

When words meet resources: how financial slack shapes the relevance of innovation disclosure

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Abstract

This paper examines how investors perceive innovation disclosure by focusing on the coherence between firms' strategic innovation narratives and financial disclosure. Prior research consistently shows that disclosure reduces the cost of equity by lowering information asymmetry. Yet recent work demonstrates that not all disclosure is interpreted uniformly, particularly when considering innovation. Building on March's (1991) distinction between exploration and exploitation, prior findings reveal that markets tend to reward exploitation-oriented disclosure, while penalizing exploration. We argue that the relevance of innovation disclosure depends not only on its content but also on its perceived coherence with financial slack, excess resources inferred from firms' balance sheets. Innovation narrative disclosure helps investors connect strategic intentions to fundamentals, but its interpretive value weakens when it conflicts with financial information. We propose that financial slack, plays a central role in shaping this perceived coherence. Rooted in the Behavioral Theory of the Firm, slack has long been identified as a determinant of exploration and exploitation. Different slack types support or constrain different innovation orientations. We conceptualize slack as an information that enables investors to assess whether a disclosed innovation strategy is relevant. Using a panel of S&P 500 firms from 2014-2022 and fixed-effects regressions, we test how slack types moderate the relationship between innovation disclosure and the cost of equity. Results show that congruence between slack and disclosed innovation orientations amplifies the effect of innovation disclosure, whereas incongruence weakens it. This highlights that disclosure relevance fundamentally hinges on the coherence between financial and non-financial messages.

Keywords: Innovation Disclosure; Disclosure relevance; Financial Slack; Coherence; Cost of Equity

1. INTRODUCTION

A well-established body of literature demonstrates that higher-quality corporate disclosure reduces a firm's cost of equity capital. Early empirical work by Botosan (1997) showed that firms providing more extensive voluntary disclosure tend to experience lower equity costs, particularly when analyst coverage is limited. This empirical regularity aligns with theoretical models suggesting that disclosure reduces information asymmetry and estimation risk, thereby lowering the return investors require (Verrecchia, 2001; Easley & O'Hara, 2004; Healy & Palepu, 2001).

Interestingly, Richardson and Welker (2001) findings suggest that disclosure can, in certain contexts, have the opposite effect, increasing rather than decreasing the cost of equity. Building on these early insights, more recent studies have shifted from examining the general quality of disclosure to exploring its nature and content. Researchers increasingly find that not all types of disclosure have the same effects on the cost of equity. While earlier studies emphasized financial disclosure (Botosan, 1997, 2006; Botosan & Plumlee, 2002a, 2002b), subsequent work has broadened the scope to encompass non-financial forms such as corporate social responsibility (Dhaliwal et al., 2011), social disclosure (Richardson & Welker, 2001), intellectual capital (Mangena et al., 2016), environmental practices (Plumlee et al., 2015) in both voluntary and mandatory reporting contexts (Blanco et al., 2015).

In this vein, recent research has started to examine the effect of innovation disclosure on the cost of equity. Matthews et al. (2022), building on March's (1991) distinction between exploration and exploitation, argue that innovation disclosure is not a uniform construct. Exploration involves experimentation, long-term investments, and higher levels of uncertainty and risk, whereas exploitation emphasizes incremental improvements, efficiency, and short-term operational gains (O'Reilly & Tushman, 2013). According to Matthews et al. (2022), innovation disclosure can either be oriented toward exploration, or exploitation, or both simultaneously - reflecting ambidexterity. Financial markets, however, do not respond uniformly to these different orientations. Indeed, Matthews et al. (2022) argue that markets tend to favor exploitation-oriented disclosure, which aligns with investors' preferences for predictability and near-term returns. Conversely, exploration-oriented disclosure is often penalized, as it signals delayed payoffs and heightened uncertainty (Levinthal & March, 1993;

Smith & Tushman, 2005). This asymmetry reflects a broader, well-documented bias in financial markets toward short-termism and outcomes tied to exploitation (Jia, 2017, 2018, 2019).

Previous research has generally regarded disclosure as inherently relevant. According to the Financial Accounting Standards Board (FASB, 1980), relevance refers to information that can influence the decisions made by users of financial statements. The well-established association between disclosure and the cost of equity (Mangena et al., 2016; Botosan, 1997, 2006; Plumlee & Botosan, 2002a, 2002b; Dhaliwal et al., 2011; Richardson & Welker, 2001; Plumlee et al., 2015) provides strong empirical support. In this sense, disclosure is relevant as it directly shapes investors' judgments by reducing information risk, concurrently influencing their decision to buy or sell a firm's shares and ultimately its cost of equity. Disclosure relevance thus lies in its capacity to help investors more accurately evaluate a firm's risk profile and future performance.

However, the extent of such relevance has yet to be taken into consideration. Non-financial disclosure and more particularly its inherent narrative nature plays a crucial interpretive role. Indeed, narrative disclosure helps investors connect a firm's quantitative financial data with its strategic fundamentals (Merkley, 2014). As Merkley (2014) observes, narrative disclosure "bridges the gap" between a firm's financial statements and its underlying business fundamentals. We argue that the extent of a firm's disclosure relevance hinges on the perceived coherence between financial and non-financial information, that is, the extent to which strategic narratives and accounting figures are interpreted as conveying a consistent message about the firm's overall strategy. The relevance of narrative disclosure therefore lies in the perceived quality of the bridge it creates with financial disclosure.

To convey a coherent message, financial disclosure must align with narrative disclosure. Such congruence strengthens the relevance of the narrative. Conversely, when financial and non-financial disclosures are not complementary - or even undermine each other - the message appears incoherent. This incoherence reduces the relevance of non-financial disclosure and weakens investors' confidence. In other words, investors do not take narratives at face value: they also assess whether the firm has the resources to execute or sustain its disclosed strategy.

Although prior studies on disclosure narratives have examined aspects such as tone and connectivity (Bassouny et al., 2022; Wang et al., 2024) - defined as the principle of highlighting and explaining linkages between pieces of information presented within the Strategic Report and the annual report more broadly - few have investigated the relevance of

disclosure nor the coherence between financial and non-financial innovation disclosure. While this coherence between financial and non-financial disclosure has not been explicitly addressed in prior research, it has been implicitly acknowledged through studies examining moderating effects. For example, Mangena et al. (2016) analyzes the role of financial disclosure as a moderator in the relationship between intellectual capital disclosure and the cost of equity, whereas Richardson and Welker (2001) show that financial performance moderates the association between social disclosure and the cost of equity.

Gaining insight into how innovation disclosure affects the cost of equity and shapes its relevance is of particular significance. Innovation disclosure represents a major source of soft information about a firm's innovative endeavors (Li & Zou, 2024) but it also adds interpretive complexity for investors' evaluating corporate strategy and competitive positioning (Merkley, 2014). Moreover, reporting of innovative activities remains largely discretionary, even when formal guidelines exist to encourage greater transparency (Li & Zou, 2024).

Thus, because innovation disclosure is inherently subjective and interpretive, we contend that investors when assimilating disclosure, and more particularly innovation disclosure, use financial signals to contextualize such disclosure. In this vein, investors assess the perceived coherence between innovation narratives and financial indicators. This perceived coherence depends on the degree of congruence between innovation disclosure and financial disclosure. When such congruence is present, investors perceive a more coherent narrative, which enhances the relevance of innovation disclosure and shapes their expectations and investment decisions.

Thus, when analyzing financial information disclosure, it is essential to consider the structure of a firm's assets and the resources it controls. In the context of innovation, particular attention should be given to financial slack, which, although not a disclosure item per se, can be inferred from accounting data and measured through indicators derived from a firm's balance sheet, a form of financial communication. These indicators provide valuable insights into the structure of excess resources, offering a financial lens through which investors can interpret innovation-related narratives. Among financial indicators, financial slack has emerged as a particularly relevant determinant of a firm's innovation orientation, reflecting resources exceeding operational requirements that can be redeployed without disrupting ongoing activities (Geiger & Cashen, 2002).

First conceptualized by the Behavioral Theory of the Firm (Cyert & March, 1963), financial slack has long been recognized as closely intertwined with firms' innovation strategies, shaping

firms' capacity to pursue exploratory or exploitative activities (Mount et al., 2024; Depino Besada, 2025). Subsequent research demonstrates that different types of slack steer firms toward distinct innovation trajectories. While certain forms of slack facilitate exploration-oriented innovation, others are more conducive to exploitation. Additionally, resources that enable one form of innovation simultaneously constrain the other (see Tabesh et al., 2019; Voss et al., 2008; Freitas et al., 2025; Troilo et al., 2014; Luo et al., 2018; Luo et al., 2019). Given the antagonistic relationship between slack type and innovation orientation, it is crucial to examine what slack structure is *congruent* with a firm's disclosed innovation, that is, the extent to which financial slack could potentially support or sustain the implementation of the disclosed innovation strategy.

This approach allows us to better understand the underlying mechanism linking innovation disclosure to the cost of equity, addressing a central question: How do investors price innovation disclosure, and through which mechanisms do this pricing occur?

From a theoretical standpoint, we extend disclosure research by integrating insights from the Behavioral Theory of the Firm (Cyert & March, 1963). Specifically, we conceptualize slack not only as a determinant of a firm's internal innovation decisions but also as a form of interpretive information perceived by investors, an external signal that remains largely underexplored (You et al., 2020). In doing so, we refine our understanding of how disclosure, and more specifically innovation disclosure, is interpreted and priced into the cost of equity, thereby shedding light on the behavioral and informational mechanisms that underpin this relationship. Again, investors do not rely solely on narratives; they also evaluate whether firms *can potentially operationalize* or *sustain* what they disclose. Disclosure relevance is therefore reinforced when words are substantiated by the appropriate resources.

Using a panel dataset of S&P 500 firms from 2014 to 2022 and fixed-effects regression models, we examine how the interaction between slack type and innovation disclosure influences the cost of equity, proxied by the PEG ratio. We examine the degree of congruence between slack and innovation disclosure by assessing how different slack types modify the baseline effect of innovation disclosure on the cost of equity. A reinforcing interaction suggests congruence: investors amplify their initial assessment of the firm's innovation disclosure, indicating that such disclosure becomes more salient, more relevant, in their valuation. Conversely, a weakening interaction signals incongruence: investors discount their initial assessment, thereby reducing the perceived relevance of the firm's innovation disclosure.

The findings support our theoretical expectations revealing that coherent messages stemming from the congruency between the type of slack and the type of innovation disclosure significantly moderates the effect of innovation disclosure on equity costs. Specifically, the initial impact of innovation disclosure on the cost of equity is amplified when it is congruent with the corresponding slack types (coherent message), that is the innovation disclosure becomes more relevant. Conversely, incongruent configurations of slack undermine information coherence, weakening the initial effect of the disclosure innovation type on the cost of equity, that is reduce the relevance of innovation disclosure. Consequently, the relevance of innovation disclosure do hinges on the coherence of the message between financial disclosure and non-financial disclosure and such relevance stems from the congruency between innovation disclosure type and slack type.

The remainder of this paper is structured as follows. Section 2 reviews the theoretical foundations and prior literature on disclosure, innovation, and financial slack positing the baseline hypotheses. Section 3 develops our moderation hypotheses, focusing on the moderating role of slack congruency with innovative disclosure in shaping the coherence and consequently relevance of innovation disclosure. Section 4 outlines the data, variable construction, and empirical methodology, including the text-mining procedures used to capture exploration and exploitation disclosure. Section 5 presents empirical results and discusses their implications. Finally, Section 6 concludes by summarizing the main findings and contributions, outlining theoretical and managerial implications, and suggesting avenues for future research.

2. INNOVATION DISCLOSURE, FINANCIAL SLACK, AND THE COST OF EQUITY

2.1.LINKING FINANCIAL AND INNOVATION DISCLOSURE: TOWARD A COHERENT NARRATIVE OF EXPLORATION AND EXPLOITATION

The cost of equity represents the minimum return investors require to compensate for the risk associated with holding a firm's stock. A key determinant of this cost is information risk, defined as the uncertainty arising from asymmetric or incomplete information about a firm's future performance (Easley & O'Hara, 2004). Crucially, information risk cannot be diversified away, leading investors to demand a premium for bearing it. Consequently, reducing information risk is a fundamental mechanism through which firms can lower their cost of equity (Healy & Palepu, 2001; Hughes et al., 2007; Verrecchia, 2001).

Extensive research suggests that corporate disclosure, encompassing both financial and non-financial information, plays a significant role in shaping a firm's cost of equity capital (Botosan, 1997, 2006; Borghesi et al., 2014; Dhaliwal et al., 2011; Easley & O'Hara, 2004; Hughes et al., 2007; Lambert et al., 2007). Indeed, a substantial body of empirical research has demonstrated that greater disclosure can reduce the cost of equity across a variety of contexts, including disclosures related to corporate social responsibility (Dhaliwal et al., 2011), environmental practices (Plumlee et al., 2015), and the distinction between mandatory and voluntary reporting (Blanco et al., 2015).

Although most of the empirical literature on the link between disclosure and cost of equity has focused on financial disclosure (Botosan, 1997, 2006; Botosan & Plumlee, 2002a, 2002b), the underlying mechanisms are equally applicable to non-financial disclosures such as sustainability, innovation, and social responsibility (Dhaliwal et al., 2011). While many studies have examined innovative outcomes such as new product launches (Lee & Chen, 2009) or proprietary intellectual capital (Baruffaldi & Simeth, 2020; Mangena et al., 2016) far less is known about the disclosure of ongoing innovation processes, which are arguably more informative about a firm's future potential (Tushman et al., 2010; Matthews et al., 2022).

More recently, research has begun to address the role of innovation-related disclosure in shaping the cost of equity. Matthews et al. (2022) emphasizes the importance of disclosing ongoing innovation activities, arguing that such disclosures do more than enhance transparency. Innovation disclosure enables investors to assess a firm's innovation potential early on (Engel & Keilbach, 2007) and to evaluate the firm's ability to sustain long-term investment in innovation streams valued by the market (Andriopoulos & Lewis, 2009). Matthews et al. (2022) introduce the distinction between exploration and exploitation disclosures, that is two different types of innovation disclosures. Matthews et al. (2022) argue that disclosing such innovation types (in isolation or in combination, i.e., ambidexterity) affect investor perceptions and hence the cost of equity differently. While exploration refers to risk-taking, experimentation, and the pursuit of novel, long-term opportunities, exploitation involves incremental improvement, operational efficiency, and leveraging existing capabilities (O'Reilly & Tushman, 2013; Wilden et al., 2018).

More precisely, they argue that disclosing exploration-related activities often leads to an increase in a firm's cost of equity which reflects a long-standing tendency in financial markets to favor short-term, exploitation-focused outcomes (Jia, 2017; 2018; 2019). Accordingly,

investors generally prefer strategies offering predictability, operational efficiency, and immediate returns, i.e. exploitation. Thus, exploration, marked by high uncertainty, delayed payoffs, and departures from established routines, elicits greater market skepticism, particularly among risk-averse investors (Levinthal & March, 1993; Smith & Tushman, 2005). Hence, Matthews et al. (2022) argue that markets tend to reward firms disclosing exploitation while penalizing firms disclosing exploration. While we support the reasoning of Matthews et al. (2022), we wish to clarify at the outset how a firm's disclosure should be interpreted in relation to its impact on the cost of equity.

Framing this dynamic in terms of penalties or rewards oversimplifies what is, at its core, a rational market response to risk, grounded in the foundational risk–return paradigm of finance (Sharpe, 1964). A higher cost of equity does not only signal investor disapproval; rather, it reflects a rational adjustment whereby investors demand higher expected returns to compensate for the estimation risk and strategic uncertainty inherent to exploration. When a firm discloses exploration, it signals that it either intends to pursue, or is already engaged in, exploratory activities, thereby implying greater risk exposure. Accordingly, markets do not necessarily penalize exploration disclosure per se; they simply adjust for the risks embedded in current or anticipated exploration. By contrast, the lower cost of equity associated with exploitation disclosures also reflects the comparatively lower risk profile of strategies aimed at efficiency and incremental improvement.

Keeping these interpretation and complementary theoretical insights in mind, we agree with the reasoning of Matthews et al. (2022) and, starting from Matthews et al.'s assumptions, extend and refine them in the remaining of this section. Hence, we first posit the following baseline hypotheses:

Hypothesis 1: Exploration disclosure has a positive (increasing) effect on the cost of equity capital.

Hypothesis 2: Exploitation disclosure has a negative (decreasing) effect on the cost of equity capital.

2.2.DISCLOSURE RELEVANCE: THE PARTICULAR CONTEXT OF INNOVATION DISCLOSURE

Information is considered relevant when it has the potential to influence information users' decisions (FASB, 1980). In this sense, corporate disclosure is inherently more or less relevant.

Indeed, prior research consistently shows that disclosure directly affects a firm's cost of equity by mitigating information risk (Botosan, 1997, 2006; Borghesi et al., 2014; Dhaliwal et al., 2011; Easley & O'Hara, 2004; Hughes et al., 2007; Lambert et al., 2007).

Accordingly, Diamond and Verrecchia (1991), argue that disclosure reduces information asymmetry and uncertainty. It enhances investors' confidence in both the reliability of the information provided and the firm's future prospects. This increased confidence strengthens demand for the firm's equity, ultimately lowering the required rate of return, its cost of equity.

In contrast, incomplete or ambiguous disclosure intensifies perceived uncertainty and information risk. Investors become more hesitant to hold the firm's shares and require a higher expected return to compensate for the opacity they face. Variations in the cost of equity thus reflect not only the level of transparency or opacity but also the nature and implications of the information disclosed. In other words, disclosure shapes how investors evaluate the firm's risk profile and future performance, influencing their decisions to buy, hold, or sell, i.e., shapes their investment decisions. Disclosure relevance therefore resides in its capacity to support investors in forming more accurate assessments of a firm's prospects.

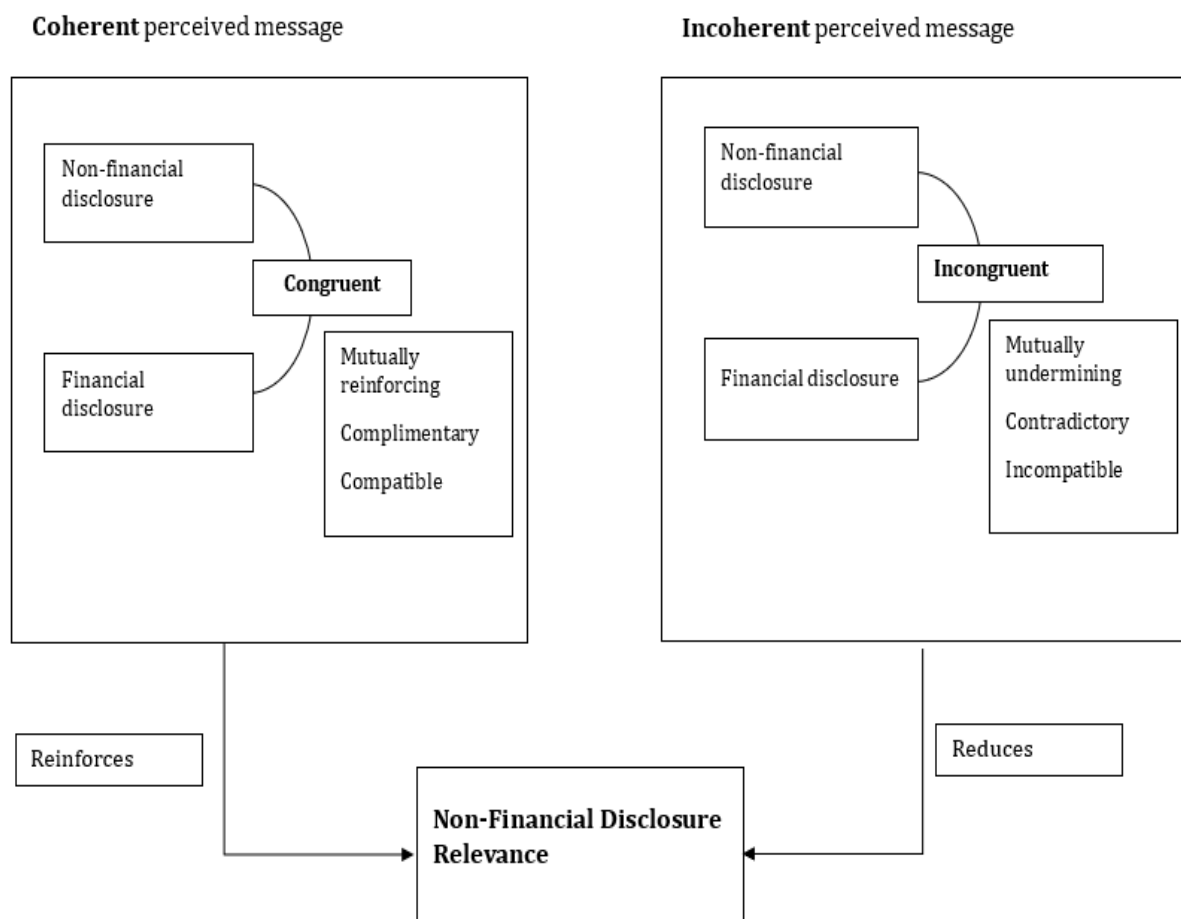
In line with this reasoning, narrative disclosure plays a key interpretive role in helping investors connect quantitative financial information to the firm's underlying fundamentals. As Merkley (2014, p. 1) notes, such disclosure can “*bridge the gap between a firm's financial statement numbers and its underlying business fundamentals.*” Accordingly, Merkley shows that when managers disclose R&D information for informative purposes, these narratives shape investors' perceptions of the firm by clarifying the meaning behind financial figures. In this view, congruent financial figures enhance narrative disclosure relevance by acting as a bridge that links financial data to the broader context it represents.

Building on this view, we argue that the relevance of disclosure depends on the quality of the bridge it creates between financial information and the firm's underlying fundamentals. Investors do not take disclosure at face value, particularly in the context of innovation disclosure. They first assess whether the firm possesses the resources necessary to potentially operationalize or sustain the disclosed strategy, that is, whether *congruence* exists between what is communicated and what could be implemented. When such congruence is observed, the firm's message appears internally consistent: financial evidence supports the disclosed strategy. In these cases, investors perceive the narrative disclosure as coherent and consequently as more

relevant, reinforcing the judgments they initially form about the disclosure. Conversely, when financial and non-financial disclosures diverge, when the firm lacks the appropriate resources, contradicting the disclosed strategy, the bridge between financial and non-financial disclosure weakens, revealing *incongruence*. This in turn leads to perceived incoherence reducing the informational relevance of the disclosure. Investors thus reassess and weaken their initial judgments, reducing the degree of relevance of the firm's disclosure.

Figure 1 summarizes the proposed argument.

Figure 1: Coherence and incoherence between financial and non-financial disclosures, and the relevance of non-financial information disclosures



While prior studies have examined the consistency of tone within narrative disclosure (Bassyouny et al., 2022) - calling for further investigation into the coherence of tones across different disclosure channels - little attention has been paid to the coherence between financial

and non-financial disclosure. This gap is surprising given that disclosure is intended to bridge these two dimensions (Merkley, 2014). Recent accounting research moves in this direction: Wang et al. (2024) show that strategic reporting - a concise and strategically focused report within the annual report - by enhancing connectivity – defined as the principle of highlighting and explaining linkages between pieces of information presented within the Strategic Report and the annual report more broadly - between financial and non-financial information, is associated with greater liquidity and a lower cost of equity, suggesting that such a connected reporting framework enables more effective capital-market communication. Although focused on structural reporting design, their findings support our argument that investors take into consideration the coherence between different information types, financial and non-financial.

While this question has not been explicitly examined in prior research, a few studies in the disclosure literature point in this direction. Indeed, some research has examined how financial information, and more particularly financial disclosure and financial performance, interacts with particular forms of non-financial disclosure. For instance, Mangena et al. (2016) analyzes the interplay between intellectual capital disclosure - defined as the communication of a firm's knowledge, expertise, relationships, and technological capacities that provide competitive advantage - and financial disclosure. Although not tied to a specific accounting measure, their results show that intellectual capital disclosure alone reduces the cost of equity capital, and that its combination with financial disclosure further amplifies this reduction. This suggests again that investors jointly assess both forms of disclosure, interpreting their coherence and congruence as providing additional informational value. Similarly, Richardson and Welker (2001) examine social disclosure, information about firms' socially responsible activities, and find that, while such disclosure is generally associated with a higher cost of equity capital, firms with above-average financial performance experience a smaller increase. In this case, strong financial results appear to mitigate the perceived risk associated with social disclosure, reassuring investors that the firm can sustain both its operational and social commitments. Together, these findings suggest, again, that investors form a sense of coherence based on the congruence between financial and non-financial information. The specific financial indicators that reinforce or weaken congruence, however, are likely to differ according to the nature of the non-financial disclosure.

Despite these insights, the coherence between innovation disclosure and financial disclosure remains largely unexplored. This gap is particularly salient given that innovation disclosure

constitutes a key form of soft information about firms' innovation activities (Li & Zou, 2024), often adding complexity to how investors assess a firm's strategy and competitiveness (Merkley, 2014). Additionally, innovation disclosure remains largely voluntary and discretionary, even when framed by reporting guidelines (Li & Zou, 2024). We argue that the ambiguous and interpretive nature of innovation disclosure makes investors more likely to refine their judgments by integrating financial information. By doing so, investors evaluate the degree of consistency between financial and non-financial information. When they perceive these disclosures as coherent, the relevance of strategic information increases, meaning that investors are more likely to incorporate its content into their assessments of the firm's future performance and value.

In assessing the coherence of innovation disclosures, and, by extension, the relevance of such disclosures for investors, our analysis turns to a particular form of financial information: slack-related indicators. This choice is theoretically grounded. Slack not only enables firms to undertake exploratory or exploitative initiatives but also shapes the scope and intensity of such innovation efforts (Freitas et al., 2025). As such, it constitutes a lens through which investors can evaluate whether a firm's stated innovation orientation aligns with its underlying capacity to pursue it.

Focusing on slack is especially appropriate in the context of exploration and exploitation disclosures. These two forms of innovation orientation differ markedly in their resource requirements: exploration demands flexible, risk-tolerant (March, 1991) and often substantial slack (Troilo et al., 2014), whereas exploitation can be sustained with more structured and absorbed forms of slack (Luo et al., 2019; Luo et al., 2018). Consequently, when investors interpret innovation disclosures, they are likely to cross-check them against the firm's level and type of slack to assess the firm's potential to sustain or operationalize what they claim in the context of innovation. Congruence between stated innovation intentions and the right slack type, sends a coherent message strengthening the perceived relevance of disclosure. Indeed, it signals that the firm possesses the necessary and appropriate means to deliver on its claims.

Financial slack is widely recognized as a core determinant of firms' innovation trajectories, shaping whether firms engage in exploration or refine existing competencies, i.e., exploitation (Freitas et al., 2025; Depino Besada, 2025). Given this central role, slack provides an analytically powerful and theoretically consistent concept for evaluating the congruence between what firms disclose about innovation and what they are structurally capable of

implementing or sustaining. In other words, slack is a critical concept for understanding how investors interpret the relevance of exploration and exploitation disclosures.

The following section provides a brief review of the literature on the relationship between financial slack and innovation to highlight its crucial role in shaping innovation outcomes.

2.3.THE STRATEGIC ROLE OF FINANCIAL SLACK FOR INNOVATION

The notion of organizational slack has historically been defined in broad terms, encompassing financial, human, and physical resources that exceed the minimum required for operations (Cyert & March, 1963; Bourgeois, 1981). However, in empirical research, this construct has been predominantly operationalized through financial indicators—such as cash holdings, current ratios, quick ratios, selling and general administrative expenses, or leverage—which capture a firm’s liquidity and financial flexibility rather than its broader organizational resources (Depino Besada, 2025). To ensure conceptual clarity and consistency with our focus, we adopt a financial view of slack, defined as the financial resources exceeding those required for ongoing operations that can be redeployed without disrupting current activities (Geiger & Cashen, 2002)¹.

Hu et al. (2023) argues that slack has a positive effect on exploration and a negative effect on exploitation. Indeed, when slack is abundant, managers are more inclined to engage in exploratory strategies that require substantial investment in seeking new opportunities and developing novel products or technologies - activities that are inherently risky due to the uncertainty of their eventual outcomes (Greve, 2003). Such resource surpluses ease both structural and cognitive constraints for managers and employees, fostering creativity and promoting diverse search behaviors in the pursuit of high-risk or untested strategic directions (Hu et al., 2023). Greater slack availability also strengthens a firm’s ability to finance R&D initiatives by influencing decisions about which projects to pursue (Greve, 2007). By acting as a cushion against potential losses, slack resources make it more feasible for firms to undertake R&D projects aimed at exploratory innovation (Hu et al., 2023).

Exploitative innovation focuses on low-risk initiatives that deliver predictable outcomes, such as enhancing efficiency or reducing production costs. It aligns more closely with conservative

¹ Although Geiger and Cashen (2002) refer broadly to “resources” in their definition of slack, their empirical measurement relies exclusively on financial indicators. In practice, their operationalization therefore corresponds to financial slack rather than to organizational resources in a broader sense.

strategies (Nielsen et al., 2018; Hu et al., 2023). High levels of slack often steer firms toward more risk-taking approaches, which can inadvertently constrain their engagement in exploitative innovation. Because resources and managerial attention are finite, a greater commitment to high-risk initiatives typically leaves less scope for risk-averse activities. Consequently, firms with abundant slack are generally more inclined toward risk-taking, which can dampen investment in efficiency-driven innovation. Conversely, when slack resources are scarce, organizations tend to concentrate on established areas of expertise to meet short-term demands and leverage existing capabilities (Hu et al., 2023).

However, slack is far from a monolithic concept. Bourgeois and Singh (1983) identify three distinct categories: available slack, recoverable slack, and potential slack. Available slack refers to liquid resources not yet committed to ongoing operations, thereby offering immediate flexibility for strategic initiatives. Recoverable slack consists of resources already absorbed into operations - such as excess inventory, redundant personnel, or underutilized capacity - that can be redeployed to alternative uses if needed. Potential slack refers to the firm's capacity to mobilize additional resources from external sources, for instance through new debt or equity issuance (Bourgeois & Singh, 1983, p.43). We do not retain potential slack in our analysis, as it raises significant endogeneity concerns: it is closely tied to the firm's capacity to raise external financing, particularly debt, which maintains a non-recursive relationship with the cost of equity. To ensure conceptual precision and methodological consistency, we therefore adopt Singh's (1986) typology of slack, which excludes potential slack and focuses on two categories: absorbed slack and unabsorbed slack. Absorbed slack refers to excess costs already embedded in the organization's operations, that is, surplus and idle costs that can be recuperated and reallocated to other activities (Voss et al., 2008). In contrast, unabsorbed slack, refers to excess liquid resources not yet deployed in activities (Mount et al., 2024; Freitas et al., 2025). Accordingly, we refer throughout this study to absorbed and unabsorbed slack.

Troilo et al. (2014) argue that unabsorbed slack supports radical innovation, a form of exploration (Benner & Tushman, 2002, 2003). Similarly, Lu and Wong (2019) find that unabsorbed slack increases a firm's share of exploration activities. Tabesh et al. (2019) emphasize that unabsorbed slack provides managers with the flexibility to invest in technological initiatives (Bourgeois, 1981; Singh, 1986). In this vein, unabsorbed slack relaxes both structural and psychological constraints, fostering creative behavior and encouraging the pursuit of diverse, high-risk, or novel strategies (Bourgeois, 1981; Tabesh et al., 2019). Mishina

et al. (2004) further show that unused resources enable firms to seize emerging opportunities for growth. However, when unabsorbed slack is low, firms tend to avoid exploration and instead emphasize exploitation (George, 2005; Tabesh et al., 2019). As Voss et al. (2008) observe, limited unabsorbed slack is insufficient to sustain meaningful progress in exploration projects. Indeed low unabsorbed slack makes exploitative activities more appealing to managers (Tabesh et al., 2019). In sum, unabsorbed slack spurs exploration (Freitas et al., 2025) at the detriment of exploitation.

By contrast, the literature indicates that absorbed slack, resources already embedded within the organization, primarily supports exploitative rather than exploratory activities, encouraging incremental forms of innovation (Greve, 2007; Freitas et al., 2025). These resources are generally less flexible than unabsorbed slack and are harder to repurpose for alternative uses (Bourgeois, 1981; Tan & Peng, 2003). Firms may therefore engage in initiatives such as reducing administrative expenses or reallocating personnel to optimize the use of these embedded resources (Bourgeois, 1981; Bourgeois & Singh, 1983; Freitas et al., 2025) which are exploitation driven actions.

According to Luo et al. (2019) absorbed slack can be redirected to support efficiency-improving activities but, because these resources must first be released before being redeployed, absorbed slack tends to constrain exploration. Indeed, firms are encouraged to use absorbed slack for exploitation activities such as refining current technologies, products or markets (Chen et al., 2013; Luo et al., 2018). The structural limits of absorbed slack make the implementation of expansive innovative strategies difficult and pushes firms to focus on extracting short term gains through exploitation (Voss et al., 2008). Since exploration needs fast and flexible use of resources, absorbed slack hinders this process (Luo et al., 2018). Absorbed slack limited adaptability slows the integration of such resources, making it poorly suited to the demands of exploratory initiatives (Luo et al., 2019). Voss et al. (2008) also finds that absorbed slack increases exploitation and decreases exploration; Showing a detrimental impact of absorbed slack on exploration. Therefore, firms should not rely on absorbed slack for exploration (Luo et al., 2018). Overall, absorbed slack supports exploitation but does not help, and may even hurt, exploration efforts.

In addition to shaping internal innovation decisions, slack resources also function as signals to external stakeholders. Since slack influences both exploration and exploitation, it not only enhances a firm's innovation capacity but also conveys messages to the market. For

competitors, cash holdings, a part of unabsorbed slack, can signal the firm's potential to innovate, deterring rival investment in similar domains (Lyandres & Palazzo, 2016). This highlights that slack is not just internally allocated but also externally observed and interpreted.

Given that different forms of slack push firms in opposite strategic directions - unabsorbed slack fosters exploration while discouraging exploitation and absorbed slack supports exploitation while limiting exploration - the notion of congruence becomes central to our analysis. In our framework, investors assess not only the content of innovation disclosure but also its congruence with the firm's underlying resource conditions. When financial disclosure (slack) and non-financial disclosure (innovation orientation) are congruent, investors are more likely to interpret the message as coherent, thereby increasing the perceived relevance of innovation disclosure. Conversely, incongruence between these two forms of information may introduce ambiguity or doubt, reducing the extent to which investors incorporate strategic disclosure into their expectations.

The next section develops this idea in detail. We define what constitutes a congruent versus incongruent configuration between slack types and innovation orientations, and we theorize how different forms of slack may reinforce, or undermine, the relevance of exploration and exploitation disclosures. This leads to a set of hypotheses specifying how each slack type interacts with each innovation orientation to shape investors' interpretations.

2.4. HYPOTHESES OF MODERATION DEVELOPMENT

When a firm discloses an exploratory orientation while holding high levels of unabsorbed slack, such disclosure becomes more relevant. These liquid and flexible resources reinforce a firm's propensity but also capacity to engage in exploratory activities (Troilo et al., 2014; Tabesh et al., 2019). This enhanced propensity and capacity, in turn, strengthens investors' perceptions of the firm's ability to pursue high-risk, uncertain activities. In such cases, unabsorbed slack strengthens the coherence of exploration disclosure by confirming that the firm possesses the financial flexibility to sustain risky exploration innovation projects, that is, unabsorbed slack is congruent with exploration disclosure. Investors therefore fully incorporate the associated uncertainty and long-term risk into their valuation of the firm.

Unabsorbed slack, by being congruent with exploration, reinforces the perceived coherence of exploration-oriented disclosure, thereby increasing its perceived relevance. Consequently,

when firms possess unabsorbed slack, investors' initial judgments regarding exploration disclosure are strengthened, i.e., the positive effect of exploration on the cost of equity is further reinforced. Accordingly, we propose the following hypothesis:

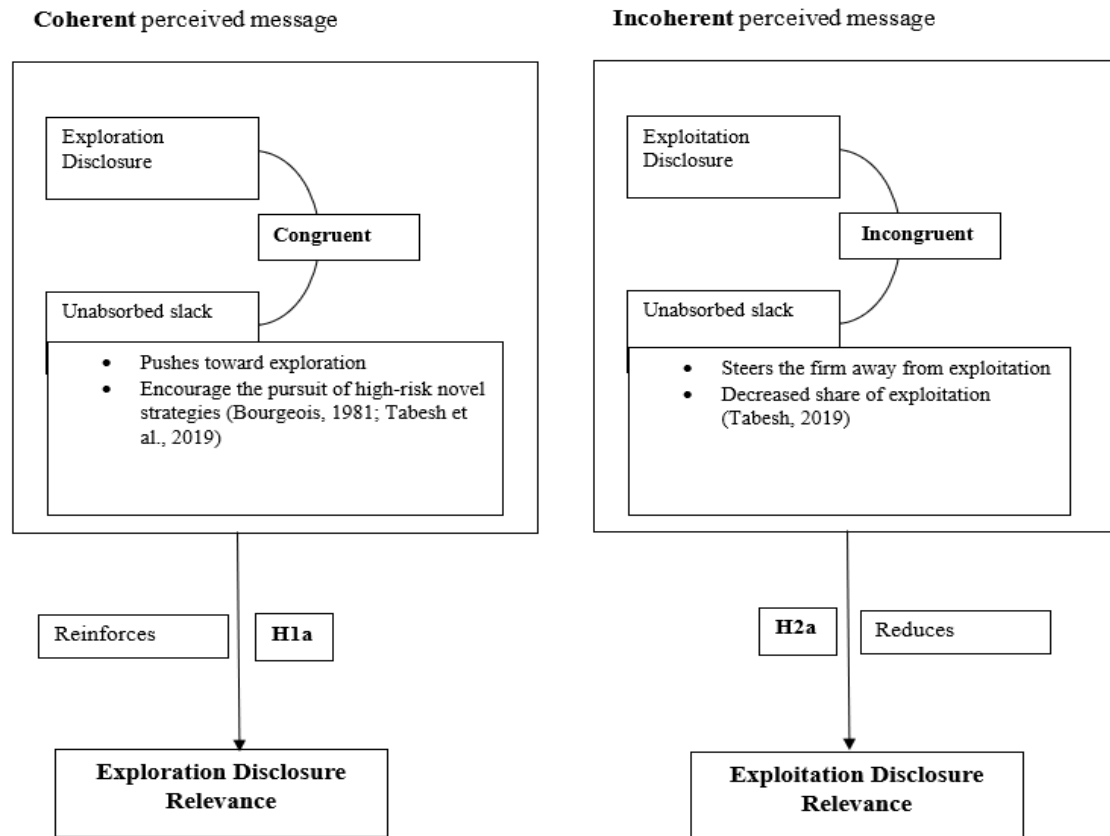
Hypothesis 1a: Unabsorbed slack strengthens the positive relationship between exploration and the cost of equity.

Inversely, disclosing exploitation in the presence of unabsorbed slack is incongruent - since unabsorbed slack tends to steer firms away from exploitation and toward exploration (Tabesh et al., 2019). Unabsorbed slack, by being incongruent with exploitation, makes the message conveyed by exploitation disclosure incoherent. This incoherence reduces the perceived relevance of exploitation disclosure and weakens investors' initial judgments of such disclosure, i.e., weakens the negative relationship between exploitation disclosure and the cost of equity. We therefore propose the following hypothesis:

Hypothesis 2a: Unabsorbed slack weakens the negative relationship between exploitation and the cost of equity.

The following figure (Figure 2) summarizes how unabsorbed slack shapes the congruence, perceived coherence, and relevance of exploration and exploitation disclosure.

Figure 2: Coherence and incoherence between unabsorbed slack and innovation disclosure, the relevance of innovation disclosure



Symmetrically, just as unabsorbed slack is incongruent with exploitation disclosure, absorbed slack is incongruent with exploration disclosure. Absorbed slack, by nature directs firms away from exploration and toward exploitation (Tabesh et al., 2019; Voss et al., 2008; Luo et al., 2018; Luo et al., 2019). Absorbed slack, by being incongruent with exploration, makes the message conveyed by exploration disclosure incoherent. This incoherence reduces the perceived relevance of exploration disclosure, i.e., weakens investors' initial judgements of such disclosure; The positive relationship between exploration disclosure and the cost of equity is weakened. We therefore propose the following hypothesis:

Hypothesis 1b: Absorbed slack weakens the positive relationship between exploration and the cost of equity.

Lastly, disclosing an exploitation strategy alongside absorbed slack creates a consistent signal, as these resources are embedded in existing operations and support efficiency-oriented goals (Luo et al., 2019). The perceived risk of exploitation is further decreased as exploiting is efficiency driven and in line with reducing absorbed slack. Reducing and redeploying absorbed

slack inherently reflects an exploitative behavior, as it involves reallocating resources embedded in ongoing operations. Thus, the very presence of absorbed slack signals that the firm is oriented toward exploitation, further reinforcing the relevance of exploitation disclosures.

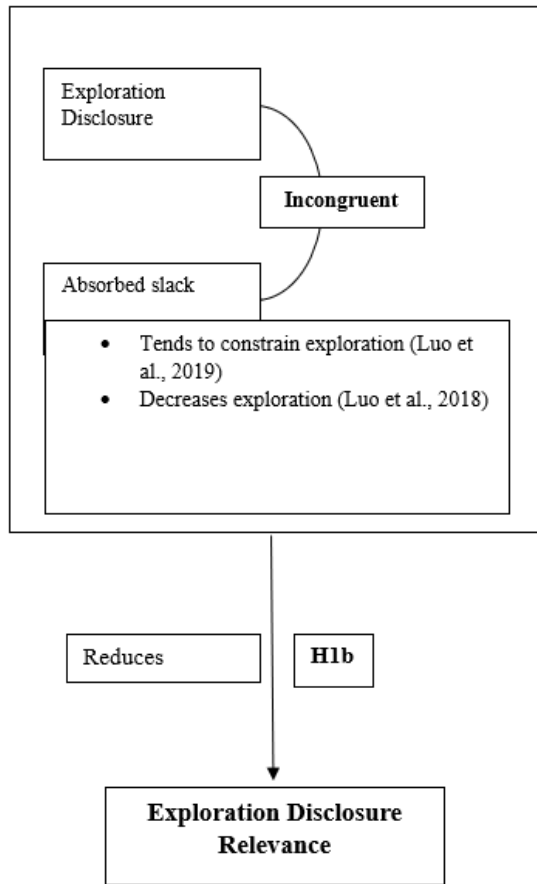
Absorbed slack, by being congruent with exploitation, reinforces the perceived coherence of exploitation-oriented disclosure, thereby increasing its perceived relevance. Consequently, when firms possess absorbed slack, investors' initial judgments regarding exploitation disclosure are strengthened. Accordingly, we propose the following hypothesis:

Hypothesis 2b: Absorbed slack strengthens the negative relationship between exploitation and the cost of equity.

The following figure (Figure 3) summarizes how absorbed slack shapes the congruence, perceived coherence, and relevance of exploration and exploitation disclosure. Figure 4 summarizes the different hypotheses posited in this section translating the theoretical implications into testable hypotheses.

Figure 3: Coherence and incoherence between absorbed slack and innovation disclosure, the relevance of innovation disclosure

Incoherent perceived message



Coherent perceived message

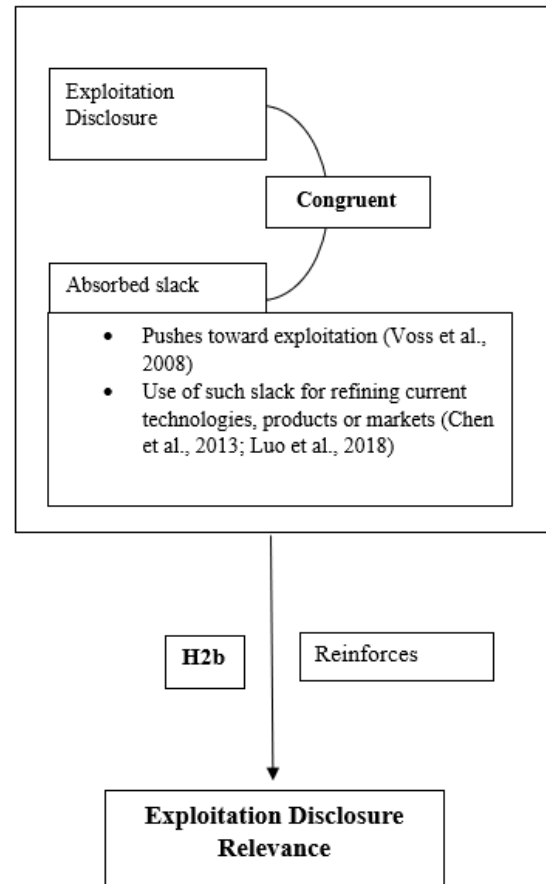
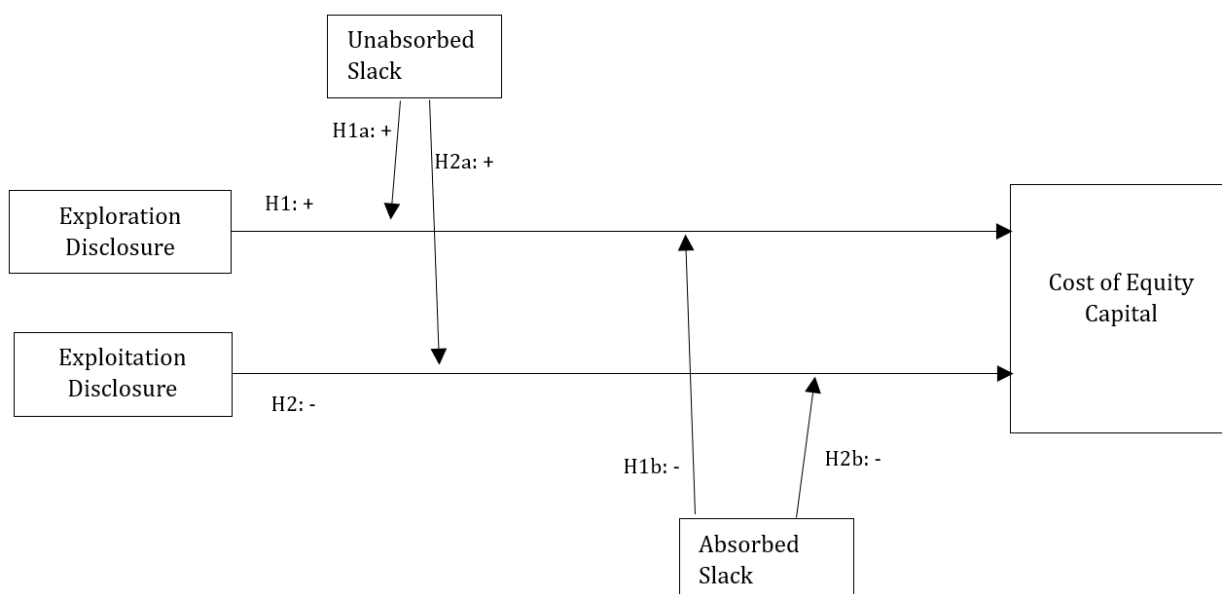


Figure 4: Model of the Moderating Role of Financial Slack in the Relationship Between Innovation Disclosure and Cost of Equity Capital



3. DATA AND VARIABLES

3.1. DATA SOURCES AND SAMPLE

Our sample follows the firms included in the 2025 snapshot of the S&P 500 backward over time to 2014. Our dataset combines financial and textual information to examine how financial slack moderates the relationship between firms' innovation disclosure and a firm's cost of equity between 2014 and 2022. Firm-level financial data were obtained from the Capital IQ database.

Our sample reflects the historical behavior of firms that remained constituents of the S&P 500 as of 2025, rather than the evolving composition of the index over time. While this retrospective design may introduce survivorship bias by excluding firms that exited the index before 2025, it ensures consistency in firm identifiers and disclosure histories. Given our focus on the relationship between innovation disclosure and the cost of equity among large, continuously listed firms, we consider this trade-off as appropriate. We chose to rely on this 2025 composition and exclude firms that entered the index after 2022 to ensure temporal consistency across the

sample. These data are used to construct the dependent, explanatory, and control variables employed in the regression analyses.

Although the S&P 500 index officially comprises 500 firms, some companies issue multiple share classes (e.g., Alphabet’s GOOG and GOOGL), which can increase the number of listed tickers beyond 500; For instance, there were 503 tickers in 2022. To prevent double counting, we retain only one share class per firm (typically the Class A shares), resulting in a final sample of 490 unique firms (e.g., GOOGL, BRK.A...), after taking out firms that were introduced after 2022 in the index.

Regarding the measure of innovation disclosure, we implemented a web-scraping procedure to collect the full texts of annual reports (Form 10-K) filed by S&P 500 firms between 2014 and 2022, retrieved directly from the SEC EDGAR database. This process enabled the construction of a longitudinal textual panel that captures firms’ innovation disclosure over time across the entire index.

The composition of the S&P 500 is not static, as firms are regularly added or removed from the index. As a result, the completeness of our dataset varies by year: earlier years (e.g., 2014) contain fewer firms that were part of the S&P 500 in 2025, whereas later years (e.g., 2022) are more comprehensive. Table 1 reports the annual completeness ratio for our unbalanced panel, defined as the proportion of available data ($1 - \text{missing ratio}$) across all variables. Data completeness improves steadily over time, from 54.2% in 2014 to 92.7% in 2022, reflecting the progressive coverage of both financial and textual dimensions in the dataset.

Table 1: Data completeness by year

The table reports, for each year from 2014 to 2023, variables, and completeness ratio.

The completeness ratio represents the proportion of available data ($1 - \text{missing ratio}$).

Year	Variables	Completeness
2014	26	0.542
2015	26	0.684
2016	26	0.732
2017	26	0.770
2018	26	0.791
2019	26	0.840
2020	26	0.858
2021	26	0.888
2022	26	0.924

3.2. MEASURE OF EXPLORATION AND EXPLOITATION DISCLOSURE

To identify innovation-related disclosures, we employ a computer-aided text analysis (CATA) method. More specifically, we apply a dictionary-based CATA (Computer-Aided Text Analysis) approach to 10-K reports, weighted by the lexical rarity of terms calculated separately for the exploratory and exploitative categories.

CATA enables the transformation of qualitative textual content into quantitative indicators by systematically counting the occurrence of selected terms. This approach builds on the idea that the frequency and distribution of specific words can act as proxies for strategic themes (Duriau et al., 2007; Heyden et al., 2015). Compared to manual coding, it offers greater consistency and scalability, while remaining anchored in theory (Belderbos et al., 2017).

We focus on exploration and exploitation language in 10-K filings and use a validated dictionary developed by Ugur et al. (2024), which clearly differentiates between these two strategic orientations. Exploration-related terms include *discovery*, *search*, *patent*, and *trademark*, whereas exploitation-related terms include *improve*, *standard*, *existing*, and *control*.

Ugur et al. (2024) conducted extensive validation of their dictionary through Key Word In Context (KWIC) analysis, sampling validity, content validity, and discriminant validity to ensure the dictionaries robustness. We analyze the same type of documents² (10-K filings), obtained from the same source (the SEC EDGAR database), and within the same institutional context (publicly listed U.S. firms). We therefore consider the original validation to be transferable to our setting.

We go beyond Ugur et al. (2024) by applying a term frequency–inverse document frequency (TF–IDF) weighting scheme, which allows us to capture not only the presence of exploration or exploitation-related terms but also their relative salience across firms’ disclosures. This

² Ugur et al. (2024) first validate their dictionary using unstructured textual data from news articles and subsequently, in a supplementary analysis, confirm its robustness on structured texts, namely 10-K reports extracted from SEC EDGAR.

refinement enhances the discriminatory power of textual measures and mitigates potential biases arising from differences in document length or verbosity.

- (1) **Term Frequency (TF):** For each 10-K report, we first compute the frequency of exploration or exploitation-related words by counting how many times each dictionary term appears in the document. We then normalize this count by the total number of words in the 10-K report to prevent longer filings from mechanically receiving higher scores.
- (2) **Document Frequency (DF):** Next, we measure how often each term appears across all documents in the corpus. For example, if a given word appears in two out of one thousand filings, its document frequency (DF) equals two.
- (3) **Inverse Document Frequency (IDF):** We then compute the inverse document frequency, which captures how rare a word is across the entire corpus. Formally,

$$\text{IDF}(w) = \ln \left(\frac{N}{\text{DF}(w)} \right)$$

where N is the total number of documents and $\text{DF}(w)$ is the number of documents containing word w . For example, a very common word such as “company,” which appears in all documents ($\text{DF} = N$), yields an IDF close to $(\ln (N/N) =) 0$. Conversely, a rarer term, for example, “blockchain,” present in only one out of one thousand documents, produces a higher IDF value $(\ln (1000/1) = 1.099)$.

- (4) **TF-IDF Weight:** Finally, the TF-IDF value for each word is obtained by multiplying its term frequency (TF) by its inverse document frequency (IDF) ($\text{TF-IDF} = \text{TF} \times \text{IDF}$). This composite measure increases when a word is frequent in a specific document but uncommon across the corpus, thereby emphasizing words that are distinctive to a firm’s disclosure.

Following a straightforward approach, Matthews et al. (2022) used Term Frequency (TF) to indicate whether and how frequently a term occurred in a document. On its own, however, TF provides limited discriminatory power, because it assigns the same importance to all terms, it

cannot reliably distinguish between relevant and irrelevant texts. Common words that appear frequently in many documents (such as “company,” “product,” or “market”) may therefore dominate the analysis, even though they carry little semantic value. To address this limitation, the Inverse Document Frequency (IDF) component is introduced to account for how terms are distributed across an entire corpus (Lan et al., 2009). The IDF metric builds on the concept of Document Frequency (DF) and relies on the assumption that words occurring in many different documents carry less informational value than those appearing in only a few (Sabbah et al., 2017). Today, the combined TF-IDF weighting scheme is the most widely applied approach, as it assumes that rarer terms across the corpus convey greater importance for distinguishing a document’s content (Sabbah et al., 2017).

In the context of this research, TF-IDF is particularly relevant because it provides a lexical footprint of the narrative textual disclosures: it emphasizes the unique, meaningful terms that differentiate one firm’s communication from another’s, rather than the generic vocabulary common to all corporate reports.

While TF-IDF is not commonly used in management research, it is widely employed in computational linguistics and language analysis. Our use of this method stems from empirical observations. Specifically, we used the *wordfreq* Python package to examine the baseline frequency of words from Ugur et al.’s (2024) dictionary in the English language. This analysis revealed a significant asymmetry: exploitation-related words (e.g., improve, standard, existing, control) appear far more frequently in everyday English than exploration-related terms (e.g., discovery, search, patent, trademark).

This finding raises concerns for studies that rely purely on term frequency to score textual disclosures, as is common in the literature. A higher exploitation score may simply reflect the natural frequency bias in English usage, rather than a firm’s true strategic intent. Importantly, while the exploitation terms do indeed signal exploitative strategies per Ugur et al. (2024), their widespread use in English could inflate exploitation scores artificially.

In contrast, exploration terms are less commonly used in everyday language, so their appearance in disclosures may be a stronger indicator of deliberate strategic intent. To address this asymmetry, we separate the dictionary into exploration and exploitation subsets and compute TF-IDF scores independently for each dictionary separately. This allows us to control general language frequency and better capture the intentional use of each word group in firm disclosures.

3.3.MEASURE OF THE COST OF EQUITY

The cost of equity capital represents the minimum return that equity investors expect to compensate for the risk of holding a company's shares. Since it is not directly observable in financial markets, researchers often rely on proxies based on analysts' earnings forecasts, commonly referred to as implied cost of equity capital (Botosan, 2006). It's a forward-looking approach, widely recognized for its ability to capture variations in expected returns across firms (Pástor, Sinha, & Swaminathan, 2008), making it a relevant tool for empirical studies.

Among the various models proposed in the literature to estimate implied cost of equity, we adopt the price-earnings growth (PEG) model introduced by Easton (2004). This method is extensively used in academic research due to its simplicity and ease of interpretation (Botosan, 2006). We do not detail the construction logic of these measures here; instead, we direct readers to the original article for a full explanation (see Easton, 2004). Empirical evidence suggests that PEG-based estimates are consistently related to risk factors in a theoretically coherent way (Botosan & Plumlee, 2005; Easton & Monahan, 2005; Botosan, Plumlee, & Wen, 2011; Matthews et al., 2022). Furthermore, alternative implied cost of equity estimates, such as the abnormal earnings growth (AEG) model proposed by Ohlson and Juettner-Nauroth (2005) and by Gode and Mohanram (2003), as well as the modified price-earnings-growth (MPEG) model introduced by Easton (2004), share strong conceptual similarities with the PEG approach and are generally found to be positively correlated with it (Botosan & Plumlee, 2005; Matthews et al., 2022).

The PEG model computes the implied cost of equity as follows:

$$PEG = \sqrt{[(EPS2 - EPS1) \div P0]}$$

where: EPS2 is the two-year ahead consensus forecast of earnings per share, EPS1 is the one-year ahead forecast, P0 is the share price at the end of the fiscal year.

For example, to compute the PEG for 2022, we take the square root of the difference between the predicted earnings per share (EPS) for 2024 and that for 2023, then divide this result by the share price at the end of 2022.

However, this model assumes that future earnings are growing (i.e., $EPS2 > EPS1$), which is not always observed in practice. To address this limitation, we also employ the modified PEG

model (MPEG) as suggested by Easton (2004), which adjusts for cases where earnings growth is negative or stagnant, thus providing a useful robustness check.

To compute the modified price-earnings growth (MPEG) estimate of the implied cost of equity capital, we follow the formulation proposed by Easton (2004). The model adjusts the traditional PEG formula by incorporating expected dividend payments, thereby offering a more flexible alternative when earnings growth is low, negative, or volatile.

The MPEG cost of equity is calculated as follows:

$$MPEG = A + \sqrt{A^2 + [(EPS2 - EPS1) \div P0]}$$

With

$$A = \frac{DPS1}{2P0}$$

where DPS1 is the expected dividend per share for the next fiscal year, P0 is the firm's stock price at fiscal year-end. EPS 1 and EPS 2 are the same then the PEG (i.e., one year ahead predicted earning per share and two years ahead predicted earning per share). This version of the model incorporates anticipated dividend distributions through term A, which helps account for expected cash flows in addition to earnings growth. The inclusion of this adjustment makes MPEG particularly useful for firms with low or declining earnings trajectories, as it partially avoids the restrictive assumption that $EPS2 > EPS1$ required by the standard PEG model.

3.4.SLACK AND CONTROL VARIABLES

Slack variables

We measure unabsorbed slack as the ratio of working capital to sales (Bourgeois & Singh, 1983; Bromiley, 1991; Geiger & Cashen, 2002; Marlin & Geiger, 2015; Luo et al., 2016). Working capital is computed as current assets minus current liabilities. Working capital includes items such as accounts receivable and inventories, which are considered easily redeployable resources because they represent short-term, liquid assets. Accordingly, a high level of working capital relative to sales reflects an abundance of financial resources that can be quickly mobilized and that exceed the firm's immediate operational needs.

By contrast, absorbed slack is more difficult to redeploy as it is considered as embedded in the firm's operations. It is captured by selling, general and administrative (SG&A) expenses divided by sales (Tabesh et al., 2019). These expenditures reflect resources already committed

to ongoing organizational routines but that could be reduced or recovered if necessary. This measure is often used in research measuring absorbed slack (for example: Marlin & Geiger, 2015; Luo et al., 2016; Tan & Peng, 2003). Absorbed slack is thus much less flexible and available than unabsorbed slack.

Control variables

Firm size is measured as the natural logarithm of the book value of total assets reported by the firm in a given year. The ROA is the ratio of return to total assets; it measures the firm's economic performance by relating its economic result to an approximation of its economic assets. To obtain a more stable estimate of systematic risk and reduce the impact of short-term volatility in market returns, we compute a two-year average of the firm's beta, e.g., the 2014 beta value reflects the average of betas computed for 2013 and 2014. Both ROA and beta are directly extracted from Capital IQ. Leverage is defined as the ratio of total debt to total assets, while the book-to-market ratio is calculated as the book value of equity divided by market capitalization at the end of the fiscal year. We measure the variable LogRD.Expend/Sales as the natural logarithm of R&D intensity (R&D expenses/ sales) as per Matthews et al. (2022). All explanatory and control variables are lagged by one year and standardized (z-scores).

3.5. EMPIRICAL MODEL

To investigate how firms' strategic disclosures influence their cost of equity capital, and more particularly how this relationship is moderated by financial slack, we estimate a panel regression model with firm and year fixed effects.

Panel data models offer several advantages compared to cross-sectional or time-series analyses. They allow for the control of unobserved heterogeneity by exploiting both the cross-sectional (between firms) and longitudinal (within firm) dimensions of the data. This dual structure increases the efficiency of the estimates and mitigates the risk of omitted variable bias by accounting for unobserved characteristics that are constant over time but vary across firms (Baltagi, 2005).

A random-effects model assumes that unobserved firm-specific effects are uncorrelated with the explanatory variables, an assumption that is often violated in corporate disclosure studies. In this vein, Nikolaev and Van Lent (2005), provide direct evidence that disclosure is impacted by unobservable firm-specific factors that are also correlated with the cost of equity, thereby introducing endogeneity if not properly controlled. To empirically test this assumption in our context, we performed a Hausman specification test to assess the consistency of the random

effects estimator relative to the fixed effects estimator. The results indicate a test statistic of $\chi^2(17) = 215.65$ with a p-value < 0.001 . Given the highly significant result, the Hausman test, unsurprisingly, rejects the null hypothesis H_0 , i.e., the random effect model is appropriate. This suggests that the random effects estimator is inconsistent, and therefore the fixed effects specification provides the more appropriate modeling choice.

As a result, we base our findings on the fixed effects specification, which is best suited to capture the dynamic and firm specific nature of the relationship between disclosure and the cost of equity.

In a fixed effects model, the overall intercept and any time or firm-invariant variables are automatically removed from estimation. This occurs because the within transformation eliminates any component that does not vary across either dimension (see Baltagi, 2005, p.34; Wooldridge, 2010). Consequently, the intercept is not included in our fixed effects specifications.

Our main explanatory variables capture firms' exploration and exploitation-oriented disclosures, as extracted from their 10-K filings. We introduce two types of financial slack, unabsorbed slack and absorbed slack, as moderating variables, and include the corresponding two-way interaction terms to examine whether slack strengthens or weakens the relationship between each disclosure type and the outcome variable.

For completeness, and from an exploratory perspective, we also examine three-way interactions among unabsorbed slack, absorbed slack, and exploration (or exploitation) disclosure. Since we hypothesize that the two types of slack exert contradictory effects on the relationship between innovation disclosure and the cost of equity, we introduce these interactions to test whether our expectations hold in the contexts we identify as most favorable to disclosure relevance. Specifically, this analysis allows us to assess whether, under configurations combining high unabsorbed slack and low absorbed slack (for exploration) or the reverse (for exploitation), the observed effects align with our theoretical predictions.

The estimated model is specified as follows:

$$\begin{aligned} PEG_{i,t} = & \beta_0 + \beta_1 Explr_{i,t-1} + \beta_2 Explt_{i,t-1} + \beta_3 UnabsSlack_{i,t-1} + \beta_4 AbsSlack_{i,t-1} + \\ & \beta_5 (Explr_{i,t-1} \times UnabsSlack_{i,t-1}) + \beta_6 (Explr_{i,t-1} \times AbsSlack_{i,t-1}) + \beta_7 (Explt_{i,t-1} \times \\ & UnabsSlack_{i,t-1}) + \beta_8 (Explt_{i,t-1} \times AbsSlack_{i,t-1}) + \beta_9 (AbsSlack_{i,t-1} \times \\ & UnabsSlack_{i,t-1}) + \beta_{10} (AbsSlack_{i,t-1} \times UnabsSlack_{i,t-1} \times \end{aligned}$$

$$\begin{aligned} & \text{Explr}_{i,t-1}) + \beta_{11} (\text{AbsSlack}_{i,t-1} \times \text{UnabsSlack}_{i,t-1} \times \text{Explt}_{i,t-1}) + \beta_{12} \text{LogSize}_{i,t-1} + \\ & \beta_{13} \text{ROA}_{i,t-1} + \beta_{14} \text{Beta}_{i,t-1} + \beta_{15} \text{B2M}_{i,t-1} + \beta_{16} \text{LogR\&Dsales}_{i,t-1} + \beta_{17} \text{Leverage}_{i,t-1} + \\ & \sum_n \beta_n \text{Year.Controls} + \sum_n \beta_n \text{Firm.Controls} + \varepsilon_{i,t}. \end{aligned}$$

4. ANALYSES AND RESULTS

4.1. DESCRIPTIVE STATISTICS

Univariate descriptive statistics are reported in Table 2. The mean PEG-based cost of equity is 10%, slightly above the 9.95% mean documented for UK samples in Mangena et al. (2016) and Matthews et al. (2022). Exploration disclosure (Explr) has a higher mean of 7.86 than exploitation disclosure (Explt), 6.91. However, Explr has a lower median of 3.78 compared to 5.40 for Explt, indicating that the typical firm emphasizes exploitation while exploration contains more extreme values. Tail behavior also differs markedly: the 99th percentile of Explr reaches 70.17, compared to 41.23 for Explt. The top 1% of observations accounts for 12.4% of total Explr, compared to 9.1% for Explt. Consistent with this concentration in the upper tail, trimming the top 1% reduces the mean of Explr from 7.86 to 6.98, close to Explt's mean of 6.38. This pattern indicates that exploration is concentrated in a small set of firms with very high disclosure, while exploitation is more evenly distributed across the sample³.

Table 2: Descriptive Statistics

Stats	N	Mean	Median	St.Dev	Min	Max
PEG	2268	0.10	0.09	0.07	0	0.76
Explr	2268	7.54	3.72	13.33	0	158.97
Explt	2268	6.78	5.37	7.06	0	131.90
Unabs.Slack	2268	0.05	0.09	0.65	0	0.96
Abs.Slack	2268	0.19	0.16	0.17	0	0.73
Beta	2268	1.00	1.00	0.47	0.20	1.86
LogSize	2268	10.15	10.03	1.28	7.00	12.59
B2M	2268	0.35	0.28	0.31	0.28	2.61
Leverage	2268	0.93	0.35	1.48	0.02	5.68
ROA	2268	6.48	5.34	5.24	0.80	17.08
Log.RD.expend/Sales	2268	0.03	0.00	0.06	0.00	0.16

³ We deliberately refrain from winsorizing the TF-IDF scores of exploration and exploitation disclosure. While both distributions exhibit heavy right tails, these extreme values represent real firm-year observations rather than noise. Winsorizing would thus distort the empirical variation we aim to capture, particularly the fact that exploration disclosure is concentrated in a small set of firms with very high disclosure intensity.

Appendix A displays the Pearson correlation coefficients. Pearson correlations are generally low. Exploration and exploitation disclosures are only weakly related ($r = 0.08$, $p < 0.01$), indicating they capture largely distinct dimensions. Unabsorbed slack correlates positively with exploration ($r = 0.18$) and negatively with exploitation ($r = -0.17$), while absorbed slack is more aligned with exploitation ($r = 0.14$) and larger firms ($r = 0.15$). R&D intensity is strongly associated with exploration ($r = 0.38$) but not with exploitation ($r = 0.03$). PEG is higher for firms with higher beta ($r = 0.32$), larger size ($r = 0.11$) and higher book-to-market ($r = 0.26$), and lower for firms with higher ROA ($r = -0.23$). The strongest correlations involve firm characteristics (size–B2M, $r = 0.50$; B2M–ROA, $r = -0.55$; size–ROA $r = -0.45$), which we address in regressions with controls and fixed effects.

4.2.FIXED EFFECTS REGRESSION ANALYSIS

We estimated a hierarchical regression model with firm and year fixed effects, using two-way cluster-robust standard errors (clustered by firm and year), across four nested specifications. Model 1 introduces control variables. Model 2 extends Model 1 by adding the main explanatory variables, namely the two types of slack (unabsorbed and absorbed) and the two types of disclosure (exploration and exploitation). Model 3 further extends Model 2 by introducing the interactions between slack and innovation disclosure (e.g., unabsorbed slack $\times$ exploration, unabsorbed slack $\times$ exploitation... etc). Finally, Model 4 incorporates both the interaction between the two types of slack (unabsorbed slack $\times$ absorbed slack) and the three-way interactions between slack and disclosure (unabsorbed slack $\times$ absorbed slack $\times$ exploration, and unabsorbed slack $\times$ absorbed slack $\times$ exploitation).

To assess the robustness and adequacy of these specifications, we conducted three complementary tests: (i) Variance Inflation Factors (VIFs) to check for multicollinearity, (ii) a global Wald χ^2 test to assess overall model significance, and (iii) block-level Wald tests to evaluate the incremental explanatory power of each model relative to the previous one.

(i) First, to assess potential multicollinearity among the independent variables, we computed Variance Inflation Factors (VIFs) and tolerance values. As reported in Appendix B, all VIFs are well below the conventional threshold of 5, and tolerance values are comfortably above 0.1. These results indicate that multicollinearity is not a concern in our models.

(ii) Second, we conducted global Wald chi-squared tests for each regression to assess overall model significance, that is, whether the tested coefficients jointly differed from zero (see Table

3). The number of estimated coefficients (k) increased from 6 in Model 1 to 10 in Model 2 with the introduction of the main explanatory variables for slack and innovation disclosure. From Model 3 onward, the reported degrees of freedom (df) remain 10 because the global test excludes higher-order interaction terms that are not independently estimable. The Wald χ^2 statistics indicated strong joint significance in all specifications ($p < 0.001$).

Table 3: Global Wald χ^2 test

Model	Wald χ^2	df	p-value	Sign.	k (coeffs)
M1	386.025	6	2.82e-80	***	6
M2	861.926	10	7.98e-182	***	10
M3	451.360	10	2.27e-93	***	14
M4	814.578	10	1.33e-171	***	17

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Wald χ^2 : Global Wald chi-squared statistic testing the null hypothesis that all coefficients (except the constant) are jointly equal to zero. Higher values indicate stronger explanatory power and a greater likelihood of rejecting the null hypothesis.

df: Degrees of freedom used in the Wald χ^2 test, corresponding to the number of independent predictors tested (excluding variables that may be linearly dependent due to multicollinearity or fixed effects).

k: Total number of coefficients estimated, representing the total number of parameters included in the model.

(iii) Third, we performed block-level Wald tests with cluster-robust standard errors to assess the incremental explanatory power of each specification relative to the preceding one. The results, reported in Table 4, indicate that the additional regressors introduced in Models 2 and 3 are jointly significant at the 1% level, demonstrating meaningful incremental explanatory power. Although the inclusion of higher-order interaction terms (absorbed slack x unabsorbed slack, absorbed slack x unabsorbed slack x exploration, and absorbed slack x unabsorbed slack x exploitation) in Model 4 does not yield a statistically significant improvement over Model 3, Model 4 remains highly significant (Wald χ^2 $p < 0.001$, see Table 3). We hence retain Model 4 to take a more exploratory perspective on how absorbed slack interacts with varying levels of unabsorbed slack in moderating exploration or exploitation disclosure effect on the cost of equity.

Table 4: Block Wald Test

Pair	k added	χ^2 stat	df	p-value	adj. p (Holm)	Sig.	Δ within R^2
------	---------	---------------	----	---------	---------------	------	-----------------------

M1 → M2	4	106.0532	4	5.05e-22	1.01e-21	***	0.0139 (1.39%)
M2 → M3	4	309.6344	4	9.04e-66	2.71e-65	***	0.0073 (0.73%)
M3 → M4	3	5.730	3	1.25e-01	1.25e-01		0.0007(0.07%)

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

k: Number of parameters added (i.e., new variables introduced in the more complex model).

χ^2 stat: Wald chi-square statistic computed under the null hypothesis that all k added coefficients are jointly equal to zero.

df: Degrees of freedom corresponding to the number of added parameters.

adj. p (Holm): Holm-adjusted p-value for multiple comparisons; lower values indicate robust significance after adjustment.

Δ within R²: Additional within-firm variation explained when moving from the simpler to the more complex model, reflecting the incremental explanatory power of the new block of variables.

Table 5 reports the results of the regression models.

Table 5: Fixed effect regression two way clustered (PEG)

Notes: All regressions include firm and year fixed effects and are estimated with two-way cluster-robust standard errors (by firm and year). The sample covers 445 firms over the 2014–2022 period, yielding 2,268 firm-year observations.

*** $p < 0.01$, ** $p < 0.05$, $p < 0.1$ *.

	Model 1 (PEG)	Model 2 (PEG)	Model 3 (PEG)	Model 4 (PEG)
LogSize	-0.064*** (0.015)	-0.062*** (0.015)	-0.064*** (0.015)	-0.064*** (0.015)
ROA	-0.027*** (0.006)	-0.022*** (0.005)	-0.022*** (0.005)	-0.023*** (0.005)
Beta	0.007*** (0.003)	0.007*** (0.003)	0.007*** (0.003)	0.007*** (0.003)
B2M	0.025*** (0.008)	0.026*** (0.008)	0.026*** (0.008)	0.025*** (0.007)
Log.RD.expend/Sales	-0.007 (0.009)	-0.008 (0.008)	-0.006 (0.007)	-0.006 (0.006)
Leverage	0.001** (0.000)	0.001** (0.000)	0.001* (0.000)	0.000 (0.000)
Unabs.Slack		0.003 (0.005)	0.003 (0.006)	0.010 (0.007)

Absorb.Slack		0.029*** (0.009)	0.029*** (0.008)	0.028*** (0.008)
Explr		0.002 (0.003)	0.003 (0.004)	0.004 (0.004)
Explt		-0.006** (0.003)	-0.006*** (0.002)	-0.006** (0.003)
Unabs.Slack x Explr			0.007 (0.007)	0.005 (0.009)
Unabs.Slack x Explt			0.001 (0.001)	-0.002 (0.005)
Abs.Slack x Explr			-0.010*** (0.003)	-0.009*** (0.003)
Abs.Slack x Explt			-0.005** (0.002)	-0.005* (0.002)
UnabsSlack x AbsSlack				-0.004* (0.002)
Unabs.Slack x AbsSlack x Explr				-0.001 (0.003)
Abs.Slack x Explr x Explt				0.001 (0.002)
R ²	0.104	0.118	0.125	0.126
R ² Adj.	-0.113	-0.108	-0.101	-0.101

Controls variables (Model 1)

We begin with the baseline specification (Model 1), which includes only control variables and two-way fixed effects (firm and year). The estimation relies on two-way cluster-robust standard errors applied to 2,268 firm-year observations. Results indicate that firm size is negatively associated with the implied cost of equity capital (coefficient: -0.064 , $p < .01$). ROA exhibits a similar pattern as return on assets is negatively associated with PEG (coefficient: -0.027 , $p < .01$). This finding is consistent with the interpretation that more profitable firms, being financially sound and mature, have a lower implied cost of equity.

In contrast, both systematic risk (beta) and the book-to-market ratio are positively associated with PEG. Firms with higher betas exhibit higher implied equity costs (coefficient: 0.007 , $p < .01$), reflecting investors' demand for risk compensation. Similarly, the positive association between the book-to-market ratio (B2M) and PEG (coefficient: 0.025 , $p < .01$) aligns with the view that high book-to-market values typically signal lower expected growth, which, through

the PEG formula, translates into a mechanically higher implied cost of equity. Leverage has a significant positive effect on PEG but is tiny in magnitude (coefficient: 0.001, $p < 0.05$). Model 1 explains 10.4% of the variation in PEG ($R^2 = .104$) across 445 firms over 8 years.

Explanatory Variables (Model 2)

In Model 2, we introduce theoretical regressors, unabsorbed slack, absorbed slack, exploration, and exploitation, while retaining firm and year fixed effects. The analysis, based on the same sample as Model 1 (2,268 observations; 445 firms; 8 years), shows results consistent with Matthews et al. (2022). Specifically, exploration disclosure does not exhibit a significant association with PEG, and thus H1 is not supported. By contrast, exploitation disclosure is negatively and significantly related to PEG (coefficient = -0.006 , $p < 0.05$), providing support for H2.

Unabsorbed slack does not have a significant effect on the implied cost of equity (PEG). By contrast, absorbed slack is positively and significantly associated with PEG (coefficient: 0.029, $p < .01$).

Interacting explanatory variables (Model 3)

In Model 3, which constitutes one of the core specifications, we interact our explanatory variables. Unabsorbed slack does not significantly moderate the relationship between either disclosure (exploration or exploitation) and the implied cost of equity (PEG) hence H1a and H2a are not supported. By contrast, absorbed slack exhibits significant negative interaction with exploration disclosure (coefficient: -0.010 , $p < .01$) and exploitation disclosure (coefficient: 0.005, $p < 0.05$). Hence H1b and H2b are supported.

Interactions between slack types and Threeway interactions (Model 4)

In Model 4, the interaction between unabsorbed slack and absorbed slack exhibits a negative but statistically insignificant effect on the PEG ratio (coefficient = -0.004 , $p < .10$). Similarly, none of the three-way interactions involving slack types and innovation disclosure show a significant impact on the cost of equity (PEG).

4.3.MARGINAL EFFECTS

Given the complexity of the estimated relationships, we further examine the marginal effects of slack on the association between innovation search disclosure and the PEG ratio. Although the average interaction terms are not statistically significant in the global model, this does not imply that disclosure announcements related to firms' search (exploitation or exploration) have no

association with the PEG across all levels of slack. In other words, the absence of a significant mean interaction effect does not preclude the existence of meaningful conditional effects at specific levels of slack. To better capture this heterogeneity, we compute the marginal effects of disclosure across the observed distribution of slack.

Since all variables are standardized (z-scored), the marginal effects of exploration or exploitation on the PEG ratio at different slack levels are computed while holding the other type of slack constant at its mean (i.e., 0). For instance, when examining the marginal effect of exploration at varying levels of unabsorbed slack, absorbed slack is fixed at its mean value.

4.3.1. Unabsorbed slack moderation of Innovation

To better illustrate the interaction between exploration and unabsorbed slack and to determine whether the relationship between exploration and the cost of equity becomes significant from a certain level of unabsorbed slack, we calculated the marginal effects of exploration at different levels of unabsorbed slack⁴.

Table 6: Marginal Effects of Exploration Disclosure on PEG at Different Levels of Unabsorbed Slack

Percentile of UnabsSlack	Effect of Explr. on PEG	SE	z	p	CI (lower)	CI (upper)
5%	-0.0056	0.0132	-0.423	0.672	-0.0314	0.0203
25%	0.0024	0.0043	0.568	0.570	-0.0059	0.0108
50%	0.0033	0.0033	1.009	0.313	-0.0031	0.0098
75%	0.0046 **	0.0022	2.136	0.033	0.0004	0.0088
95%	0.0083 ***	0.0032	2.594	0.009	0.0020	0.0146

Significance levels: *** p < 0.01, ** p < 0.05, *p<0.1

Table 6 indicates that the effect of exploration on the cost of equity is positive and significant, but only at high levels of unabsorbed slack. This result is not particularly surprising. It is important to remember that the coefficients in Table 3 (the general regression) reflect the change in slope when exploration is interacted with unabsorbed slack. In other words, the interaction is not significant across the entire range of unabsorbed slack. On average, the slope of exploration does not differ meaningfully from its baseline effect once the full distribution is

⁴We use Model 3 to estimate our average marginal effects of the two ways interactions between slack and innovation disclosure.

considered. This means there is no systematic moderating effect of unabsorbed slack across the whole sample; the effect emerges only in specific conditions of high slack. Indeed, when examining specific ranges of unabsorbed slack, particularly at higher values, the conditional effect of exploration becomes significant. In other words, the moderation effect only becomes visible at high levels of unabsorbed slack. These results highlight the importance of accounting for the interaction between exploration and unabsorbed slack in shaping the cost of equity.

Exploration increases the cost of equity when unabsorbed slack is high. Hence, H1 and H1a are supported, but only conditionally, i.e., at high levels of unabsorbed slack. More precisely, a Johnson Neyman test shows that the effect of exploration on PEG becomes significant around the 73rd percentile of unabsorbed slack (73,36th) and remains significant above. Moreover, these effects are economically meaningful: a one-standard deviation increase in exploration, when slack is in the top quartile, raises the cost of equity by approximately 0.4% to 0.8%. These figures may seem low, but they should be considered relative to the average cost of equity, which is 10%.

Additionally, to better illustrate the interaction between exploitation and unabsorbed slack and to determine whether the relationship between exploitation and the cost of equity becomes significant from a certain level of unabsorbed slack, we also computed the marginal effects of exploitation at different levels of unabsorbed slack.

Table 5: Marginal Effects of Exploitation Disclosure on PEG at Different Levels of Unabsorbed Slack

Percentile of UnabsSlack	Effect of Explt. on PEG	SE	z	p	CI (lower)	CI (upper)
5%	-0.0065 **	0.0028	-2.321	0.020	-0.0120	-0.0010
25%	-0.0065 **	0.0028	-2.321	0.020	-0.0120	-0.0010
50%	-0.0064 **	0.0026	-2.475	0.013	-0.0114	-0.0013
75%	-0.0061 ***	0.0022	-2.820	0.005	-0.0104	-0.0019
95%	-0.0054 ***	0.0018	-3.010	0.003	-0.0089	-0.0019

Significance levels: *** p < 0.01, ** p < 0.05, *p<0.1

The overall (average) interaction effect is not significant, which suggests that, across the full distribution of unabsorbed slack, the moderation is too weak to systematically alter the relationship between exploitation and the cost of equity. Table 5 supports this result. When

looking more closely at conditional effects using the Johnson-Neyman test, we see that the slope of exploitation remains significantly negative from about the 2nd percentile (1.88th) of unabsorbed slack upwards. This means that exploitation reliably lowers the cost of equity across nearly all levels of slack - supporting H2. However, the magnitude of this reduction does not significantly change as unabsorbed slack increases. In other words, while the slope of the relationship becomes marginally flatter at higher slack levels (e.g., the PEG ratio decreases by -0.65% at low slack versus -0.54% at the 95th percentile), the difference between these effects is economically and statistically negligible. Consequently, the weak positive moderation of the exploitation disclosure-PEG relationship by unabsorbed slack does not provide empirical support for H2a.

4.3.2. Absorbed slack moderation of Innovation Disclosure

We do the same for the interaction between absorbed slack and innovation disclosure looking more closely into Average Marginal Effects of disclosure on the cost of equity at different levels of absorbed slack. First, we examine the effect of exploration on PEG at different levels of Absorbed slack.

Table 6: Marginal Effects of Exploration on PEG at Different Levels of Absorbed Slack

Percentile of AbsSlack	Effect on PEG	SE	z	p	95% CI lower	95% CI upper
5%	0.0135**	0.00576	2.3471	0.0189	0.00223	0.02482
25%	0.0099 **	0.00497	2.0071	0.0447	0.00023	0.01973
50%	0.0048	0.00409	1.1754	0.2398	-0.00321	0.01284
75%	-0.0008	0.00374	-0.2124	0.8318	-0.00813	0.00654
95%	-0.0209 ***	0.00740	-2.8338	0.0046	-0.03550	-0.00647

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The Exploration $\times$ Absorbed Slack interaction is negative and statistically significant (coefficient: -0.10 , $p < .01$, Model 3, Table 5), indicating that the slope of exploration on PEG decreases linearly as absorbed slack increases on average on the full sample. Table 6 illustrates this effect. Simple-slope (marginal effect) estimates show a positive and significant effect of exploration at low slack (5th: 0.0135, $p = 0.019$; 25th: 0.0100, $p = 0.045$), no detectable effect at mid-range slack (50th–75th percentiles), and a negative and significant effect at very high slack (95th: -0.0210 , $p < 0.005$). A Johnson–Neyman analysis indicates that the effect of

Exploration is significantly positive for Absorbed Slack below 27th percentile (26.9th percentile), becomes non-significant on a large range between 27th(26.9th) and 90th percentile (90.2nd) percentiles, and is significantly negative only above 90th (90.2nd) percentile. Overall, these results are consistent with a crossover pattern: as absorbed slack increases, the effect of exploration on PEG transitions from positive to neutral and finally negative. This result is consistent with a decrease in disclosure relevance as absorbed slack increases. At low levels of absorbed slack, exploration disclosure significantly increases PEG, which we interpret as higher relevance, as investors now incorporate the riskiness of exploration into their return expectations⁵. However, as absorbed slack rises, the effect of exploration weakens and becomes non-significant on a large range of absorbed slack. In our framework, this reflects incongruency between financial disclosure and exploration leading to a loss of coherence and subsequently of relevance: investors no longer perceive exploration disclosure as coherent or relevant. The decreasing effect of exploration on PEG as absorbed slack increases therefore reflects diminishing exploration disclosure relevance, partially supporting H1b. At low levels of absorbed slack – absorbed slack, let us recall, tends to favor exploitation but hinders exploration – investors perceive the exploration disclosure as highly relevant. However, as absorbed slack increases, the relevance of exploration-oriented strategies gradually diminishes until the effect becomes statistically insignificant. Quite strikingly, beyond a very high threshold of absorbed slack (above the 90th percentile), markets even seem to assume that none of the risks associated with exploration announcements will materialize, and that the firm will instead revert to exploitation. It is, as if, a high level of absorbed slack completely reverses the meaning of the disclosure and the perceived risk that investors attach to the firm’s choice of words.

Second, we look at the marginal effects of exploitation on PEG at different levels of absorbed slack.

Table 7: Marginal Effects of Exploitation on PEG at Different Levels of Absorbed Slack

Percentile of AbsSlack	Effect on PEG	SE	z	p	95% CI lower	95% CI upper
5%	-0.0007	0.0038	-0.177	0.859	-0.0081	0.0068

⁵ Recall that, since our variables are z-scored, the marginal effect of exploration on PEG at low levels of absorbed slack reflects the effect of exploration when unabsorbed slack is fixed at its mean (i.e., 0) and absorbed slack is set between the 5th and 25th percentiles. The lack of significance in the middle range may be due to the fact that the effect of absorbed slack is partially offset by unabsorbed slack at its mean level, which reduces the clarity of the moderation (see section 3.3.2.).

25%	-0.0025	0.0032	-0.787	0.432	-0.0087	0.0037
50%	-0.0052 **	0.0025	-2.049	0.040	-0.0101	-0.0002
75%	-0.0080 ***	0.0024	-3.367	0.001	-0.0127	-0.0034
95%	-0.0184 ***	0.0057	-3.211	0.001	-0.0297	-0.0072

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The effect of exploitation on the PEG is negative and significant (coefficient: -0.006, $p < .05$, Model 2, Table 3). Exploitation x Absorbed Slack interaction is negative and significant (coefficient: -0.005, $p < .05$, Model 3) indicating that the slope of exploitation on PEG decreases even further when absorbed slack increases, on average on the full distribution. Consistently, simple slope (marginal effect) estimates show a negative and significant effect of exploitation starting the 49th percentile (49.05th percentile) until the maximum using a Johnson Neyman test. As Absorbed slack increases from the median to the 95th percentile the effect decreases further from -0.0052 ($p < .05$) at the median to -0.0184 ($p < .01$). This further supports H2b.

4.3.3. Interacting different types of slack with exploration or exploitation: An exploratory perspective

We expected a positive association between exploration and PEG, particularly when unabsorbed slack is high (H1a). At the same time, we anticipated that this positive association between exploration and PEG would weaken as absorbed slack increases (H1b). The two types of slack therefore exert contradictory effects on this relationship. We only found weak evidence partially supporting the hypotheses involving exploration. Here, the aim is to combine both conditions and examine whether, in the contexts we describe as most favorable to the relevance of exploration-related announcements, that is, with high unabsorbed slack and low absorbed slack, we indeed observe a positive association between exploration and PEG.

Table 8: Marginal effects of Exploration on PEG at different levels of Absorbed and Unabsorbed Slack

Level of AbsSlack	Level of UnabsSlack	d(PEG)/d(Explr)	SE	95% CI	p-value
5%	95%	0.0182 ***	0.0044	[0.0095, 0.0269]	0.00004
25%	75%	0.0118 ***	0.0028	[0.0063, 0.0172]	0.00002
50%	50%	0.0059 *	0.0034	[-0.0007, 0.0126]	0.081
75%	25%	0.0000	0.0038	[-0.0075, 0.0076]	0.990

95%	5%	-0.0227	0.0141	[-0.0503, 0.0049]	0.107
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Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

When absorbed slack is low and unabsorbed slack is high, the effect of exploration on PEG is positive and significant (5th percentile of absorbed slack and 95th percentile of unabsorbed slack: coefficient = 0.0182, $p < 0.01$). As absorbed slack increases and unabsorbed slack decreases, the effect of exploration becomes weaker and less significant (at the medians of both absorbed and unabsorbed slack: coefficient = 0.0059, $p < 0.10$). These results show that exploration disclosure exerts the strongest and most significant positive effect on PEG when firms hold high levels of unabsorbed slack and little absorbed slack.

Our results provide partial corroboration for our hypotheses (H1a and H1b): a positive association between exploration and PEG is indeed observed under the specific conditions identified in our framework as most favorable, adding coherence and subsequently relevance to exploration-related announcements, namely, high unabsorbed slack combined with low absorbed slack are congruent with exploration disclosure. This pattern is therefore consistent with our theoretical expectations, suggesting that investors' initial judgement strengthens, that is exploration disclosure becomes more relevant when having high unabsorbed slack - flexible and available resources rather than resources already absorbed by ongoing operations. As absorbed slack increases and unabsorbed slack diminishes, the effect of exploration weakens and becomes only marginally significant. This pattern suggests incongruency between exploration-oriented disclosure and the absorbed nature of slack, which undermines the coherence of the firm's message and, in turn, reduces the relevance of such exploratory disclosure. Overall, this highlights the importance of congruency between financial disclosure and innovation disclosure: exploration disclosure relevance is reinforced by unabsorbed slack but diluted by absorbed slack.

We expected a negative association between exploitation and PEG, particularly when absorbed slack is high (H2b). Concurrently, we anticipated that this negative association would weaken as unabsorbed slack increases (H2a). The two types of slack therefore exert opposing effects on this relationship. The objective again is to examine both conditions jointly and assess whether, in the contexts identified as most favorable to the relevance of exploitation-related disclosures, that is, when firms exhibit high absorbed slack and low unabsorbed slack, we observe a stronger negative association between exploitation and PEG.

Table 9: Marginal effects of Exploitation on PEG at different levels of Absorbed and Unabsorbed Slack

Level of AbsSlack	Level of UnabsSlack	d(PEG)/d(Explt)	SE	95% CI	p-value
5%	95%	-0.0034	0.0035	[-0.0103, 0.0035]	0.337
25%	75%	-0.0030	0.0023	[-0.0075, 0.0015]	0.192
50%	50%	-0.0049 *	0.0026	[-0.0100, 0.0003]	0.0646
75%	25%	-0.0073 **	0.0030	[-0.0131, -0.0016]	0.0148
95%	5%	-0.0183 ***	0.0052	[-0.0284, -0.0082]	0.0004

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Looking at the marginal effects of exploitation on PEG across different combinations of absorbed and unabsorbed slack, we find that the effect of exploitation is not significant when absorbed slack is low but unabsorbed slack is high providing partial support to H2a. At median levels of both slack types, the effect becomes negative and weakly significant (coefficient = -0.0049 , $p < 0.10$). As absorbed slack increases while unabsorbed slack decreases, the effect grows stronger and more significant. At the 95th percentile of absorbed slack and the 5th percentile of unabsorbed slack, exploitation significantly reduces PEG (coefficient = -0.0183 , $p < 0.01$). These results suggest that the negative effect of exploitation disclosure on PEG is reinforced when the firm's resource profile, high absorbed and low unabsorbed slack, are congruent with the innovation disclosed, exploitation. Indeed, in this context the message is coherent to investors, providing partial support to H2b.

The results suggest a symmetric pattern: while absorbed slack dilutes the relevance of exploration disclosure by offsetting the reinforcing effect of unabsorbed slack, unabsorbed slack in turn dilutes the effect of exploitation disclosure by weakening the coherence provided by absorbed slack.

We conducted a robustness check to assess the stability of our findings. We re-estimated our main regressions using MPEG as an alternative proxy for the cost of equity capital. The results remain qualitatively consistent with our baseline specification, reinforcing the reliability of our conclusions. The results of the robustness check are presented in Appendix C.

5. DISCUSSION

Innovation processes are inherently complex and not easily observable from outside the firm. Companies often choose to disclose information about their innovation strategies to assist investors in assessing and valuing their future potential (Matthews et al., 2022). From the perspective of information risk, two primary mechanisms explain how such disclosures influence the cost of equity capital: information asymmetry and estimation uncertainty. By increasing transparency, disclosure helps mitigate information asymmetry between firms and investors. Disclosure enhances the accuracy of investor forecasts and enables a more precise estimation of a firm's innovation capacity and associated cost of equity.

However, not all innovative activities carry the same implications for future value. Exploration and exploitation strategies signal fundamentally different risk profiles and temporal payoffs. Prior research suggests that the effect of innovation disclosure on the cost of equity depends on investor risk preferences: exploration, being high-risk and uncertain, tends to increase the cost of equity, whereas exploitation, which offers predictability and short-term returns, tends to decrease it. Financial market actors, including analysts, have been found to encourage firms toward exploitation strategies over exploration (Benner, 2010; He & Tian, 2013; Matthews et al., 2022). In this vein, Matthews et al. (2022) argue that capital markets reward exploitation disclosure with lower equity costs, while penalizing exploration with higher expected returns due to the associated risk.

By weaving together the Behavioral Theory of the Firm (Cyert & March, 1963), the concept of relevance (FASB, 1980) and the literature on disclosure narratives (Merkley, 2014; Li & Zou, 2024) and on disclosure more broadly (Botosan, 2006, 1997; Matthews et al., 2022), we posit that the cost of equity depends not only on what type of innovation a firm discloses, but also on how this disclosure is congruent with its underlying financial resources—in particular, the type of slack it holds. Drawing from research on slack (Tabesh et al., 2019; Depino Besada, 2025; Mount et al., 2024; Troilo et al., 2014; Luo et al., 2019; Luo et al., 2019; Voss et al., 2008; Freitas et al., 2025) we show that exploration disclosures are more relevant when congruent with the slack type, i.e., high unabsorbed slack. Indeed, in this context investors perceive that the firm possesses the flexible resources necessary to sustain or implement risky, long-term projects and hence reinforce their initial judgements. Consequently, investors incorporate the risk associated with exploration more fully, leading to a higher cost of equity. Conversely, when disclosing exploitation, investors discount its risk profile even further in the presence of slack

consistent with efficiency-oriented strategies, i.e., absorbed slack - resulting in a lower cost of equity.

We interpret these fluctuations as evidence of greater relevance: when financial slack and innovation disclosure are mutually consistent, congruent, the innovation disclosure becomes more impactful, subsequently leading to a reinforcement of investors' initial judgements. In such cases, the firm demonstrates its capacity to explore or exploit not merely through words, but through the financial structure that substantiates its narrative, subsequently reinforcing the relevance of innovation disclosure.

We further show that exploration positively affects the PEG ratio when unabsorbed slack is high, or when absorbed slack is low (and unabsorbed slack is around its mean). This finding indicates that the positive impact of exploration on PEG is contingent upon the firm's slack configuration, emerging only under conditions that provide sufficient flexibility for exploration. Notably, Matthews et al. (2022) did not find empirical support for their hypothesis that exploration increases the cost of equity. Our findings suggest that the relationship is contingent on contextual factors most notably the firm's financial slack, which prior analyses did not explicitly consider.

Importantly, our results also reveal a mutual attenuation effect between the two slack types. Absorbed slack reduces the moderating impact of unabsorbed slack on exploration, thereby weakening the relevance, the strength of the message conveyed. Conversely, unabsorbed slack diminishes the reinforcing role of absorbed slack on exploitation. This pattern further indicates that when a firm's resource structure is incongruent with its innovation disclosure, the relevance of the disclosure decreases.

This study contributes to the literature on financial slack by showing that slack is not only an internal buffer that supports strategic decision-making (Cyert & March, 1963), but also an external signal interpreted by capital markets. This study complements recent work (e.g., You et al., 2020; Lyandres & Palazzo, 2016) examining how financial slack shapes investor decision-making and extends this perspective by explicitly linking slack to disclosure dynamics and the cost of equity. We also extend the Behavioral Theory of the Firm (Cyert & March, 1963) by showing that investors form expectations not only based on firms' disclosures but also on the internal consistency between those disclosures and the firms' financial structures. In this view, slack operates as a bridge between managerial intent and market interpretation, functioning both as a strategic resource and as a key element in investors' interpretation of

innovation disclosures. Furthermore, our findings provide evidence that the internal mechanisms underlying slack's influence on innovation, initially proposed by the Behavioral Theory of the Firm (Cyert & March, 1963) and later refined by subsequent research (Tabesh et al., 2019; Troilo et al., 2014; Voss et al., 2008; Luo et al., 2018; Luo et al., 2019; George, 2005), not only hold within organizations but are also reflected in external market perceptions.

By integrating innovation disclosure, financial slack, through the lens of disclosure relevance, our study offers a more behaviorally grounded and financially nuanced understanding of how markets price innovation strategies disclosures.

This study offers several important implications for managers involved in strategic disclosure and financial communication. Managers should ensure that innovation narratives are cohesive with their firm's underlying resource configurations, to maximize the relevance of disclosure. For instance, firms with high levels of unabsorbed slack can make exploration-oriented disclosures more relevant, as investors interpret these signals within a context of available and flexible resources that make exploration feasible. Conversely, firms with higher absorbed slack enhance the relevance of exploitation-oriented disclosures, as such messages align with a resource structure favoring efficiency and incremental improvement.

This perspective suggests that slack should be managed and communicated not merely as a reserve of resources but as a contextual message that shapes the informational content of innovation disclosure. Moreover, the study reframes how managers interpret changes in the cost of equity: increases following exploration disclosures should not be seen as punitive, but as a rational adjustment to greater perceived uncertainty. By understanding and leveraging context congruence, managers can design disclosure strategies that convey coherent message as to enhance the relevance of what they disclose, helping markets better assess and price innovation potential.

6. LIMITS AND FUTURE RESEARCH

As with all empirical research, this study is subject to several limitations that open promising directions for future inquiry.

First, while our analysis focuses on average market responses, we do not account for potential heterogeneity across investor types. Prior work has shown that the effect of slack on investors decisions is contingent on shareholder identity (You et al., 2020). Future research could investigate whether different types of investors differ in their sensitivity to information coherence. Indeed our theorization assumes that investors process both financial and narrative

information with sufficient attention to detect congruence; however, in contexts of high information overload or limited investor sophistication, this mechanism may be attenuated

Second, we treat slack as an observed financial condition. As an additional information perceived by external stakeholders, firms may subsequently engage in strategic presentation or impression management of slack-related information. This possibility is consistent with research showing that Chairmans often shape external perceptions through selective disclosure and framing (Clatworthy & Jones, 2006). Future studies could investigate whether firms intentionally adjust or align their non-financial disclosure to their financial disclosure to enhance the perceived relevance of their innovation narratives.

A final and essential limitation of this study concerns the issue of organizational ambidexterity, that is, the simultaneous pursuit and communication of both exploration and exploitation. At first glance, our findings may seem to suggest that ambidexterity is inherently paradoxical, since unabsorbed and absorbed slack appear to pull in opposite directions, one facilitating exploration while constraining exploitation, and the other doing the reverse. However, this apparent antagonism does not mean that ambidexterity is an illusion. Rather, it underscores the structural and cognitive challenges firms face in reconciling competing demands for flexibility and efficiency.

According to ambidexterity theory, firms must balance exploration and exploitation when allocating slack resources (Voss et al., 2008). Achieving ambidexterity therefore depends not on neutralizing these oppositions, but on leveraging them synergistically: absorbed slack provides stability and efficiency that sustain ongoing operations (Baker & Nelson, 2005), while unabsorbed slack allows firms to invest in novel opportunities and adaptive exploration (Troilo et al., 2014). As both forms of slack increase, a firm's exploitative and exploratory capabilities expand, suggesting that ambidexterity is achieved when the two are maintained in relative equilibrium (Deng et al., 2024).

Methodologically, approaches such as polynomial regression or response surface analysis, already used to model slack balance (Deng et al., 2024), could be adapted to examine the relationship between linguistic ambidexterity, slack configuration, and cost of equity.

In short, far from suggesting that ambidexterity is not crucial, our results highlight its complexity and empirical elusiveness. Understanding how ambidexterity manifests both in discourse and in the resource structure of organizations represents a rich and necessary extension of this research, one that undoubtedly warrants a dedicated study of its own.

In sum, while our study introduces coherence between financial and non-financial disclosure as a novel explanatory mechanism in the disclosure–cost of equity relationship, its scope, strategic use, and broader consequences remain open for further theoretical and empirical exploration.

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APPENDIX

Appendix A: Pearson correlations

Variable	1	2	3	4	5	6	7	8	9	10	11
1 PEG	1.000										
2 Explr	0.074***	1.000									
3 Explt	0.084***	0.082***	1.000								
4 Unabs.Slack	-0.000	0.184***	-0.170***	1.000							
5 Abs.Slack	-0.017	0.103***	0.141***	-0.349***	1.000						
6 Beta	0.322***	0.023	0.074***	0.067***	0.153***	1.000					
7 LogSize	0.105***	0.008	0.259***	-0.357***	0.149***	-0.015	1.000				
8 B2M	0.261***	-0.125***	0.241***	-0.352***	0.061***	0.055***	0.501***	1.000			
9 Leverage	-0.035*	0.001	-0.029	-0.051**	0.050**	-0.014	-0.025	-0.006	1.000		
10 ROA	-0.225***	0.130***	-0.155***	0.242***	-0.057***	-0.043**	-0.445***	-0.549***	0.050**	1.000	
11 Log.RD.expend/Sales	-0.014	0.383***	0.028	0.228***	0.149***	0.085***	-0.120***	-0.244***	0.011	0.143***	1.000

Appendix B: VIF table in decreasing order

Variable	VIF	Tolerance
ROA	1.365	0.733
LogSize	1.229	0.814
Abs.Slack	1.189	0.841
B2M	1.152	0.868
Log.RD.expend/Sales	1.090	0.917
Beta	1.043	0.958
Explr.	1.036	0.965
Explt	1.030	0.971
Unabs.Slack	1.017	0.984
Leverage	1.009	0.991

Appendix C: Fixed effect regression two way clustered (MPEG)

	Model 1 (MPEG)	Model 2 (MPEG)	Model 3 (MPEG)	Model 4 (MPEG)
LogSize	- 0.061*** (0.014)	-0.060*** (0.014)	-0.061*** (0.014)	-0.062*** (0.014)
ROA	-0.026*** (0.006)	-0.021*** (0.005)	-0.021*** (0.005)	-0.021*** (0.005)
Beta	0.008*** (0.003)	0.007*** (0.003)	0.007*** (0.003)	0.007*** (0.003)
B2M	0.028*** (0.008)	0.029*** (0.008)	0.029*** (0.008)	0.029*** (0.008)
Log.RD.expend/Sales	0.001 (0.006)	-0.001 (0.004)	0.001 (0.004)	0.001 (0.004)
Leverage	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001* (0.000)
Unabs.Slack		0.003 (0.003)	0.002 (0.005)	0.008 (0.006)
Absorb.Slack		0.028*** (0.009)	0.029*** (0.008)	0.028*** (0.008)
Explr		0.003 (0.003)	0.004 (0.004)	0.004 (0.004)
Explt		-0.006** (0.003)	-0.006*** (0.002)	-0.006** (0.003)
Unabs.Slack x Explr			0.005 (0.007)	0.005 (0.009)

Unabs.Slack x Explt			0.001 (0.001)	-0.003 (0.004)
Abs.Slack x Explr			-0.009*** (0.003)	-0.008*** (0.003)
Abs.Slack x Explt			-0.005 ** (0.002)	-0.004** (0.002)
UnabsSlack x AbsSlack				-0.004** (0.002)
Unabs.Slack x AbsSlack x Explr				-0.002 (0.003)
Abs.Slack x Explr x Explt				0.002 (0.002)
N observations	2282	2282	2282	2282
N firms	445	445	445	445
N years	8	8	8	8
R ²	0.103	0.116	0.123	0.123
R ² Adj.	-0.121	-0.108	-0.102	-0.103
Fixed Effects	Firm x Year	Firm x Year	Firm x Year	Firm x Year
SE type	Two-way cluster	Two-way cluster	Two-way cluster	Two-way cluster

*, **, and *** indicate significance at 10%, 5%, and 1% levels respectively.