($p < 0.10$), indicating that the positive effect of vega on IL disclosure is weaker among more able managers. This result suggests that high-ability managers may better manage and evaluate risk without resorting to expanded disclosure of uncertain obligations (Bonsall IV, Holzman, & Miller 2017; Demerjian, Lev, & McVay 2012). In other words, even when compensation incentivizes risk-taking, capable managers may exercise greater discipline in how risky policies translate into reporting outcomes. The main effect of VEGA remains positive and significant, confirming that risk-taking incentives increase IL disclosures overall, but the managerial ability serves as an important boundary condition.

Column (2) examines whether career horizon of CEOs (i.e., near retirement age: $\text{age} \geq 63$) moderates the vega–disclosure relationship. The interaction term $VEGA \times \text{CEO Close to Retirement}$ is positive and statistically significant ($p < 0.10$), indicating that the effect of vega on IL is stronger for CEOs approaching retirement. This finding is consistent with career horizon theory, which predicts that late-career managers may place greater weight on short-term outcomes and face weaker long-term reputational discipline (Antia, Pantzalis, & Park 2010; Dechow & Sloan 1991). As a result, CEOs close to retirement appear more responsive to risk-taking incentives and more inclined to generate disclosures reflecting uncertain and off-balance sheet obligations. The main effect of VEGA remains positive and significant, reinforcing the view that retirement proximity amplifies, rather than offsets, incentive-driven disclosure behavior.

[Insert table 7 here]

Column (3) explores whether CEO personality traits—specifically extroversion—moderate the effect of vega on IL. We proxy for CEO extraversion using linguistic cues from the interactive Q&A segment of conference calls (Green, Jame, & Lock 2019). The interaction term $VEGA \times \text{Extrovert CEO}$ is negative and statistically significant ($p < 0.05$), showing that the influence of risk-taking incentives on IL disclosures is attenuated for more extroverted CEOs. Prior research suggests that extroversion is associated with

optimism, self-confidence, assertiveness, and strong communication skills (Green, Jame, & Lock 2019). These traits may lead extroverted CEOs to downplay uncertainty and negative contingencies, relying instead on persuasive narratives and strategic communication to manage investor perceptions (Bamber, Jiang, & Wang 2010). Our finding suggests that this behavioral channel dampens the extent to which incentive-driven risk-taking manifests in expanded IL disclosures. Overall, the results highlight that CEO personality traits interact with compensation incentives in shaping corporate disclosure behavior.

In sum, we find that managerial attributes such as ability, career horizon, and personality significantly moderate the effect of vega, with high-ability and extroverted CEOs weakening the relationship, while CEOs nearing retirement strengthen it. Overall, the results show that the impact of compensation-based risk-taking incentives is heterogeneous, reinforcing the importance of executive heterogeneity in understanding corporate disclosure behavior.

5.3 Cross-sectional analysis: The role of corporate respect culture and corporate governance committee

We examine the role of corporate respect culture and corporate governance committees to understand how organizational norms and oversight structures shape the effect of CEO risk-taking incentives on IL disclosure behavior. These cross-sectional tests allow us to identify organizational internal conditions under which risk-seeking CEOs are more or less likely to increase IL disclosures.

Column (1) examines whether a strong corporate respect culture (Li, Mai, Shen, & Yan, 2021) influences the relationship between CEO risk-taking incentives and IL disclosures. The interaction term $VEGA \times \text{Respect Culture}$ is negative and statistically significant ($p < 0.05$), indicating that the positive association between vega and IL is weaker in firms that exhibit a stronger respect culture. This finding suggests that organizational values emphasizing fairness, empathy, and interpersonal accountability mitigate the extent to which risk-seeking CEOs translate their incentives into greater disclosure of uncertain or judgment-based obligations. This is because corporate respect cultures function as informal governance mechanisms by shaping managerial norms and constraining opportunistic behavior (Guiso, Sapienza, & Zingales 2015; Li, Mai, Shen, & Yan 2021). Therefore, while firms with high CEO vega disclose more IL on average—as

reflected in the positive main effect—the effect is attenuated in environments with strong respect cultures.

[Insert table 8 here]

Column (2) analyses whether formal oversight through a corporate governance committee moderates the effect of CEO risk-taking incentives on IL disclosure. The interaction term $VEGA \times \text{Corporate Governance Committee indicator}$ is negative and statistically significant ($p < 0.10$), indicating that board-level monitoring committees weaken the relationship between vega and IL disclosures. This aligns with theories of internal governance emphasizing the role of specialized committees in enhancing transparency, strengthening internal controls, and curbing managerial discretion (Xie, Davidson, & DaDalt 2003). While the standalone effect of the VEGA is positive and significant, the negative and significant interaction demonstrates how corporate governance limits the role of CEO risk-taking incentives on IL disclosure levels.

Taken together, the cross-sectional findings demonstrate that CEO risk-taking incentives do not operate in isolation. Although CEOs with high vega is generally associated with greater disclosure of IL, this effect is meaningfully attenuated by both informal cultural norms and formal governance structures.

5.4 Consequence test

The consequence tests examine whether the interaction between CEO risk-taking incentives (VEGA) and IL disclosures (INTAN_LIAB) affects firm value, measured using both Tobin's Q and Total Q contemporaneously (t) and one year ahead ($t+1$). We measure Tobin's Q as the market value of equity divided by the book value of equity. Total Q incorporates intangible capital, which better captures both physical and intangible investment opportunities (Peters and Taylor, 2017). In Table 9, across all specifications, the interaction term $VEGA \times \text{INTAN_LIAB}$ is negative and statistically significant, indicating that firms with both high CEO risk-taking incentives and extensive IL disclosures are associated with lower market valuations. Interestingly, INTAN_LIAB alone is small and only marginally significant, indicating that IL are not necessarily harmful in isolation.

This negative interaction is economically meaningful. The estimated coefficients (e.g., -0.118 for Tobin's Q_t ; -0.134 for Total Q_t) indicate that IL become more value-destroying specifically when CEOs face strong volatility-based incentives. These results imply that investors do not assess IL in isolation; rather, they evaluate them through the

lens of managerial incentives. When CEOs are highly incentivized to increase stock return volatility, IL—often reflecting uncertain future obligations, contingent commitments, or risky strategic investments—are interpreted as symptoms of excessive risk-taking rather than value-enhancing growth opportunities.

Theoretically, this negative interaction is consistent with expectation. VEGA increases managerial preferences for high-variance projects, even when such projects reduce expected firm value (Coles, Daniel, & Naveen, 2006). Intangible liabilities, by their nature, are opaque, difficult to verify, and subject to significant estimation uncertainty. When these liabilities are generated under high-VEGA incentive structures, investors are more likely to infer that they arise from aggressive risk-shifting, opportunistic investment, or deferred recognition of downside risk. Consequently, markets apply a valuation discount to reflect heightened uncertainty, limited verifiability, and the potential for future cash flow shortfalls (Armstrong, Larcker, Ormazabal & Taylor, 2013; Boustanifar & Verriest 2025).

The persistence of the negative interaction in the one-year-ahead regressions further reinforces this interpretation. The results suggest that investors anticipate future value erosion rather than merely reacting to contemporaneous disclosures, consistent with forward-looking pricing of risk and expected downside outcomes. Collectively, the results show that the value implications of IL depend critically on managerial incentive structures. This provides strong evidence that disclosure content interacts with executive incentives to shape market perceptions of firm risk and long-term value.[Insert table 9 here]

5.5 Robustness tests

Table OA.2 reports sensitivity analyses using alternative fixed-effects structures and regression specifications. Column (1) includes industry and year fixed effects, while Column (2) further incorporates CEO fixed effects as an alternative fixed-effects specification. Across both models, the coefficient on Vega remains positive and statistically significant. Columns (3)–(5) present results from alternative contemporaneous regression specifications, in which IL disclosure in year t is regressed on Vega in year t , controlling for year- t covariates. Across all specifications, the coefficient on Vega remains positive and statistically significant. Overall, these results indicate that

our findings are robust and not driven by a particular fixed-effects structure or regression specification.

Table OA.3 reports sensitivity analyses that test the robustness of our main results using an alternative scaling of IL disclosure. Specifically, instead of using the natural logarithm of the IL disclosure measure, we scale the intangible liabilities score by the total number of words in the firm's Form 10-K filing, which captures the relative size of IL disclosure. We then re-estimate the main regression specifications using this alternative scaling. Across all specifications reported in Columns (1)–(3), the coefficient on Vega remains positive and statistically significant. These findings indicate that our results are robust and not driven by the particular scaling of the IL disclosure measure.

In Section 4.4.1, we examine the causal effect of CEO risk-taking incentives on IL disclosure using a DiD regression design. Following prior studies (e.g., Chircop, Tarsalewska, & Trzeciakiewicz, 2025; Mao & Zhang, 2018), we exploit the adoption of FAS 123R as an exogenous regulatory shock to executive compensation incentives. To strengthen causal inference and assess the robustness, we re-estimate the DiD model using entropy balancing. OA.4, Panel A reports covariate balance statistics, showing that treated and control firms are well matched in terms of the mean, variance, and skewness of observable characteristics. Panel B presents the entropy-balanced DiD estimates and parallel trends tests. The results remain robust, reinforcing the causal interpretation of the effect of CEO risk-taking incentives on IL disclosure.

6. Conclusion

This paper examines how CEO risk-taking incentives shape firms' disclosure of IL—an important yet understudied component of narrative financial reporting. Using comprehensive textual measures from 10-K filings, we document that CEOs with higher vega disclose significantly more IL, suggesting that volatility-based incentives influence not only operational and investment decisions, as shown in prior research (Coles, Daniel & Naveen, 2006; Armstrong, Larcker, Ormazabal & Taylor, 2013), but also the communication of uncertainty and complex obligations to external stakeholders. The magnitude of the effect is economically meaningful and robust across numerous specifications, indicating that compensation-induced risk-taking preferences systematically manifest in firms' disclosure choices.

To strengthen causal identification, we exploit FAS 123R as an exogenous shock to option-based incentives and find that firms most affected by the rule change exhibit

significant declines in IL disclosures. Dynamic difference-in-differences tests further confirm the absence of pre-trends and reveal that the treatment effect persists over several years. Consistent with a causal interpretation, within-firm change regressions further reveal that increases in vega are followed by increases in IL disclosures after controlling for all time-invariant firm and managerial heterogeneity.

Mechanism analyses reveal that vega operates through economically meaningful channels related to uncertainty and contingent obligations. The effect is stronger in firms with high R&D intensity, greater stock return volatility, and elevated litigation risk, consistent with theories linking risk-taking incentives to innovation, legal exposure, and uncertainty (Lev & Sougiannis, 1996; Skinner, 1994; Field, Lowry & Shu, 2005; Kim & Skinner, 2012). Cross-sectional tests demonstrate that high-ability and extroverted CEOs attenuate the relationship, while CEOs nearing retirement strengthen it. Further respect-oriented cultures and governance committees attenuate the vega–IL disclosure relation, suggesting that ethical norms and board oversight constrain high-powered incentives.

Finally, consequence tests show that IL disclosures are most value-relevant when paired with high vega. In particular, the interaction between high risk-taking incentives and extensive intangible obligations results in lower firm value, both contemporaneously and one year ahead, indicating that investors view the disclosure of IL as value destroying in the presence of risk-seeking managers. Overall, the evidence highlights an important but previously unrecognized channel through which executive incentives shape reporting outcomes and influence market perceptions.

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Appendix A: Variable definition

Variables	Definitions
INTAN_LIAB	Natural logarithm of the frequency of intangible liabilities appearing in firms' 10-K filings. See Section 3.1 for detailed construction.
VEGA	Natural logarithm of the CEO's vega (sensitivity of the CEO's wealth to a 1% change in the firm's stock return volatility).
DELTA	Natural logarithm of the CEO's delta (sensitivity of the CEO's wealth to a 1% change in the firm's stock price).
CEO TENURE	Natural logarithm of the number of years the CEO has held the CEO position in the firm.
CASH COMP	Natural logarithm of the CEO's annual cash compensation.
CEO AGE	Natural logarithm of the CEO's age in years.
SIZE	Natural logarithm of the firm's total assets.
MTB	Market-to-book ratio, calculated as the market value of equity divided by the book value of equity.
LEV	The sum of short-term and long-term debt scaled by total assets.
DIV	Dummy variable equal to 1 if the firm pays dividends during the year, and 0 otherwise.
INTAN CAP	Intangible capital intensity, measured as intangible assets scaled by total assets following Peters and Taylor (2017).
ROA	Return on assets.
PPE	Property, plant, and equipment scaled by total assets.
INST	Percentage of institutional ownership.
RET	Buy-and-hold stock return over the fiscal year.
VOL	Annualized volatility of daily stock returns over the fiscal year.
TRADE VOL	Average daily trading volume divided by the number of shares outstanding at the beginning of the year.
FILESIZE	Natural logarithm of the net file size of the firm's 10-K filing.
<i>Variables used in other analysis</i>	
R&D	Research and development expenses scaled by total assets.
Litigation Risk	Firm-specific litigation risk measure of Kim and Skinner (2012).
Mgr. Ability	Managerial ability score of Demerjian et al. (2012).
CEO Close to retirement	An indicator that takes the value of 1 for CEOs aged 63 or above, and 0 otherwise.
Extrovert CEO	A measure of a CEO's extraverted personality traits derived from their speech patterns in the interactive questioning phase of conference calls.
Respect Culture	A measure that assesses the degree of respect as an element of corporate culture (Li et al., 2021).
Corporate Governance Committee	A binary variable that takes the value of 1 if a company has established a corporate governance committee, and 0 otherwise.
Total Q	Total Q represents the ratio of a company's market value to its total capital stock (both tangible and intangible assets) (Peters and Taylor, 2017).

Table 1

Summary statistics.

	N	Mean	SD	p25	p50	p75	p99
INTAN_LIAB	27,131	4.996	1.017	4.522	5.165	5.677	6.874
VEGA	27,131	3.517	1.944	2.394	3.828	4.947	7.149
DELTA	27,131	5.380	1.531	4.387	5.355	6.379	9.477
CEO TENURE	27,131	1.784	0.874	1.099	1.792	2.398	3.584
CASH COMP	27,131	6.765	0.655	6.390	6.764	7.101	8.626
CEO AGE	27,131	4.032	0.127	3.951	4.043	4.111	4.331
SIZE	27,131	7.387	1.612	6.238	7.278	8.428	11.654
MTB	27,131	2.141	1.445	1.252	1.676	2.460	8.961
LEV	27,131	0.232	0.194	0.060	0.214	0.348	0.866
DIV	27,131	0.492	0.500	0.000	0.000	1.000	1.000
INTAN CAP	27,131	0.614	0.420	0.310	0.579	0.823	2.419
ROA	27,131	0.151	0.123	0.093	0.146	0.210	0.530
PPE	27,131	0.261	0.218	0.094	0.192	0.369	0.892
INST	27,131	0.633	0.335	0.480	0.749	0.891	1.000
RET	27,131	0.164	0.506	-0.139	0.104	0.369	2.379
VOL	27,131	0.117	0.066	0.072	0.100	0.143	0.395
TRADE VOL	27,131	0.209	0.164	0.100	0.163	0.263	0.937
FILESIZE	27,131	0.336	0.142	0.239	0.312	0.406	0.832
Additional variables							
R&D	27,131	0.036	0.063	0.000	0.004	0.046	0.351
Litigation Risk	26,396	-2.514	1.177	-3.270	-2.687	-1.970	1.798
Mgr. Ability	26,818	0.007	0.137	-0.078	-0.024	0.054	0.509
CEO Close to retirement	27,131	0.162	0.369	0.000	0.000	0.000	1.000
Extrovert CEO	14,785	0.234	0.704	-0.220	0.207	0.670	1.941
Respect Culture	19,208	2.774	1.862	1.466	2.260	3.535	10.206
Corporate Governance							
Committee	10,953	0.959	0.198	1.000	1.000	1.000	1.000
Total Q	26,271	1.429	1.794	0.479	0.887	1.639	11.277

Notes: This table presents summary statistics of the variables. Detailed variable definitions are provided in Appendix A.

Table 2

Correlation.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) INTAN_LIAB	1.00																	
(2) VEGA	0.05*	1.00																
(3) DELTA	0.04*	0.48*	1.00															
(4) CEO TENURE	-0.05*	0.03*	0.38*	1.00														
(5) CASH COMP	0.05*	0.36*	0.31*	0.02*	1.00													
(6) CEO AGE	0.02*	-0.01	0.14*	0.36*	0.15*	1.00												
(7) SIZE	0.24*	0.36*	0.42*	-0.08*	0.57*	0.14*	1.00											
(8) MTB	-0.01	0.08*	0.33*	0.06*	-0.06*	-0.07*	-0.15*	1.00										
(9) LEV	0.11*	0.04*	-0.01	-0.06*	0.19*	0.06*	0.33*	-0.16*	1.00									
(10) DIV	-0.11*	0.10*	0.12*	-0.02*	0.28*	0.16*	0.37*	-0.08*	0.08*	1.00								
(11) INTAN CAP	0.07*	0.03*	-0.11*	-0.05*	-0.11*	-0.06*	-0.26*	0.19*	-0.12*	-0.14*	1.00							
(12) ROA	-0.16*	0.09*	0.28*	0.04*	0.18*	0.02	0.10*	0.32*	-0.05*	0.17*	-0.24*	1.00						
(13) PPE	-0.09*	-0.05*	-0.04*	-0.02*	0.07*	0.07*	0.16*	-0.18*	0.21*	0.14*	-0.48*	0.12*	1.00					
(14) INST	0.19*	0.06*	0.07*	0.02*	0.07*	0.03*	0.13*	0.04*	0.00	0.05*	-0.02*	0.08*	-0.07*	1.00				
(15) RET	-0.03*	0.00	0.15*	0.02	0.03*	-0.02*	-0.05*	0.26*	-0.04*	-0.05*	0.00	0.11*	-0.04*	0.00	1.00			
(16) VOL	0.00	-0.18*	-0.25*	-0.02*	-0.25*	-0.13*	-0.33*	0.00	0.02*	-0.36*	0.08*	-0.26*	0.00	-0.19*	0.06*	1.00		
(17) TRADE VOL	0.25*	0.00	0.01	0.00	-0.03*	-0.11*	0.04*	0.07*	0.03*	-0.23*	-0.06*	-0.01	0.04*	0.10*	-0.01	0.39*	1.00	
(18) FILESIZE	0.44*	0.12*	0.07*	-0.07*	0.18*	0.01	0.35*	-0.10*	0.23*	-0.03*	0.00	-0.15*	0.01	0.05*	-0.03*	0.00	0.15*	1.00

Notes: This table presents correlation matrix. Detailed variable definitions are provided in Appendix A. * indicates significance at $p < 0.01$.

Table 3

Baseline regression results.

Variables	(1) INTAN_LIAB	(2) INTAN_LIAB	(3) INTAN_LIAB
VEGA	0.018*** [0.005]	0.016*** [0.006]	0.016*** [0.006]
DELTA	-0.013 [0.008]	-0.010 [0.010]	-0.016* [0.009]
CEO TENURE	-0.019* [0.010]	-0.013 [0.021]	-0.018* [0.011]
CASH COMP	-0.002 [0.015]	-0.009 [0.015]	0.012 [0.017]
CEO AGE	0.152* [0.079]	-0.056 [0.561]	0.185** [0.094]
SIZE	0.104*** [0.018]	0.095*** [0.022]	0.080*** [0.023]
MTB	0.002 [0.007]	-0.003 [0.007]	0.004 [0.008]
LEV	-0.001 [0.057]	-0.013 [0.053]	0.001 [0.066]
DIV	-0.019 [0.023]	0.003 [0.027]	-0.008 [0.028]
INTAN CAP	0.004 [0.036]	0.016 [0.036]	-0.015 [0.041]
ROA	-0.356*** [0.061]	-0.258*** [0.062]	-0.286*** [0.073]
PPE	-0.151 [0.107]	-0.078 [0.117]	-0.034 [0.122]
INST	-0.105*** [0.037]	-0.067* [0.038]	-0.086** [0.041]
RET	-0.019** [0.008]	-0.016** [0.008]	-0.029*** [0.009]
VOL	0.652*** [0.096]	0.413*** [0.097]	0.608*** [0.115]
TRADE VOL	0.221*** [0.052]	0.171*** [0.055]	0.101 [0.062]
FILESIZE	0.430*** [0.044]	0.255*** [0.039]	0.389*** [0.045]
Constant	3.574*** [0.344]	4.530** [2.266]	3.532*** [0.419]
Year FE	Y	Y	N
Firm FE	Y	Y	Y
CEO FE	N	Y	N
Year x Ind FE	N	N	Y
Observations	27,131	27,131	27,131
Adj. R-squared	0.782	0.830	0.808

Notes: This table presents regression results examining the effect of CEO risk-taking incentives (VEGA) on intangible liabilities (INTAN_LIAB). Clustered (firm-level) robust standard errors are shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A.

Table 4

Endogeneity tests

Panel A: Difference-in-differences (DiD) regression results.

	(1)	(2)	(3)
	Main DiD	Placebo test: Random treated	Placebo test: Alternative event period
VARIABLES	INTAN_LIAB	INTAN_LIAB	INTAN_LIAB
Treat× Post	-0.079** [0.040]	0.025 [0.023]	-0.063 [0.057]
DELTA	0.002 [0.012]	0.004 [0.012]	-0.017 [0.021]
CEO TENURE	-0.023 [0.016]	-0.022 [0.016]	-0.018 [0.025]
CASH COMP	0.022 [0.019]	0.021 [0.019]	-0.042 [0.028]
CEO AGE	0.075 [0.129]	0.062 [0.129]	0.394** [0.176]
SIZE	0.166*** [0.033]	0.161*** [0.033]	0.093** [0.047]
MTB	-0.007 [0.013]	-0.007 [0.013]	0.026* [0.015]
LEV	0.062 [0.099]	0.049 [0.100]	0.114 [0.132]
DIV	0.072* [0.040]	0.072* [0.040]	0.034 [0.060]
INTAN CAP	0.086 [0.064]	0.069 [0.064]	-0.033 [0.088]
ROA	-0.523*** [0.112]	-0.532*** [0.112]	-0.713*** [0.163]
PPE	-0.050 [0.180]	-0.040 [0.180]	-0.365 [0.264]
INST	-0.161** [0.072]	-0.164** [0.072]	-0.107 [0.100]
RET	-0.038*** [0.012]	-0.040*** [0.012]	-0.032 [0.020]
VOL	0.577*** [0.156]	0.623*** [0.155]	0.873*** [0.227]
TRADE VOL	0.125 [0.083]	0.154* [0.082]	0.127 [0.171]
FILESIZE	0.316*** [0.063]	0.315*** [0.063]	0.218*** [0.084]
Constant	3.227*** [0.576]	3.306*** [0.575]	2.458*** [0.806]
Year FE	Y	Y	Y
Firm FE	Y	Y	Y
Observations	6,646	6,646	5,360
Adj. R-squared	0.785	0.785	0.755

Panel B: Parallel trend.

VARIABLES	(1)
	INTAN_LIAB
Treat× Pre ⁻³	-0.059 [0.039]
Treat× Pre ⁻²	-0.066 [0.049]
Treat× Pre ⁻¹	-0.080 [0.057]
Treat× Post⁺¹	-0.119* [0.061]
Treat× Post⁺²	-0.133** [0.063]
Treat× Post⁺³	-0.125* [0.064]
Treat× Post⁺⁴	-0.160** [0.065]
DELTA	0.001 [0.012]
CEO TENURE	-0.023 [0.016]
CASH COMP	0.022 [0.019]
CEO AGE	0.080 [0.129]
SIZE	0.165*** [0.033]
MTB	-0.009 [0.013]
LEV	0.068 [0.099]
DIV	0.073* [0.040]
INTAN CAP	0.090 [0.064]
ROA	-0.520*** [0.113]
PPE	-0.047 [0.181]
INST	-0.160** [0.072]
RET	-0.035*** [0.012]
VOL	0.548*** [0.160]
TRADE VOL	0.122 [0.083]
FILESIZE	0.317***

	[0.063]
Constant	3.231***
	[0.575]
Year FE	Y
Firm FE	Y
Observations	6,646
Adj. R-squared	0.785

Notes: Panel A of this table presents difference-in-differences (DiD) regression results examining how the adoption of FAS 123R affected intangible liabilities (INTAN_LIAB). The analysis uses firm-year data from 2001–2009, excluding 2005—the implementation year—to avoid mechanical transition effects. *POST* is an indicator equal to 1 for observations in the post-FAS 123R period (2006 - 2009) and 0 otherwise. *TREAT* equals 1 for firms whose OPTION_EXPENSING_IMPACT lies above the sample average and 0 otherwise, thereby distinguishing treatment from control groups based on the expected magnitude of the expensing shock. Column (1) present the results of the baseline regression and Columns (2) and (3) present the placebo test results using random treated firms and alternative event period, respectively. Panel B present DiD dynamic analysis. *Treat* is an indicator variable equal to 1 for the treatment firms and 0 for the control states. *Post* is an indicator variable equal to 1 for the post-event period and 0 for the pre-enactment period. *Post⁻⁴* is used as the benchmark year in our dynamic analysis. Clustered (firm-level) robust standard errors are shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A

Table 5

Change regression analysis.

Variables	(1) Δ INTAN_LIAB	(2) Δ INTAN_LIAB
Δ VEGA	0.006** [0.003]	0.006* [0.003]
Δ DELTA	-0.002 [0.004]	0.001 [0.005]
Δ CEO TENURE	-0.004 [0.006]	-0.003 [0.008]
Δ CASH COMP	-0.002 [0.007]	-0.001 [0.009]
Δ CEO AGE	0.063 [0.059]	0.072 [0.085]
Δ SIZE	0.042*** [0.014]	0.019 [0.017]
Δ MTB	0.000 [0.005]	0.000 [0.005]
Δ LEV	-0.043 [0.032]	-0.025 [0.039]
Δ DIV	0.036*** [0.012]	0.033** [0.015]
Δ INTAN CAP	0.001 [0.022]	-0.013 [0.026]
Δ ROA	-0.079** [0.035]	-0.043 [0.038]
Δ PPE	0.094 [0.064]	0.078 [0.075]
Δ INST	-0.010 [0.022]	0.004 [0.028]
Δ RET	-0.006 [0.005]	-0.007 [0.006]
Δ VOL	0.115** [0.055]	0.091 [0.064]
Δ TRADE VOL	0.018 [0.031]	0.007 [0.036]
Δ FILESIZE	-0.058** [0.025]	-0.072** [0.029]
Constant	0.070*** [0.001]	0.072*** [0.002]
Year FE	Y	Y
Firm FE	Y	Y
CEO FE	N	Y
Observations	23,176	23,176
R-squared	0.142	0.248

Notes: This table reports change regression results. Clustered (firm-level) robust standard errors are shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A.

Table 6

Mechanism analysis.

Variables	(1) INTAN_LIAB	(2) INTAN_LIAB	(3) INTAN_LIAB
VEGA	0.014** [0.006]	0.010 [0.007]	0.029*** [0.008]
VEGA × R&D	0.114* [0.067]		
VEGA × VOL		0.079** [0.039]	
VEGA × Litigation Risk			0.005** [0.002]
DELTA	-0.013 [0.008]	-0.013 [0.008]	-0.013 [0.008]
CEO TENURE	-0.018* [0.010]	-0.018* [0.010]	-0.018* [0.010]
CASH COMP	-0.002 [0.015]	-0.002 [0.015]	-0.002 [0.015]
CEO AGE	0.149* [0.079]	0.151* [0.079]	0.151* [0.079]
SIZE	0.103*** [0.018]	0.103*** [0.018]	0.104*** [0.018]
MTB	0.002 [0.007]	0.002 [0.007]	0.003 [0.007]
LEV	-0.002 [0.057]	0.001 [0.057]	0.015 [0.058]
DIV	-0.018 [0.023]	-0.018 [0.023]	-0.012 [0.024]
INTAN CAP	0.010 [0.040]	0.006 [0.036]	0.010 [0.037]
ROA	-0.360*** [0.062]	-0.358*** [0.060]	-0.368*** [0.063]
PPE	-0.151 [0.107]	-0.147 [0.107]	-0.142 [0.110]
INST	-0.108*** [0.037]	-0.106*** [0.037]	-0.110*** [0.038]
RET	-0.020** [0.008]	-0.019** [0.008]	-0.022** [0.009]
VOL	0.654*** [0.096]	0.427*** [0.146]	0.617*** [0.168]
TRADE VOL	0.215*** [0.052]	0.217*** [0.052]	0.222*** [0.054]
FILESIZE	0.431*** [0.044]	0.430*** [0.044]	0.415*** [0.045]
R&D	-0.444 [0.354]		
Litigation Risk			-0.011 [0.011]
Constant	3.600*** [0.342]	3.606*** [0.343]	3.539*** [0.356]
Year FE	Yes	Yes	Yes

Firm FE	Yes	Yes	Yes
Observations	27,131	27,131	26,396
Adj. R-squared	0.782	0.782	0.782

Notes: This table presents regression results examining the mechanisms explaining how CEO risk-taking incentives (VEGA) affect intangible liabilities (INTAN_LIAB). Clustered (firm-level) robust standard errors are shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A.

Table 7

Cross-sectional analysis: The role of managerial characteristics

Variables	INTAN_LIAB	INTAN_LIAB	INTAN_LIAB
VEGA	0.019*** [0.005]	0.016*** [0.005]	0.020*** [0.007]
Mgr. Ability	0.104 [0.100]		
VEGA × Mgr. Ability	-0.038* [0.022]		
CEO Close to retirement		-0.027 [0.029]	
VEGA × CEO Close to retirement		0.012* [0.007]	
Extrovert CEO			0.043 [0.036]
VEGA × Extrovert CEO			-0.014** [0.007]
DELTA	-0.012 [0.008]	-0.013 [0.008]	-0.013 [0.011]
CEO TENURE	-0.020** [0.010]	-0.019* [0.010]	0.008 [0.015]
CASH COMP	-0.003 [0.015]	-0.002 [0.015]	-0.023 [0.020]
CEO AGE	0.144* [0.079]	0.129 [0.087]	-0.115 [0.133]
SIZE	0.106*** [0.018]	0.104*** [0.018]	0.110*** [0.026]
MTB	0.004 [0.007]	0.002 [0.007]	-0.002 [0.008]
LEV	0.011 [0.057]	-0.001 [0.057]	-0.070 [0.066]
DIV	-0.018 [0.023]	-0.019 [0.023]	-0.026 [0.030]
INTAN CAP	0.015 [0.037]	0.004 [0.036]	0.038 [0.048]
ROA	-0.373*** [0.064]	-0.357*** [0.061]	-0.370*** [0.082]
PPE	-0.151 [0.109]	-0.150 [0.107]	-0.191 [0.138]
INST	-0.104*** [0.036]	-0.105*** [0.037]	-0.103** [0.044]
RET	-0.020*** [0.008]	-0.020** [0.008]	-0.017* [0.009]
VOL	0.649*** [0.097]	0.648*** [0.096]	0.614*** [0.120]
TRADE VOL	0.218*** [0.053]	0.221*** [0.052]	0.220*** [0.067]
FILESIZE	0.429***	0.429***	0.499***

	[0.044]	[0.044]	[0.050]
Constant	3.575***	3.673***	4.840***
	[0.344]	[0.374]	[0.563]
Year FE	Y	Y	Y
Firm FE	Y	Y	Y
Observations	26,818	27,131	14,785
Adj. R-squared	0.783	0.782	0.789

Notes: This table presents regression results examining the role of managerial characteristics on the relationship between CEO risk-taking incentives (VEGA) and intangible liabilities (INTAN_LIAB). Clustered (firm-level) robust standard errors are shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A.

Table 8

Cross-sectional analysis: The role of corporate respect culture and corporate governance committee.

Variables	INTAN_LIAB	INTAN_LIAB
VEGA	0.023*** [0.006]	0.048** [0.022]
Respect Culture	0.019*** [0.006]	
VEGA × Respect Culture	-0.003** [0.001]	
Corporate Governance Committee		0.118 [0.118]
VEGA × Corporate Governance Committee		-0.036* [0.021]
DELTA	-0.008 [0.008]	-0.008 [0.011]
CEO TENURE	-0.012 [0.009]	-0.003 [0.013]
CASH COMP	0.004 [0.016]	-0.029 [0.023]
CEO AGE	0.035 [0.076]	-0.009 [0.113]
SIZE	0.110*** [0.018]	0.112*** [0.026]
MTB	-0.005 [0.006]	0.000 [0.008]
LEV	-0.029 [0.051]	-0.132* [0.076]
DIV	-0.019 [0.020]	-0.033 [0.028]
INTAN CAP	0.033 [0.035]	0.097* [0.054]
ROA	-0.267*** [0.057]	-0.273*** [0.077]
PPE	-0.080 [0.096]	-0.183 [0.137]
INST	-0.038 [0.037]	-0.077 [0.050]
RET	-0.017** [0.007]	-0.012 [0.010]
VOL	0.434*** [0.094]	0.107 [0.137]
TRADE VOL	0.204*** [0.048]	0.305*** [0.069]
FILESIZE	0.434*** [0.040]	0.431*** [0.054]
Constant	4.111*** [0.343]	4.510*** [0.521]
Year FE	Y	Y

Firm FE	Y	Y
Observations	19,208	10,953
Adj. R-squared	0.754	0.772

Notes: This table presents regression results examining the role of corporate respect culture and corporate governance committee on the relationship between CEO risk-taking incentives (VEGA) and intangible liabilities (INTAN_LIAB). Clustered (firm-level) robust standard errors are shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A.

Table 9

Consequence test.

Variables	Tobin' Q_t	Tobin's Q_{t+1}	Total Q_t	Total Q_{t+1}
VEGA	-0.045 [0.031]	-0.025 [0.035]	-0.105** [0.041]	-0.088** [0.041]
INTAN_LIAB	0.057* [0.031]	0.050 [0.035]	0.033 [0.041]	0.039 [0.039]
VEGA $\times$ INTAN_LIAB	-0.118*** [0.035]	-0.092** [0.040]	-0.134*** [0.046]	-0.090* [0.046]
DELTA	0.350*** [0.018]	0.181*** [0.016]	0.377*** [0.022]	0.215*** [0.018]
CEO TENURE	-0.159*** [0.016]	-0.070*** [0.017]	-0.143*** [0.019]	-0.059*** [0.017]
CASH COMP	0.023 [0.022]	0.046* [0.024]	-0.001 [0.030]	0.013 [0.029]
CEO AGE	-0.059 [0.119]	0.047 [0.130]	-0.383** [0.150]	-0.180 [0.148]
SIZE	-0.528*** [0.034]	-0.495*** [0.037]	-0.429*** [0.045]	-0.482*** [0.044]
LEV	-0.142 [0.099]	0.163 [0.110]	-0.122 [0.120]	0.115 [0.122]
DIV	0.089** [0.039]	0.027 [0.043]	0.050 [0.047]	0.002 [0.047]
INTAN CAP	-0.126 [0.099]	0.030 [0.110]	-1.635*** [0.113]	-0.995*** [0.103]
ROA	2.922*** [0.188]	1.761*** [0.191]	3.201*** [0.223]	2.249*** [0.201]
PPE	-0.048 [0.171]	0.014 [0.193]	-1.830*** [0.205]	-1.063*** [0.200]
INST	-0.114** [0.054]	-0.094 [0.058]	-0.132* [0.069]	-0.102 [0.067]
RET	0.370*** [0.020]	0.332*** [0.021]	0.416*** [0.026]	0.437*** [0.025]
VOL	0.229 [0.181]	-0.198 [0.198]	0.889*** [0.234]	-0.371* [0.203]
TRADE VOL	0.563*** [0.104]	-0.016 [0.107]	0.871*** [0.134]	0.251** [0.125]
FILESIZE	-0.048 [0.062]	-0.074 [0.065]	-0.003 [0.083]	-0.059 [0.079]
Constant	4.080*** [0.581]	4.152*** [0.671]	5.189*** [0.734]	5.108*** [0.737]
Year FE	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Observations	26,342	22,519	26,271	26,265
Adj. R-squared	0.724	0.678	0.711	0.675

Notes: This table explores how the interaction between CEO risk-taking incentives (VEGA) and intangible liabilities (INTAN_LIAB) affects firm value. Clustered (firm-level) robust standard errors are

shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A.

Online Appendix

Table OA.1

Panel A: Covariate balance

	Treat			Control				Treat			Control		
	mean	variance	skewness	mean	variance	skewness		mean	variance	skewness	mean	variance	skewness
DELTA	6.095	1.346	0.550	4.664	2.315	0.436	DELTA	6.095	1.346	0.550	6.094	1.350	0.545
CEO							CEO						
TENURE	1.802	0.668	-0.214	1.765	0.860	-0.170	TENURE	1.802	0.668	-0.214	1.802	0.668	-0.214
CASH COMP	6.999	0.397	-0.151	6.532	0.352	-0.234	CASH COMP	6.999	0.397	-0.151	6.999	0.397	-0.150
CEO AGE	4.033	0.015	-0.282	4.030	0.017	-0.215	CEO AGE	4.033	0.015	-0.282	4.033	0.015	-0.281
SIZE	8.038	2.195	0.254	6.736	2.154	0.605	SIZE	8.038	2.195	0.254	8.037	2.196	0.254
MTB	2.271	2.141	2.376	2.011	1.999	2.581	MTB	2.271	2.141	2.376	2.271	2.141	2.376
LEV	0.246	0.035	0.761	0.217	0.040	0.880	LEV	0.246	0.035	0.761	0.246	0.035	0.761
DIV	0.556	0.247	-0.227	0.428	0.245	0.290	DIV	0.556	0.247	-0.227	0.556	0.247	-0.226
INTAN CAP	0.619	0.143	1.004	0.608	0.210	1.532	INTAN CAP	0.619	0.143	1.004	0.619	0.143	1.006
ROA	0.164	0.012	-0.134	0.138	0.018	-0.448	ROA	0.164	0.012	-0.134	0.164	0.012	-0.136
PPE	0.252	0.044	1.190	0.271	0.051	1.088	PPE	0.252	0.044	1.190	0.252	0.044	1.190
INST	0.668	0.106	-1.187	0.599	0.117	-0.689	INST	0.668	0.106	-1.187	0.668	0.106	-1.186
RET	0.163	0.197	1.528	0.165	0.316	1.396	RET	0.163	0.197	1.528	0.163	0.197	1.527
VOL	0.103	0.003	1.934	0.131	0.005	1.539	VOL	0.103	0.003	1.934	0.103	0.003	1.933
TRADE VOL	0.215	0.025	1.975	0.203	0.029	1.969	TRADE VOL	0.215	0.025	1.975	0.215	0.025	1.976
FILESIZE	0.356	0.020	1.002	0.315	0.019	1.161	FILESIZE	0.356	0.020	1.002	0.356	0.020	1.002

Panel B: Regression results

VARIABLES	(1)	(2)	(3)
	INTAN_LIAB	INTAN_LIAB	INTAN_LIAB
VEGA	0.015**	0.013*	0.014**
	[0.006]	[0.006]	[0.006]
Constant	3.860***	3.284	3.522***

	[0.488]	[3.411]	[0.496]
Year FE	Y	Y	N
Firm FE	Y	Y	Y
CEO FE	N	Y	N
Year x Ind FE	N	N	Y
Observations	27,131	27,131	27,131
Adj. R-squared	0.798	0.845	0.851

Notes: Panel A presents covariate balance before and after weighting and Panel B show entropy balanced regression results. Standard errors (in brackets) are reported below coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A.

Table OA.2
Alternative regression models

	(1)	(2)	(3)	(4)	(5)
	Alternative FE		Contemporaneous Regression		
Variables	INTAN_LIAB	INTAN_LIAB	INTAN_LIAB	INTAN_LIAB	INTAN_LIAB
VEGA	0.011** [0.005]	0.016*** [0.006]	0.016*** [0.005]	0.012** [0.006]	0.014*** [0.005]
DELTA	0.004 [0.009]	-0.010 [0.010]	-0.018** [0.008]	-0.018* [0.010]	-0.015* [0.008]
CEO TENURE	-0.042*** [0.011]	-0.017 [0.020]	-0.025** [0.010]	-0.029 [0.021]	-0.023** [0.010]
CASH COMP	-0.029* [0.015]	-0.008 [0.014]	0.009 [0.015]	0.004 [0.015]	0.025 [0.015]
CEO AGE	0.175** [0.075]	-0.152 [0.557]	0.206** [0.082]	0.092 [0.646]	0.163* [0.084]
SIZE	0.079*** [0.013]	0.094*** [0.021]	0.082*** [0.018]	0.085*** [0.022]	0.076*** [0.019]
MTB	0.004 [0.008]	-0.002 [0.007]	-0.003 [0.007]	-0.007 [0.007]	-0.001 [0.007]
LEV	0.029 [0.055]	-0.008 [0.053]	0.046 [0.059]	0.076 [0.054]	0.040 [0.062]
DIV	-0.120*** [0.022]	-0.002 [0.027]	-0.038 [0.024]	-0.015 [0.028]	-0.050** [0.025]
INTAN CAP	-0.024 [0.032]	0.009 [0.036]	0.018 [0.036]	0.046 [0.038]	-0.009 [0.037]
ROA	-0.320*** [0.078]	-0.260*** [0.062]	-0.375*** [0.064]	-0.284*** [0.064]	-0.347*** [0.070]
PPE	-0.283*** [0.085]	-0.090 [0.116]	-0.211* [0.109]	-0.159 [0.121]	-0.143 [0.108]
INST	0.017 [0.034]	-0.070* [0.038]	-0.083** [0.038]	-0.069* [0.040]	-0.083** [0.037]
RET	-0.022** [0.009]	-0.017** [0.008]	-0.013* [0.008]	-0.010 [0.008]	-0.018** [0.008]
VOL	0.704*** [0.129]	0.433*** [0.097]	0.597*** [0.096]	0.416*** [0.096]	0.671*** [0.103]
TRADE VOL	0.548*** [0.060]	0.175*** [0.055]	0.143*** [0.054]	0.114** [0.056]	0.115** [0.057]
FILESIZE	1.169*** [0.066]	0.260*** [0.039]	0.667*** [0.047]	0.513*** [0.042]	0.642*** [0.047]
Constant	3.506*** [0.318]	4.937** [2.252]	3.387*** [0.352]	3.892 [2.598]	3.489*** [0.362]
Year FE	Yes	Yes	Yes	Yes	No
Firm FE	No	No	Yes	Yes	Yes
CEO FE	No	Yes	No	Yes	No
Ind FE	Yes	Yes	No	No	No
Year x Ind FE	No	No	No	No	Yes
Observations	27,131	27,131	26,342	26,342	26,342
Adj. R-squared	0.590	0.847	0.790	0.837	0.796

Notes: This table presents main regression results using alternative regression models. Clustered (firm-level) robust standard errors are shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A

Table OA.3

Alternative scaling of intangible liabilities.

Variables	(1) INTAN_LIAB_REL	(2) INTAN_LIAB_REL	(3) INTAN_LIAB_REL
VEGA	0.008*** [0.003]	0.009*** [0.003]	0.007** [0.003]
DELTA	-0.008* [0.004]	-0.011** [0.005]	-0.008* [0.004]
CEO TENURE	-0.016*** [0.005]	-0.025** [0.011]	-0.015*** [0.006]
CASH COMP	0.018** [0.009]	0.003 [0.009]	0.020** [0.009]
CEO AGE	0.121*** [0.043]	-0.124 [0.309]	0.105** [0.044]
SIZE	0.040*** [0.010]	0.043*** [0.011]	0.039*** [0.010]
MTB	-0.004 [0.004]	-0.006* [0.004]	-0.001 [0.004]
LEV	-0.046 [0.032]	-0.069** [0.033]	-0.056* [0.034]
DIV	0.003 [0.013]	-0.003 [0.015]	-0.005 [0.014]
INTAN CAP	0.041** [0.019]	0.030 [0.019]	0.029 [0.020]
ROA	-0.072** [0.035]	-0.031 [0.038]	-0.058 [0.039]
PPE	0.092 [0.056]	0.057 [0.055]	0.099* [0.057]
INST	-0.040* [0.022]	-0.029 [0.022]	-0.041* [0.021]
RET	-0.010** [0.004]	-0.007* [0.004]	-0.012*** [0.004]
VOL	0.169*** [0.053]	0.091* [0.053]	0.193*** [0.056]
TRADE VOL	0.076** [0.031]	0.066** [0.030]	0.070** [0.032]
FILESIZE	0.050** [0.023]	0.040** [0.019]	0.051** [0.023]
Constant	-0.234 [0.192]	0.889 [1.245]	-0.181 [0.196]
Year FE	Yes	Yes	No
Firm FE	Yes	Yes	Yes
CEO FE	No	Yes	No
Year x Ind FE	No	No	Yes
Observations	27,131	27,131	27,131
Adj. R-squared	0.618	0.717	0.625

Notes: This table presents main regression results using alternative regression models (Panel A) and alternative scaling of intangible liabilities (Panel B Clustered (firm-level) robust standard errors are shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A.

Table OA.4

Entropy balanced difference-in-differences (DiD) analysis

Panel A: Covariate balance

	Treat			Control				Treat			Control		
	mean	variance	skewness	mean	variance	skewness		mean	variance	skewness	mean	variance	skewness
DELTA	5.725	2.221	-0.130	5.331	2.225	-0.013	DELTA	5.725	2.221	-0.130	5.725	2.221	-0.130
CEO							CEO						
TENURE	1.792	0.743	-0.166	1.712	0.750	-0.066	TENURE	1.792	0.743	-0.166	1.792	0.743	-0.166
CASH COMP	6.757	0.550	-0.069	6.900	0.455	0.127	CASH COMP	6.757	0.550	-0.069	6.757	0.550	-0.069
CEO AGE	4.003	0.018	-0.142	4.031	0.015	-0.298	CEO AGE	4.003	0.018	-0.142	4.003	0.018	-0.143
SIZE	7.291	2.344	0.410	7.468	2.395	0.345	SIZE	7.291	2.344	0.410	7.291	2.344	0.409
MTB	2.223	1.816	2.095	1.837	1.130	2.728	MTB	2.223	1.816	2.095	2.223	1.816	2.095
LEV	0.166	0.032	1.115	0.227	0.030	0.828	LEV	0.166	0.032	1.115	0.166	0.032	1.115
DIV	0.247	0.186	1.173	0.595	0.241	-0.387	DIV	0.247	0.186	1.173	0.247	0.186	1.173
INTAN CAP	0.730	0.155	1.243	0.566	0.150	1.299	INTAN CAP	0.730	0.155	1.243	0.730	0.155	1.243
ROA	0.122	0.017	-0.249	0.161	0.012	0.166	ROA	0.122	0.017	-0.249	0.122	0.017	-0.249
PPE	0.160	0.020	1.971	0.305	0.046	0.924	PPE	0.160	0.020	1.971	0.160	0.020	1.971
INST	0.623	0.128	-0.889	0.590	0.120	-0.770	INST	0.623	0.128	-0.889	0.623	0.128	-0.889
RET	0.119	0.331	1.290	0.153	0.263	1.487	RET	0.119	0.331	1.290	0.119	0.331	1.290
VOL	0.134	0.006	1.430	0.117	0.005	1.811	VOL	0.134	0.006	1.430	0.134	0.006	1.430
TRADE VOL	0.289	0.036	1.368	0.199	0.023	1.861	TRADE VOL	0.289	0.036	1.368	0.289	0.036	1.368
FILESIZE	0.357	0.021	1.100	0.326	0.021	1.168	FILESIZE	0.357	0.021	1.100	0.357	0.021	1.100

Panel B: DiD analysis with matched sample

VARIABLES	(1) INTAN_LIAB	(2) INTAN_LIAB
Treat× Post	-0.092* [0.051]	
Treat× Pre ⁻³		-0.095 [0.092]
Treat× Pre ⁻²		-0.115 [0.082]
Treat× Pre ⁻¹		-0.088 [0.091]
Treat× Post⁺¹		-0.161* [0.095]
Treat× Post⁺²		-0.172* [0.096]
Treat× Post⁺³		-0.168* [0.092]
Treat× Post⁺⁴		-0.183* [0.099]
Constant	3.702*** [0.744]	3.707*** [0.745]
Other controls	Y	Y
Year FE	Y	Y
Firm FE	Y	Y
Observations	6,646	6,646
Adj. R-squared	0.796	0.797

Notes: Panel A presents covariate balance before and after weighting for the difference-in-differences (DiD) sample. Panel B show entropy balanced difference-in-differences (DiD) regression results examining how the adoption of FAS 123R affected intangible liabilities (INTAN_LIAB) (column 1) and DiD dynamic analysis (column 2). *Treat* is an indicator variable equal to 1 for the treatment firms and 0 for the control states. *Post* is an indicator variable equal to 1 for the post-event period and 0 for the pre-enactment period. *Post⁻⁴* is used as the benchmark year in our dynamic analysis. Clustered (firm-level) robust standard errors are shown in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix A.