# Political risk and Greenwashing: Evidence from anti-ESG

**Abstract**

This research examines the impact of anti-ESG bills on corporate greenwashing. Based on the driver of greenwashing, this research argues that the external regulations might mitigate corporate greenwashing by affecting firms' stakeholders and the ESG atmosphere where firms operate. This research analyses an unbalanced dataset of 7,771 firm-year observations of U.S. firms from 2018 to 2023. These findings are still robust after using stacked DID, bacon decomposition, PSM DID, and staggered DID. This research also provides possible channels to explain the influence of anti-ESG on corporate greenwashing. This research offers implications for businesses and policymakers. Our findings suggest that business entities should adapt to changes within the anti-ESG campaign advocated by the Republican Party that could be deeper under Trump's second administration. For policymakers, this research provides direct evidence supporting the impact of ESG-related legislation in reducing greenwashing.

**Key words:** *ESG, Anti-ESG bills, Greenwashing, ESG decoupling, Green funds*

## Introduction

The pressure for companies to become environmentally responsible has increased in recent years (Delmas and Burbano, 2011; Kim and Lyon, 2015). This pressure comes mainly from the increased public awareness of social responsibility. People expect companies to fulfil their social responsibilities as well as achieve their profit purposes. Under this pressure, the demand for green products and services has been increasing in the consumer market and capital markets. Sustainable investment in the U.S. has reached over 17 trillion dollars in 2020 (U.S. SIF Foundation, 2020), while the global sustainable product market size has reached over 350 billion dollars in 2024 (Industry Statistics, 2033). Many companies have increased their communication of their green products and activities to benefit from the growing green markets. The U.S. Securities and Exchange Commission (SEC) has also played a role in companies' green disclosure. It has proposed a rule to require companies to include the climate related disclosures in their statement and periodic report. Green practices request additional costs from a company compared to green communication.

The conventional view is that environmental performance imposes additional costs on companies (Friedman, 1970). Compared with green communication, green practices require companies to spend extra money on green investments, whose return is uncertain, to improve their energy structure or improve their green products. Therefore, many companies choose to just increase their green communications rather than actually going green. Indeed, greenwashing has become a more common problem (Delmas and Burbano, 2011). RepRisk's report documented that the greenwashing behavior increased by 35% in 2022 (Lamar, 2023). The prosperity of greenwashing is an example of Gresham's Law, where bad (misleading) sustainability claims drive out genuine environmental efforts. It can seriously undermine consumer and investor confidence in green markets. Therefore, mitigating this issue is essential to ensuring genuine sustainability efforts.

Amidst this ESG trend, industries or companies with poor ESG performance face boycotts, such as the firearms industry and energy companies. To protect these businesses, some states have gradually introduced legislation since 2021. For example, Tennessee passed SB 2649 in

2022, and Texas enacted SB 19 in 2021. These two laws protect fossil fuel companies and firearms companies within their respective states. Some states have also introduced similar laws, such as permitting state governments to oppose enforcing federal ESG-related mandates. These laws, which differ from the ESG trend, are referred to as anti-ESG laws. The primary goal of these anti-ESG laws is to shield companies from ESG discrimination and shift the focus back from ESG to economic development. This study links anti-ESG bills to corporate greenwashing behavior.

The emerging literature has investigated the motivations behind greenwashing and its subsequent impacts. However, research on how to mitigate greenwashing remains limited. In particular, studies focusing on external legal are scarce, which has left many policymakers uncertain about how policies affect greenwashing. Moreover, research on anti-ESG laws remains quite limited. Existing studies mainly focus on the impact of individual anti-ESG laws on specific industries or corporate financial performance. There is currently no research that links these anti-ESG laws to corporate greenwashing behavior.

To address the research gap on understanding the impact of external regulations on corporate greenwashing behavior, this research analyses unbalanced panel data of 7,771 firm-year observations of U.S. firms between 2018 and 2023. This research uses a difference-in-differences (DID) model to examine the changes in corporate greenwashing after the anti-ESG bills enactment. In the robustness checks, this research applies methods such as stacked DID to address the issues in the two way fixed effect (TWFE) model when dealing with multiple time periods of treatment. Since the available data only extends to 2023, this study only considers the anti-ESG bills that were successfully enacted or resolved in 2021 and 2022 as the treatment. To prevent anticipation effects, this paper only considers the first anti-ESG bills, which are successfully enacted or resolved, in each state as the treatment, meaning a state would not be treated multiple times. This study finds that anti-ESG bills can significantly mitigate corporate greenwashing, while this effect is less pronounced among green-silent firms. Additionally, this research identifies several factors that can influence the impact of anti-ESG bills. Furthermore, this research examines the role of financial constraints and green fund shareholding in the impact of anti-ESG bills on corporate greenwashing.

This research contributes to the theory and empirical literature in several ways. Firstly, this

research is part of the limited literature on how the business external environment affects business greenwashing. Recent literature has studied the impact and driver of greenwashing. However, research on how to mitigate corporate greenwashing behavior remains limited, particularly regarding how external policymakers can address and reduce corporate greenwashing. Secondly, this research contributes to the literature on anti-ESG bills. Since these anti-ESG bills are relatively new types of laws, there is limited research on them. However, this does not imply that such laws are unimportant; more than 50 anti-ESG laws have been introduced since 2021. This research is the first to show how anti-ESG bills affect corporate greenwashing.

This research is useful for businesses and policymakers. Based on actions taken by the Republican Party, we can predict that, with Trump serving as president again, this anti-ESG trend will become more prominent. Therefore, research on anti-ESG laws could help businesses anticipate future changes and develop strategies to adapt to these changes. At the same time, it can also help policymakers assess the potential impacts of such policies and provide them with a new perspective on mitigating the issues caused by greenwashing.

The rest of the paper is organized as follows. Section 2 provides a literature review on greenwashing, brownwashing, and the anti-ESG bills. Section 3 provides hypotheses. Section 4 presents the models and variables used in this study. Section 5 reports the main regression results, summary statistics, and findings on green-silent companies. Section 6 provides robustness checks, including Bacon decomposition, stacked DID, PSM-DID, placebo tests, and staggered DID. Section 7 presents four cross-sectional tests. The final section is the discussion conclusions.

## Literature review

### Greenwashing

Jay Westerveld first started with the idea of greenwashing in 1986, when he pointed out that the environmental policy advertised by hotels - recycling towels- wasn't aimed at being environmentally friendly, but rather at cost simplicity (Orange and Cohen, 2010). Since the term greenwashing was coined, the definition of greenwashing has gradually become uniform, referring to the practice of firms engaging in misleading ESG promotion for specific purposes.

This misleading promotion can take the form of exaggeration, falsification, or selective disclosure (Becker-Olsen and Potucek, 2013; Marquis et al., 2016; Siano et al., 2017; Li et al., 2023).

Greenwashing occurs at both the corporate and fund levels (Raghunandan and Rajgopal, 2022; Heath et al., 2023). This research focuses on corporate level greenwashing. There are different manifestations of greenwashing at the corporate level, and based on Siano et al. (2017), it can be categorized as attention deflection, decoupling, and deceptive manipulation. Attention deflection refers to the diversion of stakeholder attention to cover up unethical behavior by a company, including "selective and inaccurate disclosure". Decoupling is when a business claims to fulfil stakeholder expectations but does not have sufficient sustainable departments or means to support it. Deceptive manipulation is a situation where a firm not only misrepresents on its face, but also maliciously engages in deceptive behavior, such as Volkswagen's manipulation of its products for fraudulent purposes. Some scholars have also argued that the issuance of green bonds by companies is also a form of greenwashing. By studying the quantity and quality of patents of listed companies in China, Shi et al. (2023) found that companies issuing green bonds only superficially improve the output of green innovation, but do not effectively improve the quality and capacity of green innovation. However, others claim that the issuance of green bond is a serious commitment that removes greenwashing concerns. Following Flammer (2021), the green bond issuers would improve their environmental performance after issues, such as higher environmental ratings and lower CO2 emissions.

The motivations for corporate greenwashing are complex, which means the greenwashing is driven by a combination of external and internal drivers. External drivers serve as the direct motivation for corporate greenwashing, while internal factors influence how companies respond to these external drivers (Delmas and Burbano, 2011). Therefore, it is essential to consider both external drivers and internal drivers simultaneously when studying corporate greenwashing. The external drivers of greenwashing are mainly due to regulation and pressure from market participants (e.g. green consumers, green investors, competitors) (Delmas and Burbano, 2011), while internal drivers include firm-specific characteristics (e.g., financial constraints) as well as the individual attributes of managers and board members (Delmas and

Burbano, 2011; Kim and Lyon, 2015). Companies may engage in greenwashing in order to ease financial constraints and meet government or stakeholder requirements for green disclosure (Dhaliwal *et al.*, 2011; Becker-Olsen and Potucek, 2013; Testa, Boiral and Iraldo, 2018; Zhang, 2022). Following Zhang (2022), the implementation of green regulations will increase greenwashing by firms. This influence is mainly in highly polluting firms and in the private sector rather than state- and foreign-owned firms. He argues that some highly polluting companies might experience financial constraints following the implementation of green finance regulations and will not have sufficient funds to improve their green performance, so they are more likely to choose fraudulent advertising and greenwashing to alleviate their financial constraints, rather than genuinely improving their green performance. Similarly, Dhaliwal et al. (2011) also found a negative relationship between ESG disclosure and equity costs. In addition, stakeholder pressure can also drive greenwashing behavior in companies. Kim and Lyon (2015) find that as expectations and demands for ESG grow, some companies are subject to pressure from external stakeholders. These companies are expected or required to use socially responsible technologies in their production and operations. However, this can lead to a significant conflict between these firms' internal needs to improve operational efficiency and the external pressures to be socially responsible, and many firms will choose to decouple greenwashing.

Scholars have begun to study the implications of greenwashing as more and more companies greenwash. Some scholars have found that greenwashing, before exposure, can have a positive impact on firms, which explains part of the motivation for firms to choose greenwashing (Solomon and Rhianon Pel Edgley, 2008; Dhaliwal et al., 2011; Yang et al., 2020). The greenwashing brings benefits to existing stakeholders by bringing in additional profits (Solomon and Rhianon Pel Edgley, 2008; Yang et al., 2020). In addition, as stated earlier in this study, some polluted companies with financial constraints might choose greenwashing in order to reduce the cost of equity capital. They use greenwashing as a tool to reduce the cost of capital. Green investors tend to favor firms with good ESG disclosures when considering investments. As a result, greenwashed firms tend to attract attention in the capital market.

However, the negative effects of greenwashing are more widely known. Du (2015a) finds that a firm's greenwashing behavior gives the firm a negative cumulative abnormal return when the

greenwashing behavior is exposed. The possible reason is that media disclosure is an important way where a firm's greenwashing behaviour is exposed, and the disclosure of such negative events can directly affect investor attitudes. In addition, Du (2015b) also argued that the firm's reputation and brand value would be permanently damaged after the disclosure of the greenwashing behaviour. This is consistent with the views of Guo et al. (2018), who believe that greenwashing can seriously undermine trust between brands and stakeholders. This is because consumers and investors are often willing to pay more for green products or green portfolios. Greenwashing behaviour means that customers and investors pay more without getting what they want. Therefore, greenwashing can negatively affect the confidence of consumers and shareholders in green products (Delmas and Burbano, 2011; Guo et al., 2018; Yang et al., 2020; Gatti et al., 2021).

In addition, greenwashing also leads to a decline in social morality and prevents solutions to environmental problems (Nyilasy et al., 2014; Bradley, 2024). Following Bradley (2024), greenwashing can hinder real environmental protection activities. They argue that greenwashing can lead to distrust of sustainable finance, which is important for solving environmental problems, so greenwashing behaviour can prevent people from solving environmental problems. Nyilasy et al. (2014) find that, as people perceive greenwashing, they tend to be sceptical of green advertising and disclosure, which can prompt firms to engage in green silence.

Therefore, some scholars begin to investigate ways to mitigate the adverse effects of greenwashing and curb greenwashing. Dutta et al. (2024) find that when consumers possess basic information-processing capabilities and understand the mechanisms of greenwashing, the detrimental effects of greenwashing on consumers would be mitigated. Zhang (2024) analyze the negative correlation between AI usage and corporate greenwashing by utilizing data from Chinese listed companies. Gibson (2009) has conducted a theoretical study on the disordereed regulation of environmental advertising and proposed three potential solutions (e.g., recommending collaboration between the Federal Trade Commission and the Environmental Protection Agency) to mitigate greenwashing. However, few studies have approached the issue from the perspective of greenwashing motivations, examining how to fundamentally mitigate corporate incentives for greenwashing and curb such behavior. This gap exists because the

primary drivers of greenwashing stem from external pressures and the ESG atmosphere in which a company operates. Previously, there has been no suitable exogenous shock that directly influences a company's external ESG environment. As a result, empirical research on whether alleviating external pressures truly leads firms to cease greenwashing remains scarce. This research leverages the unique political environment and policies in the United States to examine how anti-ESG bills mitigate corporate ESG strategies. Furthermore, based on the motivations behind corporate greenwashing, this study provides a detailed explanation of the underlying mechanisms of this causal impact.

**Brownwashing**

The concept of brownwashing was introduced in 1985. Ullmann (1985) argues that it is unwise to report extensively about ESG performance, since ESG behavior is not conducive to maximizing shareholder interests. In some article, brownwashing is also called greenhushing, which is identified as firms' communication strategy that under-state their environmental achievements (Testa et al., 2018). In contrast to greenwashing, brownwashing is 'walk more than talk'.

Similar to greenwashing, brownwashing is an imbalance between green disclosure and green performance (Huang et al., 2022). It could increase information asymmetry and reduce the transparency of the firm. Scholars usually do not see brownwashing as a malicious deception, which is totally different from greenwashing. According to Kilbourne (2004), greenwashing and brownwashing are both marketing strategies for companies to better sell their goods and services. Brownwashing is also seen as quiet but conscientious behavior and not adds sustainability to firms' brand values (Vallaster et al., 2012; Ettinger et al., 2021). Delmas and Burbano (2011) refer to brownwashing companies as silent green companies, while Kim and Lyon (2015) refer to the brownwashing as undue modesty.

The driver of brownwashing is different from greenwashing. Following Huang et al. (2022), one of the incentives for brownwashing is to avoid excessive attention from peers and stakeholders. This is because good corporate performance and communication could raise stakeholders' expectations for the company's future ESG performance, which might stimulate more demand from stakeholders and might trigger discontent among peers. As a result, the company might face higher costs and greater uncertainty. Following Ullmann (1985), another

possible reason is that some companies adopt brownwashing to avoid investor dissent to ESG policies, as some investors believe that ESG investments do not contribute to maximizing shareholder value. Similarly, Kim and Lyon (2015) find that companies with low profitability are more likely to engage in brownwashing than those with high profitability. These firms aim to hide environmental expenses to reduce shareholder dissent. Some companies choose to remain silent and strategically not publicize their environmental certification out of concern about being perceived as hypocritical, particularly those firms whose behavior contradicts their environmental certification claims (Carlos and Lewis, 2018). According to Ettinger et al. (2021), some companies choose green silence to prevent being accused of greenwashing by activists. Because some activists only accuse companies of what they haven't done yet instead of focusing on what they have done (Kelsey, 2016).

The other incentive for brownwashing is to sell the companies' services better. In the hospitality industry, some hotel managers believe that customers don't want to hear about CSR during their holiday, such as resource shortages, climate change, etc.; instead, their customers want to behave indulgently on holiday, stepping out of the daily responsibilities (Coles et al., 2017; Font et al., 2017). To reduce the guilt of their customers, companies in the hospitality industry may choose to green silence.

**Anti-ESG**

Different people have different attitudes on ESG investment, just like "one person's taboo is another person's sacred cow" (Statman, 2000). Many conservative politicians and entrepreneurs believe that ESG is a form of political correctness that will limit the growth of businesses, such as Tesla CEO Musk who has several times claimed that ESG is a scam. With the growing opposition to ESG in recent years, several U.S. states have enacted anti-ESG regulations since 2021 (Houston et al., 2023; Tang et al., 2024). The enactment of anti-ESG bills is to prevent financial losses to companies or individuals as a result of the emphasis on ESG. Anti-ESG legislation often falls into several distinct categories, including restrictions on investment purposes, prohibitions against ESG-based discrimination, and challenges to federal regulations, and so on. Restrictions on investment purpose means preventing financial institutions from prioritising ESG when lending and investing, such as bills enacted in Florida and Texas to limit the consideration of ESG criteria when pension funds invest and to restrict divestment from

energy companies (Tang et al., 2024). Prohibitions against ESG-based discrimination means preventing financial firms from boycotting companies or industries with low ESG performance, such as energy and firearms industry. Challenges to federal regulations means that when federal rules related with ESG are introduced, state governments could refuse enforcement. Although these bills vary in type, they collectively reflect a shift of focus from ESG to economic development, signaling a decline in the emphasis placed on ESG. Democrats and Republicans engaged in a bitter political battle around ESG, with the Department of Labour proposing to allow retirement plan managers the freedom to consider ESG in their investments, which was immediately blocked by Senate Republicans (Sorkin et al., 2023).

The reasons why people are cooling down or even opposing ESG are as follows. People who oppose ESG argue that there is no standardisation of ESG disclosure, and the differences in ESG disclosure requirements in different countries (e.g. the US and the EU) can result in higher disclosure costs for companies, therefore many companies choose to be green silent (green hushing) (Gim et al., 2023). In addition, the lack of standardisation of ESG disclosure hinders accurate cross-company and cross-industry comparisons and may lead to wrong investment choices. Following Statman (2000), opponents of socially responsible investment argue that it is unwise, even illegitimate, to combine social objectives with investment. Anti-ESG advocates even believe that ESG investments are a diversion of resources away from profit-oriented activities and undermine market efficiency. Skepticism about ESG also exists among customers. Some consumers are concerned that corporate emphasis on society and the environment may reduce the quality of products and services (Bonini and Oppenheim, 2008). This is consistent with Papagiannakis et al. (2024) finding that in the tourism and hospitality industry, overly green communication leads to a drop in sales. In addition, the market reaction to firms' ESG performance is not always positive (Jacobs et al., 2010; Kim and Lyon, 2015). They found that voluntary emission reductions negatively affect firms' market value, which is consistent with the conclusion of Fisher-Vanden and Thorburn (2011). The possible reason is that the costs of emission reductions are direct and visible, but the benefits are uncertain.

In addition, green products and investment are often not truly green. Following Gibson Brandon et al. (2022), the ESG score of institutional investors who have signed on Principles for Responsible Investment (PRI) are not higher than those of non-signatories, which means that

many “sustainable” investment organizations don't really care about ESG after signing up to PRIs. The probable reason for this is that these investment organisations sign up to PRI with commercial incentives outweighing the social responsibility incentives. However, these ESG-supporting investment funds generally have higher management fees (Raghunandan and Rajgopal, 2022), which means that people pay more but not actually promote ESG development. Therefore, people are increasingly sceptical about ESG.

The impact of the anti-ESG bill has been studied after its implementation. Following Tang et al. (2024), they found that the implementation of ESG bills led to a positive stock market reaction for fuel energy companies. This positive reaction is more pronounced in companies with low ESG performance and those with financial constraints. They argue that after preventing financial institutions from investing according to ESG criteria, fossil energy companies with poor ESG performance and financial constraints in the past will have easier access to financial resources.

However, some scholars have argued that anti-ESG bills are mainly political attitudes without economic substance (Rajgopal et al., 2023). Rajgopal et al. (2023) researched the anti-ESG bill implemented in Texas in 2021, and they found that the banned funds were large index funds with a slight bias towards energy stocks. They also found that the Texas Pension Fund does not invest in ESG companies as much as politicians claim. Following Garrett and Ivanov (2024), they found that the implementation of the Texas Anti-ESG bill in 2021 caused the five largest municipal bond underwriters, which increase bond issuers’ uncertainty in the bond market and borrowing costs.

**Hypothesis**

Following Delmas and Burbano (2011), pressure from external market participants is one of the key reasons why companies are greenwashing. Green market participants, such as investors and consumers, focus on a company's ESG information when looking for investment opportunities or consumptions. These ESG information they obtained comes from the

company's ESG communication, as well as the company's ESG score. Increasing ESG performance requires long term investment and higher costs than increasing ESG communication. As a result, many companies would choose to increase ESG communication, or even exaggerate it, rather than increase ESG performance. This behavior that focuses on ESG communication rather than ESG performance is a form of greenwashing.

The introduction of the anti-ESG bills aims to shift the focus from ESG back to economic development. Although there are different types of anti-ESG bills, they all demonstrate a phenomenon that the ESG atmosphere is changing in the states where the bills are enacted. The change means that ESG is no longer supported by the state, or ESG is no longer as important as it was before. Corporate executives in these states are likely to perceive the shifting of ESG atmosphere. Companies that previously engaged in greenwashing despite potential penalties may adjust their strategies, reducing such practices to mitigate regulatory risks.

**H1: The introduction of anti-ESG bills mitigates firms' greenwashing.**

The impact of anti-ESG bills on corporate greenwashing can also be explained through the alleviation of financial pressures. The financial pressures stem from external green funds and internal financial constraints, which are motivations for greenwashing. One of the primary drivers behind corporate greenwashing is the pursuit of lower-cost capital to alleviate financial constraints. In capital market, many financial institutions have introduced ESG-related investment programs (Raghunandan and Rajgopal, 2022), which primarily focus on companies' ESG information and boycott companies with bad ESG performance. As mentioned in section 2.1, these ESG information mainly comes from the company's ESG communication, as well as the company's ESG score. Since green funds prioritize a company's ESG score over its financial performance, companies facing financial constraints may be particularly inclined to attract investment from these funds. To attract these green funds, some companies may choose to greenwash which is cost-effective compared with improving their actual ESG performance. By greenwashing, these companies could get low-cost equity capital (Dhaliwal et al., 2011). Thus, when there is a higher level of green fund, the company would face more pressure and have more incentive to greenwash.

One type of anti-ESG bills is prohibitions against ESG-based discrimination. These bills require the government to list financial companies that boycott the energy or firearms industries and impose sanctions or divest from them. Therefore, financial institutions may reduce these green investment programs or relocate them to other states.

These bills are designed to allow companies to obtain financing even as "poor green firms", which means these firms would not be discriminated against by external green investors based on the firm's bad green image. In this case, firms would not choose to greenwash, because they would not overly concern about the external pressures brought by green investors and greenwashing could also impose costs on firms. Therefore, this research has the following hypothesis.

**H2: The anti-ESG bills mitigate firms' greenwashing by reducing financial pressure.**

Political risk is defined as the risk posed to a firm due to government actions or instability in the political/social system(Root, 1972; Kobrin, 1979). In the sample of this paper, the political risk that firms are exposed to is mainly due to changes in political policies and government intervention, which brings uncertainties to their operations. Political risks can affect a firm's daily activities such as hiring and investment, as well as the volatility of the firm's share price(Hassan et al., 2019). Therefore, companies with higher political risk would have more incentive to concern about regulation, political party elections, as well as policy changes. Firms with higher political risk will change their strategies more quickly in response to changes in policy to reduce the risk of being penalized.

To measure the impact of changes in institutions and policies on different firms, this paper uses data from Hassan (2019), who captures firms' political risk in their quarterly earning conference calls. This research assumes that firms with higher political risk would pay more attention to political change, especially policies like anti-ESG bills, which are seen as a form of political attitudes in addition to their practical effects. Therefore, these firms might react faster and more strongly to the anti-ESG bills than firms with low political risks.

In addition, this research assumes that firms with high political risk will be more sensitive to the political atmosphere of the state in which the firm is located. The states which introduced

anti-ESG bills are largely concentrated in Republican states. Compared to Democratic states, Republican states are inherently dismissive of ESG. Therefore, to reduce policy risk, companies in these states may choose to embrace the anti-ESG environment smoothly rather than oppose it. As a result, firms with high political risk would be more responsive to anti-ESG bills and decrease more on ESG communication. Therefore, the anti-ESG bills have a great impact on greenwashing in firms with high political risks.

**H3A: The political risk exposed by firms will intensify the effect of anti-ESG bills on greenwashing.**

Climate change affects the operation of companies. There are two types of impacts that climate change brings to companies, one is physical and the other is non-physical also known as transition impacts(*TCFD, 2017*). Physical impacts are the direct losses or gains that climate change brings to companies, such as the impacts of extreme weather or long-term climate shifts. Transition impacts are the climate change impact related to the transition to a low-carbon economy (Cepni et al., 2022; Ozturk et al., 2022). The impact of climate change varies across firms, and this paper assumes that firms that are more directly affected by climate change have more incentives to care about external climate-related changes (both direct climate change and government attitudes towards ESG).

To measure the impact of climate physical change, this research uses data from Sautner (2023), who captures information related to physical climate change from earning conference calls through machine learning. They argued that if a firm mentions more information about physical climate change in the earning conference call, it indicates that the firm is more affected by the physical aspects of climate change. For example, firms are directly exposed to the physical risks of extreme weather or opportunities in long-term climate change.

Compared with firms less affected by climate change, these firms are likely to be more sensitive to external ESG-related information, which means they might be more sensitive to the change in the ESG atmosphere (ESG is no longer as important as before). Therefore, they may choose to reduce greenwashing more rapidly and to a greater extent.

Another possible reason is that companies mentioning more climate-related keywords in

earnings calls may inherently have a stronger preference for green communication. As a result, their greenwashing may be higher compared to other companies, making them more sensitive to the enactment of an anti-ESG bill and more shocked by it. As a result, firms that are directly more affected by climate change will be more sensitive to the anti-ESG environment and reduce greenwashing behavior more.

**H3B: The climate risk exposed by firms will intensify the effect of anti-ESG bills on greenwashing.**

Following Bloom (2007), there is a cautionary effect when firms are exposed to high risks and uncertainty, they would choose to temporarily slow down their activities to wait for the uncertainty to dissipate. Therefore, higher uncertainty and risk can lead to a reduction in firms' ability to react to specific shocks and policies (Bloom, 2007; Coiculescu et al., 2023). Following Coiculescu et al. (2023), this research uses stock market volatility as a measure of firms' uncertainty and risk because it is difficult to predict firms' future when the stock market becomes more volatile.

Another possible reason is that decision managers are inherently uncertainty averse and will not choose to quickly follow politically fraught policies when the firm's risk and uncertainty are high, so the firm's response to the policy will be slower. Firms with high risk and uncertainty would be more likely to focus on the present rather than investing for the future because of the possible cost (Bloom et al., 2007). This means that riskier companies will become short-sighted and do not care so much about the future if they want to survive. This is consistent with the theory of managerial short-termism. Managerial short-termism and company uncertainty are often mentioned together. Due to uncertainty aversion, long-sighted managers dislike high levels of uncertainty in their firms and are more inclined to invest in sustainable or green development, such as reducing carbon emissions (Slawinski et al., 2017). Short-sighted managers, on the other hand, would be more likely to ignore future risks and focus on the benefits of the present. Therefore, I suspect that companies with higher future risk and uncertainty will have more myopic behaviors, will be less sensitive to bills with political attitudes, and will not change their current greenwashing patterns for cost reasons.

**H3C: The uncertainty faced by firms will moderate the effect of anti-ESG bills on greenwashing.**

## Methodology

### Data and sample

To test the main hypothesis, this paper collected data of US firms from 2018 to 2023. Following Zhong (2018), this paper excludes public utilities. In order to better validate the hypothesis of this paper, after calculating the ESG decoupling by using Zhang's (2022b) method, this paper retains only the samples of greenwashing firms and removes the samples of firms in the brownwashing portion.

This paper collected data from several sources including Bloomberg, EIKON Refinitiv, and LEGISCAN. Following Zhang (2022b), this paper acquires firms' ESG performance and disclosure scores from Refinitiv and Bloomberg, respectively. Information related to the anti-ESG bill was obtained from the LEGISCAN database. This paper collects control variables data from Refinitiv and COMPUSTAT database. This paper then merged the greenwashing data with financial data (collected from Compustat) and corporate governance data (collected from Refinitiv). Finally, after removing the unmatched data, the paper obtains a dataset of 7,773 firm-year data.

### Measure of main variables

#### *Greenwashing*

Prior studies (Zhang, 2022b) measure greenwashing as the difference between firms' real ESG performance and ESG disclosure using data from Refinitiv and Bloomberg, respectively. Bloomberg obtained firms' ESG disclosure scores from firms' filings, such as firms' websites, ESG reports, and surveys. Refinitiv, also called Assets4, gives ESG scores by collecting the various firms' ESG performances, such as emissions reductions.

They measure the greenwashing score by using a peer-relative gap between ESG performance and disclosure. Specifically, the peer-relative greenwashing score is the difference between a normalized measure of a firm's disclosure score relative to its peers and a normalized measure

of a firm's performance score relative to its peers. This measure addresses the issue of the difference in metrics between the two databases, as disclosure scores and performance scores are not calculated in the same way. A larger variable indicates that the firm has a higher disclosure score compared to its peers but performs worse, which means the firm is more greenwashing. However, this paper thinks this calculation is more like calculating green decoupling than greenwashing. Because this measure has negative results, a negative value means that the firm's ESG performance relative to peers is more than its ESG disclosure, which represents the firm brown-washing but not greenwashing.

Therefore, in this paper, only the greenwashed portion of the sample is retained, which means that the positive values of the variables are retained.

The model of greenwashing is as follows:

$$Greenwashing_{i,t} = \left(\frac{ESG_{dis_i,t} - \overline{ESG_{dis_t}}}{\sigma_{dis_t}}\right) - \left(\frac{ESG_{per_i,t} - \overline{ESG_{per_t}}}{\sigma_{per_t}}\right) \quad (1)$$

Where $Greenwashing_{i,t}$ is the greenwashing score for firm i in time t. $ESG_{dis\_i,t}$ is the ESG performance score for firm i in time t, while $ESG_{per\_i,t}$ is the ESG disclosure score for firm i in time t. $\overline{ESG_{dis_t}}$is the mean value of ESG disclosure in year t for all peers in the industry. Similarly, $\overline{ESG_{per\_t}}$ is the mean value of ESG performance in year t in the industry. $\sigma_{dis\_t}$ is the standard deviation of ESG disclosure scores for all firms in time t in the industry, while $\sigma_{per\_t}$ is the standard deviation of ESG performance scores in time t in the industry.

***Anti-ESG bills***

This paper uses publicly available data sources to count anti-ESG bills from 2021 to the most recent. Anti-ESG Legislation in US states from 2020 to 2024 is publicly available in the PLEIADES website, with both passed or enacted bills and failed bills. LEGISCAN provides a historical timeline for each bill, from the time of first reading to the time it was passed or failed. It also provides the specifics of each bill and enables us to check in detail whether the bill is anti-ESG.

A state may introduce multiple anti-ESG bills, such as some that prohibit discrimination against

gun businesses and others that prohibit pensions from using ESG as a primary investment purpose. In order to prevent the effect of anticipation, this paper selects only the bills that were first enacted or resolved in the state. The paper takes the time when a bill was first enacted or resolved in the state as the time when the state was treated. In addition, the paper assumes that the effect of a bill does not dissipate, which means that the state's status does not go back from being treated to being untreated. For example, in 2021 only 6 states ('AR', 'MT', 'TX', 'WY', 'OK', and 'ND') were first treated.

Due to data limitations, this paper uses only bills from 2021-2022 as shocks. In addition, according to Rajgopal et al. (2023), anti-ESG bills are more like political attitudes but have no economic substance. This paper assumes that the closer to the US election, the more likely anti-ESG bills are to be political attitudes, which means they are less effective and have a more serious problem of anticipation[1].

***Model***

This paper analyses unbalanced panel data of 7773 firm-year observations of US-listed firms between 2018 and 2023 using the Difference in Difference (DID) approach to find the causality and address the potential issue of endogeneity.

To investigate the causality between external pressure and greenwashing, we run the following model.

$$Greenwashing_{i,t} = \beta_1 + \beta_2 \times Treat_{i,t} \times Post_{i,t} + Control_{i,t} + FixedEffects + \epsilon_{i,t} \quad (2)$$

where *i* and *t* refer to firm and year, respectively; $Greenwashing_{i,t}$ represents the greenwashing score for firm i in time t. The $Treat_{i,t}$ is a dummy variable that equal to 1 if the firm i is in the states who enacted or resolved the anti-ESG bills in time t at first time. The $Post_{i,t}$ is a time dummy variable if the firm is located in the states of Arkansas, Montana, Texas, Missouri,

[1] Taking the 2023 anti-ESG bills into account, the results remain significant, but the significance drops slightly, which proves the conjecture.

Oklahoma, and North Dakota in 2021 and beyond; or in the states of West Virginia, Tennessee, New Hampshire , Kentucky, Idaho, and Louisianain 2022 and beyond, the $Post_{i,t}$ is equal to 1.

This paper uses a variety of different control variables, including firm financial characteristics, board characteristics, and other firm characteristics. Financial characteristics include firm size (logarithm of total assets), leverage (long-term debt over total assets), R&D (R&D expenditures over total assets), market-to-book value (ratio between market value and book value), Tobin's Q (ratio of market value to total assets), and ROA (earnings before interests and taxes over total assets). Board characteristics include director gender diversity (percentage of women on boards). Other company characteristics include whether the company has implemented iso14000, the ambiguity of the company, the existence of an audit committee, and CEO duality. All control variables are defined in Table 1.

This paper also controls for firm fixed effect and year fixed effect as well as cluster standard errors at firm level to control for the differences over time across firms.

## Empirical results

### Summary statistics results

Table 3 presents the summary statistics of main dependent variable and control variables used in this paper. The key dependent variable measures the greenwashing score relative to peers; the min value is 0.0000246, the max value is 2.825, and the standard deviation is 0.415. This proves that the degree of greenwashing varies quite a bit among companies.

For control variables, the firms' average size is 7.583 (millions in USD), the leverage is 25.4%, the market-to-book value is 4.043, the Tobin's Q is 2.452. The average value of the R&D rate is 5.8%, indicating that the company invests 5.8 per cent of its total assets in R&D. The mean value of CEO duality is 0.426 indicating that there are 42.6% of observations in the sample where the CEO and the chairman of the board are the same person. The mean value of board gender diversity is 22.052, indicating that 22% of the observations are female directors. The mean value of iso14000 is 0.318, indicating that only 31.8% of the observations practice iso14000.

Table 4 reports the correlation among all variables used in the analysis. It also shows the

significance among all variables. For example, it shows the correlation between greenwashing and firm size is positive and significant. To further explore the issue of multicollinearity, we also check the variance inflation factor (VIF) values. The unreported VIF values for all variables were within the acceptable threshold of 10 and the mean VIF was 1.69, indicating that the problem of multicollinearity did not exist.

**Baseline results**

Prior to the regression, the sample passed the parallel trends test. The Fig. 1 shows that the trend in corporate greenwashing changed significantly in the year when anti-ESG bills enacted, and this effect decreased over time. This proves the viability of the DID model. In addition, the parallel trends assumption still holds even not conditioning on observed covariates.

Table 5 reports the main regression results for Eq. (2), which estimates the impact of anti-ESG bills on firms' greenwashing behavior. The first column shows results from controlling only for fixed effects but not any control variables. The second column controls for fixed effects and firm financial characteristics. The third column includes fixed effects and all control variables (financial characteristics, board characteristics, and others).

The results in the first column show a coefficient of -0.093 at 1% significant level without adding any control variables. The results in the second column show that after controlling for the financial characteristics of the firm, the effect of anti-ESG bills on greenwashing remains significant at the 1% with a coefficient of -0.087. In addition, based on the coefficients of the control variables this paper finds that larger firms are more likely to greenwash, and more profitable firms are less likely to greenwash.

The results in the third column indicate that the effect of anti-ESG bills remains significant after controlling for all control variables. Undoubtedly, the third column, which presents the estimation results containing all the control variables (financial characteristics, board characteristics, and others) and fixed effects, provides more reliable estimation results than those in the first and second columns. The coefficient is -0.083, indicating that a one-unit standard deviation in the anti-ESG bills causes an 8.2% decrease in greenwashing.

In terms of control variables, CEO duality can effectively reduce the firm's greenwashing. The coefficient is -0.122 and significant at the 1% level. The possible reason for this is that

greenwashing is sometimes seen as a kind of conflict between managers and shareholders, as CEOs might choose to exaggerate the green of the company for their own benefit. If the CEO and the chairman of the board are the same person, the greenwashing that comes from the misalignment of interests can be effectively mitigated. In addition, board gender diversity can also effectively reduce corporate greenwashing. The coefficient is -0.004 and significant at the 1% level. It proves that a one-unit standard deviation in the increase of board gender diversity links with a 0.4% decrease in greenwashing. The probable reason for this is that greenwashing refers to firms focusing on ESG talk but not ESG walk. The increase in board gender diversity is a symptom of ESG walk, therefore it is negatively correlated with greenwashing. Whether or not a firm implements ISO14000, and the firm's future ambiguity are also relevant to greenwashing. However, these coefficients are significant only at the 10% level, which means the effect is not great.

All results control for firm fixed effects and year fixed effects and are clustered at the firm level. Through gradually adding control variables, this paper finds that anti-ESG bills could mitigate firms' greenwashing, which helps prove Hypothesis 1.

**Heterogeneity test: Brownwashing**

By separating companies according to the brownwashing and greenwashing, we could understand the impact of the anti-ESG bill on company ESG behaviors more clearly and further demonstrate that the motivation of brownwashing is different from the motivation of greenwashing.

The paper uses the sample of the brown washing firms to examine whether anti-ESG bills also have an impact on brown washing firms. By using the method from Zhang (2022), this paper keeps only the sample with negative ESG decoupling in this regression. The heterogeneity test allows us to compare the different impacts of the bills on greenwashing firms and on brownwashing firms.

The results are shown in Table 6. This paper gradually adds different level control variables in column 1 to column 3. All control variables and fixed effects and the clustering level are consistent with those in Table 5.

The results show that the coefficients are not significant regardless of the number of control

variables. This proves that the anti-ESG bill has no effect on the brown washing companies. The impact of these bills is more concentrated on greenwashing companies rather than on brown washing companies.

The possible reason is that the motivation for brownwashing is to prevent too much attention from peers and stakeholders, and brownwashing companies have already achieved their purpose. After the enactment of the anti-ESG bills, these companies have no incentive to spend additional costs to adjust their strategies, i.e., to reduce their green communications more or to increase their green communications. As a result, the greenwashing of these green silenced companies might not change so much.

**Mechanism exploration: green institutional funds**

According to Raghunandan and Rajgopal (2022) and Li et al. (2021), this paper matches data of greenwashing firms with mutual green funds to examine the role of green fund holdings in the effect of anti-ESG bills.

In this paper, green funds are first screened by name matching. This is because according to US legislation, all funds that make ESG investments must have names that contain relevant segments. Therefore, by filtering the names of funds with 'SUSTAIN', 'ESG', 'GREEN', and 'ENVIR' segments, this paper obtained the first part of the green funds. Then based on Morningstar's publicly available data, this article screens for funds which are US EQUITY and have a sustainable star rating of 5 globes. This paper merges them with the previous list to obtain a list of green funds. Refinitiv has data about mutual fund holdings in firms, and by manually name matching and removing unmatched funds, this paper obtains fund-firm level data. The paper then calculates the shares of each firm that are held by the Mutual Green Fund. The paper then matches the greenwashing firms in the sample to this dataset, and by removing the unmatched data, this paper obtains the pressure exposed by greenwashing firms from green funds.

The results are shown in Table 7. Similar to Table 5, this paper examines the effect of the bill on green fund holdings by gradually increasing the control variables. The coefficients of all three columns are -0.0004. Since the dependent variable is shareholding, and the mean value of green fund holdings in the merged sample is only 0.0017, this coefficient value is not

particularly low. The p-values for all three columns are less than 0.6, indicating that the significant values are close to the 5 per cent level.

Column 3, which presents the estimation results containing all control variables, are more reliable than those in Column 1 and 2. The third column shows a coefficient of -0.0004, which means that mutual green funds' holdings in greenwashing firms have decreased by 0.04% since anti-ESG bill enacted or resolved. Therefore, this paper proves that anti-ESG bills do reduce the external pressure exposed by firms from green funds. In addition, according to Delmas and Burbano (2011), this external pressure is a driver of corporate greenwashing. Therefore, the results prove Hypothesis 1A that anti-ESG bills reduce firms' incentives to greenwash by reducing external pressure from green funds.

**Robustness test**

**DDTIMING & TWFE WEIGHT**

When examining treatment effects, scholars often intend to compare the evolution of groups over time. Then, this idea can be realized by regressions with period and group fixed effects. This regression method, which controls for time and group fixed effects, is known as a two-way fixed effects model (TWFE). This method is typically used in single-period treatments. This is because, in single-period treatment, TWFE could give unbiased results.

However, this approach might be biased in multi-period DID. Following de Chaisemartin and D'Haultfœuille (2020), TWFE regression results are weighted sums of the average treatment effects (ATEs) in each group and period. However, in the case of multi-period DID, when the control group is EARLY TREATED and the treatment group is LATER TREATED, negative weights would be generated. In addition, the negative weights are an issue when the average treatment effects are heterogeneous across groups or periods. Therefore, in the case of multi-period treatments, one of the important assumptions that need to be fulfilled for the unbiased TWFE regression results is that the treatment effects are consistent rather than heterogeneous across periods.

However, this assumption is difficult to fulfil. Therefore, following de Chaisemartin and D'Haultfœuille (2020), in order to test the validity of the TWFE results, one should compute the weights attached to the regression.

By using the *twowayfeweights* Stata package which is recommended by de Chaisemartin and D'Haultfœuille (2020), this paper shows the results of ATEs weights in Table 8.a. Table 8.a shows that the results for negative weights only account for 0.002, indicating that the impact from negative weights in TWFE is low. It proves that the bias of the main regression results is small, and the results are credible.

Following Goodman-Bacon (2021), this paper has a further decomposition of the ATEs. G also mentions that negative weights arise when the ATE changes over time. This is because when already-treated units are used as controls, changes in their outcomes are subtracted out, and these changes may include treatment effects that vary over time.

Following Goodman-Bacon (2021), by using the Stata package ddtiming, this paper reports different weights of the ATEs in Table 8.b. The main source of bias is when earlier treated units are used as the control group, later treated units are used as the treatment group; or already treated units are used as the control group.

The results in Table 8.b show that the combination of Earlier Treated units vs. Later comparison, and the combination of Treatment vs. Already treated accounted for only 2 per cent. This means that the regression combinations that bring bias are only a small percentage. Consistent with the findings in Table 8.a, the results of the main regression are robust and credible.

**PSM DID**

Following Rosenbaum and Rubin (1983), this paper uses propensity score matching. When using TWFE, control and treatment groups are compared in order to look at treatment effects. However, in reality, the direct comparisons may be misleading because the units exposed to one treatment generally differ systematically from those exposed to the other treatment, which means there is often heterogeneity across units. This heterogeneity may lead to problems of selectivity bias. However, this problem can be addressed well by matching through the observable covariates.

This paper uses nearest neighbor matching. Results are shown in Table 9. All control variables and fixed effects are the same as the main regression. Columns (1) to (3) show the results for neighbors 1, 3, and 5, respectively. The neighbor 1 means that the treatment group units are matched to the units of the control group only with the closest propensity score. The neighbor

1 matching has minimum matching bias. The neighbor 5 is used to extend the coverage of the matched samples and reduce the dependence on a single control sample. The caliper is set to 0.05 during matching.

Fig 3 shows the matching results, and we can see that the bias of the covariates is significantly reduced after the matching, indicating the effectiveness of the propensity score matching.

The results in Table 9 indicate that the regression results are all significant at a 1% level regardless of the number of neighbors. By using Propensity Score Matching DID, this paper further demonstrates the validity of the conclusions that anti-ESG bills could mitigate firms' greenwashing behavior.

**Heterogeneity treatment and placebo test**

To estimate the effect of a treatment, scholars compare different groups who experience different evolution of their exposure to the treatment over time. This can be achieved by controlling for group and time fixed effects. In addition, TWFE assumes that the treatment effect is constant and not dynamic over time, which implies that the regression estimates the effect under the common trends assumption. However, the treatment effect is rarely constant.

In cases where treatments are dissimilar in different groups, the coefficient calculated by TWFE is a weighted sum of several difference-in-differences (DID). The negative weight in the calculations occurs when the early treated group is used as a control group to compare with the late treated group. The negative weights are a bias when the average treatment effects are heterogeneous across groups or periods.

To solve this problem, this paper follows de Chaisemartin and D'Haultfœuille (2023) and uses the DIDM approach. They used a new estimator, DIDM, which is also valid when the treatment effect is heterogeneous. This method relies on two assumptions, both of which are satisfied in this experiment. The first is the common trend assumption, and the second is that the treated status of the group does not change, which means that states will not change from a treated status to an untreated status.

Results are shown in Table 10. The results presented in Table 10.a. are the effects of the enactment of the anti-ESG bills in 2021 and 2022. LB CI and UB CI denote the lower and upper

bounds of the confidence interval. For example, the interval for Effect_1 is [-0.2012254, -0.0617661]; if zero is not in the interval, the effect is statistically significant. The results show that the coefficient of anti-ESG bills enacted or resolved in 2021 is -0.131, while the coefficient of anti-ESG bills enacted or resolved in 2022 is -0.079. In addition, the coefficient of anti-ESG bills enacted or resolved in 2021 is statistically significant, while the coefficient for 2022 is not significant. This indicates that the impact of anti-ESG bills in 2021 is greater than that of those in 2022, which is consistent with the inference.

Switchers denote the number of units that switched to the treated group in this period. The number of switchers in 2021 and 2022 are 116 and 89 respectively, indicating that 116 and 89 observations were switched to the treated group in 2021 and 2022, respectively.

Table 10.b shows the total impact of anti-ESG bills. The average cumulative treatment effect estimate was -0.1086557, suggesting that the treatments overall resulted in a negative cumulative effect. Confidence intervals do not include 0, indicating that the cumulative effect is statistically significant. The results indicate that anti-ESG bills are effective in mitigating the greenwashing of firms.

By using this approach, this paper also shows the results of the placebo test. Table 10.c and Fig 3 demonstrate the results of the placebo test. The findings show that the effects are not significant no matter the treatment is brought forward by one or two years. It suggests that the change in greenwashing behavior is indeed due to the impact of the enactment of anti-ESG bills. By using the DIDM approach, this paper demonstrates once again the impact of anti-ESG bills on firms' greenwashing.

**Stacked DID**

Following Cengiz et al. (2019), this paper uses a stacked DID model to solve the problem of negative weights and test the robustness of main regression results.

Stacked DID estimates can be used to estimate the average effect of the anti-ESG bills across events. Instead of using the calendar year like the traditional two way fixed effects model, stacked DID uses the event period. By splitting multi-period treatment into multiple events and then stacking them, stacked DID can effectively solve the issue that TWFE faces in multi-period treatment.

First, the stacked event-by-event model creates different stacks. Each stack includes all observations from a group of units that were treated during the same time period and all units that were never treated at all. Then, each stack is stacked by event time, which solves the problem of comparison between earlier treated and later treated.

Results are shown in Table 11. F_2 implies two periods in front of the event, and F_1 implies one period in front of the event. Current implies event current. L_1 represents one period after the event and L_2 represents two periods after the event. All control variables and fixed effects are the same as the main regression.

Column 1 shows the results with no control variables. We can see that neither of the two periods before the event is significant, and only the current period of the event and the first post-treatment period are significant. This indicates that there is a continuous effect of anti-ESG bills without controlling for the control variables. Columns 3 and 4 show that only the current period of the event is significant after adding the control variables. This indicates that after controlling for the covariates, this continuous effect diminishes and disappears.

Columns 1, 2, and 3 all show significance in the current period of treatment, illustrating the fact that the enactment of anti-ESG bills did lead to a reduction in greenwashing, regardless of the control variables. The conclusion is similar to the baseline regression results. This shows that issues of negative weight are unlikely to affect the conclusion.

Fig 5 shows a large change in effectiveness from 1 period before the event to 1 period after the event. All these results indicate that the effect of the anti-ESG bills is significant and the main regression results are robust.

**CS DID**

Callaway and Sant'Anna (2021) improve on traditional TWFE in the case where there are more than two time periods and units can become treated at different time by using a staggered DID approach. Unlike typically ATEs, they propose group-time average treatment effects, which are the average treatment effect for a group of units first treated in time t. This approach provides intuitive causal effects and allows for heterogeneity, as well as capturing dynamic effects, avoiding the problems encountered with traditional TWFE over multiple time periods as previously mentioned.

To robustly verify the impact of the anti-ESG bill on corporate greenwashing, this paper uses this staggered DID model. Results are shown in Table 12. All control variables are the same as the main regression. *Pre_avg* implies pre average effects. *Post_avg* implies post average effects. *Tm3* denotes the third period before treatment, *Tm2* denotes the second period before treatment, and *Tm1* denotes the first period before treatment. *Tp0* indicates the current period of treatment, *Tp1* indicates the first post-treatment period, and *Tp2* indicates the second post-treatment period. This demonstrates the dynamic effect of treatment.

The first to third columns show results with no control variables, only financial characteristics control variables, and all control variables, respectively. The results in all three columns show that the pre average effects are not significant, which means that there is no significant difference before the anti-ESG bills enactment. The coefficient of post average effects in columns (1) and (2) are significant at a 1% level, and the coefficient in column (3) is significant at a 5% level. These prove that anti-ESG bills have a significant effect on greenwashing.

In addition, by capturing the dynamic impact, we can see that the impact of the anti-ESG bills enactment in the current year was significant. This impact continues into the second year, with the significance decreasing in the second year which suggests that the impact diminishes over time. Conclusions do not change with the number of control variables.

Therefore, by using the approach from Callaway and Sant'Anna (2021), this paper proves the robustness of the main results.

**Additional tests**

**Political risks**

Following Hassan et al. (2019), they use textural analysis to measure firms' political risks. The proxy of political risks is the share of political risk terms that firms devote in the quarterly earning conference calls. Political risk is mainly due to political changes. It can affect the operations of the company, such as investment and hiring. Since the enactment of anti-ESG bills is also a change in politics, this study predicts a cross-sectional effect of political risks. This paper collects publicly available data from Hassan's website and uses the average annual political risk and divides it by 100.

Results are shown in Table 13. Column (1) shows the estimate with no control variables.

Column (2) shows the estimate with financial characteristics control variables. Column (3) shows results with both financial characteristics and other control variables.

All results in three columns show that the cross-section effect is significant at a 1% level. All three columns' coefficients are around -0.047. The coefficient on Treat*Post becomes smaller and insignificant compared with the baseline model. The possible reason for this is that after matching the sample from the main regression with the data on political risk, the observation lost 2,000, resulting in an error in the results. Another possible reason is that the direct effect of anti-ESG policy itself is weakened by the addition of Political Risk.

However, the interaction term *Treat*Post*Politicalrisk* suggests that the effect of policy is more pronounced when political risk is higher. This proves Hypothesis 3.a, indicating that firms with high political risk will be more sensitive to changes in politics compared to firms with low political risk. In other words, they will, after the enactment of anti-ESG, adjust their ESG strategies according to the ESG atmosphere (ESG is no more important) in the state of firms.

**Climate physical risks**

Following Sautner et al. (2023), they used a machine learning method to capture the keywords related to climate in earning conference calls. This measure provides a good proxy of a firm's climate focus. This research mainly focuses on the physical part of climate risks. Physical risks are those climate risks that have a direct impact on the firm, e.g. directly damaging the firm's assets. Since the method divides the total number of words by the climate words, which is a percentage, this research multiplied it by 100.

Table 14 shows the results of the cross-sectional test for climate physical risks. Similar to Table 13, the first column shows estimation with no control variables, while the second column shows the regression results which control only financial characteristics. The third column shows results with all control variables.

The coefficients of the cross-sectional term are around 3.9 in all three columns and are significant at a 5% level. This indicates that firms' physical climate risk exposure enhanced anti-ESG policy disincentives to greenwashing. It proves Hypothesis 3.b, indicating that firms who pay great attention to climate physical terms will be more sensitive to changes in anti-ESG politics compared to firms who do not focus on climate terms.

The possible reason is that the greenwash may be higher for firms that regularly mention climate terms in earning conference calls, compared to firms that don't care about climate. Therefore, after the anti-ESG bill was enacted, these firms may be more sensitive to the climate atmosphere (ESG is no longer important) and more incentivized to reduce greenwashing.

**Uncertainty**

Following Coiculescu et al. (2023), the firm's future uncertainty is calculated through average daily variance over the month. The more volatile a firm is in the stock market, the more uncertainty in its operations. Uncertainty in a firm tends to affect its operations and choice of strategy, e.g., a firm with high uncertainty would be more likely to focus on short-term interests. Since greenwashing is part of its ESG strategy, this study predicts a cross-sectional effect of firms' uncertainty.

Table 15 shows the results of the cross-sectional test of uncertainty. The first column shows results with no control variables. The second column shows results with only financial characteristics control variables. The third column shows results with all control variables.

All results in three columns show that the cross-section effect of uncertainty is positive and statistically significant. This suggests that anti-ESG policies have less impact on greenwashing in firms with higher uncertainty. The likely reason for this is that firms with higher uncertainty are more likely to focus on firms' survival and short-term interests rather than ESG, and therefore firms' greenwashing behavior is more likely to be lower compared to firms with low uncertainty. Therefore, the impact on these firms' greenwashing would be low after the enactment of anti-ESG bills.

To test the conjecture, this research divides the sample based on uncertainty into a sample with higher uncertainty (top 50 per cent) and a sample with lower uncertainty (bottom 50 per cent). This study finds that the average greenwashing score in firms with high uncertainty is 0.468, while the average greenwashing score in firms with low uncertainty is 0.518. This proves the first possible reason.

Another possible reason is that firms with higher uncertainty are less likely to care about the ESG atmosphere in the state where firms are located. The higher the uncertainty, the more short-sighted the managers tend to be. They are more likely to be concerned with the survival and

short-term interests of the company. They would be less likely to change their ESG strategy due to the enactment of an anti-ESG bill.

**Financial constrains**

Following Delmas and Burbano (2011), when examining the motivations behind corporate greenwashing, it is essential to consider both internal and external factors. Therefore, this study investigates the role of internal financial constraints in the impact of anti-ESG laws on corporate greenwashing. Based on section 2.1, firms facing greater financial constraints have stronger incentives to engage in greenwashing. Therefore, this study predicts that firms with high financial constraints will respond differently to anti-ESG laws compared to those with low financial constraints.

Following Habibzadeh et al. (2021), this research uses the KZ index as a proxy for financial constraints. This research collects data on cash, debt and dividends from Compustat. The KZ value is calculated according to the formula (Kaplan and Zingales, 1997), the greater the KZ value, the larger the financial constraint of the firm.

The results are shown in Table 16. Column (1) shows the results with no control variables, while column (2) shows the estimate with only financial characteristics control variables. Column (3) shows results with both financial characteristics and other control variables. The result is positive, but the value is small. Moreover, the significance is 1% level only in the absence of control variables. After adding control variables, the significance is low. This means that the financial constraint plays a weak adjusting role. This suggests that when considering only internal financial constraints, the differences between firms with varying levels of financial constraints are not substantial.

In order to further investigate the role of financial pressures in the impact of anti-ESG bills on corporate greenwashing, this research consider external fund pressure and internal financial constraints simultaneously by grouping the sample according to both financial constraints and green fund pressures. This research argues that the role of financial constraints in the impact should be considered alongside external green fund pressures. This research sets dummy variables, *constraints* and *share*, based on financial constraints and external green funding pressures. *Constraints* is equal to 1 when the firm's financial distress belongs to the top 50% of

the sample. *Share* is equal to 1 when the firm's external green funding pressure belongs to the top 50% of the sample.

Through this method, this research divided the sample into four subgroups. The results are shown in the four columns of Table 16, respectively. Based on the results of the four columns, this research finds that the bill has the largest and most statistically significant effect on greenwashing in the group with low financial constraints and no external green funding pressures compared with other groups. The possible reason is that firms with low financial constraints and no external green funding pressure have less incentive to continue greenwashing after the bills are enacted. These firms are therefore more likely to comply with the change in ESG atmosphere (ESG is no more important) in the state of firms. In other words, these firms would be able to 'get away' with greenwashing more easily.

In addition, the table also shows that firms facing significant financial pressure are unlikely to immediately adjust their ESG strategies after the enactment of anti-ESG bills. A possible explanation is that financially constrained firms are reluctant to incur additional costs to modify their greenwashing.

**Discussion and conclusions**

This research demonstrates that the enactment of anti-ESG bills can mitigate corporate greenwashing. This study argues that the impact of anti-ESG laws on corporate greenwashing can be explained through changes in the ESG atmosphere within the state and the pressures faced by firms. The enactment of an anti-ESG bill signals a shift in the state's focus from corporate social responsibility to economic development, which means that ESG is less important than before. Companies that previously pursued ESG may perceive this shift in the ESG atmosphere. Meanwhile, the impact of anti-ESG bills on corporate greenwashing might also be felt by the pressure faced by firms, which comes from green fund shareholdings and internal financial constraints. Based on these factors, this study explains the mechanisms through which anti-ESG laws may influence corporate greenwashing.

Additionally, this paper highlights the heterogeneity between greenwashing companies and green-silent companies, showing that anti-ESG bills do not significantly affect ESG decoupling among green-silent companies. This research explains this finding through the different drivers

between greenwashing and brownwashing.

Furthermore, this research uses several cross-sectional tests and reveals that political risk and corporate attention to climate change amplify the effects of anti-ESG bills, while stock market uncertainty weakens the firm's responses to these anti-ESG laws. This paper interprets these findings through firms' sensitivity and ability to respond to changes in the external ESG environment. For instance, firms that pay more attention to climate change may also be more sensitive to the ESG atmosphere they operate in, enabling them to respond more effectively to these anti-ESG laws.

This study has several limitations. Although this research accounts for the external pressure from green fund shareholdings, as it is a driver of greenwashing (Delmas and Burbano, 2011), we do not specifically examine the role of other stakeholders in the impact of anti-ESG bills on corporate greenwashing. Additionally, this study only focuses on the effect of anti-ESG bills on corporate greenwashing and does not explore their broader impact on firms. We anticipate that the enactment of such bills might also affect stock market performance, particularly in the firearms and fossil fuels industries. Furthermore, due to the limited existing literature on corporate greenwashing, there is no universally accepted measure of greenwashing. As a result, the measurement approach adopted in this study may be subject to criticism.

This study argues that the shift in the ESG trend is primarily driven by changes in the ruling party in the United States, as Democrats and Republicans have fundamentally different attitudes toward ESG. However, this shift does not necessarily indicate that ESG is no longer important; rather, it reflects the changing priorities of different administrations. It is undeniable that corporate social responsibility remains a crucial consideration for businesses. Companies should adopt green as a measure to support their long-term development, rather than pursuing green just for green.

**Table 1. Definition of Variables**

| Variables | Definition | Sources |
|---|---|---|
| Greenwashing | A positive peer-relative gap between ESG disclosure and performance | Bloomberg, Refinitiv |
| Brownwashing | A negative peer-relative gap between ESG disclosure and performance | Bloomberg, Refinitiv |
| Size | The logarithm of total assets | Compustat |
| Leverage | Total long-term debt to total assets | Compustat |
| Market To Book Value | Ratio between market value and book value of the company | Compustat |
| Tobins' Q | Ratio of market value to total assets | Compustat |
| R&D | Ratio of R&D expenditure to total assets | Compustat |
| ROA | Ratio of earning before interests and taxes to total assets | Compustat |
| CEO Duality | Whether the CEO and the Chairman of the Board are the same person | Refinitiv |
| Board Gender Diversity | Percentage of women among board members | Refinitiv |
| Audit Board Committee | Whether the company has an audit committee | Refinitiv |
| ISO14000 | Whether the company has implemented iso14000 | Refinitiv |
| Ambiguity | The variance of stock return probabilities in stock market | Publicly available data from Coiculescu et al. (2023) |
| Yearly_pressure | The company's shares held by green fund (mutual fund) | Refinitiv, Morningstar |
| Uncertainty | Firm's average daily variance over the month with the Scholes and Williams (1977) adjustment | Publicly avaliable data from Coiculescu et al. (2023) |
| Politicalrisk | The share of firms' earnings conference calls that they devote to political risks. | Tarke A. Hassan's public website |
| Physical exposure | Frequency of climate physical risk terms mentioned in Earning conference calls. | Zacharias Sautner's public website |
| Financial constraints | The KZ index calculated by using cash flow, leverage and other metrics. The higher the KZ index, the higher the financial constraint. | Compustata |

**Table 2. Summary of Anti-ESG bills**

| Name | Year | Bill categories | Summary |
|---|---|---|---|
| LA HR246 | 2022 | Study bill | To create the ESG Criteria Study Group to study and make recommendations regarding regulation of ESG criteria in lending and investment practices. |
| LA HR203 | 2022 | Study bill | To create the ESG Criteria Study Group to study and make recommendations regarding regulation of ESG criteria in lending and investment practices. |
| LA HCR110 | 2023 | Restricted Pension investment | Requests the state public retirement systems to avoid Environmental, Social, and Governance investing |
| LA HCR70 | 2023 | Restricted investment contracts | Requests retirement systems and the state treasurer to report on companies that do not invest in certain energy companies |
| LA HCR59 | 2023 | Opposing federal rules | Requests the U.S. Securities and Exchange Commission to withdraw its proposed rule with respect to climate-related disclosures for investors |
| LA HR267 | 2024 | Proxy shareholder voting restriction | Requires state retirement systems to submit reports on the proxy voting process in order to limit ESG investments to protect resident interests. |
| LA HRC78 | 2024 | Unique | Requests that Board of Regents and public postsecondary education management boards report to House and Senate education committees and Joint Legislative Committee on the Budget on actions related to environmental, social, and governance criteria |
| MO HR12 | 2023 | Opposing federal rules | Urges Missouri to oppose federal rules or regulations requiring companies to disclose climate change |
| MT HJ11 | 2023 | Opposing federal rules | Urges the U.S. Congress to push back against ESG policies, arguing that federal ESG regulations threaten Montana's economy and free market principles. |
| UT SCR009 | 2023 | Unique | Concurrent resolution opposing efforts to weaken the economy or restrict energy supply |
| AL SB261 | 2023 | Restricted investment contracts | To prohibit governmental entities from entering into certain contracts with companies that boycott businesses because the business engages in certain sectors or does not meet certain environmental or corporate governance standards or does not facilitate certain activities; to provide that no company in the state shall be required by a governmental entity, nor penalized by a governmental entity for declining to engage in economic boycotts or other actions that further social, political, or ideological interests; to require |

| | | | |
|---|---|---|---|
| | | | the Attorney General to take actions to prevent federal laws or actions from penalizing, inflicting harm on, limiting commercial relations with, or changing or limiting the activities of companies or residents of the state based on the furtherance of economic boycott criteria |
| AR HB1637 | 2021 | Opposing federal rules | This act grants the Arkansas State Legislature and judiciary the authority to review and reject the enforcement of certain presidential executive orders, particularly those concerning pandemics, natural resources, agriculture, land use, financial regulations (including ESG standards), and gun rights. |
| AR SB62 | 2023 | Restricted investment contracts | To prohibit public entities from contracting with companies that boycott energy, fossil fuel, firearms, and ammunition industries. |
| AR HB1307 | 2023 | Restricted investment contracts; Restricted Pension investment | To regulate the use of ESG scores in state investments and financial transactions |
| AR HB1253 | 2023 | Restricted Pension investment; Proxy shareholder voting restriction | To restrict the influence of ESG factors in managing Arkansas state government employee pension funds. It establishes that fiduciaries responsible for these funds must prioritize only financial (pecuniary) factors and explicitly prohibits decisions based on ESG or other non-financial considerations. |
| FL H989 | 2024 | Chilling effect (civil liability) | To prevent ESG scoring systems from influencing financial, corporate, or individual assessments |
| FL H0003 | 2023 | Government ESG score ban; Restricted Pension investment; Restricted investment contracts; Proxy shareholder voting restriction | The government and related agencies must make investment decisions based solely on financial factors (i.e., 'pecuniary factors'), to the exclusion of social, political or ideological considerations. |
| FL H1645 | 2023 | Unique | Creates Gainesville Regional Utilities Authority; establishes authority as governing board of GRU. Requires GRUA and chief executive officer/general manager (CEO/GM) to consider only factors related to economic interests when making policy and operational decisions, and does not include social, political or ideological objectives. |
| GA HB481 | 2023 | Restricted Pension investment; Proxy shareholder voting restriction | It emphasizes that fiduciaries (those in charge of managing the retirement system) must prioritize the financial interests of plan participants and their beneficiaries. |

| | | | |
|---|---|---|---|
| ID S1291 | 2024 | Restricted investment contracts | Adds to existing law to prohibit public entities from entering into contracts with entities that boycott certain industry sectors. |
| ID H0190 | 2023 | Restricted investment contracts | Amends existing law to require that credit unions and banks holding state funds not boycott certain industries. |
| ID H0191 | 2023 | Government ESG score ban | Amends and adds to existing law to provide that procurement decisions shall not be based on environmental, social, and governance standards. |
| ID SB1405 | 2022 | Restricted Pension investment; Restricted investment contracts; Unique | ESG factors must not be substituted for prudent investment principles in the investment decisions of public entities |
| IN HB1008 | 2023 | Restricted Pension investment; Proxy shareholder voting restriction | Prohibits the board from making an investment decision with the purpose of influencing any social or environmental policy or attempting to influence the governance of any corporation for nonfinancial purposes. |
| KS HB2100 | 2023 | Restricted Pension investment; Proxy shareholder voting restriction | Prohibits the state and political subdivisions from giving preferential treatment to or discriminating against companies based on such ESG criteria in procuring or letting contracts; Restricts state agencies from adopting ESG criteria or requiring any person or business to operate in accordance with such criteria |
| KY HB236 | 2023 | Restricted Pension investment; Proxy shareholder voting restriction | fiduciaries shall consider the sole interest of the members and beneficiaries of the retirement systems using only pecuniary factors and prohibit the consideration of or actions on nonpecuniary interests including environmental, social, political, and ideological interests. |
| KY SB205 | 2022 | Restricted Pension investment; Restricted investment contracts | Require state governmental entities to inform and warn listed financial companies that they may become subject to divestment by the state governmental agency unless they clarify their actions or cease their energy company boycott |
| LA SB234 | 2024 | Restricted investment contracts | Provides relative to prohibition on certain governmental entity contracts with companies that discriminate against firearm and ammunition industries. |
| MT HB228 | 2023 | Restricted Pension investment; Proxy shareholder voting restriction | The Public Investment is prohibited from considering non-pecuniary factors for investment. |

| | | | |
|---|---|---|---|
| MT HB356 | 2023 | Restricted investment contracts | Establish firearms industry nondiscrimination |
| MT SB227 | 2021 | Opposing federal rules | Montana will not enforce ESG financial regulatory policies that may be implemented by the federal government, such as requiring investment funds to disclose their carbon footprints and limiting fossil fuel investments. |
| NH HB457 | 2023 | Unique | This bill requires the state treasurer and the retirement system to report quarterly on the motivations of funds, especially those that have environmental social, political, or ideological interests. |
| NH HB1469 | 2022 | Study bill; Proxy shareholder voting restriction | Establishing a committee to study the need for anti-discrimination legislation in the New Hampshire financial services industry. |
| NC H750 | 2023 | Restricted Pension investment; Government ESG score ban | The bill focuses on North Carolina government agencies and state pension funds, restricting their use of ESG standards in employment decisions, contract awards and investment management |
| ND HB1429 | 2023 | Restricted Pension investment; Study bill; Restricted investment contracts | The bill makes it clear that if an investment is chosen solely because of ESG criteria, rather than on the basis of maximizing financial returns, it will be prohibited. |
| ND HB1164 | 2021 | Opposing federal rules | North Dakota can refuse to enforce the policy which is implemented by the federal government if it addresses a financial institution's compliance requirements with ESG standards. |
| ND SB2291 | 2021 | Study bill | To provide for a department of commerce study of the implications of complete divestment of companies that boycott energy or commoditie |
| OH SB | 2023 | Restricted Pension investment | Restricting the board from considering ESG factors when investing |
| OK HB | 2021 | Opposing federal rules | Oklahoma can refuse to enforce the federal rules if it addresses a financial institution's compliance requirements with ESG standards. |
| OK HB | 2021 | Restricted Pension investment; Restricted investment contracts | Demand that the government divest from companies which boycott energy companies. |
| SC H3690 | 2023 | Restricted Pension investment; Proxy shareholder voting restriction | Require pension funds not to invest with ESG as their primary purpose. |
| TN HB2100 | 2024 | Chilling effect (civil liability) | Prohibit financial institutions and insurers from denying or canceling services to a person, or otherwise |

| | | | |
|---|---|---|---|
| | | | discriminating against a person, based upon certain factors, including the person's political opinions, speech, or affiliations, or religious beliefs, religious exercise, or religious affiliations |
| TN SB955 | 2023 | Unique; Proxy shareholder voting restriction | Require the department of treasury investment division staff to invest, reinvest, manage, and select investment options for program assets for financial reasons, excluding environmental, social, and governance interests that may not be material to the financial analysis of the investment |
| TN SB2649 | 2022 | Restricted Pension investment; Restricted investment contracts | Prohibits state treasurer from entering into a contract with a state depository if the state depository has a policy prohibiting financing to companies in the fossil fuel industry. |
| TX SB833 | 2023 | Private Sector ESG Score ban | The bill restricts insurers from using ESG criteria in setting rates |
| TX SB13 | 2021 | Restricted Pension investment; Restricted investment contracts | Restrict Texas government agencies (including various pension funds) from investing in financial companies that boycott energy companies. |
| TX SB19 | 2021 | Restricted investment contracts | Prohibit contracts with companies that discriminate against the firearm or ammunition industries. |
| UT HB0281 | 2023 | Government ESG score ban | Prohibit a governmental entity from using, enforcing, providing data for use in, or otherwise participating in the creation or use of a system that, based on a social credit score, discriminates against, advocates for, or causes adverse or preferential treatment of a person |
| UT HB0449 | 2023 | Unique | Restrict companies from adopting boycott or exclusion strategies against other companies based on ESG criteria |
| UT SB0096 | 2023 | Restricted Pension investment; Proxy shareholder voting restriction | Require a public entity to invest public funds in accordance with the prudent investor rule, which means The sole objective is to ‘maximise risk-adjusted returns’, without regard to ESG considerations. |
| UT SB0097 | 2023 | Restricted investment contracts | Prohibit a public entity from entering into a contract with a company that engages in certain boycott actions |
| WV HB2862 | 2023 | Restricted Pension investment; Proxy shareholder voting restriction | Require the board or trustees to prioritize the pecuniary factor over social responsibility when making investments. |
| WV SB262 | 2022 | Restricted investment contracts | Restricts on contracts with financial institutions that boycott energy companies. |
| WY HB0236 | 2021 | Private Sector ESG Score ban | Prohibit financial institutions from discriminating against firearms businesses |

**Table 3.**

**Summary Statistics**

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Greenwashing | 7,014 | 0.495 | 0.415 | 0.000 | 2.825 |
| Brownwashing | 7,762 | -0.562 | 0 .444 | -2.556 | -0.000 |
| Size | 7,770 | 7.583 | 1.982 | 1.843 | 14.782 |
| Leverage | 7,752 | 0.254 | 0.253 | 0.000 | 2.084 |
| Market To Book Value | 7,581 | 4.043 | 27.857 | -503.535 | 440.786 |
| Tobins' Q | 7,581 | 2.452 | 2.511 | 0.437 | 25.276 |
| R&D | 7,770 | 0.058 | 0.141 | 0.000 | 1.647 |
| ROA | 7,218 | 0.015 | 0.260 | -2.516 | 0.796 |
| CEO Duality | 7,773 | 0.426 | 0.495 | 0.000 | 1.000 |
| Board Gender Diversity | 7,762 | 22.053 | 12.347 | 0.000 | 66.667 |
| Audit Board Committee | 7,773 | 0.848 | 0.359 | 0.000 | 1.000 |
| ISO14000 | 7,773 | 0.318 | 0.466 | 0.000 | 1.000 |
| Ambiguity | 7,773 | 36.869 | 44.683 | 0.590 | 414.678 |
| Yearly_pressure | 6,218 | 0.002 | 0.007 | 0.000 | 0.099 |
| Uncertainty | 7,773 | 0.077 | 0 .136 | 0.002 | 1.236 |
| Politicalrisk | 5,251 | 1.232 | 1.403 | 0.000 | 20.315 |
| Physical exposure | 6,280 | 0 .001 | 0 .010 | 0.000 | 0 .458 |
| Financial constraints | 4,167 | -474.952 | 13636.150 | -838036.400 | 1531.311 |

The table presents the number of available observations and summary statistics (mean, standard deviation, minimum, and maximum) for the variables of the empirical analysis. The variables are defined in Table 1.

**Table 4. Correlation matrix**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Greenwashing | 1.000 | | | | | | | | | | | |
| Size | 0.163 | 1.000 | | | | | | | | | | |
| Leverage | 0.042 | 0.142 | 1.000 | | | | | | | | | |
| Market to book value | 0.016 | -0.012 | -0.015 | 1.000 | | | | | | | | |
| Tobins' Q | 0.000 | -0.208 | -0.008 | 0.135 | 1.000 | | | | | | | |
| R&D | -0.076 | -0.423 | -0.087 | 0.032 | 0.310 | 1.000 | | | | | | |
| ROA | 0.084 | 0.459 | 0.109 | 0.001 | -0.152 | -0.811 | 1.000 | | | | | |
| CEO Duality | -0.042 | -0.110 | -0.006 | -0.005 | -0.008 | 0.088 | -0.086 | 1.000 | | | | |
| Board Gender Diversity | 0.008 | 0.273 | 0.101 | -0.007 | 0.006 | -0.046 | 0.107 | 0.013 | 1.000 | | | |
| Audit Board Committee | 0.014 | -0.027 | -0.042 | 0.006 | 0.040 | -0.035 | 0.043 | -0.003 | -0.113 | 1.000 | | |
| ISO14000 | 0.029 | 0.232 | 0.085 | 0.005 | -0.073 | -0.044 | 0.104 | -0.022 | 0.207 | -0.587 | 1.000 | |
| Ambiguity | 0.111 | 0.629 | 0.134 | 0.015 | -0.004 | -0.192 | 0.277 | -0.094 | 0.209 | 0.002 | 0.154 | 1.000 |

**Table 5. Baseline regression results by TWFE model**

| | (1) Greenwashing | (2) Greenwashing | (3) Greenwashing |
|---|---|---|---|
| Treat*Post | -0.093*** | -0.087*** | -0.082** |
| | (-3.008) | (-2.651) | (-2.439) |
| Size | | 0.034* | 0.031 |
| | | (1.764) | (1.627) |
| Leverage | | 0.020 | 0.022 |
| | | (0.457) | (0.535) |
| Market to book value | | 0.000 | 0.000 |
| | | (1.234) | (1.076) |
| Tobins' Q | | 0.002 | 0.002 |
| | | (0.597) | (0.587) |
| R&D | | -0.161 | -0.143 |
| | | (-1.644) | (-1.490) |
| ROA | | -0.112** | -0.101* |
| | | (-2.113) | (-1.956) |
| CEO Duality | | | -0.122*** |
| | | | (-4.925) |
| Board Gender Diversity | | | -0.004*** |
| | | | (-5.000) |
| Audit Board Committee | | | -0.004 |
| | | | (-0.233) |
| ISO14000 | | | -0.030* |
| | | | (-1.717) |
| Ambiguity | | | 0.000* |
| | | | (1.819) |
| Constant | 0.519*** | 0.257* | 0.430*** |
| | (262.132) | (1.674) | (2.813) |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| Observations | 6,521 | 5,977 | 5,971 |
| adj. R-sq | 0.606 | 0.605 | 0.612 |

The table reports coefficient estimates of baseline model. The dependent variable is the greenwashing. The explanatory variables are defined in Table 1. The first column only controls fixed effects but not control variables. The second column adds firms' financial characteristics level control variables. The third column controls not only firms' financial characteristics but also others control variables. Firm and year fixed effects are used in each specification. Regression clusters at the firm level. T statistics value is in parentheses. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 6. Regression results on Brownwashing**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Brownwashing | Brownwashing | Brownwashing |
| Treat*Post | 0.007 | 0.016 | 0.015 |
| | (0.244) | (0.518) | (0.493) |
| Size | | 0.044* | 0.047* |
| | | (1.722) | (1.891) |
| Leverage | | -0.062 | -0.046 |
| | | (-1.008) | (-0.740) |
| Market to book value | | 0.000 | 0.000 |
| | | (0.422) | (0.396) |
| Tobins' Q | | -0.001 | -0.000 |
| | | (-0.145) | (-0.012) |
| R&D | | -0.100 | -0.072 |
| | | (-1.080) | (-0.773) |
| ROA | | -0.047 | -0.040 |
| | | (-0.929) | (-0.762) |
| CEO Duality | | | -0.133*** |
| | | | (-4.824) |
| Board Gender Diversity | | | -0.005*** |
| | | | (-5.310) |
| Audit Board Committee | | | -0.003 |
| | | | (-0.141) |
| ISO14000 | | | -0.057*** |
| | | | (-2.913) |
| Ambiguity | | | -0.000 |
| | | | (-1.381) |
| Constant | -0.579*** | -0.895*** | -0.698*** |
| | (-257.566) | (-4.491) | (-3.503) |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| Observations | 7,303 | 6,779 | 6,779 |
| adj. R-sq | 0.531 | 0.533 | 0.541 |

The dependent variable is the greenwashing. This regression retains only firms with ESG decoupling less than 0, which means they have brownwashing behavior. The explanatory variables are defined in Table 1. The first column only controls fixed effects but not control variables. The second column adds firms' financial characteristics level control variables. The third column controls not only firms' financial characteristics but also others control variables. Firm and year fixed effects are used in each specification. Regression clusters at the firm level. T statistics value is in parentheses. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 7. Channel test: green fund pressure**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Yearly_pressure | Yearly_pressure | Yearly_pressure |
| Treat*Post | -0.000* | -0.000* | -0.000* |
| | (-1.952) | (-1.927) | (-1.943) |
| Size | | 0.000 | 0.000 |
| | | (1.326) | (1.361) |
| Leverage | | 0.000 | 0.000 |
| | | (0.046) | (0.015) |
| Market to book value | | 0.000 | 0.000 |
| | | (0.535) | (0.467) |
| Tobins' Q | | 0.000 | 0.000 |
| | | (0.291) | (0.346) |
| R&D | | 0.001 | 0.001 |
| | | (1.599) | (1.607) |
| ROA | | 0.000 | 0.000 |
| | | (0.745) | (0.814) |
| CEO Duality | | | -0.000** |
| | | | (-2.274) |
| Board Gender Diversity | | | -0.000 |
| | | | (-0.832) |
| Audit Board Committee | | | -0.000 |
| | | | (-0.430) |
| ISO14000 | | | 0.000 |
| | | | (0.524) |
| Ambiguity | | | -0.000** |
| | | | (-2.263) |
| Constant | 0.002*** | -0.001 | -0.001 |
| | (159.098) | (-0.432) | (-0.271) |
| Firm FE | yes | yes | yes |
| Year FE | yes | yes | yes |
| Observations | 5,702 | 5,236 | 5,233 |
| adj. R-sq | 0.914 | 0.914 | 0.914 |

The table reports coefficient estimates of channel tests. The dependent variable is the shares held by green fund. The explanatory variables are defined in Table 1. The first column only controls fixed effects but not control variables. The second column adds firms' financial characteristics level control variables. The third column controls not only firms' financial characteristics but also others control variables. Firm and year fixed effects are used in each specification. Regression clusters at the firm level. T statistics value is in parentheses. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 8. Test of TWFE bias**

**Table 8.a. Weight of TWFE**

| Description | # ATTs | Σ Weights |
|---|---|---|
| Positive weights | 379 | 1.002 |
| Negative weights | 38 | -0.002 |
| Total | 417 | 1.000 |

**Table 8.b. Bacon Decomposition**

| DD Comparison | Weight | Avg DD Est |
|---|---|---|
| Earlier T vs. Later C | 0.007 | -0.128 |
| Later T vs. Earlier C | 0.005 | -0.139 |
| T vs. Never treated | 0.975 | -0.092 |
| T vs. Already treated | 0.014 | -0.062 |

T = Treatment; C = Comparison

**Table 9. PSM DID**

| | Neighbor (1) Greenwashing | Neighbor (3) Greenwashing | Neighbor (5) Greenwashing |
|---|---|---|---|
| Treat*Post | -0.125*** | -0.102*** | -0.098*** |
| | (-2.834) | (-2.818) | (-2.825) |
| Size | 0.016 | -0.001 | 0.011 |
| | (0.324) | (-0.030) | (0.257) |
| Leverage | -0.032 | 0.011 | 0.000 |
| | (-0.256) | (0.112) | (0.001) |
| Market to book value | 0.000 | 0.000 | 0.000 |
| | (0.595) | (0.728) | (0.784) |
| Tobins' Q | 0.009 | 0.007 | 0.010 |
| | (1.043) | (0.895) | (1.475) |
| R&D | -0.545** | -0.441** | -0.410** |
| | (-2.258) | (-2.135) | (-2.041) |
| ROA | -0.051 | -0.028 | -0.054 |
| | (-0.467) | (-0.296) | (-0.591) |
| CEO Duality | -0.022 | -0.034 | -0.041 |
| | (-0.410) | (-0.802) | (-1.040) |
| Board Gender Diversity | -0.002 | -0.001 | -0.001 |
| | (-0.771) | (-0.546) | (-0.903) |
| Audit Board Committee | 0.073 | 0.070* | 0.048 |
| | (1.439) | (1.685) | (1.197) |
| ISO14000 | 0.026 | 0.041 | 0.027 |
| | (0.570) | (1.071) | (0.757) |
| Ambiguity | -0.000 | -0.000 | -0.000 |
| | (-0.415) | (-0.092) | (-0.014) |
| Constant | 0.451 | 0.544 | 0.473 |
| | (1.096) | (1.520) | (1.377) |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| Observations | 1,195 | 2,237 | 3,076 |
| adj. R-sq | 0.617 | 0.624 | 0.627 |

This table provides coefficient estimates of Propensity Score Matching Difference-in-Difference model. Column 1 shows the results of Neighbor (1), which means that the units of the treatment group are matched to only one unit that have closest propensity score. Column 2 shows the results of Neighbor (3), which means that the units of the treatment group are matched to three unit that have closest propensity score. Column 3 shows the results of Neighbor (5), which means that the units of the treatment group are matched to five unit that have closest propensity score. All control variables and fixed effects are the same as in the main regression. Regression clusters at the firm level. T statistics value is in parentheses. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 10. Results of Heterogeneity treatment and placebo test**

**Table 10.a. Estimation of treatment effects: Event-study effects**

| Effect | Estimate | SE | LB CI | UB CI | N | Switchers |
|---|---|---|---|---|---|---|
| Effect_1 | -0.131 | 0.036 | -0.201 | -0.062 | 1,548 | 116 |
| Effect_2 | -0.079 | 0.040 | -0.158 | 0.000 | 1,285 | 89 |

Test of joint nullity of the effects: p-value = 0.00097673

**Table 10.b. Average cumulative (total) effect per treatment unit**

| Effect | Estimate | SE | LB CI | UB CI | N | Switch*Periods |
|---|---|---|---|---|---|---|
| Av_tot_eff | -0.109 | 0.034 | -0.175 | -0.042 | 2,296 | 205 |

Average number of time periods over which a treatment's effect is accumulated = 1.5658537

**Table 10.c. Testing the parallel trends and no anticipation assumptions**

| Effect | Estimate | SE | LB CI | UB CI | N | Switchers |
|---|---|---|---|---|---|---|
| Placebo_1 | -0.018 | 0.046 | -0.111 | 0.076 | 1,179 | 87 |
| Placebo_2 | 0.007 | 0.057 | -0.106 | 0.120 | 863 | 66 |

Test of joint nullity of the placebos: p-value = 0.87410877

**Table 11. Stacked DID**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Greenwashing | Greenwashing | Greenwashing |
| F_2 | -0.013 | 0.007 | -0.002 |
| | (-0.408) | (0.238) | (-0.059) |
| F_1 | 0.003 | 0.026 | 0.023 |
| | (0.088) | (0.722) | (0.608) |
| Current | -0.112** | -0.094** | -0.093** |
| | (-2.556) | (-2.089) | (-2.041) |
| L_1 | -0.093** | -0.065 | -0.061 |
| | (-2.097) | (-1.439) | (-1.305) |
| L_2 | -0.072 | -0.051 | -0.052 |
| | (-1.442) | (-0.993) | (-1.002) |
| Size | | 0.041*** | 0.037*** |
| | | (4.249) | (3.910) |
| Leverage | | 0.024 | 0.027 |
| | | (1.118) | (1.299) |
| Market to book value | | 0.000** | 0.000* |
| | | (2.174) | (1.918) |
| Tobins' Q | | 0.002 | 0.001 |
| | | (1.030) | (0.965) |
| R&D | | -0.148*** | -0.124*** |
| | | (-3.012) | (-2.585) |
| ROA | | -0.124*** | -0.110*** |
| | | (-4.518) | (-4.118) |
| CEO Duality | | | -0.137*** |
| | | | (-10.696) |
| Board Gender Diversity | | | -0.005*** |
| | | | (-10.924) |
| Audit Board Committee | | | -0.018* |
| | | | (-1.843) |
| ISO14000 | | | -0.040*** |
| | | | (-4.515) |
| Ambiguity | | | 0.000*** |
| | | | (3.862) |
| Constant | 0.512*** | 0.198*** | 0.410*** |
| | (347.106) | (2.608) | (5.469) |
| Firm FE | yes | yes | yes |
| Year FE | yes | yes | yes |
| Observations | 17,677 | 16,189 | 16,173 |
| adj. R-sq | 0.602 | 0.600 | 0.610 |

This table shows results of stacked did. All control variables and fixed effects are the same as in the main regression. T statistics value is in parentheses. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 12. Callaway and Sant' Anna DID with Multiple Time Periods**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Greenwashing | Greenwashing | Greenwashing |
| Pre_avg | -0.009 | 0.001 | 0.004 |
| | (-0.355) | (0.052) | (0.180) |
| Post_avg | -0.095*** | -0.097*** | -0.088** |
| | (-2.858) | (-2.676) | (-2.392) |
| Tm3 | -0.019 | 0.014 | 0.018 |
| | (-0.294) | (0.235) | (0.286) |
| Tm2 | -0.010 | -0.004 | -0.001 |
| | (-0.310) | (-0.120) | (-0.022) |
| Tm1 | 0.002 | -0.007 | -0.004 |
| | (0.061) | (-0.176) | (-0.103) |
| Tp0 | -0.134*** | -0.138*** | -0.135*** |
| | (-4.053) | (-3.836) | (-3.729) |
| Tp1 | -0.080** | -0.082** | -0.073* |
| | (-2.330) | (-2.177) | (-1.857) |
| Tp2 | -0.069 | -0.070 | -0.056 |
| | (-1.367) | (-1.253) | (-0.983) |
| Control - financial characteristics | no | yes | yes |
| Control - others | no | no | yes |
| N | 5,978 | 5,448 | 5,443 |

The table reports coefficient estimates of Callaway and Sant' Anna DID model. The dependent variable is the greenwashing. The first column only controls fixed effects but not control variables. The second column adds firms' financial characteristics level control variables. The third column controls not only firms' financial characteristics but also others control variables. *Pre_avg* is the pre average effect. *Post_avg* is the post average effect. T statistics value is in parentheses. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 13. Cross-sectional Test: Political Risk**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Greenwashing | Greenwashing | Greenwashing |
| Treat*Post*Politicalrisk | -0.048*** | -0.047*** | -0.047*** |
| | (-2.925) | (-2.923) | (-2.800) |
| Treat*Post | -0.064 | -0.050 | -0.041 |
| | (-1.539) | (-1.126) | (-0.914) |
| Politicalrisk | 0.002 | -0.002 | -0.003 |
| | (0.439) | (-0.603) | (-0.884) |
| Size | | 0.042 | 0.032 |
| | | (1.631) | (1.304) |
| Leverage | | 0.004 | 0.002 |
| | | (0.066) | (0.039) |
| Market to book value | | 0.000 | 0.000 |
| | | (0.888) | (0.757) |
| Tobins' Q | | -0.000 | -0.000 |
| | | (-0.020) | (-0.115) |
| R&D | | -0.161 | -0.187* |
| | | (-1.472) | (-1.744) |
| ROA | | -0.180*** | -0.171*** |
| | | (-2.841) | (-2.713) |
| CEO Duality | | | -0.143*** |
| | | | (-4.942) |
| Board Gender Diversity | | | -0.003*** |
| | | | (-3.230) |
| Audit Board Committee | | | -0.049 |
| | | | (-1.401) |
| ISO14000 | | | -0.050* |
| | | | (-1.895) |
| Ambiguity | | | 0.000** |
| | | | (1.981) |
| Constant | 0.534*** | 0.227 | 0.477** |
| | (95.115) | (1.095) | (2.309) |
| Firm FE | yes | yes | yes |
| Year FE | yes | yes | yes |
| Observations | 4,478 | 4,119 | 4,118 |
| adj. R-sq | 0.605 | 0.602 | 0.610 |

Following Hassan et al. (2019), the political risk is due to changes in political system. This table provides coefficient estimates and T statistics value (in parentheses). The first column only controls fixed effects but not control variables. The second column adds firms' financial characteristics level control variables. The third column controls not only firms' financial characteristics but also others control variables. Firm and year fixed effects are used in each specification. Regression clusters at the firm level. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 14. Cross-sectional Test: Physical Risks exposure**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Greenwashing | Greenwashing | Greenwashing |
| Treat*Post*Physical exposure | -3.886** | -3.806** | -3.957** |
| | (-2.223) | (-2.137) | (-2.131) |
| Treat*Post | -0.105*** | -0.093** | -0.085** |
| | (-2.948) | (-2.486) | (-2.231) |
| Physical exposure | 0.810** | 0.835** | 0.862** |
| | (2.159) | (2.159) | (2.236) |
| Size | | 0.052** | 0.048** |
| | | (2.272) | (2.150) |
| Leverage | | 0.034 | 0.035 |
| | | (0.703) | (0.733) |
| Market to book value | | 0.000 | 0.000 |
| | | (0.788) | (0.660) |
| Tobins' Q | | 0.002 | 0.001 |
| | | (0.429) | (0.392) |
| R&D | | -0.135 | -0.135 |
| | | (-1.345) | (-1.359) |
| ROA | | -0.163*** | -0.152*** |
| | | (-2.774) | (-2.631) |
| CEO Duality | | | -0.135*** |
| | | | (-5.032) |
| Board Gender Diversity | | | -0.004*** |
| | | | (-4.250) |
| Audit Board Committee | | | -0.000 |
| | | | (-0.021) |
| ISO14000 | | | -0.032 |
| | | | (-1.632) |
| Ambiguity | | | 0.000* |
| | | | (1.884) |
| Constant | 0.526*** | 0.119 | 0.296 |
| | (233.147) | (0.636) | (1.598) |
| Firm FE | yes | yes | yes |
| Year FE | yes | yes | yes |
| Observations | 5,409 | 4,962 | 4,959 |
| adj. R-sq | 0.603 | 0.601 | 0.609 |

Following Sautner et al. (2023), the climate risk can be measured by a text capture from earning conference calls. This table provides coefficient estimates of cross-sectional test of climate risks. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 15. Cross-sectional Test: Future uncertainty**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Greenwashing | Greenwashing | Greenwashing |
| Treat*Post*Uncertainty | 0.271*** | 0.247** | 0.230** |
| | (2.875) | (2.266) | (2.083) |
| Treat*Post | -0.112*** | -0.102*** | -0.096*** |
| | (-3.292) | (-2.865) | (-2.635) |
| Uncertainty | -0.045 | -0.004 | 0.004 |
| | (-0.678) | (-0.054) | (0.056) |
| Size | | 0.036* | 0.033* |
| | | (1.792) | (1.675) |
| Leverage | | 0.020 | 0.023 |
| | | (0.479) | (0.550) |
| Market to book value | | 0.000 | 0.000 |
| | | (1.254) | (1.094) |
| Tobins' Q | | 0.002 | 0.002 |
| | | (0.615) | (0.600) |
| R&D | | -0.163* | -0.144 |
| | | (-1.654) | (-1.491) |
| ROA | | -0.111** | -0.101* |
| | | (-2.105) | (-1.946) |
| CEO Duality | | | -0.122*** |
| | | | (-4.920) |
| Board Gender Diversity | | | -0.004*** |
| | | | (-4.981) |
| Audit Board Committee | | | -0.005 |
| | | | (-0.263) |
| ISO14000 | | | -0.031* |
| | | | (-1.747) |
| Ambiguity | | | 0.000* |
| | | | (1.821) |
| Constant | 0.522*** | 0.245 | 0.416*** |
| | (110.189) | (1.540) | (2.636) |
| Firm FE | yes | yes | yes |
| Year FE | yes | yes | yes |
| Observations | 6,521 | 5,977 | 5,971 |
| adj. R-sq | 0.607 | 0.605 | 0.612 |

Following Coiculescu et al. (2023), the uncertainty is firm's average daily variance over the month (risk) with the Scholes and Williams (1977) adjustment for nonsynchronous trading to estimate the variance of returns. The first column only controls fixed effects but not control variables. The second column adds firms' financial characteristics level control variables. The third column controls not only firms' financial characteristics but also others control variables. T statistics value is in parentheses. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 16. Cross-sectional Test: Financial constraint**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Greenwashing | Greenwashing | Greenwashing |
| Treat*Post*KZ | 0.000*** | 0.000* | 0.000 |
| | (6.227) | (1.746) | (1.601) |
| Treat*Post | -0.081** | -0.085** | -0.080** |
| | (-2.070) | (-2.138) | (-1.965) |
| KZ | -0.000*** | -0.000*** | -0.000*** |
| | (-44.057) | (-36.954) | (-32.770) |
| Size | | 0.081*** | 0.079*** |
| | | (2.669) | (2.683) |
| Leverage | | -0.047 | -0.047 |
| | | (-0.842) | (-0.856) |
| Market to book value | | 0.000** | 0.000** |
| | | (2.387) | (2.318) |
| Tobins' Q | | 0.007 | 0.006 |
| | | (0.988) | (0.974) |
| R&D | | -0.068 | -0.038 |
| | | (-0.381) | (-0.217) |
| ROA | | -0.114 | -0.100 |
| | | (-1.520) | (-1.344) |
| CEO Duality | | | -0.100*** |
| | | | (-3.074) |
| Board Gender Diversity | | | -0.004*** |
| | | | (-3.566) |
| Audit Board Committee | | | -0.013 |
| | | | (-0.566) |
| ISO14000 | | | -0.028 |
| | | | (-1.301) |
| Ambiguity | | | 0.000 |
| | | | (1.256) |
| Constant | 0.532*** | -0.125 | 0.041 |
| | (214.164) | (-0.497) | (0.165) |
| Firm FE | yes | yes | yes |
| Year FE | yes | yes | yes |
| Observations | 3696 | 3547 | 3545 |
| adj. R-sq | 0.613 | 0.606 | 0.612 |

Following Habibzadeh et al. (2021), this research uses the KZ index as the proxy for financial constraints. The first column only controls fixed effects but not control variables. The second column adds firms' financial characteristics level control variables. The third column controls not only firms' financial characteristics but also others control variables. T statistics value is in parentheses. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

**Table 17. Heterogeneity Test: Financial constraint and green shares**

| | Constraints1, Share1 Greenwashing | Constraints1, Share0 Greenwashing | Constraints0, Share1 Greenwashing | Constraints0, Share0 Greenwashing |
|---|---|---|---|---|
| Treat*Post | -0.098 | -0.105** | 0.101 | -0.643*** |
| | (-1.408) | (-2.089) | (1.145) | (-4.822) |
| Size | 0.096* | 0.001 | 0.117 | -0.105 |
| | (1.785) | (0.020) | (1.234) | (-1.021) |
| Leverage | 0.123 | -0.038 | 0.010 | -0.036 |
| | (0.817) | (-0.519) | (0.050) | (-0.175) |
| Market to book value | -0.000 | 0.000 | 0.000 | 0.001 |
| | (-0.477) | (0.422) | (1.269) | (0.622) |
| Tobins' Q | 0.004 | -0.010 | -0.011 | 0.015 |
| | (0.468) | (-1.556) | (-1.255) | (0.519) |
| R&D | -0.401 | -0.201 | -0.833* | -1.560** |
| | (-0.812) | (-1.500) | (-1.758) | (-2.180) |
| ROA | -0.176 | -0.187** | -0.009 | -0.187 |
| | (-1.065) | (-2.383) | (-0.028) | (-0.878) |
| CEO Duality | -0.136** | -0.086* | -0.178** | -0.075 |
| | (-2.438) | (-1.865) | (-2.391) | (-0.996) |
| Board Gender Diversity | -0.003 | -0.004*** | -0.010*** | -0.003 |
| | (-1.460) | (-2.609) | (-2.702) | (-0.765) |
| Audit Board Committee | 0.006 | 0.030 | 0.008 | -0.102 |
| | (0.143) | (0.649) | (0.210) | (-1.381) |
| ISO14000 | -0.045 | -0.035 | -0.053 | -0.086 |
| | (-1.371) | (-0.788) | (-1.306) | (-1.246) |
| Ambiguity | 0.000 | 0.000 | 0.001 | -0.000 |
| | (0.851) | (0.042) | (1.388) | (-0.546) |
| Constant | -0.129 | 0.627** | -0.177 | 1.523* |
| | (-0.267) | (1.977) | (-0.193) | (1.931) |
| Firm FE | yes | yes | yes | yes |
| Year FE | yes | yes | yes | yes |
| Observations | 1451 | 1555 | 910 | 554 |
| adj. R-sq | 0.668 | 0.592 | 0.702 | 0.480 |

This research divides the sample into four groups based on external green funding pressures and firms' financial constraints. *Constraints* equal to 1 if the firm's KZ index belongs to the top 50 per cent of the sample. *Share* equal to 1 if the firm's shares held by green fund belongs to the top 50 per cent of the sample. T statistics value is in parentheses. Stars, ***, **, *, indicate statistical significance at the 1%, 5%, and 10%, respectively.

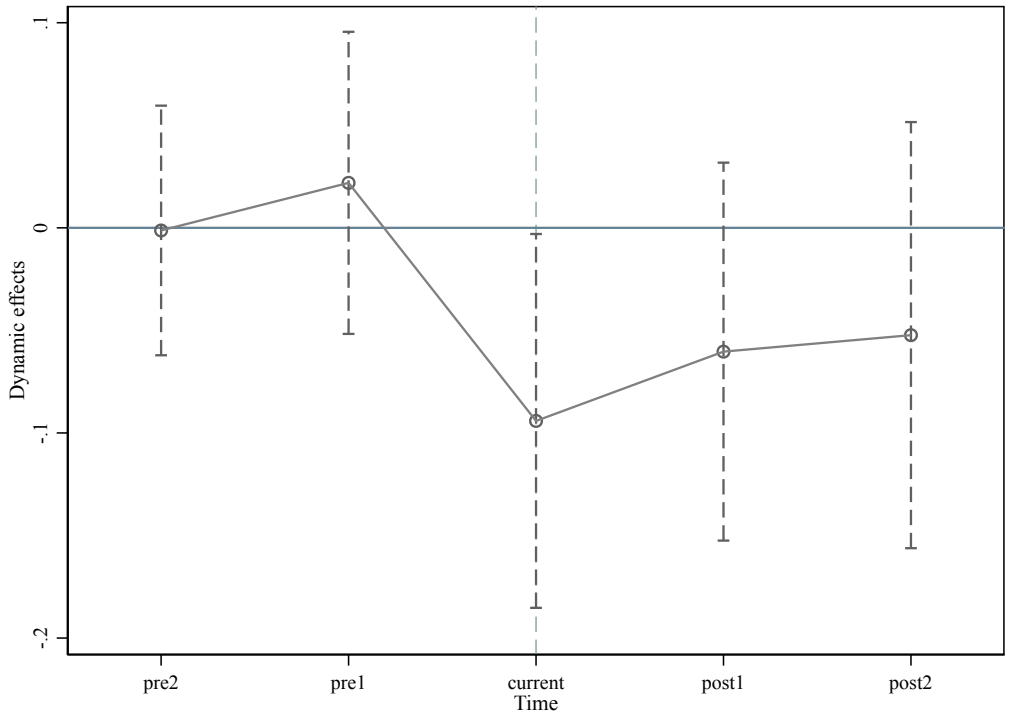


**Fig. 1.** The trends of greenwashing performance

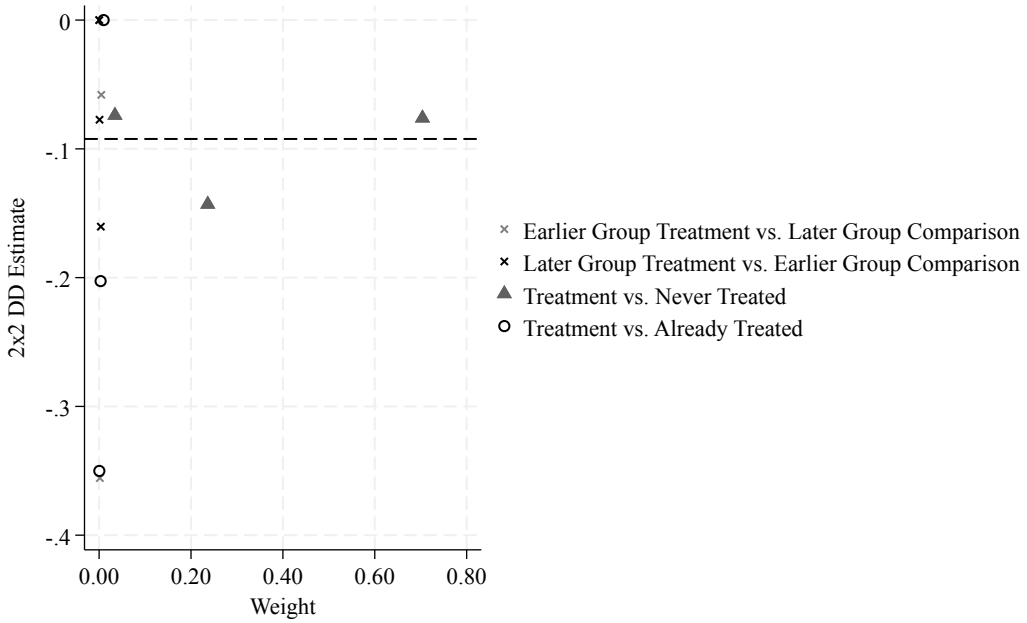


**Fig. 2.** Distribution of treatment time

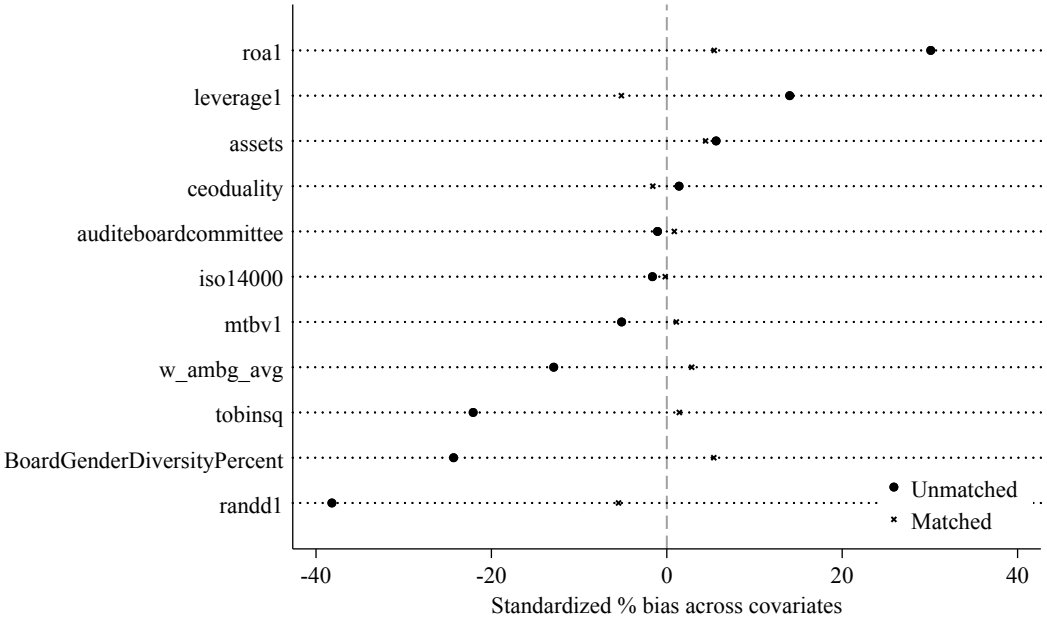


**Fig. 3.** PSM DID matching situation

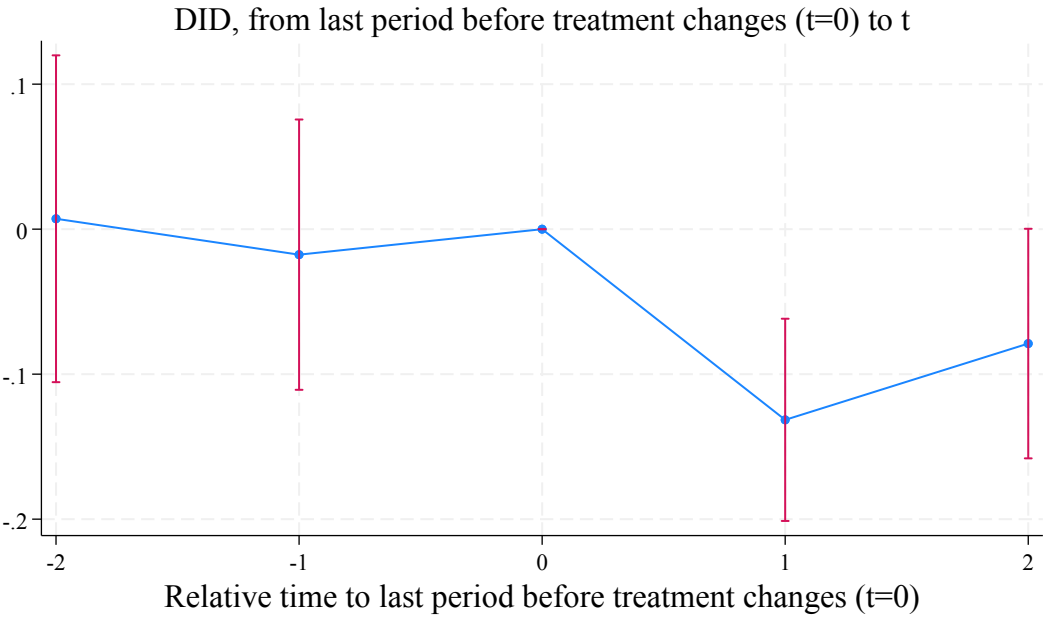


**Fig. 4.** The placebo test and dynamic test

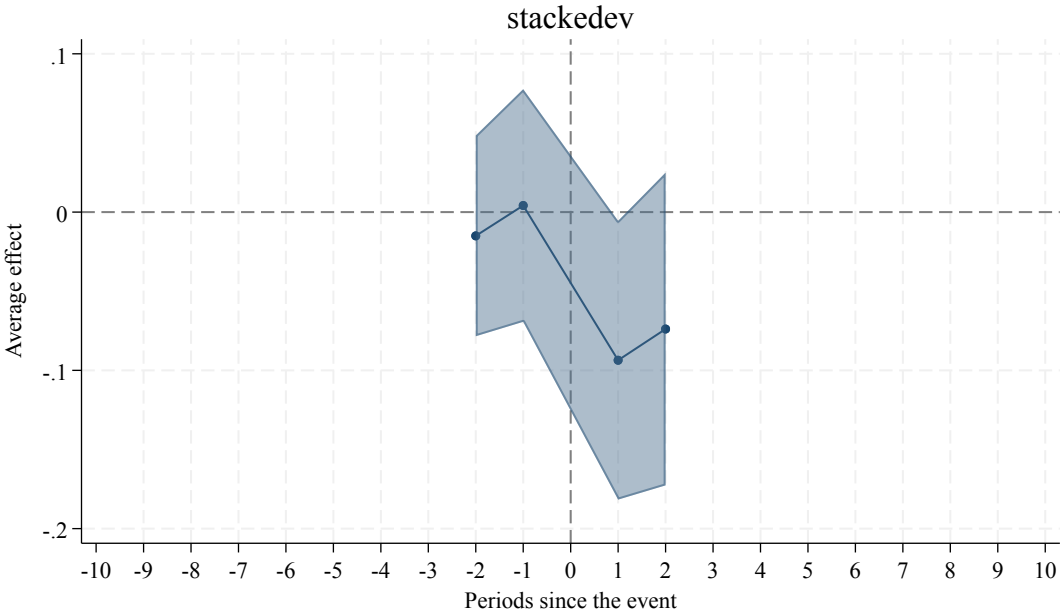


**Fig. 5.** The stacked DID

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