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The interplay of cash flow uncertainty and firm life cycle on sustainability disclosure

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Abstract

This study investigates the role of cash flow uncertainty and firm life cycle on sustainability disclosures using environmental, social and governance (ESG) disclosure score data. We conduct our analysis on a sample of 190 Indian firms for a period of 12 years from 2010 to 2021. Drawing upon the real-option theory and organisational-inertia theory, we document a negative impact of cash flow uncertainty and firm life cycle on a firm's commitment to disclose sustainability information. We also find a significant impact of managerial risk inclination and risk tolerance at the firm level in moderating the above relationships. Our findings can help managers equip themselves to meet the challenges of sustainability commitments during cash flow constraints and firm life-cycle transitions. Moreover, our results can also help policymakers in assessing the need to enforce sustainability disclosures depending on the hurdles confronted by a firm.

KEYWORDS
cash flow uncertainty, ESG disclosure score, firm life cycle, organisational-inertia theory, real-option theory

1 | INTRODUCTION

The need for firms to disclose their sustainability practices has become increasingly important as stakeholders such as investors, customers and employees have become more concerned about the socio-environmental repercussions of businesses. This has been fuelled by several factors, including the growing awareness of the negative consequences of climate change, the disruption caused by the socio-environmental issues on business operations and reputation and the rise of corporate scandals and controversies (Gerged et al., 2021; Haque & Ntim, 2018; Sinkovics et al., 2016). As a result, firms are largely prioritising their engagement in environmental, social and governance (ESG) activities with the idea of addressing the interest of stakeholders who are directly or indirectly involved with the organisation (Choi & Wang, 2009; Freeman et al., 2004; Kotsantonis & Serafeim, 2019).

These commitments are regarded as a voluntary effort from the firm and depict its concern for improving the public image (Husted & De Jesus Salazar, 2006). Firms are also making serious efforts to communicate this nonfinancial information through annual reports and periodic disclosures (Rezaee & Tuo, 2017). Rather than managers' preparedness, the strategies employed by the companies are being revealed through these reports (Barako et al., 2006). Recent years also witnessed an increase in the number of rating agencies that were involved in the assessment and verification of the sustainability efforts of the companies (Avetisyan & Ferrary, 2013).

Adding to the relevance of sustainability information for the various stakeholders and the prevalence of heterogeneity among firms in the practice of sustainability engagements (Al Abri et al., 2017; Hardcopf et al., 2019), this study examines how constraints stemming

Abbreviations: Adj, adjusted; BSE, Bombay Stock Exchange; CEO, chief executive officer; COMP, CEO compensation; CSR, corporate social responsibility; CU, cash flow uncertainty; DER, debt equity ratio; DIR, percentage of independent directors; DSIZE, dummy of firm size; DUL, CEO duality; ESG, Environmental, Social and Governance; FE, fixed effects; FLC, firm life cycle; GEN, board gender diversity; GICS, Global Industry Classification Standard; LESG, natural logarithm of environmental, social and governance disclosure score; LMV, natural logarithm of market value of equity; MB, market value of equity to book value of equity; Obs, observations; PPE, plant property and equipment; PSM, propensity score matching; RD, research and development; ROA, return on asset; SE, standard error; VIF, variance inflation factor; VOL, stock return volatility.

out of cash flow uncertainty (CU) and the level of incentive at firm life-cycle (FLC) stages influence the sustainability disclosures of the firms. Both CU and FLC come with inherent challenges that restrict a firm from exercising business operations optimally. Previous studies on CU have examined its impact on dividend decisions, choice of financing sources, risk exposure and R&D allocations (An et al., 2022; Beladi et al., 2021; Keefe & Yaghoubi, 2016; Wang et al., 2023). Similarly, FLC literature has mainly looked into its influence on corporate governance structures and strategic decisions at the firm level (Esqueda & O'Connor, 2020; Faff et al., 2016; Habib & Hasan, 2019a). Despite having far-reaching consequences on corporate outcomes, these two elements are unexplored with respect to sustainability disclosures. Consequently, empirically examining CU and FLC in the context of sustainability disclosure is particularly important for several reasons.

CU can significantly hamper the firm's ability to invest in sustainability activities, access financing for sustainable projects and allocate resources towards sustainability initiatives (Ortas et al., 2015). Moreover, the firm's ability to engage in corporate philanthropy often hinges on the availability of stable cash flows (Seifert et al., 2004). Weak economic circumstances, poor financial position and uncertain future cash flows may further limit the firm's ability to engage in socially responsible actions (Campbell, 2007). The findings of Wang et al. (2014) suggest that heightened uncertainty surrounding future cash flows may motivate firms to defer investment decisions. Subsequently, firms make fewer capital investments, especially in the presence of financial constraints (O'Connor Keefe & Tate, 2013). Hence, the availability and stability of cash flow are critical factors in determining a firm's ability to implement sustainable practices and achieve its sustainability goals (Bansal, 2005). Thus, we argue that the increased level of uncertainty in a firm's cash flow can negatively influence investments in sustainability initiatives and their subsequent disclosures.

Empirical evidence underlines that the stages of a firm's life have an impact on corporate reporting decisions and disclosures (Gray & Ariss, 1985). Developing on the theory of absorptive capacity, Zahra and George (2002) underline that the ability to acquire and deploy resources improves as a firm gains more experience. We expect that this acquired expertise through the navigation of the life cycle enables firms to devote more attention towards showcasing sustainability initiatives through disclosures. Moreover, to tackle the competition from rivals, large and established firms employ unique strategies to build reputations that are strenuous to mimic (McWilliams et al., 2002). We argue that mature-stage firms view sustainability disclosures as one such approach with enough barriers to mimicking since these initiatives are communication of longer social commitments. Conversely, firms in other life-cycle stages may not give importance to sustainability disclosures due to their resource and expertise constraints. As firms mature, they tend to face greater pressure from stakeholders, which forces them to prioritise socially responsible actions (Hasan & Habib, 2017). In contrast, such social pressures are less pronounced during the early stages of the FLC. Therefore, the involvement of a firm in ESG activities and disclosures is anticipated to vary as it progresses ahead along the life cycle.

Using a sample of Indian firms from 2010 to 2021, this study investigates the impact of CU and FLC on the firm's sustainability disclosures. The findings indicate a negative relationship between CU and ESG disclosure scores. We document a decrease in sustainability engagements as a firm gets older. We also show that managerial risk inclination reduces the negative effect of CU and FLC on ESG disclosures. However, the firm's risk tolerance further enhances the negative impact of both CU and FLC on ESG disclosures. The results of our study are robust to alternate measures of independent variables, sample excluding financial firms and after taking care of sample selection bias using propensity score matching technique.

Our study contributes to the literature in a number of ways. First, real-option theory is often examined from the dimension to give a rationale for the postponement of investment decisions under uncertain conditions. Literature remains unexplored with respect to its expansion towards a firm's decision on dedicating resources for sustainability initiatives. This study extends the real-option theory to sustainability aspects (Jia & Li, 2020) and proposes the connecting link between the firms' intention to commit resources for sustainability projects and constraints from the prevalence of uncertain cash flows. Second, this study contributes to the FLC literature (Faff et al., 2016) by documenting the influence of challenges at different stages of the life cycle on sustainability disclosures at the organisational level. This indicates that firms may face unique sustainability challenges at different points in their growth trajectory. By understanding these challenges, firms can better develop and implement sustainability strategies that align with their goals and objectives. Third, this study further enriches sustainability literature (Christensen et al., 2021) by laying down two boundary conditions that explain the heterogeneity in the above relationship, namely, managerial risk inclination and the firm's risk tolerance.

The rest of the paper is designed as follows. Section 2 provides the theoretical framework. Section 3 describes the related literature and subsequently proposes the hypothesis. Section 4 outlines the data used in this study, followed by the empirical models. The results are furnished in Section 5. Further, Section 6 offers a discussion of the findings and provides the conclusion.

2 | THEORETICAL FRAMEWORK

2.1 | Real-option theory

Our theoretical framework for examining the impact of CU on corporate sustainability involvement and disclosures is based on real-option theory. This theory builds on the proposition that the value of corporate investments consists of immediate income generated from projects and returns from future growth opportunities (Myers, 1977; Trigeorgis & Reuer, 2017). Real-option theory explains that firms adopt an incremental decision-making strategy in uncertain business environments to leverage growth options (Bloom et al., 2007; Lambrecht, 2017), which can provide additional benefits when investment decisions are made at later stages (Kogut, 1991; Li & Rugman, 2007). Firms are identified to be making their decisions and choices incrementally owing to the benefits derived from this strategic approach (Belderbos et al., 2019; Bowman & Hurry, 1993). Ever

since the documentation of incremental strategy by Mintzberg (1978) stating that firms follow a sequential pattern with respect to decisions and choices, this has been the theoretical underpinning for the ways in which firms pave the path for strategic changes and resource allocation under the constraints of uncertainty (Belderbos et al., 2019; Bowman & Hurry, 1993; Song, 2017). In this context, the real-option theory provides a robust foundation for understanding how CU influences corporate sustainability disclosures. Firms facing high CU might prefer a phased approach to sustainability investments, gradually committing resources to align with evolving market conditions and reducing the risk of premature or overcommitment. This theoretical perspective helps explain the dynamics of sustainability disclosure and the strategic timing of corporate investments in sustainability initiatives. By leveraging the flexibility embedded in real-option theory, firms can enhance their resilience and adaptability, ensuring that their sustainability efforts are both strategically sound and financially prudent.

2.2 | Organisational-inertia theory

Our theoretical framework for examining the impact of the FLC on corporate sustainability involvement and disclosures is based on organisational-inertia theory. This theory advocates that firms in the older stage of their life cycle take slower steps towards changes in the external environment, leading them to react conservatively to both prevailing threats and emerging opportunities (Hannan & Freeman, 1984; Schwarz, 2012). The prevalence of organisational-inertia delimits a firm's capacity (in the older stage) to address the demands of transitions happening outside its business arena to bring innovative solutions for the prevailing problems by adjusting its existing strategies (Gilbert, 2005).

Conversely, young firms, free from the constraints of organisational inertia and structural complexity, are better positioned to adapt to dynamic environments (Sine et al., 2006). Contrary to the concept of liability of newness, which suggests that new firms face disadvantages (Freeman et al., 1983), the flexibility and simplicity of their structures enable them to respond more effectively to external changes. Additionally, young firms are willing to upgrade their structural competencies to seize growth opportunities by advancing with extra investment decisions (Faff et al., 2016). The proactive nature of young firms, facilitated by their lower complexity in adaptation, allows them to engage more actively in sustainability practices, thereby meeting the legitimacy requirements of various stakeholders. This theoretical perspective highlights the differences in corporate sustainability involvement among firms at different stages of their life cycle. While older firms may struggle with inertia, young firms leverage their adaptability to implement sustainability initiatives that enhance their strategic positioning and stakeholder relationships. By understanding these dynamics, we can better comprehend how the firm life cycle influences corporate sustainability involvement and the strategic decisions firms make to balance their environmental and social responsibilities.

3 | LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

3.1 | Literature on CU

Previous research has extensively examined the corporate implications of CU. For instance, Deng et al. (2013) identified a non-linear relationship between dividend policies and investment decisions, which varies with the degree of CU. Expanding this understanding, Keefe and Yaghoubi (2016) observed that firms experiencing high volatility in cash flows tend to minimise their reliance on debt financing for projects. Harris et al. (2019) also noted that unpredictable cash flows compel companies to offer less trade credit to external entities. Alnahedh et al. (2019) discovered that CU can delay a firm's investment and recruitment plans, even when promising investment opportunities are present, and this highlights the pervasive impact of financial uncertainty on a firm's operational and strategic decisions. Beladi et al. (2021) document that CU curtails engagement in innovative activities, which arises due to concerns about future funding situations and makes firms conservative. This risk aversion can extend to sustainability efforts, where long-term payoffs may be deprioritised in favour of immediate financial stability.

Considering the context of the uncertain business environment at the aggregate level, Wang et al. (2022) explain that industry-level cash flow fluctuations aggravate the possibility of future crashes in stock prices, amplifying market-wide volatility. Conversely, Huang and Tarkom (2022) underline that firms facing high cash flow risk may increase their investments in human capital. This counterintuitive strategy aims to enhance shareholder value by leveraging a more skilled and productive workforce, thus potentially offsetting some of the adverse effects of CU. In the context of sustainability, this could mean prioritising investments in employee training and development to build a resilient workforce capable of driving long-term sustainable growth. On the flip side, An et al. (2022) highlight the cautious behaviour of firms dealing with CU, which often refrain from paying dividends to conserve cash and ensure liquidity. Expanding on these findings, Wang et al. (2023) emphasise the increased risk of stock price crashes for firms with high CU, primarily due to difficulties in securing the necessary financing. This financial strain heightens overall risk and undermines investor confidence, potentially impacting the firm's ability to fund sustainability projects. The study by Li et al. (2023) recognises cash flow as a vital indicator of a firm's financial capacity, revealing that persistent CU significantly elevates the risk of corporate failure. This highlights the need for robust cash flow management practices to ensure long-term sustainability, including the pursuit of ESG goals.

3.2 | CU and sustainability disclosure

Previous studies highlight that the presence of uncertainty about future economic prospects discourages firms from moving ahead with stakeholder welfare projects (Hou et al., 2022; Zhao et al., 2021) as

those initiatives are irreversible in nature with a sizeable amount of sunk cost (Bansal et al., 2015; Habib & Hasan, 2019b). In the presence of rising uncertainty, a firm will not be in a position to proceed with costly sustainability commitments (Jia & Li, 2020; Saharti et al., 2024), and they may choose to delay these initiatives, which are considered optimal based on real-option theory (Chen et al., 2024; Li et al., 2024). Along the same line, firms restrain capital investments when confronted with uncertain future cash flows, compelling them to wait for better availability of information in their favour to move ahead with the delayed projects (Phan et al., 2021). A firm's commitment to ESG initiatives is a form of strategic investment requiring the deployment of its scarce resources with the expectation of deriving long-term benefits (McWilliams & Siegel, 2001; Sun & Gunia, 2018). It comes with three inherent features, namely, irreversibility of decisions to invest as it involves high sunk cost, the presence of uncertainty of its expected outcomes and the level of flexibility available to the firms in terms of its execution (Cruz & Wakolbinger, 2008). The above characteristics compel the firms to allocate only a few resources to ESG activities under the constraints of uncertainty with respect to future cash flows (Cui et al., 2023; Phan et al., 2021), and consequently, there will be less commitment from the firm's side to disclose them. Considering the literature, we hypothesise

H1. Cash flow uncertainty is negatively related to sustainability disclosure.

3.3 | Literature on FLC

Various studies have examined the role of the FLC with respect to stakeholder engagements in terms of corporate social responsibility (CSR) decisions and sustainability activities. Using firm age as a proxy of a firm's life, Withisuphakorn and Jiraporn (2016) demonstrate that mature firms tend to make more significant investments in CSR activities, reflecting a focus on long-term stakeholder relationships. Primc and Čater (2016) underline that firms in the innovative stage exhibit a proactive approach towards environmental initiatives, driven by the dynamism and creativity inherent in this phase. This stage often sees firms experimenting with sustainable practices as part of their innovation strategies. Conversely, Habib and Hasan (2017) find that firms in the early and decline stages are more inclined towards more risky choices in the presence of a high level of investor sentiment. This tendency can sometimes lead to superficial sustainability efforts aimed at quick gains rather than long-term impact. Al-Hadi et al. (2019) show that the ability of CSR activities to mitigate financial distress is more pronounced in the mature stage, where established operations and stable revenue streams allow for strategic, impactful CSR engagements.

Madden et al. (2020) highlight that as the family firms get older, they become selective in investment decisions, and this narrowing down approach, in turn, leads to a reduction in CSR activities among these firms, as these firms prioritise immediate financial returns over broader social responsibilities. Researchers have also shown interest in examining how firm-level decisions changed across different FLC stages. For instance, Tascón et al. (2021) show that the impact of carbon performance on capital structure decisions is contingent on the FLC stage. Blomkvist et al. (2021) document that firms gain better credit ratings in the established stages of FLC through accumulated reputation and the ratings get diminished when investments and reputation exhausts in the declining stage. Biswas et al. (2022) highlight that mature firms will have the required competencies and organisational control systems in place, which enable them to provide comparable financial statements. This capability enables them to undertake and report sustainability initiatives more effectively, ensuring transparency and accountability. Using the class-structure data of US firms, Lin et al. (2022) show that single-class firms reduce the cash holdings level at a greater rate than dual-class firms as they move from the younger stage to the mature stage, which can influence their ability to fund sustained CSR activities. Chatterjee et al. (2023) find that the capacity of CEO compensation to reduce financial distress becomes evident in mature and older stages.

3.4 | Firm life cycle and sustainability disclosure

Incorporation of ESG (sustainability) initiatives into business comes with strategic changes in their normal course of action with a view of attaining corporate legitimacy through stakeholder-centric actions (Aragón-Correa & Sharma, 2003). Organisational-change literature documents that inertia at the older stage, which is a result of a well-ingrained system of dealing with its current operations (Davis & Stout, 1992; Hannan & Freeman, 1984), can cause resistance in adapting to changes in the business environment (Dibrell et al., 2011). However, this tendency to exhibit inertia will be absent at the early stages of FLC (Bennett & Levinthal, 2017), giving flexibility to impart the culture of environmental friendliness into the organisational structure with much better cooperation from the workforce (Jawahar & McLaughlin, 2001). Subsequently, firms in the young stage are expected to show a better interest in building corporate reputation (Fischer & Reuber, 2007; Reuber & Fischer, 2005) and to be more involved in highlighting their contribution to sustainability aspects (Bruna & Nicolò, 2020).

In the same way, as the firms accumulate both physical and financial resources in the mature stage (Hasan et al., 2021), they exhibit more enthusiasm to meet the requirements of a changing business environment and strive for continuous improvement in their business practices (Haiyan et al., 2021). Since mature-stage firms have stable cash flows and income, they will be more conscious about the outcome of their business practices in terms of stakeholder approval and legitimacy (Perrault & McHugh, 2015). This also makes them give due importance to stakeholder welfare and commitment through CSR activities (Hasan & Habib, 2017). Rafiq et al. (2016) emphasise that established firms, with their superior organisational capabilities, are better equipped to yield greater financial returns from innovations compared to their younger counterparts. Therefore, we expect mature-stage firms to prioritise disseminating sustainability information to their stakeholders to achieve legitimacy and superior advantage. Conversely, firms in the decline stage, typically older firms, may

exhibit minimal concern for stakeholder engagement due to existing resource constraints and the potential threat of market exit (Habib & Hasan, 2017). These firms also exhibit inertia when making changes in their business operations to incorporate the demands of the changing environment. Therefore, these firms will have the least incentive to make sustainability disclosures. Based on the stated premises, we hypothesise

H2a. Firm life cycle is negatively related to sustainability disclosure.

H2b. Young-stage is positively related to sustainability disclosure.

H2c. Mature-stage is positively related to sustainability disclosure.

H2d. Older stage is negatively related to sustainability disclosure.

3.5 | Moderating impact of managerial risk inclination and firm risk tolerance

Literature shows that decisions on the strategies undertaken during uncertain times differ across top managers based on their risk inclination (Kaplan, 2008). Often, cognitive bias inherent in managers encourages them to undermine the reality of uncertainty faced by a firm (Camerer & Lovallo, 1999). Upper echelons theory states that a firm's decisions are driven by the innate characteristics of top managers (Hambrick, 2007). The manager's inclination to make risky decisions also varies based on the economic conditions faced by a firm in the market, which can impact the firm's cash flows (Raviv & Sisli-Ciamarra, 2013). In markets with easy capital access and high growth expectations, managers tend to make riskier decisions, whereas in markets with pessimistic conditions, they tend to be risk-averse and make suboptimal decisions (DeYoung et al., 2013). On top of this, sustainability initiatives are characterised by heavy capital requirements and relatively longer commitments to have an impact on stakeholders (Cruz & Wakolbinger, 2008). Managers may prefer to make risky decisions in a friendly business situation, but when there is uncertainty about expected outcomes and in the presence of career concerns, they give less preference for sustainability engagements (Fabrizi et al., 2014). Siegrist et al. (2020) highlight that the need to produce immediate outcomes for shareholders compels managers to forgo investments in sustainability initiatives and instead focus on projects that produce returns immediately.

Similarly, the career and reputational concerns among managers can potentially be higher in older firms as they are exposed to more visibility and public scrutiny (Carter, 2006; Ortega, 2003). This gets amplified by the absence of financial incentives for making risky decisions in firms at older stage (Kanagaretnam et al., 2009). In addition, managers show higher commitment to maintaining the status quo with respect to strategic decisions and restrain from adapting to the requirements of the external environment in case of firms having high levels of organisational rigidity and inflexibility (McClelland et al., 2010). Based on agency theory, managers with a higher risk inclination may be more willing to take bold and socially responsible actions, even in the face of CU. They are also more likely to view ESG initiatives as opportunities to differentiate the firm, enhance its reputation and attract socially conscious investors (Bhattacharya et al., 2021). Based on prospect theory, individuals' decision-making is influenced by their attitudes towards risk and potential gains or losses. Managers with a higher risk inclination may perceive the potential benefits of ESG disclosures, such as improved stakeholder relationships, enhanced brand image and access to capital, as significant gains. As a result, they may be more willing to disclose ESG information despite CU, as the potential rewards outweigh the perceived risks (Yip* & Lee, 2018). Hence, we hypothesise

H3a. Managerial risk inclination positively moderates the relationship between cash flow uncertainty and sustainability disclosure.

H3b. Managerial risk inclination positively moderates the relationship between firm life cycle and sustainability disclosure.

On the other hand, firms with high-risk tolerance make long-term investments even in uncertain times to make use of the early mover advantage (Vo & Le, 2017). Sanders and Hambrick (2007) highlight that the willingness to take risks is a strong driving force for achieving and maintaining market competence. By investing in risky projects, firms aim to devote their resources to investments that may involve uncertainty but are expected to bring long-term value (Banerjee & Gupta, 2017). Aggressive firms tend to accelerate their investments in uncertain times to cease market dominance, even when peers show reluctance in making decisions (Mirza & Ahsan, 2020). Based on resource dependence theory, studies reveal that the resilience of a firm is largely conditional on its proficiency to interact with the external environment, acquire and efficiently utilise resources (Barringer & Harrison, 2000). Consequently, with the idea of sending positive signals to the stakeholders, firms may prefer to invest in socially responsible projects yielding competitive advantage and insurance in times of adversity (Lins et al., 2017).

Along this line, previous studies underline the role of risk-taking in deciding the future outcome of firms across different life cycles (Habib & Hasan, 2017). Shahzad et al. (2019) highlight that the tendency of a firm in the growth and mature phase to make more risky decisions positively contributes to the better performance of a firm. Moreover, the ability to adapt as per the changing environment and act beyond the accumulated inertia encourages risk-tolerant firms to indulge in more sustainability initiatives (Bryant et al., 2020; Walls & Hoffman, 2013). Based on the above premises, we hypothesise

H4a. Firm risk tolerance negatively moderates the relationship between cash flow uncertainty and sustainability disclosure.

H4b. Firm risk tolerance negatively moderates the relationship between firm life cycle and sustainability disclosure.

4 | DATA

We test our hypotheses in the Indian context and utilise the annual data for the constituents of the Bombay Stock Exchange (BSE)-500 index for our sample period from 2010 to 2021. BSE-500 index constituents are considered to be the broad representation of the Indian market and represent 93% of market capitalisation on the BSE. Studies focusing on the Indian emerging market have previously used BSE-500 firms as the representative sample (Chahal & Ahmad, 2022; Hussain & Tyagi, 2024; Srivastava et al., 2019). Our initial sample consisted of 500 firms, but the ESG disclosure score for the period was available only for 195 firms. After excluding observations for missing data points of other independent variables used in the study, our final sample gets reduced to 190 firms, making 2280 firm-year observations. This approach of dropping the firms with incomplete data for relevant variables from the sample is followed in similar studies (Cambrea et al., 2023; Sandberg et al., 2023). These firms are spread across 11 sectors based on Global Industry Classification Standard (GICS) industry classification. The highest number of firms in our sample are from the material sector (42 firms), and the lowest is from the energy sector (five firms). Table A1 presents the full distribution of firms across industries. All the required data are retrieved from Bloomberg. Table A2 presents the list of variables used in the study.

4.1 | Dependent variable

We use the ESG disclosure score provided by Bloomberg to capture the level of sustainability disclosure made by individual firms (Atayah et al., 2023; Eccles et al., 2014; Grewal et al., 2021; Minutolo et al., 2019; Yu et al., 2018). Our main dependent variable is the natural logarithm of the ESG disclosure score (LESG) (Liu et al., 2024; Wan et al., 2023). The ESG disclosure score is generated by Bloomberg analysts who use publicly reported information by the respective firms. It represents the amount of information a firm publicly provides under the three dimensions of ESG. This score ranges from 0.1, indicating very minimal information, to 100, indicating complete and comprehensive disclosure across all aspects of ESG dimensions.

4.2 | Independent variables

We consider two independent variables, namely, CU and FLC. We consider the rolling standard deviation of cash flow from operations divided by total assets for the past 6 years as the primary proxy of cash flow uncertainty (CU1) (Beladi et al., 2021; Deng et al., 2013), and we consider retained earnings to total equity ratio as the primary proxy of the firm life cycle (FLC1) (Al-Hadi et al., 2019; Amin et al., 2023; Chatterjee et al., 2023; DeAngelo et al., 2006; O'Connor & Byrne, 2015).

4.3 | Controls

We incorporate several firm-specific control variables in our analysis. More specifically, we control for firm size (market value of equity [LMV]), profitability (return on asset [ROA]), growth opportunities (ratio of market value of equity to book value of equity [MB]), investment in innovation (ratio of research and development [RD] expenses to sales), disposable resources (ratio of net plant, property and equipment to total assets [PPE]), stock return volatility (VOL), percentage of female directors (GEN) and independent directors (DIR) and dual role of CEOs (DUL). Larger and profitable firms possess enough economic resources to meaningfully engage in sustainability activities (Campbell, 2007; Li & McConomy, 1999). Women are more concerned about socio-environmental issues and female directors (GEN) are more inclined towards sustainability issues (Liu, 2018). The presence of DIR (Post et al., 2011) and dual role of CEOs also influence ESG engagements (Mallin et al., 2013).

4.4 | Descriptive statistics

Table 1 provides descriptive statistics of variables. The mean value of LESG is 3.434, and it ranges between 2.054 and 4.352 indicating wider variation in ESG disclosure practices among the sample firms. The mean value of the CU1 is 0.061, and it ranges between 0.000 and 0.747 indicating greater variability in the level of future cash flows of the sample firms. The mean value of FLC1 is 0.076 with standard deviation of 0.247 indicating greater diversity in the age and developmental stage of the firms being studied.

Table 2 reports the correlation coefficients with variance inflation factor (VIF). VIF is employed to test for multicollinearity issues in the data. As the VIF values are less than 5, our data do not have a multicollinearity problem (Hill & Adkins, 2003).

5 | MAIN RESULTS

5.1 | CU, FLC and sustainability disclosure

To understand the impact of CU and FLC on ESG disclosure score (which is the proxy of sustainability disclosure), we consider the following panel data models:

$$\mathrm{LESG}_{i,t} = \alpha_0 + \alpha_1 \mathrm{CU}_{i,t} + \mathrm{Controls}_{i,t} + \mathrm{Firm-fixed\ Effect} + \mathrm{Year-fixed\ Effect} + \varepsilon_{i,t} \quad (1)$$

$$\mathrm{LESG}_{i,t} = \alpha_0 + \alpha_1 \mathrm{FLC}_{i,t} + \mathrm{Controls}_{i,t} + \mathrm{Firm-fixed\ Effect} + \mathrm{Year-fixed\ Effect} + \varepsilon_{i,t} \quad (2)$$

TABLE 1 Descriptive statistics.

Variable	Observations	Mean	Std. dev.	Min	Max
LESG	2280	3.434	0.344	2.054	4.352
CU1	2280	0.061	0.057	0.000	0.747
FLC1	2280	0.076	0.247	−7.785	1.149
LMV	2280	11.584	1.593	6.342	16.589
ROA	2280	0.091	0.154	−2.798	1.961
VOL	2280	37.128	10.329	5.361	128.314
RD	2280	0.693	2.654	0.000	69.104
PPE	2280	0.405	0.651	0.001	14.377
MB	2280	5.863	9.755	−5.508	162.815
DUL	2280	0.316	0.465	0.000	1.00
GEN	2280	10.963	8.740	0.000	50.00
DIR	2280	50.598	12.038	0.000	100.00

TABLE 2 Correlation matrix.

Variables	CU1	RTE	MV	ROA	VOL	RD	PPE	MB	DUL	GEN	DIR	VIF
CU1	1.000											1.08
FLC1	0.001	1.000										1.04
MV	−0.17	0.024	1.000									1.35
ROA	0.087	0.099	0.1	1.000								1.4
VOL	0.122	−0.106	−0.352	−0.25	1.000							1.25
RD	−0.029	0.027	0.037	0.032	−0.1	1.000						1.01
PPE	0.055	−0.023	−0.102	0.38	−0.007	−0.025	1.000					1.22
MB	0.074	−0.052	0.255	0.366	−0.173	0.002	0.184	1.000				1.26
DUL	0.115	−0.009	−0.089	−0.029	0.028	0.02	0.002	−0.07	1.000			1.06
GEN	−0.066	−0.031	0.237	−0.03	0.027	−0.018	−0.06	0.123	−0.141	1.000		1.11
DIR	0.059	0.1	−0.11	0.117	−0.043	0.026	0.13	0.057	−0.133	0.036	1.000	1.07

Here, the CU takes the value of CU1 or CU2, and FLC takes the value of FLC1 or FLC2, respectively.

Table 3 reports the results. Columns 1–3 present the results of Equation (1) based on fixed-effect regression model. The variable of interest (CU1) is negative and significant in all three columns with coefficients (−1.138), (−0.494) and (−0.418), respectively. The results indicate that the cash flow uncertainty (CU1) negatively impacts a firm's commitment to devote resources for sustainability initiatives and subsequently resulting in lower disclosures. According to the results based on column 3, the 1-point increase in CU1 contributes to reducing LESG by 0.418 points. The result is also economically significant indicating one standard deviation increase in CU1 decreases the unconditional standard deviation of LESG by −2.38% (−0.418 * 0.057). This indicates that as the CU increases, firms reduce their investment in sustainability initiatives, which further forces the firms to make fewer ESG disclosures. Moreover, firms facing CU may be more likely to prioritise short-term financial goals over longer term ESG considerations, as they may need to focus on immediate cash needs (Baum et al., 2010). This eventually leads to a reduction of investment in sustainability initiatives and a lower level of ESG disclosures. These results substantiate the preposition of hypothesis H1.

Columns 4–6 present the results of Equation (2). The variable FLC1 is negative and significant at 5% level of significance in columns 5 and 6 with coefficients (−0.102) and (−0.084). The results in column 6 indicate that, after controlling for firm and time-fixed effects, a 1-point increase in FLC1 reduces the LESG by 0.084 points. These results are also economically significant indicating one standard deviation increase in the FLC lowers the unconditional standard deviation of LESG by −2.07% (−0.084 * 0.247). These results indicate that as firms move ahead in their life cycle, they devote few resources to ESG initiatives consequently leading to fewer disclosures. This also indicates that as firms get older and stagnant, they may become less motivated to engage in sustainability initiatives. These results substantiate the preposition of hypothesis H2a.

Regarding the results of control variables, we find that firm size (LMV) positively influences ESG disclosures. This signifies that

TABLE 3 Cash flow uncertainty, firm life cycle and sustainability disclosure.

	LESG (1)	LESG (2)	LESG (3)	LESG (4)	LESG (5)	LESG (6)
CU1	−1.138**	−0.494**	−0.418*			
	(0.489)	(0.240)	(0.214)			
FLC1				−0.090	−0.102**	−0.084**
				(0.057)	(0.049)	(0.036)
LMV		0.206***	0.154***		0.212***	0.159***
		(0.011)	(0.011)		(0.011)	(0.011)
ROA		−0.221***	−0.147***		−0.202***	−0.133***
		(0.051)	(0.043)		(0.045)	(0.040)
VOL		0.003***	0.001*		0.003***	0.001
		(0.001)	(0.001)		(0.001)	(0.001)
RD		−0.004***	−0.002***		−0.004***	−0.002**
		(0.001)	(0.001)		(0.001)	(0.001)
PPE		0.049***	0.040***		0.043***	0.035**
		(0.015)	(0.014)		(0.015)	(0.014)
MB		−0.006***	−0.005***		−0.007***	−0.005***
		(0.001)	(0.001)		(0.001)	(0.001)
DUL			−0.119***			−0.118***
			(0.026)			(0.025)
GEN			0.010***			0.009***
			(0.001)			(0.001)
DIR			−0.002***			−0.002***
			(0.001)			(0.001)
Constant	3.503***	1.001***	1.706***	3.440***	0.928***	1.631***
	(0.030)	(0.134)	(0.138)	(0.004)	(0.131)	(0.141)
Firm-FE	Added	Added	Added	Added	Added	Added
Year-FE	Added	Added	Added	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added	Added	Added	Added
Obs.	2280	2280	2280	2280	2280	2280
Adj. R^2	0.027	0.400	0.482	0.007	0.405	0.484

*(10%), **(5%), and ***(1%) statistical significance.

visibility and stakeholder pressure act as driving forces for larger firms to commit to sustainability initiatives. The findings also indicate that the better performing Indian firms provide fewer ESG disclosures due to the negative effect of profitability (ROA) on ESG disclosure scores. The possible reason can be that the better performing Indian firms may feel that they do not need to prioritise ESG disclosures as much as other areas of their business as they may believe that their financial performance alone is sufficient to attract and retain investors. Investment in RD activities and growth opportunities (MB) available to a firm also has a negative impact on the ESG disclosure score. However, the increase in level of disposable resources (PPE) and stock volatility (VOL) motivate the firm to dedicate resources to sustainable projects. The positive and significant coefficient of GEN variable denote the inclination of female board members towards sustainability initiatives. On the contrary, firms with CEO duality (DUL) and independent directors (DIR) are reducing their commitment towards ESG investments.

5.2 | Young firms, mature, old-stage firms and sustainability disclosure

An underlying aspect of the FLC is that corporate decisions get driven by accumulated capabilities, as they move from one stage to another (Helfat & Peteraf, 2003). As a result, investment decisions are made comprehensively by the firms with the idea of dealing with the challenges faced at each stage as well as the relative importance given to each set of pressure groups (Jawahar & McLaughlin, 2001). Additionally, the resources and capabilities evolve over a span of time, and hence, firms are expected to develop competitive advantage evenly across their life cycle (Qaiyum & Wang, 2018). Hasan and Habib (2017) find that mature firms make more investments in CSR initiatives as they enjoy the benefits of resource abundance and accumulated competitiveness in comparison to firms in other life-cycle phases. However, Primc and Čater (2016) highlight that a proactive

approach towards environmental initiatives brings a competitive advantage irrespective of the life-cycle phase, which indicates equal commitment towards sustainability aspects. Therefore, in order to further reinstate our findings that highlight the influence of FLC on sustainability disclosure, we decompose the FLC into three cohorts, namely, young-stage, mature-stage and old-stage firms (Bakarich et al., 2019; Hasan et al., 2017). We create variables Young1, Mature1 and Old1 representing young-stage, mature-stage and old-stage firms, respectively. Young1 is a dummy variable that takes a value of 1 for firms with FLC1 value in the bottom 1/3rd cohort and 0 otherwise. Mature1 is a dummy variable that takes a value of 1 for firms having FLC1 value in the middle 1/3rd cohort and 0 otherwise. Old1 is a dummy variable that takes a value of 1 for firms with FLC1 value in the top 1/3rd cohort and 0 otherwise ratio. This approach aligns with previous literature (Bakarich et al., 2019; Hasan et al., 2017).

First, we examine the nexus between young-stage firms and sustainability disclosure based on the following panel regression:

$$\mathrm{LESG}_{i,t} = \alpha_0 + \alpha_1 \mathrm{Young1}_{i,t} + \mathrm{Controls}_{i,t} + \mathrm{Firm} - \mathrm{fixed\ Effect} + \mathrm{Year} - \mathrm{fixed\ Effect} + \varepsilon_{i,t} \quad (3)$$

Column 1–3 of Panel A of Table 4 reports the results. The positive and significant coefficient of Young1 in all three columns (0.119, 0.106, 0.082, $p < 0.01$) indicate that flexibility in the organisational structure and adaptive capacity enjoyed by the young-stage firms enable them to respond proactively towards sustainability practices, which also translates to better ESG disclosures. Based on the stakeholder theory, the findings further denote that young-stage firms are more likely to prioritise reputation building and establishing themselves as a responsible corporate business in order to attract customers, investors and other stakeholders (Reuber & Fischer, 2005). These firms can show their commitment to social and environmental responsibility to stakeholders by disclosing their ESG activities. This can help them build a better reputation and foster customer loyalty and confidence. These results validate the preposition of hypothesis H2b.

Next, we examine the nexus between the mature-stage firms and sustainability disclosure using the following panel regression:

$$\mathrm{LESG}_{i,t} = \alpha_0 + \alpha_1 \mathrm{Mature1}_{i,t} + \mathrm{Controls}_{i,t} + \mathrm{Firm} - \mathrm{fixed\ Effect} + \mathrm{Year} - \mathrm{fixed\ Effect} + \varepsilon_{i,t} \quad (4)$$

The coefficient of Mature1 is insignificant in all the three columns of Panel B. Therefore, these results could not validate the preposition of hypothesis H2c.

Finally, we examine the nexus between the old-stage firms and sustainability disclosure using the following panel regression:

$$\mathrm{LESG}_{i,t} = \alpha_0 + \alpha_1 \mathrm{Old1}_{i,t} + \mathrm{Controls}_{i,t} + \mathrm{Firm} - \mathrm{fixed\ Effect} + \mathrm{Year} - \mathrm{fixed\ Effect} + \varepsilon_{i,t} \quad (5)$$

The coefficient of Old1 is negatively significant (−0.114, −0.089, −0.072, $p < 0.01$), indicating that old-stage firms suffer from organisational inertia, which impedes them in making any ESG investments and related disclosures. According to organisational-inertia theory, older firms tend to be less innovative and more resistant to change due to their established routines, procedures and structures. They may become complacent with their existing practices and fail to adapt to changes in the environment (Polos & van Witteloostuijn, 2004). These results validate the preposition of hypothesis H2d.

TABLE 4 Young firms, mature firms, old firms and sustainability disclosure.

	(1)	(2)	(3)
Panel A: Sustainability disclosure and young-stage firms			
Young1	0.119***	0.106***	0.082***
	(0.019)	(0.015)	(0.013)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.034	0.422	0.494
Panel B: Sustainability disclosure and mature-stage firms			
Mature1	−0.001	−0.012	−0.007
	(0.017)	(0.013)	(0.012)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	−0.000	0.396	0.478
Panel C: Sustainability disclosure and old-stage firms			
Old1	−0.114***	−0.089***	−0.072***
	(0.018)	(0.014)	(0.013)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.032	0.414	0.490

*(10%), **(5%), and ***(1%) statistical significance.

5.3 | Cross-sectional analysis

5.3.1 | Moderating impact of managerial risk inclination

We consider the debt-to-equity ratio as a proxy of managerial risk inclination (Lou et al., 2022). We use a dummy variable DER equal to 1 for firms having a debt-to-equity ratio greater than the sample 75th percentile and 0 otherwise. We examine the moderation impact of

managerial risk inclination on the impact of CU1 and RTE on the ESG disclosure score by using the following panel regressions:

$$\begin{aligned} LESG_{i,t} = {} & \alpha_0 + \alpha_1 CU1_{i,t} + \alpha_2 DER_{i,t} + \alpha_3 CU1_{i,t} * DER_{i,t} + Controls_{i,t} \\ & + Firm - fixed\ Effect + Year - fixed\ Effect + \varepsilon_{i,t} \end{aligned} \quad (6)$$

$$\begin{aligned} LESG_{i,t} = {} & \alpha_0 + \alpha_1 FLC1_{i,t} + \alpha_2 DER_{i,t} + \alpha_3 FLC1_{i,t} * DER_{i,t} \\ & + Controls_{i,t} + Firm - fixed\ Effect + Year - fixed\ Effect \\ & + \varepsilon_{i,t} \end{aligned} \quad (7)$$

Panel A of Table 5 reports the results of Equation (6). We find a negative and significant impact of CU1 on LESG, which confirms the findings of the main results. The positive and significant coefficient of managerial risk inclination (DER) in columns 2 and 3 indicate that the risk-taking inclination of managers pushes a firm towards engaging and disclosing sustainability efforts, which confirms the upper echelons theory. However, for column 1, we observe negative significant impact of managerial risk inclination on ESG disclosure score indicating that the increased managerial risk inclination may motivate the managers to prioritise short-term financial gains over long-term ESG investments, resulting in a negative impact on the firm's involvement in ESG activities. Moreover, the interaction term CU1*DER is positively significant in column 1 (coefficient = 1.058, $p < 0.05$), indicating that if a firm has risk-seeking managers, the negative impact of CU on ESG disclosure will be reduced.

Panel B of Table 5 presents the results based on Equation (7) to examine the role of managerial risk inclination on the nexus between FLC and ESG disclosure. The results are consistent with the findings of the main analysis. The results related to managerial risk inclination provide similar inferences as observed in the results of Equation (6). The interaction term FLC1*DER is positive and significant at 1% level of significance, indicating the significant moderating role of managerial risk inclination on the negative impact of FLC on ESG disclosure. This further indicates that the managers of older firms may be more risk-averse and less willing to showcase ESG commitments due to organisational inertia, stakeholder pressure or financial constraints. However, if managers have a higher risk-taking propensity, they may be more willing to take on the potential risks and costs associated with ESG activities, even in an older FLC stage.

Additionally, we use an alternate proxy to capture managerial risk inclination, which further supports our findings. Based on the empirical evidence that CEOs with high cash-based compensation are risk-averse (Belghitar & Clark, 2015) and CEO compensation is inversely related to risk-taking, specifically in the Indian context (Jaiswall & Bhattacharyya, 2016; Jaiswall & Raman, 2021), we use CEO compensation as an alternate proxy for managerial risk inclination (denoted by COMP). We capture COMP using a dummy variable, which takes the value 1 if CEO compensation in a year is less than the median CEO compensation of the sample and 0 otherwise. Here, CEO compensation is captured by the natural logarithm of total salary and bonus received by a CEO or equivalents.

The results are presented in Table A3. The coefficient of the interaction term (CU1*COMP) in column 2 of Panel A indicates the positive moderating role of managerial risk inclination on the link between sustainability disclosure and CU. This further supports our understanding that firms with risk-inclined managers will prefer more sustainability disclosures even in the presence of CU. Similarly, the coefficient of the interaction term (FLC1*COMP) in column 2 of Panel B indicates the positive moderating role of managerial risk inclination on sustainability disclosure and FLC. This further reinstates that managerial risk inclination is an important element that possibly drives the older FLC stage to devote greater attention towards stakeholder orientation through sustainability disclosures. Additionally, it implies that these managers prefer to disseminate corporate sustainability commitments as a revival mechanism for older firms to sustain the business. These results also signal that risk-inclined managers react proactively towards the requirements of a changing business environment even in uncertain times and at older FLC stage. Both these results further substantiate our findings in Panels A and B of Table 5, respectively.

5.3.2 | Moderating impact of firm risk tolerance

We measure firm risk tolerance as firm size (Otchere et al., 2020). We use a dummy variable DSIZE that takes a value of 1 for firms having a firm size greater than the sample 75th percentile and 0 otherwise. We use the following panel regressions to examine the moderation impact of firm risk tolerance on the impact of CU1 and FLC1 on the ESG disclosure score:

$$\begin{aligned} LESG_{i,t} = {} & \alpha_0 + \alpha_1 CU1_{i,t} + \alpha_2 DSIZE_{i,t} + \alpha_3 CU1_{i,t} * DSIZE_{i,t} \\ & + Controls_{i,t} + Firm - fixed\ Effect + Year - fixed\ Effect \\ & + \varepsilon_{i,t} \end{aligned} \quad (8)$$

$$\begin{aligned} LESG_{i,t} = {} & \alpha_0 + \alpha_1 FLC1_{i,t} + \alpha_2 DSIZE + \alpha_3 FLC1_{i,t} * DSIZE_{i,t} \\ & + Controls_{i,t} + Firm - fixed\ Effect + Year \\ & - fixed\ Effect + \varepsilon_{i,t} \end{aligned} \quad (9)$$

Panel C of Table 5 reports the results using Equation (8). We observe that the coefficients of DSIZE are positively significant at conventional levels of significance, indicating that risk-seeking firms tend to make more ESG disclosures. This also indicates that firms with higher risk tolerance may also have a greater capacity to absorb the costs and risks associated with ESG disclosures, such as increased monitoring and reporting requirements, reputational risks and legal liabilities. Thus, they may be more willing to disclose their ESG performance and strategy to demonstrate their resilience and transparency, which can help them build trust and credibility with stakeholders (Fatemi et al., 2018). In contrast, the interaction term CU1*DSIZE is negatively significant in the first column (coefficient −2.538, $p < 0.05$), second (coefficient −1.922, $p < 0.05$) and third column (coefficient −1.671, $p < 0.05$). This reveals that the overall risk-tolerance aspect of firms further reduces the engagement and disclosures of sustainability initiatives in the presence of uncertain cash flows. This further indicates that when a firm faces high CU, it may focus more on short-term survival and be less willing to take on longer

TABLE 5 Moderating impact of managerial risk inclination and firm risk tolerance.

	(1)	(2)	(3)
Panel A: Moderating impact of managerial risk inclination on link between sustainability disclosure and cash flow uncertainty			
CU1	−1.546***	−0.494	−0.372
	(0.414)	(0.317)	(0.297)
DER	−0.166***	0.087**	0.080**
	(0.048)	(0.034)	(0.034)
CU1 * DER	1.058**	0.109	−0.026
	(0.508)	(0.300)	(0.291)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.048	0.410	0.488
Panel B: Moderating impact of managerial risk inclination on link between sustainability disclosure and firm life cycle			
FLC1	−0.336***	−0.257***	−0.204***
	(0.093)	(0.061)	(0.054)
DER	−0.125***	0.078***	0.066**
	(0.034)	(0.026)	(0.025)
FLC1 * DER	0.296***	0.202***	0.157***
	(0.100)	(0.069)	(0.059)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.033	0.420	0.494
Panel C: Moderating impact of firm risk tolerance on link between sustainability disclosure and cash flow uncertainty			
CU1	−0.832*	−0.335	−0.292
	(0.466)	(0.222)	(0.200)
DSIZE	0.371***	0.192***	0.151**
	(0.088)	(0.069)	(0.067)
CU1 * DSIZE	−2.538**	−1.922**	−1.671**
	(1.062)	(0.883)	(0.819)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.054	0.408	0.487
Panel D: Moderating impact of firm risk tolerance on link between sustainability disclosure and firm life cycle			
FLC1	−0.054	−0.076*	−0.066**
	(0.041)	(0.039)	(0.029)
DSIZE	0.289***	0.113*	0.077
	(0.082)	(0.063)	(0.059)
FLC1 * DSIZE	−0.457***	−0.352***	−0.242**
	(0.144)	(0.122)	(0.094)

(Continues)

TABLE 5 (Continued)

	(1)	(2)	(3)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.043	0.414	0.489

*(10%), **(5%), and ***(1%) statistical significance.

term ESG initiatives. When this is combined with a high-risk tolerance, the firm may prioritise risk-taking behaviour over ESG disclosures, leading to a negative impact on ESG disclosures.

Panel D of Table 5 reports the results based on Equation (9). The interaction term FLC1*DSIZE is negatively significant in the first column (coefficient −0.457, $p < 0.01$), second column (coefficient −0.352, $p < 0.01$) and third column as well (coefficient −0.242, $p < 0.05$). These results reveal that firms' overall risk-tolerance aspect further accelerates the FLC's negative impact on sustainability disclosure. In this case, these firms may be inferring that risky decisions in the presence of organisational inertia may fail to bring any positive outcomes. They may also be less willing to devote resources to longer term sustainability initiatives, which may not show immediate financial returns. As firms become older and enter later stages of the FLC, organisational rigidity exacerbates the tendency to prioritise short-term gains over long-term sustainability goals.

5.4 | Robustness analysis

5.4.1 | Additional proxies

We consider alternate proxies of CU and FLC for robustness tests. We consider the standard deviation of operating income to total assets ratio for past 4 years inclusive of the current year as an alternate proxy of cash flow uncertainty (CU2) (Chay & Suh, 2009). We also consider retained earnings to total asset ratio as an alternate proxy of FLC (FLC2) (DeAngelo et al., 2006). Panel A of Table 6 reports the results of Equation (1) considering CU2 as a proxy of CU in place of CU1. The results are similar to that of Table 3, which further supports H1. Panel B of Table 6 reports the results of Equation (2) considering FLC2 instead of FLC1. The results are again similar to that of Table 3, which further supports H2a. Panel C of Table 6 reports the results of Equation (3). Here, we consider Young2 variable instead of Young1 as a dummy variable that takes a value of 1 for firms having FLC2 value in the bottom 1/3rd cohort and 0 otherwise. The results are similar to what we obtained in Table 4 (Panel A). Panel D of Table 6 reports the results of Equation (4). Here, Mature2 is used in place of Mature1, which is a dummy variable that takes a value of 1 for firms having FLC2 value in the middle 1/3rd cohort and 0 otherwise ratio. The results are again similar to results from Table 4 (Panel B). Panel E of Table 6 reports the results of Equation (5). Here, Old2 is used in place of Old1, which is a dummy variable that takes a value of 1 for firms having FLC2 value in the top 1/3rd cohort and 0 otherwise ratio. The results are again similar to results from Table 4 (Panel C).

5.4.2 | Non-linear effect of firm life cycle on sustainability disclosure

We have also used Dickinson (2011) proxy of the FLC, which captures the non-linear aspect of the FLC (Bhattacharya et al., 2020). Based on the definition of Dickinson (2011), FLC is classified into five stages, namely, introduction, growth, maturity, shake-out and decline. Firms are allocated to each of these five stages based on cash flow criteria outlined in Table A4. Following previous studies (Abuhommous, 2024; Dickinson, 2011; Hasan & Habib, 2017), we exclude the analysis of the shake-out stage due to the presence of ambiguity about its theoretical aspects. The results are presented in Table 7. The coefficient of the introduction stage in column 1 (insignificant) and growth stage in column 2 (significant) variables are negative, which indicates the least importance of sustainability disclosure at this stage. On the other hand, we find positive and significant results in the mature stage in column 3, which indicates the relevance of having adequate financial and technical capacity to engage in sustainability engagements and subsequent disclosures. Finally, the coefficient of the decline stage in column 4 is insignificant, implying that older firms are least concerned about sustainability disclosures. Based on the results using Dickinson (2011) FLC classification, we infer that a firm will have an established business arena by the time it enters the mature stage, and these firms give priority to distinguishing themselves from the competitors through sustainability disclosures. This supports our hypothesis H2c.

5.4.3 | Main results excluding financial firms

Table 8 shows the results of the main models by excluding financial firms from the sample. Panels A, B, C and D report the results based on panel data models given in Equations (1), (2), (3), (4) and (5), respectively, without including firms in the financial sector. Results are similar to Table 3 and Table 4.

TABLE 6 Robustness test using alternate proxies of cash flow uncertainty and firm life cycle.

	(1)	(2)	(3)
Panel A: Sustainability disclosure and cash flow uncertainty			
CU2	−0.122	−0.250**	−0.243**
	(0.166)	(0.116)	(0.102)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2,280	2,280	2,280
Adj. R^2	0.000	0.398	0.480
Panel B: Sustainability disclosure and firm life cycle			
FLC2	−0.314***	−0.359***	−0.296***
	(0.089)	(0.121)	(0.103)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.011	0.403	0.483
Panel C: Sustainability disclosure and young-stage firms			
Young2	0.080***	0.081***	0.064***
	(0.020)	(0.015)	(0.013)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.012	0.408	0.486
Panel D: Sustainability disclosure and mature-stage firms			
Mature2	−0.010	−0.005	−0.005
	(0.016)	(0.012)	(0.011)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	−0.000	0.396	0.478
Panel E: Sustainability disclosure and old-stage firms			
Old2	−0.066***	−0.075***	−0.057***
	(0.021)	(0.014)	(0.013)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.008	0.406	0.484

*(10%), **(5%), and ***(1%) statistical significance.

TABLE 7 Firm life cycle and sustainability disclosure.

	ESG (1)	ESG (2)	ESG (3)	ESG (4)
INTRODUCTION	−0.022			
	(0.014)			
GROWTH		−0.039***		
		(0.010)		
MATURE			0.037***	
			(0.010)	
DECLINE				0.007
				(0.023)
LMV	0.156***	0.155***	0.153***	0.157***
	(0.011)	(0.011)	(0.011)	(0.011)
ROA	−0.151***	−0.152***	−0.156***	−0.151***
	(0.047)	(0.047)	(0.047)	(0.047)
VOL	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
RD	−0.002**	−0.002**	−0.002***	−0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
PPE	0.035**	0.036**	0.035**	0.036**
	(0.014)	(0.014)	(0.014)	(0.014)
MB	−0.005***	−0.005***	−0.005***	−0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
DUL	−0.121***	−0.119***	−0.121***	−0.120***
	(0.026)	(0.025)	(0.025)	(0.026)
GEN	0.010***	0.009***	0.009***	0.010***
	(0.001)	(0.001)	(0.001)	(0.001)
DIR	−0.002***	−0.002***	−0.002***	−0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
				(0.023)
Constant	1.668***	1.689***	1.687***	1.653***
	(0.142)	(0.141)	(0.142)	(0.142)
Firm-FE	Added	Added	Added	Added
Year-FE	Added	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added	Added
Observations	2280	2280	2280	2280
Adjusted R^2	0.479	0.482	0.482	0.478

Abbreviation: ESG, environmental, social and governance; RD, research and development.
*(10%), **(5%), and ***(1%) statistical significance.

5.4.4 | Sample selection bias

We use propensity score matching (PSM) to address the issue of sample selection bias in the study. First, the firms that are having ESG disclosure scores greater than 3rd quartile of the sample are taken as the treatment sample and other firms are considered as the control group. A logistic regression is performed by taking all control variables as

TABLE 8 Robustness test excluding financial firms.

	(1)	(2)	(3)
Panel A: Sustainability disclosure and cash flow uncertainty			
CU1	−1.938***	−0.887***	−0.725**
	(0.447)	(0.293)	(0.294)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	1884	1884	1884
Adj. R^2	0.052	0.418	0.502
Panel B: Sustainability disclosure and firm life cycle			
FLC1	−0.063	−0.080**	−0.066**
	(0.045)	(0.040)	(0.029)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	1884	1884	1884
Adj. R^2	0.004	0.415	0.499
Panel C: Sustainability disclosure and young-stage firms			
Young1	0.106***	0.095***	0.075***
	(0.020)	(0.016)	(0.014)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	1884	1884	1884
Adj. R^2	0.025	0.429	0.508
Panel D: Sustainability disclosure and mature-stage firms			
Mature1	0.003	−0.007	−0.008
	(0.018)	(0.014)	(0.013)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	1884	1884	1884
Adj. R^2	−0.001	0.409	0.495
Panel E: Sustainability disclosure and old-stage firms			
Old1	−0.104***	−0.082***	−0.063***
	(0.020)	(0.015)	(0.015)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	1884	1884	1884
Adj. R^2	0.026	0.424	0.504

*(10%), **(5%), and ***(1%) statistical significance.

TABLE 9 Propensity score matching (PSM).

	LESG (1)	LESG (2)	LESG (3)
CU1		−0.883**	
		(0.363)	
FLC1			−0.052**
			(0.023)
MV	0.719	0.048*	0.052*
	(0.695)	(0.026)	(0.027)
ROA	2.328	0.263	0.223
	(3.543)	(0.172)	(0.170)
VOL	0.05	0.001	0.001
	(0.04)	(0.001)	(0.001)
RD	−0.492	0.055**	0.054**
	(0.382)	(0.022)	(0.022)
PPE	0.783	0.070	0.072
	(2.076)	(0.091)	(0.089)
MB	−0.047	−0.002**	−0.002*
	(0.072)	(0.001)	(0.001)
DUL	−0.069	0.029	0.028
	(1.044)	(0.037)	(0.040)
GEN	−0.086*	0.003*	0.003*
	(0.046)	(0.002)	(0.002)
DIR	−0.05*	−0.001	−0.001
	(0.029)	(0.001)	(0.001)
Constant	−20.187**	2.461***	2.341***
	(8.448)	(0.348)	(0.377)
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Obs.	1800	1,276	1,276
Pseudo R^2/Adj. R^2	0.7833	0.551	0.545

*(10%), **(5%), and ***(1%) statistical significance.

independent variables using 1:4 nearest neighbour matching (Abadie et al., 2004). Then, we implement Equations (1) and (2) on the matched sample. Column 1 of Table 9 reports the results of logistic regression. The results in columns 2 and 3 show the impact of CU and FLC on the ESG disclosure score after matching the samples. The coefficients of CU1 (−0.883) and FLC1 (−0.052) are negatively significant at 5%, which resonates with our previous results.

6 | DISCUSSION, IMPLICATIONS AND CONCLUSION

The concerns about the societal and environmental impact of corporate actions have risen dramatically over the years. Subsequently,

firms are forced to take serious measures to commit resources for sustainability initiatives and timely disclosure of these initiatives. A firm is required to make long-term commitments and allocate physical and financial resources for pursuing its sustainability goals. This may get challenged either by the presence of certain unforeseen circumstances or by the dominance of other business priorities (Jia & Li, 2020; Phan et al., 2021). In this line, this study explores the consequences of uncertain cash flow situations and the transition from one FLC stage to another on corporate sustainability disclosures.

The findings demonstrate that the possibility of uncertain future cash flows makes firms delay their investments in ESG projects and related disclosures. This phenomenon is in line with real-option theory and underlines the fact that when there is a reward for postponing investment decisions, firms wait for the availability of enhanced information, which facilitates arriving at a better choice (Bloom et al., 2007; McDonald & Siegel, 1986). The findings are also substantiated by the agency theory, suggesting that managers may prioritise their short-term financial interests over long-term sustainability goals when faced with CU. CU can also lead to a decrease in the firm's ability to finance sustainable projects and allocate resources towards sustainable initiatives, resulting in lower sustainability disclosures (Boyle & Guthrie, 2003). This indicates that the presence of CU can increase the perceived riskiness of sustainability investments, leading firms to avoid them in favour of less risky investments with shorter payback periods. This is further reflected in the lesser disclosures by these firms under the ESG dimensions.

Similarly, using the prepositions of organisational-inertia theory, we show how incentives prevalent at different FLC stages contribute to a firm's sustainability intentions. We found a negative relationship between FLC and sustainability disclosures. Precisely, there is a lower incentive for an old-stage firm to provide ESG information. This behaviour of resistance to adapting to changes comes from the rigidity in the organisational structure that gets accumulated during its lifetime as a firm moves to an established enterprise (Larsen & Lomi, 1999). This could be due to a shift in priorities as the company focuses on maintaining its position in the market rather than committing to long-term sustainability goals (Huang, 2021). It could also be due to a lack of perceived benefits, as the costs and benefits of sustainability initiatives may not be immediately apparent or easily quantifiable.

Conversely, our results show that young firms are in a better position to shape their business around sustainability dimensions. Since young firms need to establish themselves in the market, ESG initiatives are being considered as a tool to gain legitimacy and superior advantage over their competitors (Aragón-Correa et al., 2008). Thus, these firms make substantial efforts to provide ESG disclosures. Additionally, our results based on Dickinson's (2011) FLC classification indicates that mature-stage firms also provide more ESG information to their stakeholders. Previous studies document that the abundant resource base coupled with the competitive advantage enjoyed by mature firms enables them to devote more investments in CSR activities (Hasan & Habib, 2017). Therefore, our study expands this line of literature, further outlining the priorities of a mature-stage firm with respect to gaining legitimacy from its stakeholders.

We also document how a manager's risk inclination moderates the influence of CU and FLC on sustainability disclosure. This can be attributed to a manager's foresight to make use of the benefits of moral capital and goodwill attained through sustainability efforts in uncertain times (Lynn, 2021). This is in line with the prepositions of stakeholder theory, which suggests that firms have a social responsibility to meet the needs of their stakeholders, including the environment, and such efforts can enhance the firm's reputation and create long-term value. The inhibiting character of uncertainty in investment decisions may also get translated into managers' ability to anticipate the future outcome (Slawinski et al., 2017). However, top executives are observed to have a high tolerance towards risk (Graham et al., 2013) and may behave proactively by involving in stakeholder management efforts to obtain resilience during uncertain times (Choi & Wang, 2009). Similarly, organisational rigidity and inertia may act as a hurdle in acting in accordance with the changing business environment; our results show that risk-inclined managers reduce this influence on sustainability engagements and respective disclosures. Additionally, based on the quiet life hypothesis, we also show that firm risk tolerance negatively moderates the influence of CU and FLC on sustainability disclosure. This hypothesis argues that firms prefer to stay back and relax when it comes to investment decisions (Bertrand & Mullainathan, 2003). This effect will be more pronounced during uncertain times when the firm is already constrained in its operations. We underline that as a firm gets older, its preference for quiet life also gets increased eventually restraining itself from proactively engaging in sustainability initiatives.

Our findings also have useful implications for the top-level management to prepare themselves for meeting the stakeholder demands even during uncertain times. Our findings also aid managers in designing their organisational structure with a space to accommodate ESG initiatives as they enter into the later stage (old stage) of FLC. If firms want to derive long-term benefits from sustainability initiatives, it has to allocate both physical and financial resources reserved for these projects, even in uncertain times. By doing this, the firm will not go in short of adequate funds even in the presence of a volatile situation with respect to its cash flows. To accumulate positive externalities through stakeholder legitimacy and reputational capital, a continuous sustainability commitment is inevitable. As a step towards this, companies can monitor the cash flow situations in advance and consider sustainability initiatives as a part of their normal course of business by allocating required funds depending on their progress.

Our results also reveal that the rigidity and resistance to change accumulated over a period may restrain a firm from adopting sustainability initiatives. This is evident in the lower commitment to make ESG disclosure during the old FLC stage. This is an alert to top-level management and signals them to rethink the relative importance given to the achievement of sustainability goals. As larger and established firms are always under the scrutiny of external monitoring agencies, failure to comply with socio-environmental concerns can hamper growth prospects in the long run. These actions can also eventually force government bodies to impart strict guidelines on business operations, making it difficult to expand its market and gain a customer base. Since

customers are also increasingly aware of the sustainability aspects, older organisations may face backlash in the market if they fail to act responsibly towards society and the environment.

Policymakers can also draw meaningful insights from the findings of the study to incorporate the uncertainty and life-cycle aspects in the regulatory framework for enforcing sustainability disclosures at the firm level. Achieving the sustainability goals of a country can only be achieved through the inclusive participation of all the stakeholders involved in it. Individual organisations are the important stakeholders in this agenda who consume large amounts of resources on the one hand, and simultaneously, their operations impact the lives of many people. A continuous organisational commitment to sustainability engagements is of interest to regulatory bodies as well. Our results point out the reluctance on the part of firms to engage in sustainability efforts during uncertain periods. Therefore, external incentives in terms of subsidies and tax concession are required to motivate firms to be involved in sustainability projects. This can act as a support during uncertain times and enable firms to take care of the interests of all stakeholders. Similarly, the negative effect of FLC on sustainability disclosures underlines the need for strict regulatory rules and fines for firms that have enough resources to make investments in sustainability projects.

6.1 | Limitations and future research

One of the main variables of interest in this study is CU, which can be considered as an internal element. However, external uncertainties can also have an impact on the sustainability engagements of a firm, and this element can have a different direction of relationship with a firm's intention to devote its resources to sustainability. This may also depend on a firm's sensitivity and exposure to tackle those unforeseen circumstances. Therefore, further studies can be explored in this direction. Research highlights that the presence of a weaker regulatory environment and political ecosystem constrains a firm from accessing funds and other resources, which hampers the smooth execution of sustainability-oriented business operations (Baldini et al., 2018). Firms in those environments may be reluctant to dedicate their capital and human resources to sustainability initiatives. This aspect of fluctuations in the regulatory environment, together with changes in strategies employed during different FLCs, is also an interesting aspect that is unexplored in this study.

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APPENDIX A

TABLE A1 Distribution of firms based on GICS classification.

GICS code	Industry	No. of firms	Firm-year observations	Percentage
50	Communication services	8	96	4.21%
25	Consumer discretionary	20	240	10.53%
30	Consumer Staples	17	204	8.95%
10	Energy	5	60	2.63%
40	Financials	33	396	17.37%
35	Health care	18	216	9.47%
20	Industrials	23	276	12.11%
45	Information technology	9	108	4.74%
15	Materials	42	504	22.11%
60	Real estate	7	84	3.68%
55	Utilities	8	96	4.21%
	Total	190	2280	100%

TABLE A2 List of variables.

Variable	Description
LESG	Natural logarithm of ESG disclosure score from Bloomberg.
CU1	Rolling standard deviation of cash flow from operations divided by total assets for the past 6 years
CU2	Standard deviation of operating income to total assets ratio for the past 4 years
FLC1	Ratio of retained earnings to total equity
FLC2	Ratio of retained earnings to total assets
MV	Natural logarithm of market value of equity
ROA	Ratio of net income to total assets
VOL	Annualised volatility based on standard deviation of daily returns for the given year
RD	Ratio of research and development expenses to sales
PPE	Ratio of net plant, property and equipment to total assets
MB	Ratio of market value of equity to book value of equity
DUL	CEO duality, which is a dummy variable, equals 1 if a CEO is also chair of the board and 0 otherwise
GEN	Percentage of women on board
DIR	Percentage of independent directors on board

TABLE A3 Moderating impact of managerial risk inclination.

	(1)	(2)	(3)
Panel A: Moderating impact of managerial risk inclination on link between sustainability disclosure and cash flow uncertainty			
CU1	−1.158***	−0.651**	−0.550**
	(0.443)	(0.254)	(0.217)
COMP	−0.273***	−0.120***	−0.105***
	(0.026)	(0.021)	(0.021)
CU1 * COMP	0.332	0.312*	0.258
	(0.233)	(0.170)	(0.178)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.165	0.419	0.495
Panel B: Moderating impact of managerial risk inclination on link between sustainability disclosure and firm life cycle			
RTE	−0.159**	−0.193***	−0.141***
	(0.063)	(0.063)	(0.051)
COMP	−0.263***	−0.107***	−0.092***
	(0.020)	(0.016)	(0.016)
FLC1 * COMP	0.093	0.125*	0.080
	(0.075)	(0.073)	(0.059)
Controls	No	Firm	Firm and governance
Firm-FE	Added	Added	Added
Year-FE	Added	Added	Added
Cluster-SE (firm)	Added	Added	Added
Obs.	2280	2280	2280
Adj. R^2	0.152	0.424	0.498

*(10%), **(5%), and ***(1%) statistical significance.

TABLE A4 Firm life-cycle classification as per Dickinson (2011).

	Introduction	Growth	Mature	Shake-out			Decline	
	1	2	3	4	5	6	7	8
Cash flow from operating	−	+	+	−	+	+	−	−
Cash flow from investing	−	−	−	−	+	+	+	+
Cash flow from financing	+	+	−	−	+	−	+	−