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# Executive Compensation Clawbacks and Corporate Climate Engagement



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# Executive Compensation Clawbacks and Corporate Climate Engagement


## Purpose

The purpose of this study is to investigate how the adoption of executive compensation clawbacks affects the climate engagement initiatives of firms listed in the U.S. Based on agency theory, we test two competing arguments— (1) the proactive risk management view and (2) the excessive caution view—to examine whether clawback provisions improve or constrain corporate climate engagement efforts.

## Design/methodology/approach

Our sample includes firms listed in the U.S. from 1996 to 2017. We measure corporate climate engagement by creating a Climate Engagement Index (CINDEX) based on four variables: (1) the appointment of sustainability executives, (2) CDP reporting, (3) climate-related lobbying, and (4) pro-climate coalition membership. To investigate causality and mitigate possible endogeneity issues, we employ several empirical methods, including propensity score matching, instrumental variable regression, and a battery of robustness tests.

## Findings

Our results support the proactive risk management view. We find that clawback provisions increase corporate climate engagement. Specifically, firms adopting clawback provisions exhibit an increase in climate engagement of approximately 0.12 standard deviations relative to firms without such provisions. Furthermore, we show that the positive effect of clawback provisions persists across both environmentally sensitive and non-sensitive industries, as well as in firms with or without ESG-linked compensation policies. Finally, we document that climate engagement initiatives driven by clawback provisions reduce firms' exposure to climate change risks.

## Practical implications

Our results have practical implications, showing that clawback provisions are valuable governance tools that promote corporate climate engagement and help mitigate climate-related risks. Boards, managers, and investors should consider clawbacks not only as safeguards against misconduct but also as mechanisms to align executive incentives with environmental objectives. Policymakers and regulators have a clear role in

incorporating clawback provisions into sustainability frameworks to strengthen corporate accountability and support long-term climate goals.

**Originality/value**

Our study extends the existing literature on clawback provisions beyond financial outcomes by linking them to corporate sustainability. We identify clawback provisions as a key governance mechanism for promoting climate engagement and demonstrate their effectiveness across various organizational contexts. This contributes to a deeper understanding of how compensation-based governance mechanisms affect environmental performance.

## 1. Introduction

The urgency of addressing climate change risks and their adverse consequences highlights the need for effective corporate governance mechanisms. While corporate governance mechanisms primarily focus on protecting shareholders' interests from managerial opportunism (Jensen & Meckling, 1976), their scope has since expanded. In particular, existing corporate governance frameworks now monitor not only firms' financial performance but also address climate change and other sustainability issues (Bui et al., 2020; Harjoto & Jo, 2011). The literature in this regard suggests that governance mechanisms—such as board composition (Ghafoor et al., 2023; Liu, 2024)—influence climate-related risks and sustainability performance (Hussain et al., 2018; Iliev & Roth, 2023). Specifically, these mechanisms monitor managers by mitigating short-termism and opportunistic behavior.

Similar to other governance mechanisms, clawback provisions serve an effective governance tool that may influence firms' climate performance through financial accountability. These provisions enable firms to recoup executive compensation following a material misrepresentation of firm performance or failure to manage material risks (Chan et al., 2012; Dehaan et al., 2013). The foundational mechanism operates through ex-post settling-up: when compensation awarded based on reported performance is later revealed to reflect misconduct—whether through financial manipulation or concealment of material risks—clawbacks impose financial penalties to realign incentives.

Traditional applications of clawback provisions have primarily targeted accounting irregularities and financial fraud. For instance, William McGuire, the former chairman and CEO of UnitedHealth Group, paid $468 million due to an option backdating scandal. Similarly, in 2019, the CEO of McDonald's, Steve

Easterbrook, agreed to pay $105 million for misleading investors[1]. Consistent with agency theory (Jensen & Meckling, 1976), these provisions effectively align principal-agent interests by imposing monetary penalties when agents harm the firm's long-term value (Chan et al., 2012; Dehaan et al., 2013). The empirical literature also supports this alignment effect and suggests that clawback provisions reduce executives' opportunistic behavior. In particular, these studies report that clawback provisions reduce financial misstatements (Natarajan & Zheng, 2019), earnings manipulation incentives (Iskandar-Datta & Jia, 2013), and insider trading activities (Joo & Kyung, 2024)

Clawback provisions have undergone significant evolution in response to shifting definitions of materiality, increasingly encompassing failures in environmental risk governance. This shift is driven by three key developments: (1) growing regulatory recognition that climate-related risks are financially material[2], (2) empirical evidence linking environmental negligence to measurable corporate financial harm (Li et al., 2024; Matsumura et al., 2014), and (3) emerging legal precedents that classify climate-related misstatements and greenwashing as securities fraud [3]. These developments effectively broaden the scope of clawbacks to include material misstatements in climate disclosures and verifiable greenwashing practices. By explicitly tying climate-related governance failures to financial accountability mechanisms,

[1] See for details: https://www.nytimes.com/2021/12/16/business/mcdonalds-steve-easterbrook.html

[2] The SEC's Climate-Related Disclosure Rules underscore the importance of assessing and disclosing the financial impacts of climate-related risks, including both material and transition risks, on corporate financial statements (EcoActive ESG, 2025; Eversheds Sutherland, 2025; U.S. Securities and Exchange Commission, 2024). These regulations aim to enhance transparency and standardization in climate-related reporting for investors. For details, please refer to the following links:
EcoActive ESG. (2025, January 29). Climate Disclosure Trends: What the SEC's 2025 Climate Rules Mean for You. https://ecoactivetech.com/climate-disclosure-trends-what-the-secs-2025-climate-rules-mean-for-you/
Eversheds Sutherland. (2025, March 27). SEC ends defense of climate disclosure rules. https://www.eversheds-sutherland.com/en/united-states/insights/sec-ends-defense-of-climate-disclosure-rules
U.S. Securities and Exchange Commission. (2024). The Enhancement and Standardization of Climate-Related Disclosures for Investors (Final Rule, Release No. 33-11275). https://www.sec.gov/rules/final/2024/33-11275.pdf

[3] Vale S.A. faced a serious securities fraud action filed by the SEC for manipulation and misleading statements about dam safety and ESG disclosures. The SEC's allegations include safety audits and misleading investors through its sustainability reports, charging the company under Rule 10b-5 and Sections 10(b) and 13(a) of the Exchange Act, as well as Section 17(a) of the Securities Act. "This lawsuit is one of the first brought by the SEC against a publicly traded company for making false or misleading statements around climate disclosures... The SEC's lawsuit was brought under multiple commonly applied anti-fraud provisions within the federal securities framework, including Rule 10b-5, Sections 10(b) and 13(a) of the Exchange Act, and Section 17(a) of the Securities Act." (Wang, 2025). For details, please refer to https://www.jtl.columbia.edu/bulletin-blog/vale-and-the-rise-of-securities-based-climate-litigation

the redefinition of "misconduct" under clawback provisions incentivizes more rigorous environmental risk oversight and enhances alignment between executive incentives and long-term firm value.

While clawback provisions are documented as an effective tool in the agency theory literature, the studies discussed above largely examine them in the context of managing traditional financial risks and have overlooked other risks, such as climate change. We extend this scope by investigating a key question: Can clawback provisions, similar to other effective governance mechanisms—such as board independence (Liao et al., 2015) and gender diversity (Nadeem et al., 2020)—increase firms' climate engagement?

In this study, we define corporate climate engagement as firms' initiatives to promote climate performance and investigate whether the adoption of clawback provisions increases or decreases these initiatives. Based on agency theory, we propose two competing hypotheses: (i) the proactive risk management view, and (ii) the excessive caution view. Under the proactive risk management view, we expect that clawback provisions enhance firms' climate engagement by making managers more attentive to potential risks, including climate change risks, that could result in the loss of their compensation. Conversely, under the excessive caution view, we propose that clawback provisions may reduce firms' climate engagement efforts due to excessive risk aversion on the part of executives.

We investigate these competing views using a sample of firms listed in the U.S. We measure firms' climate engagement by creating the Climate Engagement Index (CINDEX). This index is based on four dummy variables indicating whether the firm: (1) appoints an executive-level Chief Sustainability Officer (CSO) or a similar executive position; (2) reports its GHG emissions to the Carbon Disclosure Project (CDP); (3) lobbies on climate change issues through the formal lobbying procedures under the Lobbying Disclosure Act; and (4) is a member of at least one pro-climate action coalition in a given year. Lerner and Osgood (2023) suggest that these variables reflect firms' pro-climate initiatives. Similarly, consistent with Babenko et al. (2023), we define clawback adoption by a firm using a dummy variable (CLAWBACK), which equals 1 if the firm discloses a clawback provision in the current or prior year, and 0 otherwise.

Our findings support the proactive risk management perspective. In particular, we find that the adoption of clawback provisions has a positive and significant impact on firms' Climate Engagement Index. The economic significance of our results indicates that firms with clawback provisions experience an increase in climate engagement of approximately 0.12 standard deviations compared to those without such provisions.

We address potential endogeneity concerns arising from selection bias, reverse causality, and omitted variable bias. First, firms that adopt clawback provisions may systematically differ from those that do not, potentially biasing the results. To address this, we apply Propensity Score Matching (PSM) to match firms with and without clawback provisions based on observable firm characteristics, thereby creating more comparable groups. Second, climate engagement might itself influence the likelihood of adopting a clawback policy, raising concerns about reverse causality. To mitigate this, we employ an instrumental variable (IV) approach using two instruments: executives' prior experience with clawback adoption at other firms, and their experience with compensation-related shareholder proposals. These instruments generate exogenous variation in clawback adoption, allowing us to better isolate its causal impact on climate engagement. Third, unobserved factors may jointly influence both clawback adoption and climate engagement. To account for this, we analyze internal and external components of climate engagement as separate outcomes. Internal components include appointing a Chief Sustainability Officer and CDP reporting, while external components cover activities such as climate lobbying and coalition membership. Finally, we include a rich set of control variables—including CEO characteristics, corporate governance measures, and industry competition—to reduce concerns related to omitted variables. Across all specifications, the positive association between clawback provisions and climate engagement remains consistent and statistically significant.

Furthermore, we investigate the moderating effects of the environmental sensitivity of firms' industries and the presence of ESG-linked compensation policies. Our findings show that the positive effect of clawback provisions on firms' climate engagement persists across both environmentally sensitive and non-sensitive industries, as well as in firms with and without ESG-linked compensation policies. This suggests that the impact of clawback provisions on climate engagement does not significantly differ between these industry types. In other words, clawback provisions are equally effective in promoting climate engagement regardless of a firm's environmental exposure. Moreover, clawback provisions function as an effective governance tool independent of existing ESG-linked compensation structures. These findings suggest that clawback provisions provide a robust mechanism to promote climate engagement, irrespective of industry environmental sensitivity or current ESG incentive policies. Additionally, we examine whether clawback-driven climate engagement helps mitigate firms' climate change risk exposure. Specifically, we explore the interaction effect between clawback provisions and the Climate Engagement Index on firms' climate risk

exposure. We find that clawback provisions not only encourage greater climate engagement but also reduce firms' climate change risk exposure.

We contribute to existing literature in several ways. First, we extend the scope of clawback provisions' implications beyond financial outcomes. Previous research has primarily focused on their effects on various financial outcomes, including financial reporting quality and accounting fraud risk (Chan et al., 2012; Dehaan et al., 2013; Fung et al., 2015), investment and risk-taking behavior (Babenko et al., 2023; Hirsch et al., 2017), firms' financing decisions (Chan et al., 2013), and stock price crash risks (Bao et al., 2018). We build on this literature by exploring how clawback provisions shape firms' climate engagement, a key outcome reflecting sustainability efforts. Second, we contribute to the climate change risk literature by identifying the adoption of clawback provisions as a critical governance mechanism that encourages firms' climate engagement. By documenting that clawback provisions increase climate engagement by 0.12 standard deviations, we highlight an important and previously underexplored driver of corporate climate initiatives. Our findings are significant because they show that clawback provisions, like other traditional governance mechanisms, can support corporate responses to climate challenges. Third, we enhance understanding of how compensation-led governance mechanisms affect environmental performance across different organizational contexts. Specifically, we show that clawback provisions effectively encourage climate engagement regardless of firms' environmental sensitivity or incentive structures. Finally, we contribute to the literature on climate change risk management by demonstrating that clawback-driven climate engagement initiatives effectively mitigate firms' exposure to climate change risks.

The paper is structured as follows. We present our literature review and hypotheses in Section 2, data and estimation methods in Section 3, baseline regression results in Section 4, robustness analyses in Section 5, additional analyses in Section 6, and the conclusion in Section 7.

## 2. Literature Review and Hypotheses

Corporate scandals and financial crises have significantly eroded public trust. Such issues have increased scrutiny and demand for greater accountability and transparency. To rebuild credibility and public trust, regulatory authorities have started to take decisive actions (Cole et al., 2021). The Sarbanes-Oxley Act (2002) and the Dodd-Frank Act (2010) are substantial regulatory pushes for corporations to reform governance mechanisms to promote corporate accountability and transparency. Due to enhanced regulatory

scrutiny, clawback provisions have gained prominence in recent years (Babenko et al., 2023; Chen et al., 2015). The need for such provisions is exemplified by cases like the $468 million settled enforcement action against the former CEO and Chairman of UnitedHealth Group Inc. in 2007[4] and the $105 million settled lawsuit against McDonald's ex-CEO in 2019[5]. Before 2005, only 3% of Fortune 100 companies had clawback provisions in executive compensation contracts (Equilar, 2009). However, from 2011 to 2015, the percentage of S&P 500 company proxies disclosing a clawback policy rose sharply from 50.4% to 77.1% (Equilar, 2016). As such, CEOs feel intense pressure to justify their bonuses and not to face potential clawbacks due to misconduct. Besides, these provisions give a signal to current and potential investors about the executives' commitment to financial reporting quality (Cha et al., 2023).

The extant research establishes that clawback provisions effectively deter financial misconduct (Asante-Appiah & Sharma, 2022; Remesal, 2024), as supported by deterrence theory (Becker, 1999), and reshape executive risk-taking behavior (Babenko et al., 2023; Dehaan et al., 2013). However, their implications for environmental governance remain theoretically ambiguous and empirically underexplored. This gap is particularly salient given the growing regulatory recognition of climate risks as financially material (SEC, 2022). Furthermore, environmental negligence is increasingly regarded as serious misconduct capable of triggering clawback provisions (Barko et al., 2022). From the perspective of agency theory, two opposing implications emerge: clawbacks may either promote climate engagement by making environmental risks personally salient to executives or suppress it due to heightened managerial risk aversion. To reconcile this theoretical divergence, we formulate two hypotheses regarding the net impact of clawback provisions on corporate climate initiatives.

Considering the theoretical and empirical literature, we argue that clawback adoption increases corporate climate engagement, as executives become more attentive to potential risks that could result in the loss of their compensation. An agency theory-based perspective (Jensen & Meckling, 1976) leads us to formulate the proactive risk management hypothesis. Executives are rational actors who seek to maximize their short-term financial benefits by making risky decisions at the expense of the firm's long-term value. Such risk-taking incentives often promote irresponsible social behavior (Bouslah et al., 2018), stemming from the understatement of potential adverse consequences (Tang et al., 2015). Clawback provisions redirect executives' risk-taking through several mechanisms. First, poor climate performance can lead to executive

[4] For more details, see: https://www.sec.gov/news/press/2007/2007-255.htm#:~:text=The%20settlement%20is%20the%20first,their%20companies%20were%20misleading%20investors.
[5] For more details, see: https://www.nytimes.com/2021/12/16/business/mcdonalds-steve-easterbrook.html

job loss (Burke, 2022; Colak et al., 2024), driven by diminished shareholder support, reduced board representation, and a higher likelihood of dismissal (Lel, 2025). If clawback provisions are in place, executives may also face financial penalties through compensation recovery. Therefore, proactive executives in such environments are more likely to pursue climate engagement initiatives to safeguard their roles and compensation. Second, clawback provisions significantly enhance corporate governance quality by increasing managerial accountability in strategic decisions (O'Sullivan, 2024; Stark, 2021). This effect is evident across various domains—from improved financial reporting quality (Dehaan et al., 2013; Joo & Kyung, 2024) to more effective risk management practices (Babenko et al., 2023). Given the role of other governance mechanisms in improving firms' environmental performance (De Villiers et al., 2011; Ghafoor et al., 2023; Gull et al., 2024), we expect clawback provisions to similarly increase climate-related initiatives and disclosures. Furthermore, due to the overarching nature of sustainability, Zhou et al. (2024) and Oh et al. (2024) find that such provisions also lead firms to improve their broader social behavior. Based on these theoretical and empirical insights, we propose the following hypothesis:

**Hypothesis 1:** *The adoption of clawback provisions is positively associated with corporate climate engagement through improved governance quality.*

Although clawbacks are widely recognized as a governance-strengthening mechanism, such provisions might inadvertently hinder climate engagement by prompting managers to perceive climate initiatives as risk-creating rather than risk-managing. With increasing concerns over personal liability, executives may become excessively risk averse. We propose this as the excessive caution hypothesis and argue that clawbacks can ultimately weaken firms' climate engagement efforts. This reasoning aligns with agency theory, which provides a lens to understand such behavior: strict monitoring mechanisms may shift executives' focus from pursuing rewarding but risky opportunities to avoiding personal losses (Hales et al., 2025). This behavioral shift is also consistent with the quiet life hypothesis, which suggests that executives tend to choose safer options to protect their personal interests.

Clawback provisions may exacerbate these tendencies by imposing asymmetric penalties—executives face severe financial repercussions through compensation recovery, yet there is no equivalent reward for undertaking successful climate initiatives. This creates a risk–reward imbalance, particularly discouraging engagement in climate-related strategies, which often involve uncertain payoffs, front-loaded costs, and prolonged temporal horizons (Eccles et al., 2014; Flammer, 2021; Krueger et al., 2020). Recent literature on risk behavior and environmental performance supports this view, suggesting that risk-averse executives

tend to disengage from climate actions (Grewal et al., 2021; Harjoto & Jo, 2011), thereby contributing to climate degradation (Hossain, Saadi, et al., 2023). Empirical studies on clawback-led executive conservatism provide further evidence—documenting reduced R&D investments, fewer patent filings, higher cash holdings, and even increased financial reporting failures (Babenko et al., 2023; Liu et al., 2020; Sung, 2025). Taken together, we posit that excessively cautious executives may avoid meaningful climate initiatives, viewing them as too risky and potentially subject to clawback-related penalties. Drawing on these theoretical insights and empirical patterns, we propose the following hypothesis:

**Hypothesis 2:** *The adoption of clawback provisions is negatively associated with corporate climate engagement due to induced managerial risk aversion.*

We summarize these two competing arguments in our conceptual framework below in Figure 1. The diagram illustrates the opposing predictions: that clawbacks will either increase climate engagement through better risk management (H1) or decrease it by promoting excessive caution (H2).

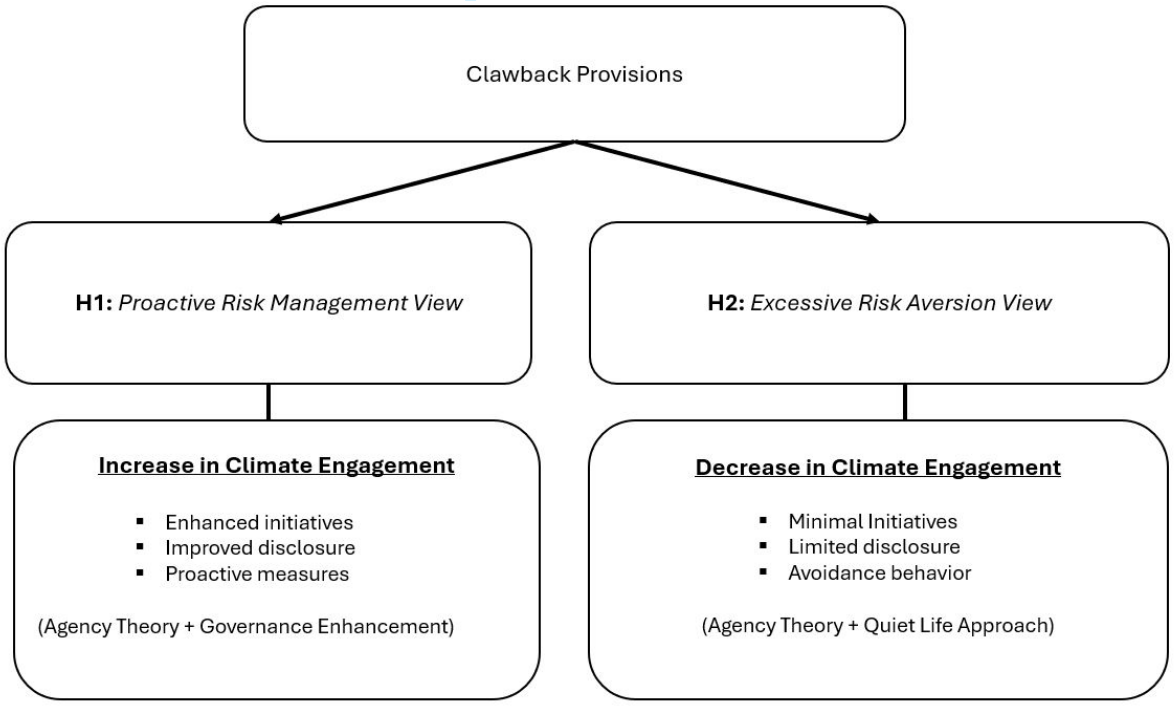


Figure 1: Theoretical Framework: Clawback Provisions and Corporate Climate Engagement

## 3. Data and Estimation Method

To investigate the effect of clawback provisions on corporate climate engagement, we merge the dataset on clawback provisions from Babenko et al. (2023) with the climate engagement data from Lerner and Osgood (2023)[6]. The study sample consists of US firms between 1996 and 2017. We use the clawback adoption dataset of Babenko et al. (2023), as it is comprehensive compared to other studies in the literature (Biddle et al., 2024; Iskandar-Datta & Jia, 2013). In particular, they analyze an extensive sample of firms' clawback disclosures using machine-readable methods. They analyzed 1.04 million SEC filings to identify 5,358 firms that implemented a clawback policy. Following Babenko et al. (2023), we define clawback adoption by a firm with a dummy variable (CLAWBACK), which equals 1 if the firm discloses a clawback provision in the current or prior year, and 0 otherwise.

We measure firms' climate engagement (CINDEX) using four indicator variables: the appointment of a Chief Sustainability Officer (CSO), reporting to the Carbon Disclosure Project (CDP), membership in pro-climate action coalitions (COAL), and lobbying on climate change issues (LOBBY). Lerner and Osgood (2023) use these variables to capture corporate commitment to climate engagement. Specifically, they suggest that the appointment of a CSO and reporting to the CDP are firms' internal actions to support green initiatives, while pro-climate coalitions (COAL) and lobbying (LOBBY) are firms' external engagements to support climate policy. While internal commitments may not guarantee improved climate performance (Belkhir et al., 2017; Delmas & Burbano, 2011), such behaviors are preliminary steps toward substantial climate actions (Lerner & Osgood, 2023). We combine both the internal and external engagements into an overall climate engagement index (CINDEX). To construct CINDEX, the four components are coded 1/0 to represent the presence/absence of (1) a firm-level Chief Sustainability Officer (CSO), (2) submission of an annual Carbon Disclosure Project report (CDP), (3) participation in at least one pro-climate action coalition (COAL), and (4) engagement in climate change legislation-related lobbying (LOBBY). We employ equal weighting for the four CINDEX components for several reasons. First, equal weighting is commonly used in the construction of corporate governance and disclosure indices due to its transparency and objectivity, especially when there is no clear basis for assigning different weights (Bebchuk et al., 2009; Gompers et al., 2003). Second, equal weighting avoids the subjectivity inherent in alternative weighting schemes and provides a transparent and replicable measure. Third, our robustness tests, discussed in Section

[6] We thank Babenko et al. (2023) and Lerner and Osgood (2023) for sharing the datasets at https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/3OKHKY and https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/KIXUIF, respectively.

5.3, show that the results remain consistent when each component is examined separately, thereby supporting the validity of the composite index.

We employ the following model to examine the impact of clawback provisions (CLAWBACK) on corporate climate engagement (CINDEX).

$$\text{CINDEX}_{it+1} = \alpha + \beta\text{CLAWBACK}_{it} + \gamma\text{CONTROLS}_{it} + \varepsilon_{it} \quad (1)$$

In the model above, *i* and *t* denote firm and year, respectively. Our dependent variable is $\text{CINDEX}_{it+1}$, and the variable of interest is clawback provisions ($\text{CLAWBACK}_{it}$). $\text{CONTROLS}_{it}$ represents control variables that could affect the firms' climate engagement. Consistent with the literature on corporate environmental and carbon performance (García Martín & Herrero, 2020; Ghafoor et al., 2023; Haque, 2017; Qian & Schaltegger, 2017), we include: firm size (SIZE: natural logarithm of total assets), leverage (LEV: total debt divided by total assets), market-to-book ratio (MTB: market value divided by book value), research and development expenditures (R&D: R&D expenditures divided by total assets), capital expenditures (CAPEX: capital expenditures divided by total assets), dividends (DIV: total dividends paid divided by total assets), cash holdings (CASH: cash divided by total assets), and firm total risk (VOL: annualized standard deviation of monthly stock returns over the prior year). The data on these variables are taken from Compustat and CRSP.

Furthermore, we control for firm, industry, and year fixed effects in our estimation model. We exclude financial and utility firms (SIC codes 6000–6999 and 4900–4999, respectively) because these firms have unique regulations and industry characteristics. We also remove firms with total assets of less than $1 million. We winsorize all continuous variables at the 1st and 99th percentiles. After merging the key datasets and applying the sampling criteria discussed above, our final sample consists of 20,676 firm-year observations. We cluster standard errors at the firm level (GVKEY) to account for potential correlation of errors across observations for each firm.

## 4. Results

### 4.1. Descriptive Statistics

We present the descriptive statistics and univariate test results for our total sample and for firms grouped by clawback provisions in Panel A of Table 1. To analyze variations in firm characteristics based on clawback status, we divide our sample into firms that have clawback provisions (CLAWBACK = 1) and

those that do not (CLAWBACK = 0). We present the mean, median, and standard deviation (SD) for each group. We report *t*-statistics and Wilcoxon rank-sum (Mann–Whitney *U*) tests to compare the mean and median values of our study variables.

We observe that the Climate Engagement Index (CINDEX) for the whole sample has a mean of 0.257, a median of 0.000, and a standard deviation of 0.661, indicating substantial dispersion and that most firms exhibit no climate engagement. However, the univariate analysis shows that the average CINDEX of firms with clawback provisions is higher (0.423) than that of firms without clawback provisions (0.118). The difference in mean and median CINDEX between the two groups is statistically significant at the 1% level. The results further show that firms with clawback provisions exhibit distinct characteristics compared to those without such provisions. Specifically, these firms are larger (SIZE), have higher growth opportunities (MTB), higher debt ratios (LEV), and higher dividend payouts (DIV). Furthermore, these firms exhibit lower investment levels (R&D and CAPEX) and lower risk-taking behavior (VOL).

We present the correlation analysis in Panel B of Table 1. We document a positive and statistically significant association between CLAWBACK and CINDEX (Coefficient: 0.250, $p<0.01$), reinforcing the univariate finding that firms with clawback provisions exhibit higher climate engagement. Moreover, CLAWBACK is positively correlated with firm size (SIZE) and leverage (LEV), but negatively associated with risk-taking (VOL) and R&D intensity, consistent with the previous studies (Babenko et al., 2023; Chan et al., 2013; Natarajan & Zheng, 2019). Overall, the descriptive statistics and correlation matrix indicate a positive relationship between clawback provisions and climate engagement.

*****Please Insert Table 1 Here*****

### 4.2. Baseline Regression Results

To examine the effect of clawback provisions (CLAWBACK) on corporate climate engagement (CINDEX), we use several model specifications with different fixed effects to account for omitted variable concerns. In Model 1, we include the CLAWBACK variable only with firm fixed effects[7]. In Model 2, we extend the specification by adding financial control variables. In Model 3, we also include firm and industry fixed effects to control for time-invariant firm characteristics, industry-specific factors, and temporal trends.

[7] We conduct a Hausman test to compare the fixed effects and random effects models. The results support the fixed effects model ($\chi^2 = 986.81$, df = 120, $p < 0.001$).

We present our regression results in Table 2. Across all specifications (Models 1–3), we find positive and statistically significant coefficients on CLAWBACK for CINDEX at the 1% level (coefficients: 0.077, 0.078, and 0.076; all $p < 0.01$). The results remain robust whether we include only CLAWBACK, CLAWBACK with control variables, or CLAWBACK with firm, industry, and year fixed effects. These findings suggest that the relationship between clawback provisions and firms' climate engagement is robust and is not driven by time-invariant omitted variables that might jointly influence a firm's clawback adoption and climate engagement over time.

The consistent positive effect of clawback provisions on climate engagement supports our Hypothesis 1, which is based on the proactive risk management perspective. Consistent with agency theory (Jensen & Meckling, 1976), clawback provisions help improve climate engagement by disciplining managers and increasing their accountability for environmental outcomes. They do this by imposing financial penalties for poor performance, including in environmental areas, which motivates managers to take climate-related risks more seriously. Our results are also consistent with recent studies showing that managers face career consequences for poor climate performance, such as job losses and reduced board appointments (Burke, 2022; Colak et al., 2024). Clawbacks reinforce these consequences by making environmental responsibility part of executive accountability. In doing so, they go beyond improving financial reporting quality and risk oversight (Babenko et al., 2023; Bao et al., 2018; Dehaan et al., 2013) and extend governance benefits to environmental management. These results support the broader view that stronger governance mechanisms lead to better environmental outcomes (De Villiers et al., 2011; Walls et al., 2012) and complement evidence from Zhou and Zhao (2024) that clawbacks enhance firms' social and environmental behavior.

Our findings are not only statistically significant but also economically meaningful. In Model 3, which controls for firm and industry–year fixed effects, we find that adopting a clawback provision is associated with an increase in climate engagement of about 0.12 standard deviations. To quantify this economic significance, we follow the approach outlined by Mitton (2024), dividing the CLAWBACK coefficient (0.076) by the full-sample standard deviation of the climate engagement index (CINDEX), which is 0.661. This calculation yields an effect size of approximately 0.12 standard deviations ($0.076 \div 0.661 = 0.115$). In practical terms, this means that firms with clawback provisions are more likely to take meaningful climate actions, such as appointing a Chief Sustainability Officer, reporting greenhouse gas emissions to the CDP, joining pro-climate coalitions, or engaging in climate-related lobbying. Even after controlling for other

relevant factors, the adoption of clawback provisions corresponds to a noticeable increase in these key climate engagement activities. Overall, this result highlights that clawback provisions have a meaningful and tangible impact on corporate climate efforts. It reinforces the proactive risk management view by demonstrating that clawbacks serve as an effective governance mechanism for strengthening environmental accountability and encouraging firms to be more active in addressing climate risks.

Regarding control variables, we show that firm size (SIZE) positively affects CINDEX, suggesting that larger firms exhibit greater climate engagement, potentially due to reputational concerns and heightened public visibility (De Villiers et al., 2011; Lerner & Osgood, 2023). Likewise, the market-to-book ratio (MTB) has a positive and significant effect on CINDEX, suggesting that firms with higher growth prospects engage more in climate initiatives (De Villiers et al., 2011; Walls et al., 2012). We further show that dividend payouts (DIV) positively affect firms' climate engagement. The results suggest that firms' financial health—indicated by their ability to pay dividends—enables them to engage in climate-related initiatives[8].

*****Please Insert Table 2 Here*****

## 5. Robustness Analyses:

### 5.1. Propensity Score Matching (PSM)

In this section, we establish the robustness of our results by addressing potential endogeneity concerns arising from self-selection. Since the adoption of clawback provisions is a voluntary choice, firms that implement such policies may systematically differ from those that do not in ways that also influence their climate engagement. For example, companies with stronger governance practices or a greater focus on sustainability may be both more likely to adopt clawbacks and more engaged in climate-related initiatives. As a result, differences in climate engagement between clawback provision adopters and non-adopters may reflect underlying firm characteristics rather than the true effect of clawback provisions. Failure to account for selection bias can lead to inconsistent and biased estimates, compromising the credibility of the results (Heckman, 1979). To mitigate this concern, we employ Propensity Score Matching (PSM), a widely used

[8] We also calculate the economic significance of our significant control variables. For SIZE, a one-unit increase is associated with a 0.03 standard deviation increase in CINDEX; for MTB, the effect is 0.005 standard deviations; for DIV, the effect is 0.67 standard deviations; and for VOL, the effect is a decrease of 0.99 standard deviations. Economic significance is calculated as the coefficient divided by the standard deviation of CINDEX (Mitton, 2024).

method that helps create a more balanced sample by matching firms based on relevant observable characteristics (Rosenbaum & Rubin, 1983).

To address possible selection bias in our estimation, we also implement Propensity Score Matching (PSM) by following the existing literature on clawback provisions (Babenko et al., 2023; Chan et al., 2012; Dehaan et al., 2013). In the matching procedure, we pair each firm-year observation with a clawback provision (CLAWBACK = 1) to a comparable one without it (CLAWBACK = 0). This matching is based on firm and year, industry, and various firm financial controls, including firm size (SIZE), market-to-book ratio (MTB), leverage (LEV), dividends (DIV), capital expenditures (CAPEX), R&D expenditures (R&D), stock volatility (VOL), and cash holdings (CASH), as specified in Table 2. Utilizing nearest-neighbor propensity score matching without replacement, we create two comparable groups: the treatment group (TREAT) with clawback provisions and the control group (CONTROL) without clawback provisions.

Table 3 shows our PSM results. In Panel A, we present the quality of the matching process, which indicates the univariate mean comparison between the treatment group (TREAT) and the control group (CONTROL). The results suggest that the two groups are similar—with no significant differences—across all covariates except for climate engagement (CINDEX). Following the matching process, we perform a PSM regression analysis to examine the effect of clawback provisions on firms' climate engagement. Panel B reports the PSM regression results. The multivariate results confirm that clawback provisions in otherwise comparable firms positively affect corporate climate engagement (coefficient = 0.042, $p < 0.01$). These findings support the conclusion that our baseline results are robust to sample selection bias.

*****Please Insert Table 3 Here*****

### 5.2. Bivariate Instrumental Variable (IV) Regression

Our PSM method addresses selection bias; however, other endogeneity concerns—such as omitted variables and reverse causality—might still affect the results. As such, the effects of unobservable factors on both clawback adoption and firms' climate engagement need consideration. For instance, firms with higher climate engagement are more likely to adopt strong governance mechanisms like clawbacks. We, therefore, employ an instrumental variables (IV) approach to isolate the relationship between clawback provisions and climate engagement from exogenous variation.

In our analysis, we utilize two different instruments regarding clawback adoption. Similar to Babenko et al. (2023), we use executives' prior experience with clawback adoption (INST_PRIOR) at other firms. It is fundamentally based on the idea that executives' familiarity with such mechanisms influences their current corporate governance decisions (Adams et al., 2010). Specifically, this instrument leverages the knowledge spillover effect (Chen et al., 2024), where directors' prior exposure to governance mechanisms such as clawback policies at other firms increases their awareness and familiarity with such mechanisms, making clawback adoption more likely at their current firm (Babenko et al., 2023). The underlying mechanism operates through directors' accumulated governance experience and institutional memory. When directors have previously encountered clawback provisions at other firms, they possess a greater understanding of the implementation process, potential benefits, and stakeholder reactions, thereby reducing information costs and implementation barriers at their current firm. This knowledge transfer is particularly relevant for complex governance mechanisms like clawbacks, where implementation requires specialized knowledge and experience. Studies suggest that directors' prior experiences influence governance decisions through interlocking board relationships and cross-firm learning effects (Hernández-Lara & Gonzales-Bustos, 2019; Knyazeva et al., 2013; Shue, 2013). Similar to Babenko et al. (2023), we define INST_PRIOR as a dummy variable that equals 1 if the focal firm's executives adopted clawback provisions while serving on the board of another firm, and 0 otherwise.

Our second instrument also measures executives' prior experience with compensation-related shareholder proposals (INST_DSHRP). As Ertimur et al. (2011) suggest, executives' familiarity with executive pay activism affects governance mechanisms such as clawbacks that link pay to performance. The rationale is simple: directors who have experienced shareholder activism regarding executive compensation become more sensitive to pay-performance alignment issues and are more likely to support governance mechanisms like clawbacks that address these concerns. Consistent with Babenko et al. (2023), we measure INST_DSHRP as a dummy variable that equals 1 if the firm's executives have experience handling compensation-related shareholder proposals while serving on another firm's board, and 0 otherwise.

We believe that both instruments satisfy the exclusion restriction. Specifically, executives' prior exposure to clawback adoption (INST_PRIOR) or compensation-related shareholder proposals (INST_DSHRP) should affect climate engagement only through their influence on the likelihood of adopting a clawback provision. These experiences are related to compensation design and governance learning rather than firms' environmental or climate strategies. It is therefore unlikely that experiences at unrelated firms directly shape

a focal firm's climate actions, except by increasing awareness of and support for clawback mechanisms. Prior research in upper echelons and governance spillovers shows that executives' experiences primarily shape firms' adoption of governance practices through learning and diffusion mechanisms, rather than directly determining unrelated strategic outcomes such as climate engagement (Campbell et al., 2023; Shin et al., 2016; Zhu & Shen, 2016). We therefore expect INST_PRIOR and INST_DSHRP to influence firms' climate engagement primarily by shaping the likelihood of clawback adoption, rather than by directly affecting firms' climate-related strategies or actions.

Incorporating both instruments in our baseline model, we provide a comprehensive framework that enhances the reliability of our estimates. Table 4 shows our IV regression results. The first column displays the first-stage regression results, while the second column presents the second-stage regression. The results reported in column (1) show that both instruments are positively and significantly associated with firms' tendency to adopt clawback provisions. In column (2), we find a positive and statistically significant coefficient for CLAWBACK (instrumented) on CINDEX (coefficient = 0.932, $p < 0.01$). The findings suggest that our baseline results are robust and not driven by endogeneity concerns such as reverse causality or omitted variable bias.

The IV estimate is larger in magnitude than the corresponding OLS coefficient, reflecting differences in the variation exploited by the two approaches. While OLS captures average associations in the full sample, the IV strategy identifies the effect for firms whose adoption of clawback provisions is influenced by industry peer adoption. This corresponds to a local average treatment effect for a subset of firms that may be more responsive to governance mechanisms, which can naturally result in a larger estimated effect (Angrist & Imbens, 1995). Similar differences between OLS and IV estimates are common in corporate finance and governance research when addressing endogeneity (Al Mamun et al., 2024; Babenko et al., 2023). Although a larger IV coefficient could raise concerns about weak identification, our diagnostic tests indicate that the instrument is strong and valid. We report several instrumental variable (IV) diagnostics in Table 4 to confirm the validity and strength of our instruments. The value of the F-test for excluded instruments is 15.16, which suggests a strong first-stage relationship between the instruments and clawback adoption. The Kleibergen–Paap rk F-statistic (Kleibergen & Paap, 2006) is 15.16, which exceeds the critical value of 11.59 at the 15% significance level (Stock & Yogo, 2005), suggesting that our instruments are strong. Furthermore, the highly significant underidentification test (Kleibergen–Paap LM = 27.99, $p < 0.001$) confirms that our instrument is relevant and not underidentified (Kleibergen & Paap, 2006). The Montiel–

Pflueger F-statistic is 13.79 and exceeds the 5% weak-instrument bias threshold, which further suggests that our instruments are strong and weak-instrument bias is unlikely (Olea & Pflueger, 2013)[9]. Finally, the Hansen J test ($p = 0.532$) supports the exclusion restriction, indicating that our instruments are exogenous (Hansen, 1982). Overall, these statistical diagnostics confirm the robustness of our instrumental variable approach, which shows that clawback provisions have a significant positive effect on climate engagement.

*****Please Insert Table 4 Here*****

### 5.3. Alternate Measures

In our initial analysis, we developed the climate engagement index (CINDEX), which combines four key variables: the appointment of a Chief Sustainability Officer (CSO), reporting to the Carbon Disclosure Project (CDP), membership in pro-climate action coalitions (COAL), and lobbying on climate change issues (LOBBY). To ensure robustness, we also examine the impact of clawback provisions on each variable individually.

Similar to Lerner and Osgood (2023), we classify the four key corporate climate engagement variables into two groups: internal support (CSO and CDP) and external engagements (LOBBY and COAL). By estimating four models, we comprehensively examine the effect of clawback provisions on these corporate climate engagement dimensions. In Table 5, Models 1 and 2 focus on internal commitments, while Models 3 and 4 focus on external engagements. In Models 1 and 2, we employ CSO and CDP as the dependent variables, respectively. Similarly, in Models 3 and 4, we use LOBBY and COAL as dependent variables, respectively. We find that across all models (1–4), the CLAWBACK coefficients are consistently positive and statistically significant at the 1 percent level. These results highlight that clawback provisions have strong effects in promoting corporate climate engagement, both internally and externally.

*****Please Insert Table 5 Here*****

### 5.4. Additional Controls

To further establish the robustness of our results, we supplement our baseline model with additional control variables in three progressive models. In Model 1, we include CEO characteristics following upper echelons theory (UET). The existing literature on UET and sustainability highlights that the CEO's gender

[9] We calculated Montiel-Pflueger F-statistic by installing weak ivtest package in Stata (ssc install weakivtest).

(Homroy, 2023; Huang, 2013), education (Lewis et al., 2014), age and experience (Quan et al., 2023), and tenure (Chen et al., 2019) are key determinants of firms' environmental or green performance. We, therefore, include CEO characteristics in Model 1. Specifically, we include CEO gender (MALE_CEO: a dummy variable coded as 1 for male and 0 for female), age (AGE_CEO: the natural logarithm of the CEO's age), tenure (TENURE_CEO: the number of years served as CEO), and ownership (OWN_CEO: the percentage of shares held by the CEO). We collect data for these variables from the Compustat–ExecuComp database.

The literature on agency theory suggests that corporate governance characteristics significantly affect firms' sustainability practices (Ghafoor et al., 2023; Javed et al., 2023; Naciti, 2019). Based on this literature, we expand Model 1 further and include corporate governance characteristics in Model 2. In particular, Model 2 includes board size (BSIZE: the natural logarithm of the number of directors on the board—source: BoardEx) (Naciti, 2019), board independence (BIND: the percentage of independent directors on the board—source: BoardEx) (Liao et al., 2015), gender diversity (FEMALE%: the percentage of female directors on the board—source: BoardEx) (Javed et al., 2023), CEO duality (CEOD: a dummy variable that equals 1 if the CEO is also chairman of the board, and 0 otherwise—source: BoardEx) (Nadeem et al., 2020), institutional ownership (INST: the percentage of shares held by institutional investors—source: Form 13F–EDGAR) (Chen et al., 2020), and analyst following (ANALYST: the natural logarithm of the number of analysts following the company—source: IBES) (Griffin et al., 2020).

Finally, we address the potential impact of industry competition on corporate climate engagement in Model 3. Existing studies show that product market competition pressures affect corporate sustainable behavior (Dupire & M'Zali, 2018; Van Horen et al., 2018). We follow Hoberg et al. (2014) and Hoberg and Phillips (2016) and include several alternative proxies to measure product market competition. These variables include the text-based Herfindahl–Hirschman index (HHI_COMP), total similarity (SIM_COMP), and product market fluidity (FLUID_COMP).

We present our results in Table 6. Across all models (Models 1–3), the coefficients on CLAWBACK are positive and statistically significant at the 1 percent level, supporting the robustness of our baseline results to additional controls.

*****Please Insert Table 6 Here*****

## 6. Additional Analyses:

### 6.1: Moderating Role of Industry Nature and ESG-linked Compensation Policy

Finally, we examine the moderating role of the environmental sensitivity of industries on the relationship between clawback provisions (CLAWBACK) and climate engagement initiatives (CINDEX). This is important because firms in environmentally sensitive industries often face higher stakeholder pressure and regulatory scrutiny regarding their environmental practices (Boiral & Heras-Saizarbitoria, 2017; Cho & Patten, 2007). Specifically, we argue that the relationship between clawback provisions and climate engagement would be stronger in environmentally sensitive industries, as managers in such industries could face financial and reputational risks due to poor environmental performance. To investigate this, we follow Nadeem et al. (2020) and create a dummy variable (ENV_SENS) that equals 1 if firms operate in environmentally sensitive industries (e.g., paper, oil exploration, petroleum refining, metals, chemical, and allied products industries) and 0 otherwise. We interact ENV_SENS with CLAWBACK to create the interaction term CLAWBACK*ENV_SENS.

We report the results in Panel A of Table 7. The results suggest that the coefficient of CLAWBACK on climate engagement is positive and significant at the 1 percent level (coefficient: 0.069, $p < 0.01$). Environmental sensitivity (ENV_SENS) also positively affects climate engagement (coefficient: 0.006, $p < 0.05$). However, the interaction term (CLAWBACK*ENV_SENS) is not statistically significant (coefficient: 0.039, $p > 0.10$), which suggests that the effect of clawback provisions on climate engagement does not significantly differ between environmentally sensitive and non-environmentally sensitive industries. In other words, the results suggest that clawback provisions are equally effective in both environmentally sensitive and non-sensitive industries. This uniform effectiveness of clawback provisions across industries highlights their fundamental significance as a corporate governance mechanism for promoting environmental initiatives.

In Figure 1A in the Appendix, we show this effect graphically through marginal plots. The graph suggests that while clawback provisions increase predicted climate engagement in both industry types—with environmentally sensitive industries showing an increase from 0.25 to 0.36, compared to non-environmentally sensitive industries increasing from 0.25 to 0.32—this difference is not statistically significant. While the magnitude of the effect appears slightly larger for environmentally sensitive

industries, this difference is not statistically significant, as confirmed by the non-significant interaction term of CLAWBACK*ENV_SENS in Panel A of Table 7.

Next, we investigate the moderating effect of ESG-linked compensation on the relationship between clawback provisions (CLAWBACK) and corporate climate engagement (CINDEX). Existing studies document that including ESG performance in executive compensation increases firms' financial (Homroy et al., 2023) and environmental performance (Gull et al., 2023; Nekhili et al., 2021). In particular, firms that link executive compensation to ESG performance demonstrate their commitment to environmental efforts and provide explicit financial incentives for sustainability performance (Al-Shaer & Zaman, 2019). To investigate this, we create a dummy variable (ESG_COMP) that equals 1 if firms have an ESG-linked compensation policy in place and 0 otherwise. We interact ESG_COMP with CLAWBACK to create the interaction term CLAWBACK*ESG_COMP. We collect information on firms' ESG-linked compensation policies from the Thomson Reuters Eikon database. It is defined as a binary variable that equals 1 if a firm has an ESG-linked compensation policy in place and 0 otherwise.

We report our results in Panel B of Table 7. We find that clawback provisions (coefficient = 0.109, $p < 0.05$) and ESG-linked compensation policies (coefficient = 0.189, $p < 0.01$) independently enhance corporate climate engagement. However, the interaction effect (CLAWBACK*ESG_COMP) is not statistically significant (coefficient = 0.020, $p > 0.10$), which suggests that ESG-linked compensation policies do not significantly moderate the relationship between clawback provisions and climate engagement. The non-significant interaction effect demonstrates that clawback provisions operate as an effective governance mechanism independent of existing ESG-linked compensation structures—clawback provisions are equally effective in firms with and without ESG-linked compensation policies. This finding reinforces the significance of clawback provisions as a standalone corporate governance instrument that consistently promotes firms' climate engagement across different compensation frameworks.

We also report a marginal plot in Figure 2A in the Appendix. The graph shows that, for firms without ESG-linked compensation policies (ESG_COMP = 0), clawback provisions increase predicted climate engagement from 0.55 to 0.67. In contrast, for firms with ESG-linked compensation policies (ESG_COMP = 1), clawback provisions increase predicted climate

engagement from 0.75 to 0.87. Firms with ESG-linked compensation start from a higher baseline, but the magnitude of the clawback effect appears consistent across both groups (approximately a 0.12-unit increase). The difference between the two groups is not statistically significant, as confirmed by the non-significant interaction term CLAWBACK*ESG_COMP in Panel B of Table 7. These findings imply that clawback provisions are effective regardless of whether firms have ESG-linked compensation policies in place.

*****Please Insert Table 7 Here*****

### 6.2. Do Clawback Provisions Turn Climate Engagement into Tangible Climate Risk Mitigation?

In this section, we investigate whether an increase in firms' climate engagement due to clawback provisions materializes into mitigation of climate change–related risk. The premise of this investigation stems from the view that clawback provisions, as a governance mechanism, not only incentivize firms to adopt environmentally responsible practices but also contribute to reducing their intrinsic exposure to climate-related risks. The literature supports this perspective, suggesting that effective governance structures are associated with lower climate risk exposure (Ghafoor et al., 2023; Trinh et al., 2023).

To measure firms' climate change risk, we merge firm-level data from Sautner et al. (2023), who construct a climate change risk (CCR) measure that captures the firm-specific and time-varying nature of climate risk. Specifically, CCR is derived through textual analysis of corporate earnings conference calls. The method counts the frequency of climate change–related keywords and risk-associated terms within the same sentences. CCR aims to quantify the extent to which a firm perceives and communicates climate change as a material risk factor in its corporate narratives. Recent studies have also employed this measure to assess firms' climate risk exposure (Choi, 2024; Ghafoor et al., 2023; Hossain, Rjiba, et al., 2023).

We interact clawback provisions (CLAWBACK) with the climate engagement index (CINDEX) to construct an interaction variable, CLAWBACK*CINDEX, which we use to test whether governance and climate engagement jointly affect climate risk. We expect a negative coefficient on this interaction term when regressed on climate change risk (CCR), indicating that the combination of clawback provisions and climate engagement leads to lower climate risk exposure. The results in Table 8 support this expectation. Specifically, we find a negative and statistically significant coefficient for CLAWBACK*CINDEX on CCR (coefficient = –0.061, $p < 0.01$). These findings indicate that firms with both clawback provisions and higher levels of climate engagement exhibit lower exposure to climate change risk.

The main effects of CLAWBACK and CINDEX on CCR are not statistically significant. This indicates that, on their own, neither clawback provisions nor climate engagement significantly reduce climate risk. However, the negative and significant interaction effect indicates a different relationship. It suggests that clawback provisions function as effective risk-mitigation tools only when firms also exhibit higher levels of climate engagement. In other words, the risk-reducing benefit of clawback provisions emerges when they are combined with active climate-related initiatives, rather than when they are implemented in isolation. These findings highlight the importance of integrating governance mechanisms such as clawback provisions into environmental strategies, not only for regulatory compliance but also as proactive instruments for managing climate-related risk.

*****Please Insert Table 8 Here*****

## 7. Conclusion

This study investigates how clawback provisions influence corporate climate engagement, using data from U.S.-listed firms between 1996 and 2017. Our findings support the proactive risk management view derived from agency theory: clawback provisions serve as effective governance tools that encourage firms to engage more deeply in climate-related initiatives. Firms that adopt clawback provisions demonstrate a statistically and economically significant increase in climate engagement, approximately 0.12 standard deviations, compared to their counterparts without such provisions.

Importantly, these results hold across a variety of contexts and remain robust to endogeneity concerns, including potential selection bias, reverse causality, and omitted variable bias. Additional analyses reveal that the positive impact of clawback provisions persists regardless of a firm's industry environmental sensitivity or the presence of ESG-linked compensation policies. Furthermore, we find evidence that clawback-driven climate engagement contributes to a measurable reduction in firms' climate risk exposure, suggesting that clawback provisions can serve not only as compliance tools, but also as strategic instruments for long-term risk mitigation.

Our findings have both theoretical and practical implications. Theoretically, we broaden the scope of agency theory by illustrating how governance mechanisms traditionally tied to financial accountability can extend to environmental domains. We also contribute to the growing literature on corporate climate risk by linking governance tools to risk outcomes through the channel of climate engagement. Practically, our results suggest that managers, boards, and investors should view clawback provisions as more than a

deterrent against misconduct, as they can also be leveraged to advance firms' sustainability goals. For policymakers and regulators, the findings offer a case for incorporating clawback provisions into environmental regulatory frameworks to enhance corporate accountability and climate responsiveness.

Looking ahead, several avenues for future research remain. While our study highlights clawback provisions as a key governance mechanism, other tools—such as shareholder activism, and long-term incentive plans—also play important roles in mitigating managerial short-termism and promoting sustainability. Future research could explore how these governance characteristics interact with clawback provisions to influence environmental performance. Additionally, investigating the long-term impact of clawback provisions on broader environmental strategies, including waste reduction, clean technology adoption, and carbon-neutral operations, would provide valuable insights. Lastly, extending this analysis to different institutional settings could reveal how the effectiveness of clawback provisions varies across countries with differing regulatory frameworks and governance norms.

**Declaration of generative AI and AI-assisted technologies in the writing process**

During the preparation of this manuscript, the authors used Qwen3-Max, a large language model developed by Alibaba Cloud, to assist with language-related improvements, including restructuring sentences, enhancing readability, and checking for grammatical accuracy. The AI tool was used solely for language editing and proofreading purposes. All intellectual content, analysis, interpretation, and scholarly conclusions are entirely the work of the authors. Following the use of the tool, the authors carefully reviewed, revised, and validated the manuscript, and take full responsibility for the final version. Documentation of the AI-assisted editing process can be provided upon request.

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## Table 1: Descriptive Statistics and Correlation Matrix

### Panel A: Descriptive Statistics

| | Total Sample | | | CLAWBACK=1 | | | CLAWBACK=0 | | | Mean Difference Test | | Median Difference Test | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **Mean** | **Median** | **SD** | **Mean** | **Median** | **SD** | **Mean** | **Median** | **SD** | **Diff.** | **T-Stat.** | **Diff.** | **Z-Stat.** |
| CINDEX | 0.257 | 0.000 | 0.661 | 0.423 | 0.000 | 0.817 | 0.118 | 0.000 | 0.449 | 0.305 | -38.344 | 0.000 | -40.711 |
| SIZE | 5.985 | 5.939 | 2.135 | 7.478 | 7.544 | 1.855 | 5.568 | 5.475 | 2.018 | 1.910 | -97.691 | 2.069 | -91.039 |
| MTB | 2.028 | 1.481 | 2.065 | 1.981 | 1.547 | 1.589 | 2.041 | 1.458 | 2.180 | -0.060 | 2.919 | 0.089 | -12.637 |
| LEV | 0.272 | 0.233 | 0.253 | 0.305 | 0.272 | 0.243 | 0.262 | 0.221 | 0.255 | 0.043 | -17.090 | 0.051 | -24.578 |
| DIV | 0.011 | 0.000 | 0.029 | 0.015 | 0.002 | 0.028 | 0.011 | 0.000 | 0.031 | 0.004 | -14.587 | 0.002 | -33.709 |
| CAPEX | 0.057 | 0.037 | 0.063 | 0.049 | 0.033 | 0.053 | 0.059 | 0.038 | 0.065 | -0.010 | 16.371 | -0.005 | 15.616 |
| R&D | 0.050 | 0.000 | 0.117 | 0.035 | 0.000 | 0.093 | 0.054 | 0.000 | 0.122 | -0.019 | 16.572 | 0.000 | 11.286 |
| VOL | 0.038 | 0.031 | 0.023 | 0.027 | 0.022 | 0.016 | 0.041 | 0.035 | 0.024 | -0.014 | 63.708 | -0.013 | 72.840 |
| CASH | 0.162 | 0.078 | 0.203 | 0.144 | 0.083 | 0.173 | 0.167 | 0.076 | 0.167 | -0.023 | 11.363 | 0.007 | -1.537 |

### Panel B: Correlation Matrix

| | Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | CINDEX | 1.000 | | | | | | | | | |
| **2** | CLAWBACK | 0.250*** | 1.000 | | | | | | | | |
| **3** | SIZE | 0.189*** | 0.385*** | 1.000 | | | | | | | |
| **4** | MTB | -0.023*** | -0.014*** | -0.161*** | 1.000 | | | | | | |
| **5** | LEV | 0.025*** | 0.067*** | 0.099*** | 0.234*** | 1.000 | | | | | |
| **6** | DIV | 0.124*** | 0.067*** | 0.099*** | 0.085*** | 0.069*** | 1.000 | | | | |
| **7** | CAPEX | 0.033*** | -0.054*** | 0.028*** | 0.141*** | 0.132*** | 0.010** | 1.000 | | | |
| **8** | R&D | -0.085*** | -0.064*** | -0.282*** | 0.274*** | -0.047*** | 0.006 | -0.084*** | 1.000 | | |
| **9** | VOL | -0.232*** | -0.255*** | -0.183*** | 0.063*** | 0.026*** | -0.100*** | 0.001 | 0.262*** | 1.000 | |
| **10** | CASH | -0.082*** | -0.030*** | -0.194*** | 0.124*** | -0.212*** | -0.011*** | -0.124*** | 0.157*** | 0.199*** | 1.000 |

This table presents descriptive statistics and a correlation matrix for a sample of U.S. firms from 1996 to 2017. The primary dependent variable in the analysis is the Climate Engagement Index (CINDEX). Panel A reports descriptive statistics for the full sample and two subsamples based on the presence of clawback provisions: firms with clawback provisions (CLAWBACK = 1) and firms without (CLAWBACK = 0). For each group, we report the mean, median, and standard deviation (SD), along with t-statistics for differences in means and Wilcoxon rank-sum tests (Mann–Whitney U) for differences in medians between the two subsamples. Panel B presents Pearson correlation coefficients among all key variables. CINDEX is used as the dependent variable throughout the analysis. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 2: Regression Results**

| Variables | Model 1 CINDEX | Model 2 CINDEX | Model 3 CINDEX |
|---|---|---|---|
| CLAWBACK | 0.077*** | 0.078*** | 0.076*** |
| | (0.013) | (0.013) | (0.013) |
| SIZE | | 0.021** | 0.022** |
| | | (0.011) | (0.011) |
| MTB | | 0.005** | 0.003 |
| | | (0.002) | (0.002) |
| LEV | | -0.006 | -0.009 |
| | | (0.020) | (0.020) |
| DIV | | 0.460*** | 0.443*** |
| | | (0.127) | (0.126) |
| CAPEX | | -0.003 | -0.029 |
| | | (0.076) | (0.079) |
| R&D | | 0.007 | 0.030 |
| | | (0.039) | (0.043) |
| VOL | | -0.659*** | -0.651*** |
| | | (0.203) | (0.204) |
| CASH | | 0.039 | 0.032 |
| | | (0.033) | (0.033) |
| Observations | 23,666 | 20,676 | 20,676 |
| R-squared | 0.063 | 0.065 | 0.078 |
| Firm-FE | YES | YES | YES |
| Year-FE | YES | YES | NO |
| Ind-Year-FE | NO | NO | YES |
| Firm-FE | YES | YES | YES |

This table presents baseline regression results examining the relationship between clawback provisions (CLAWBACK) and firms' climate engagement (CINDEX) using a sample of U.S. firms from 1996 to 2017. Model 1 includes only the CLAWBACK variable and firm fixed effects. Model 2 adds financial control variables, while Model 3 further incorporates industry and year fixed effects. Control variables include firm size (SIZE), market-to-book ratio (MTB), leverage (LEV), dividend payout (DIV), capital expenditures (CAPEX), R&D intensity (R&D), stock return volatility (VOL), and cash holdings (CASH). All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

## Table 3: Propensity Score Matching (PSM)

Panel A: Quality of Matching

| | Mean | | Mean Difference | |
|---|---|---|---|---|
| Variables | TREATMENT | CONTROL | T-Stat. | P-Value |
| SIZE | 7.613 | 7.631 | -0.680 | 0.499 |
| MTB | 1.904 | 1.904 | 0.010 | 0.988 |
| LEV | 0.302 | 0.307 | -1.380 | 0.168 |
| DIV | 0.015 | 0.015 | -0.360 | 0.722 |
| CAPEX | 0.050 | 0.051 | -1.121 | 0.188 |
| R&D | 0.448 | 0.437 | 1.550 | 0.121 |
| VOL | 0.026 | 0.026 | -1.260 | 0.208 |
| CASH | 0.136 | 0.134 | 0.730 | 0.468 |
| CINDEX | 0.466 | 0.391 | 6.180 | 0.000 |

Panel B: PSM Regression

| Variables | Model 1<br>CINDEX |
|---|---|
| CLAWBACK | 0.042*** |
| | (0.014) |
| Baseline controls | YES |
| Observations | 10,872 |
| R-squared | 0.846 |
| Firm-FE | YES |
| Year-FE | YES |

This table presents results from the Propensity Score Matching (PSM) analysis investigating the effect of clawback provisions (CLAWBACK) on firms' climate engagement (CINDEX). The sample consists of U.S. firms from 1996 to 2017. Panel A evaluates the quality of matching between the treatment group (TREATMENT: firms with clawback provisions) and the matched control group (CONTROL: firms without clawbacks) based on key firm characteristics. Mean differences, along with corresponding t-statistics and p-values, are reported to assess covariate balance after matching. Panel B shows regression results using the matched sample, with CINDEX as the dependent variable. The model includes baseline control variables, firm fixed effects, and year fixed effects. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

## Table 4: Instrument Variable (IV) Regression

| Variables | (1)<br>CLAWBACK | (2)<br>CINDEX |
|---|---|---|
| CLAWBACK-INSTRUMENTED | | 0.932*** |
| | | (0.292) |
| INST-PRIOR | 0.026** | |
| | (0.012) | |
| INST-DSHRP | 0.016*** | |
| | (0.003) | |
| Baseline controls | YES | YES |
| Observations | 7,664 | 7,664 |
| R-squared | 0.507 | 0.321 |
| Firm-FE | YES | YES |
| Year-FE | YES | YES |
| F test of excluded instruments | 15.162 | |
| Kleibergen-Paap rk F statistic | 15.162 | |
| Kleibergen-Paap- rk LM statistic | 27.995 | |
| Montiel-Pflueger weak instrument F-test | 13.791 | |

| | |
|---|---|
| Hansen J statistic | 0.387 |
| Hansen J- test (p-value) | 0.532 |

This table reports instrumental variable (IV) regression results examining the causal effect of clawback provisions (CLAWBACK) on firms' climate engagement (CINDEX). The sample comprises U.S. firms from 1996 to 2017. Two instruments are used: INST-PRIOR, which indicates whether executives previously worked at firms that adopted clawbacks, and INST-DSHRP, which captures prior experience with compensation-related shareholder proposals. Model 1 presents the first-stage regression, while Model 2 shows the second-stage results using the instrumented CLAWBACK variable. Both models include baseline control variables, firm fixed effects, and year fixed effects. All continuous variables are winsorized at the 1st and 99th percentiles to limit the influence of outliers. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 5: Alternative Measurements**

| | Panel A: Internal Engagement | | Panel B: External Engagement | |
|---|---|---|---|---|
| Variables | Model 1 CSO | Model 2 CDP | Model 3 LOBBY | Model 4 COAL |
| CLAWBACK | 0.055*** | 0.036*** | 0.019*** | 0.060*** |
| | (0.007) | (0.006) | (0.005) | (0.013) |
| Baseline controls | YES | YES | YES | YES |
| Observations | 42,127 | 20,204 | 33,841 | 42,127 |
| R-squared | 0.525 | 0.734 | 0.370 | 0.589 |
| Firm-FE | YES | YES | YES | YES |
| Year-FE | YES | YES | YES | YES |

This table examines the effect of clawback provisions (CLAWBACK) on alternative measures of corporate climate engagement using a sample of U.S. firms from 1996 to 2017. Climate engagement is classified into two categories: internal engagement, measured by the appointment of a Chief Sustainability Officer (CSO) and participation in the Carbon Disclosure Project (CDP); and external engagement, measured by firms' involvement in climate-related lobbying activities (LOBBY) and membership in climate-related coalitions (COAL). All regression models include baseline controls and firm and year fixed effects. Continuous variables are winsorized at the 1st and 99th percentiles. Robust standard errors clustered at the firm level are reported in parentheses. Statistical significance is indicated by ***, **, and * at the 1%, 5%, and 10% levels, respectively.

**Table 6: Additional Controls**

| Variables | Model 1 CINDEX | Model 2 CINDEX | Model 3 CINDEX |
|---|---|---|---|
| CLAWBACK | 0.062*** | 0.073*** | 0.075*** |
| | (0.020) | (0.022) | (0.022) |
| MALE_CEO | 0.021 | 0.020 | 0.004 |
| | (0.050) | (0.054) | (0.055) |
| AGE_CEO | -0.004 | -0.022 | -0.015 |
| | (0.093) | (0.104) | (0.105) |
| TENURE_CEO | -0.005 | -0.003 | -0.004 |
| | (0.011) | (0.012) | (0.011) |
| OWN_CEO | 0.340 | 0.416 | 0.441 |
| | (0.231) | (0.275) | (0.281) |
| CEOD | | 0.005 | 0.003 |
| | | (0.023) | (0.023) |
| BIND | | -0.069 | -0.072 |
| | | (0.099) | (0.099) |
| BSIZE | | 0.233*** | 0.233*** |
| | | (0.052) | (0.053) |
| FEMALE% | | 0.142 | 0.158 |
| | | (0.142) | (0.142) |
| INST | | 0.010 | 0.011 |
| | | (0.039) | (0.039) |
| ANALYST | | -0.036** | -0.036** |
| | | (0.017) | (0.018) |
| HHI_COMP | | | -0.023 |
| | | | (0.042) |
| SIM_COMP | | | -0.001 |
| | | | (0.005) |
| FLUID_COMP | | | 0.007 |

| | | | |
|---|---|---|---|
| | | | (0.005) |
| Baseline controls | YES | YES | YES |
| Observations | 10,252 | 8,937 | 8,791 |
| R-squared | 0.116 | 0.134 | 0.136 |
| Firm FE | YES | YES | YES |
| Year FE | YES | YES | YES |

This table presents regression results examining the effect of clawback provisions (CLAWBACK) on corporate climate engagement (CINDEX) using a sample of U.S. firms from 1996 to 2017. Model 1 includes CEO characteristics informed by upper echelons theory: CEO gender (MALE_CEO), age (AGE_CEO), tenure (TENURE_CEO), and ownership (OWN_CEO). Model 2 adds board-level controls, including board size (BSIZE), board independence (BIND), gender diversity (FEMALE%), CEO duality (CEOD), institutional ownership (INST), and analyst coverage (ANALYST). Model 3 further incorporates product market competition measures: the Herfindahl-Hirschman index (HHI_COMP), similarity (SIM_COMP), and market fluidity (FLUID_COMP). All models include baseline firm controls and year fixed effects. Continuous variables are winsorized at the 1st and 99th percentiles to limit the influence of outliers. Robust standard errors clustered at the firm level are reported. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 7: Clawback Provisions and Climate Engagement: Moderating Role of Industry Nature and ESG-lined Compensation Policy**

| Panel A: Moderating Role of Industry Environmental Sensitivity (ENV_SENS) | |
|---|---|
| Variables | CINDEX |
| CLAWBACK | 0.069*** |
| | (0.014) |
| ENV_SENS | 0.006** |
| | (0.003) |
| CLAWBACK*ENV_SENS | 0.039 |
| | (0.032) |
| Baseline controls | YES |
| Observations | 20,676 |
| R-squared | 0.813 |
| Firm-FE | YES |
| Year-FE | YES |
| Panel B: Moderating Role of ESG-Linked Compensation Policy (ESG_COMP) | |
| Variables | CINDEX |
| CLAWBACK | 0.109** |
| | (0.049) |
| ESG_COMP | 0.189*** |
| | (0.067) |
| CLAWBACK* ESG_COMP | 0.020 |
| | (0.074) |
| Baseline controls | YES |
| Observations | 5,491 |
| R-squared | 0.422 |
| Firm-FE | YES |
| Year-FE | YES |

This table examines the moderating role of industry environmental sensitivity and ESG-linked compensation policies on the effect of clawback provisions (CLAWBACK) on climate engagement (CINDEX) for U.S. firms from 1996 to 2017. Panel A includes ENV_SENS, a dummy variable equal to 1 if firms operate in environmentally sensitive industries and 0 otherwise, along with the interaction term CLAWBACK*ENV_SENS, which captures how the effect of clawback provisions on climate engagement varies with industry environmental sensitivity. Panel B includes ESG_COMP, a dummy variable indicating the presence (1) or absence (0) of an ESG-linked compensation policy, and the interaction term CLAWBACK*ESG_COMP, which captures how the effect of clawback provisions on climate engagement varies with the presence of such a policy. All models include baseline controls and firm and year fixed effects. Continuous variables are winsorized at the 1st and 99th percentiles. Robust standard errors clustered at the firm level are reported. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 8: Clawback Provisions, Climate Engagement, and Climate Change Risk**

| Variables | CCR |
|---|---|
| CLAWBACK | -0.027 |
| | (0.023) |
| CINDEX | 0.003 |
| | (0.025) |
| CLAWBACK *CINDEX | -0.061*** |
| | (0.022) |
| SIZE | 0.008 |
| | (0.020) |
| MTB | 0.014* |
| | (0.008) |
| LEV | -0.030 |
| | (0.054) |
| DIV | 0.435 |
| | (0.326) |
| CAPEX | -0.060 |
| | (0.202) |
| R&D | -0.041 |
| | (0.171) |
| VOL | 1.740** |
| | (0.715) |
| CASH | -0.019 |
| | (0.090) |
| Constant | 0.245 |
| | (0.152) |
| Observations | 18,083 |
| R-squared | 0.003 |
| Firm-FE | YES |
| Year-FE | YES |

This table investigates whether clawback provisions (CLAWBACK) facilitate the translation of firms' climate engagement (CINDEX) into tangible mitigation of climate change risk (CCR) for U.S. firms from 1996 to 2017. Climate change risk (CCR) is measured using firm-level data from Sautner et al. (2023), which quantifies risk based on textual analysis of earnings call transcripts, capturing firms' communication about climate-related risks. The key variable of interest is the interaction term CLAWBACK*CINDEX, which tests whether the presence of clawback provisions amplifies the impact of climate engagement on reducing climate risk. Continuous variables are winsorized at the 1st and 99th percentiles. Robust standard errors clustered at the firm level are reported. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

## Appendix

**Figure 1A:** Interaction Effect of Clawback Provision and Environmental Sensitivity of Industries (ENV_SENS) on Climate Engagement (CINDEX)

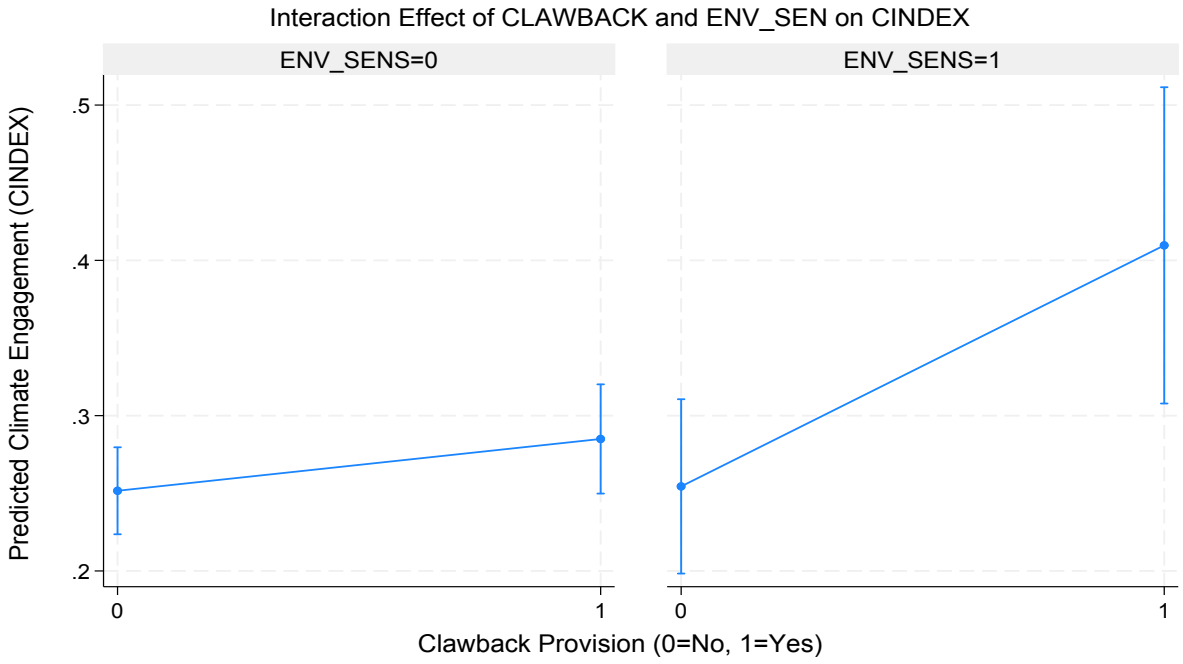


**Figure 2A:** Interaction Effect of Clawback Provisions and ESG Compensation Policy (ESG_COMP) on Climate Engagement (CINDEX)