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Article

Does the green credit policy induce hypocritical environmental information disclosure? The catering behavior of Chinese listed companies

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Abstract: Owing to the incentives and constraints imposed by the green credit policy of 2012 in China, and in an attempt to try and secure more green credit, firms may choose to hypocritically disclose, in their environmental information disclosure documents, only a portion of the truth regarding their environmental practices. Although researchers have greatly explored the environmental impacts of the green credit policy, rarely have studies probed into the policy's effects on firms' environmental disclosure strategies. This study explores the impact of the green credit policy on listed firms' hypocritical strategies regarding their environmental information disclosure. This study employs a theoretical and an empirical analysis, a difference-in-differences model, and data of Chinese listed companies from 2010–2017. We find that, after green credit policy implementation in 2012, firms are prone to adopting a catering strategy involving more, and more positive, environmental information disclosures and a concomitant fulfillment of less of their environmental responsibilities. Robustness tests consistently demonstrate pronounced catering behaviors among listed firms. The heterogeneous analyses indicate that firms that are non-heavily polluting and are located in cities with high financial development are more likely to adopt catering strategies. The internal reason why firms adopt catering strategies is the financial constraint effect caused by the green credit policy, while external reasons include rare capital market responses to catering behaviors.

Keywords: catering behavior; difference-in-differences model; environmental information disclosure; environmental responsibility

1. Introduction

Many countries have adopted various methods to invest more in environmental governance in response to the global transition toward green and low-carbon living. In this context, green finance has recently and increasingly become a crucial approach. An annual report on the development of global green finance [1] noted that its market scale has gradually increased[1]. China has accelerated its efforts to establish a green financial system, which is an important action for the country to actively join global climate governance. On 29 January 2012, the China Banking Regulatory Commission[2] issued the Green Credit Guidance (hereinafter the green credit policy), which mandates banking institutions to fully promote green credit, adjust the credit structure to support a green, low-carbon, and circular economy, and take actions to guard against environmental and societal risks. Green credit is essential for the financial support of environmental protection projects, but the potential environmental governance impact of the green credit policy relies on firm responses [2].

The green credit policy encourages banking institutions to allocate more resources to environmentally friendly investments, and fewer to projects with potential environmental and societal risks. Therefore, banking institutions' decisions on green loans are highly dependent on the clients' environmental actions. This situation leads firms to make active efforts at conveying "green" signals to the banking market, generally through their environmental information disclosure, to obtain bank financial support. One question that arises at this point is whether these firms are indeed as "green" as they report in their environmental information disclosure. Studies have found that listed companies disclose information in a strategic manner [3,4], and that most disclose information to compete for economic resources and elevate their social reputation [5]. Generally, as a part of the non-financial information in firm annual reports, environmental information disclosure rules are more elastic than those for financial information. What follows is the tendency of many listed companies to disclose positive environmental information, such as environmental strategic plans, and descriptive information that cannot be quantified [6]. This makes it such that few companies report on negative environmental information, such as pollution emissions or major environmental events. Then, if we consider that the green credit policy affords precedence to "greener" firms in relation to financial resource allocation, there is the possibility of firms having incentives to strategically disclose more "green" information to the detriment of a faithful report of their real environmental efforts. The insufficiency of the environmental information disclosure system in China may exacerbate this scenario.

Regarding the strategic actions of firms toward their environmental information disclosure, researchers have delved into how firms respond to external pressures from environmental impact reports and audits [4,7]. It remains, notwithstanding, that firms' strategic actions in response to the green credit policy in China, which has both incentive and constraint effects, have been rarely examined. Hence, we empirically explore the impact of the green credit policy on firms' catering behaviors regarding environmental information disclosure. Specifically, we define the catering behaviors evoked by the green credit policy as an inconsistency between firm environmental information disclosure and environmental responsibility fulfillment. We emphasize if a firm makes more environmental information than the environmental responsibility fulfillment, then it conducts catering behavior. We adopt a difference-in-differences method, use the Green Credit Guidance issued in 2012 as an exogenous shock, and data from Chinese listed companies during 2010–2017. This study defines firm catering behavior as when firms engage in behaviors regarding environmental information disclosure inconsistent with their environmental responsibility fulfillment. To proxy such behavior, we use the difference between a firm's scores for environmental information disclosure and environmental responsibility fulfillment. Then, in light of the possibility that firm characteristics differences between the treatment and control groups could influence their environmental information disclosure or environmental responsibility fulfillment scores, we conduct robustness checks using propensity score matching, a placebo test, and a sensitivity analysis. We also perform heterogeneity analyses involving heavily polluting industries, corporate manager features, and city financial development. Finally, we examine the internal and external reasons that render firms prone to adopt catering behaviors.

Our analyses of firm catering behaviors complement the growing literature on firm actions caused by the green credit policy, including actions associated with innovation [2,8–10], firm value or performance [11,12], debt financing [13,14], environmental governance [6,15–18], and firm dividend policy [19]. Importantly, while He et al. [2] explored the influence of the green credit policy on firms' strategic actions regarding environmental information disclosure and innovation, we are the first to examine firm catering behaviors related to environmental information disclosure from the perspective of the incentive effect (not the constraint effect) of the green credit policy.

Our work also contributes to the literature on the influencing factors of environmental information disclosure. Previous studies have also explored how the capital market [20], corporate governance structure [21], government subsidies [5] and natural disasters [22] influence firms' environmental information disclosure. We add to the evidence by delivering a theoretical analysis of incentives for firms to engage in specific environmental information disclosure strategies from the perspective of the impact of credit policies. This study also constructs a new measurement of firm catering behavior regarding environmental information disclosure, and investigates the differential impact of this behavior on firm environmental governance. Most importantly, we provide a new perspective for exploring the underlying reasons for firm catering behaviors in relation to the impact of the green credit policy, which previous studies have generally overlooked.

The remainder of this paper is structured as follows. Section 2 delivers the theoretical analysis and hypotheses. Section 3 presents the empirical strategy. The baseline results and heterogeneous analyses are presented in Section 4, and further analyses are provided in Section 5. Section 6 concludes the paper and expounds on the policy implications.

2. Institutional background, theoretical analysis and hypothesis development

2.1. Institutional background

In the process of resource allocation, the traditional financial system often overlooks environmental factors, leading to excessive capital flows into high-pollution and high-energy-consuming industries, thereby exacerbating environmental issues. To promote banking and financial institutions to actively adjust their credit structures and effectively mitigate environmental and social risks using green credit as a lever, the former China Banking Regulatory Commission issued the "Green Credit Guidelines" on 29 January 2012. These guidelines clarified the definition, principles, supported areas, and management requirements of green credit, marking the preliminary establishment of China's green credit policy system.

The green credit policy stipulates that banking and financial institutions should, in accordance with national environmental laws and regulations, industrial policies, and industry access policies, establish and continuously improve policies, systems, and processes for environmental and social risk management. They should define the support directions and key areas for green credit, develop specialized credit guidelines

for industries under national key regulation and those with significant environmental and social risks, implement differentiated and dynamic credit policies, and enforce risk exposure management systems. Banking and financial institutions should establish environmental and social risk assessment criteria for clients, conduct dynamic assessments and classifications of clients' environmental and social risks, and use the results as important bases for rating, credit access, management, and exit. They should also adopt differentiated risk management measures in loan "three checks" (pre-loan investigation, loan review, and post-loan management), loan pricing, and economic capital allocation.

Overall, the green credit policy regulates the financial sector's scrutiny of corporate environmental and social risks and the control of corporate credit resources. In other words, the corporate environmental performance has been a key factor in differentiated loan policies. After the implementation of the green credit policy, the opportunity cost of corporate pollution emissions has significantly increased. On 10 July 2018, according to information released on the website of the China Banking and Insurance Regulatory Commission (CBIRC), Ping and Bank was fined RMB 500,000 for providing financing to companies that failed to meet environmental standards. This marked the first time a local banking regulatory bureau publicly cited the Green Credit Guidelines to penalize a bank. The penalty was based on Article 17 of the 2012 "Notice on Issuing the Green Credit Guidelines", which states, "Banking financial institutions should strengthen credit approval management and determine reasonable credit authority and approval processes based on the nature and severity of the environmental and social risks faced by clients. Credit should not be granted to clients whose environmental and social performance is non-compliant".

This case highlights the increasing enforcement of green credit policies in China, emphasizing the importance of aligning financial activities with environmental and social risk management. By penalizing non-compliant financial behavior, regulators aim to incentivize banks to integrate environmental considerations into their credit decision-making processes, thereby promoting sustainable development and reducing financial risks associated with environmental and social issues. Since the environmental information disclosed by companies is one of the important sources for the financial sector to identify corporate environmental and social risks, companies are more motivated to disclose environmental information actively. This not only enables companies to gain support from green credit but also helps them avoid the credit penalties associated with increased loan costs.

2.2. Theoretical analysis

The green credit policy incentivizes firms to reduce pollution emissions by enabling "greener" firms to borrow loans from banks at a reduced interest rate. These preferential interest rates may be the underlying motivation for firm green credit adoption. To shed light on how firms respond to the green credit policy, we first model firm green credit adoption and then firm environmental strategy under the green credit policy. Based on the theoretical analyses, we propose some hypotheses.

2.2.1. The green credit policy incentives and firm behaviors

At first, we assume that firms use a single factor, capital (*k*), to produce a final good (*y*), and that all capital used in production stems from banking loans at a rate of *r*. Following Fan et al. [23], we set the production function as shown in Equation (1).

$$y = ak^{\alpha} \tag{1}$$

where *a* is the technology parameter and α is the share of capital, and the values of both are positive.

Firm production emits certain pollutants as byproducts, which leads to the assumption of an emission coefficient *b* and a total emission of $e = by$. Because pollution emissions are harmful to the environment, firms will be levied on pollution at a rate of *t* (i.e., the environmental protection tax). To simplify, we set the final product price at 1, leading the profit function (π_0) for a firm without pollution abatement to be as shown in Equation (2):

$$\pi_0 = y - rk - te \tag{2}$$

If firms adopt pollution abatement technology, the environmental protection tax rate will decrease. Moreover, after the implementation of the green credit policy, firms that adopt such technologies are granted the chance to acquire green credit at a lower loan rate. What follows is lower taxation and input costs, enabling firms to make more profit despite paying extra for using pollution abatement technology. This scenario delineates two potential alternatives for firms in general, as follows: At baseline, firms can adopt either choice set A = {high loan rate, no pollution abatement, environmental protection tax payment}, and, under the green credit policy, choice set B = {low loan rate, pollution abatement, no environmental protection tax payment}. Here, we can ask, what is the best choice for firms when considering the incentives from the green credit policy?

Following André and Valenciano-Salazar [24], we set the cost function for firm pollution abatement as shown in Equation (3):

$$C(e) = \frac{c}{2}e^2 + f \tag{3}$$

where *C* is the total abatement cost, *c* is the unit abatement coefficient, and *f* is the fixed cost (e.g., payments for equipment and plant). This function is convex, suggesting that the marginal abatement cost is increasing by the pollution emission.

When a firm uses abatement technology to meet the requirements of the green credit policy[3], it can acquire green credit at a lower loan rate—represented as r_g—and receives a reduction in environmental protection tax rates. Therefore, the profit function is redefined as shown in Equation (4):

$$\pi_1 = y - r_g k - \left(\frac{c}{2}e^2 + f\right) \tag{4}$$

Given the first-order condition of firm profit maximization, the optimal price of capital in the aforementioned two cases can be expressed as shown in Equations (5) and (6):

$$r = (1 - tb)\alpha a k^{\alpha - 1} \tag{5}$$

$$r_g = \alpha a k^{\alpha-1} - c b^2 a^2 \alpha k^{2\alpha-1} \quad (6)$$

These analyses demonstrate that the loan rate is lower with the green credit policy than without it, as represented in Equation (7):

$$\Delta r = r - r_g > 0 \quad (7)$$

When the condition, $\Delta r > 0$, holds, the cutoff of pollution emission level, e, is given by $b\alpha a k^{\alpha-1}(ce - t) > 0$. Therefore, we infer that when $e > t/c$, firms will adopt choice set B. This implies that, considering the same production, the decrease in capital input and tax costs is at least at the same level as or higher than the abatement cost.

2.2.2. Firm environmental strategy under the green credit policy

We further explore firm environmental strategy if the firm adopts the green credit policy. Based on the above analyses, firm pollution emission amounts should reduce under the green credit policy. However, as banks grant green credits according to the reported (and not the actual) emission reduction, it is rather common for banks to grant green credits to firms that are below the critical value (according to the policy) of actual emission reduction. This is due to the inefficiencies surrounding firm pollution abatement assessment and identification, as well as the information asymmetry between banking institutions and firms. Then, when firms realize that the basis for receiving green credits is their reported emission reduction, they become motivated to engage in catering behavior, which is also referred to in this study as the catering strategy. Firm catering strategy adoption entails a pollution emission reduction lower than the critical value according to the green credit policy, but a report (through the level of e_r) that claims a reduction at the critical value (through the level of e). In other words, the firm still emits $(e - e_r)$ units of pollution.

When engaging in such a catering strategy, there is the probability that the government will become aware of the firm's behavior and impose a penalty on the firm owing to the provision of false pollution emission abatement information. This entails that firms should pay extra costs (e.g., increase the environmental information disclosure) for their provision of false information on pollution emission abatement. Accordingly, the total cost of pollution emission reduction when firms adopt a catering strategy is defined as shown in Equation (8):

$$TC = f + \frac{c}{2}(e_r)^2 + h(e - e_r) \quad (8)$$

where h is the marginal cost of the catering behavior.

Based on the minimum cost condition, we can get the optimal real abatement as represented in Equation (9):

$$e_r = \frac{h}{c} \quad (9)$$

This implies that actual pollution emission reduction increases with the catering cost, and that firms will abandon the catering strategy when its cost reaches a certain point. Specifically, we have two cases in which the total cost varies with the catering cost. The first case is that if $e_r \geq e$, the firm gives up the catering strategy, and then $TC = f + \frac{c}{2}(e)^2$. In the second case, if $e_r < e$, the firm adopts the catering strategy, and

then $TC = f + \frac{c}{2}\left(\frac{h}{c}\right)^2 + h\left(e - \frac{h}{c}\right)$. Thereafter, if we substitute $e = by$, we obtain Equation (10), implying the relationship between marginal cost (*Mc*) and firm final production (*y*):

$$Mc(y) = \begin{cases} cb^2y & if\, y < \dfrac{h}{bc} \quad (e_r \geq e) \\ bh & if\, y > \dfrac{h}{bc} \quad (e_r < e) \end{cases} \tag{10}$$

where *h/bc* denotes the critical value of *y* that is used to differentiate between the aforementioned cases. As shown in **Figure 1**, under the green credit policy, a firm's environmental strategy depends on its production level, in that a production below the critical value (*h/bc*) leads to the adoption of a real pollution abatement strategy; if the production is over the critical value, the firm will adopt a catering strategy to lower the total cost because of the increase in marginal cost as production increases. If firms adopt a catering strategy, the optimal real emission reduction is *h/c*, which is less than *e*, and the marginal cost of the reduction is *bh*.

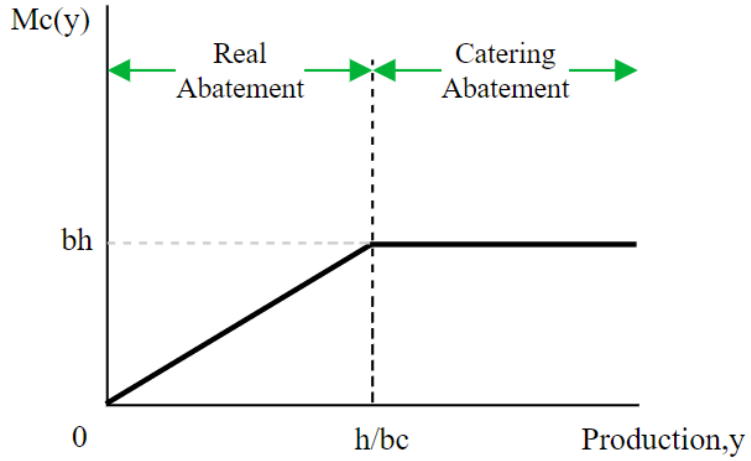

Figure 1. The firm's environmental strategy under the green credit policy.

2.3. Hypothesis development

Green credit policy has substantial economic consequences, such as promoting green investments [25,26], pushing enterprises to diversify their supply chain management to alleviate their own constraints [27], improving the sensitivity of investment-cash flow, particularly in high-pollution and energy-intensive industries [28,29]. The above theoretical analysis implies that despite the green credit policy providing incentives (i.e., lower loan rates) for firms to engage in pollution emission abatement strategies, firms may still choose to adopt catering strategies. We thus explore firm catering behavior from the perspective of environmental information disclosure and environmental responsibility fulfillment. The following subsections delineate the hypotheses of this study based on a literature review.

2.3.1. The motivation of firms' catering behavior under the green credit policy

With the aggravation of environmental pollution worldwide, enterprise "greenness" has attracted significant attention from the public and the government.

Under the pressure of such public attention, some companies selectively disclose information that is beneficial to them, while whitewashing their true environmental performance [4]. This strategy enables companies to build a reputation at lower costs [30]. Meanwhile, the green credit policy in China provides incentives for companies to actively disclose as much "green" information as possible [31]. Once firms adopt catering strategies and successfully lead the public to perceive them as "greener" than they actually are, they benefit from receiving numerous investments from investors and financial institutions [32,33]. That is, successfully engaging in catering strategies allows companies with little or no social and environmental responsibility to still achieve positive market performance and financial availability [34].

The green credit policy has a clear constraint effect because it requires banking institutions to prioritize companies that comply with environmental protection policies and regulations when granting loans, and refuse or strictly control the issuance of loans to heavily polluting enterprises [12,18]. Moreover, under the policy, banking institutions must continuously assess the environmental and social risks of enterprises during and after granting loans, and terminate credit support for enterprises that do not meet the policy requirements. This implies that heavily polluting enterprises face high financing thresholds, narrowed financing sources, and thus high financing costs [9,13,14]. Therefore, in less-developed areas and/or areas with a low degree of environmental regulation, enterprises tend to adopt greenwashing behavior [2]. This leads to Hypothesis 1 (H1):

H1: The green credit policy aggravates firm catering behaviors regarding their environmental information disclosure.

2.3.2. The impact of the green credit policy on firm environmental information disclosure

Based on the signal transmission theory, the green credit policy conveys dual signals by providing financing incentives and constraints. On the one hand, the policy leads banking institutions to opt for environmentally friendly firms and grant loans to them at lower interest rates (i.e., incentive effect); on the other hand, non-environmentally friendly firms face more stringent requirements when applying for green loans (i.e., constraint effect) owing to the inherent risks of their investments to the environment and society [12].

Because banking credit is an important firm financing method [2], both environmentally and non-environmentally friendly firms would endeavor to improve their environmental information disclosure. Environmentally friendly firms have more incentives to compete for green credit, so they will disclose more "green" information to uphold their advantages. Meanwhile, non-environmentally friendly firms, especially heavily polluting firms, experience greater constraints and may need more loans to ease the problems arising owing to these restrictions [35]. This may encourage them to improve their environmental information disclosure [36]. Therefore, we put forward Hypothesis 2 (H2):

H2: The green credit policy improves firms' environmental information disclosure.

2.3.3. The impact of the green credit policy on firms' environmental and social responsibilities

Since the green credit policy is key for green investment allocation and affects investors' preferences, it is proposed that firms will make efforts to improve their green initiatives to appeal to investors. The green credit policy states that banking institutions have the right to directly refuse loan grants for polluting investments. Therefore, under the threat of insufficient financing, heavily polluting firms are forced to be more environmentally responsible. From this perspective, the green credit policy significantly impacts firms' fulfillment of their environmental and social responsibilities by increasing loan costs and constraining financing sources for non-environmentally friendly firms [31,37]. Moreover, owing to the potential of a lack of funds for investment, some heavily polluting firms may make efforts to reduce their environmental pollution [16,18], while others may seek green innovation to improve their carbon emission performance [2,17,38].

In contrast, non-environmentally friendly firms, especially heavily polluting ones, face stringent regulations under the policy, which makes them respond by attempting to actively disclose positive information about their environmental actions. However, such information is viewed as a signal rather than concrete action, implying that others may perceive their words as more flourished than their actual deeds. If the firm is known for engaging in actions harmful to the environment, it is likely that this firm will disclose only "soft" environmental information, attempt to conceal its non-environmentally friendly actions, and then claim that it stands by its environmental and social responsibilities [6]. Due to the limitation of the current, imperfect environmental information disclosure system, companies that actively engage in environmental information disclosure account for a low proportion, and the form and content of their disclosures are not uniform. There is also a low number of third-party independent institutions to assess these disclosures, and the information in the disclosures is not systematic. These drawbacks of the current system further aggravate the problems of information asymmetry and adverse selection in the capital market [38]. Having a prior claim for loans incentivizes listed firms to exaggerate their environmental responsibility performance. Such exaggeration, when coupled with the aforementioned imperfect system, allows hypocritical firms to cater to the green credit policy and acquire green financing support at a relatively low cost. These descriptions lead to Hypothesis 3 (H3):

H3: The green credit policy does not improve firm environmental responsibility fulfillment.

3. Empirical model, data source and variables

The Chinese government implemented the green credit policy but did not specify a date for policy adoption for companies, which can be regarded as an exogenous shock for listed companies [18]. Accordingly, this policy provides us with a quasi-natural experiment for conducting a difference-in-differences analysis. Since China's Green Credit Guidance was initiated at the industry level, we use the variation in implementation dates across industries. Additionally, the two-digit industry codes based on the "Industry Classification Management Directory for the Environmental

Check of Listed Companies" enable us to identify the treatment group impacted by the shock. We then explore the differences in environmental information disclosure, environmental responsibility fulfillment, and catering behavior between the treatment and control groups. If there is a positive environmental information disclosure score and a negative environmental responsibility fulfillment score, we confirm that the firm adopts a catering strategy after green credit policy implementation.

3.1. Model specification

We specify the empirical model in Equation (11), which is used to explore the relationship between the green credit policy and firm catering behavior regarding environmental information disclosure[4]:

$$Y_{it} = \beta_0 + \beta_1 did\_2012_{it} + \beta_2 Z_{it} + \mu_i + \eta_j + \lambda_t + \varepsilon_{it} \quad (11)$$

where subscript indices *i*, *j*, and *t* represent the firm, industry, and year, respectively. *Y* is the outcome variable, which includes firms' catering behavior (*cater*), environmental information disclosure (*edi*), and environmental responsibility fulfillment (*ers*). The independent variable is *did_2012*, an interaction term of the treatment group and the post-policy period, and *Z* includes firm characteristics. To eliminate the influence of unobserved confounding factors that vary with firms, industries, and time, we control for a series of fixed effects, including firm fixed effects (μ_i), industry fixed effects (η_j), and year fixed effects (λ_t). ε_{it} is the random error. Standard errors are clustered at the industry level.

3.2. Data

We use data from listed companies for the period of 2010–2017. Given that the finance, insurance, and real estate industries are highly dependent on financial sources and are dominant in the economic development in China. In our dataset, some certain companies are out of state in production or operation, which may impact the change of environmental deeds. To secure sample efficiency, we exclude the finance, insurance, and real estate industries, companies with a status of ST, *ST, or PT, those with a negative value of total assets, and those for which the asset-liability ratio is greater than one. Given that the policy was implemented in 2012, we also dropped companies with listing dates after 2012. To avoid the effects of extreme values, all corporate characteristic variables (excluding variables with value of 0–1) are winsorized at the 1% and 99% levels.

We obtain data on the fundamental and financial information, as well as environmental information disclosure, of listed companies from the China Stock Market and Accounting Research (also known as CSMAR) database. The Hexun website (stock.hexun.com) issues environmental responsibility fulfillment scores for listed companies in China[5]. As a third-party evaluation agency independent of listed companies, Hexun is in a good position to make appropriate assessments of the environmental responsibility fulfillment of these firms [39], and researchers have confirmed that Hexun's evaluations deliver a thorough rating of such fulfillment [40]. Its assessment results have been widely applied in previous literature to identify the

social and environmental responsibility fulfillment of listed companies in China [40–42].

3.3. Variable definition

3.3.1. Firm environmental information disclosure

We use content analysis to construct a variable for firms' environmental information disclosure [6,43]. The China Stock Market and Accounting Research database provides detailed information on the environmental information disclosures of listed companies. We aggregate the five related contents of these disclosures (environmental management, environmental liability, environmental performance and governance, disclosure form, and environmental regulation and certification) into one indicator and use this as a proxy for the environmental information disclosure level. The details are presented in **Table A1** in the Appendix.

3.3.2. Firm environmental responsibility fulfillment

To measure environmental responsibility fulfillment, we use the related scores provided by a third-party evaluation agency that releases these scores on the Hexun website. This third-party agency complies with the international standard ISO26000 on social responsibility. Based on each firm's social responsibility reports and annual corporate reports, the agency sets 13 indicators at the second level and 37 indicators at the third level—covering stakeholders' responsibilities, employees' responsibilities, the responsibilities of suppliers, consumers' rights and interests, environmental responsibilities, and public responsibilities—to systematically assess environmental responsibility fulfillment. We selected the environmental responsibility score, which included five indicators, i.e., environmental consciousness, environmental management system certification, environmental protection investment, sewage types, and energy conservation types. A higher score indicates better fulfillment of environmental responsibilities. Additionally, to increase the reliability of our indicator, we consider the environmental score in the ESG evaluation system as an alternative measurement of environmental responsibility fulfillment. The environmental score is a comprehensive score in the environmental aspect of Huazheng ESG rating data, obtained from the Wind Information Financial Terminal. The Huazheng ESG rating system pays more attention to corporate ESG practices, which is beneficial for this article to measure firm behavior in environmental responsibility fulfillment. Furthermore, Huazheng ESG rating data is more popular and used in numerous literature [44,45].

3.3.3. Firm catering behavior

As mentioned above, we define the catering behaviors induced by the green credit policy as an inconsistency between firm environmental information disclosure and environmental responsibility fulfillment. We focus on the case that a firm makes more environmental information than the environmental responsibility fulfillment. In this case, the hypocritical environmental information disclosure implies the firm adopts catering behavior.

Referring to Yu et al. [46], we use the difference between firms' scores for environmental information disclosure and environmental responsibility fulfillment (both standardized variables) to measure such inconsistency. That is, greater

difference (positive) means apparent inconsistency, and thus obvious firms' catering behaviors. The related Equation (12) is as follows:

$$cater_{it} = \frac{edi_{it} - \overline{edi}}{\sigma_{edi}} - \frac{ers_{it} - \overline{ers}}{\sigma_{ers}} \quad (12)$$

where *cater* denotes firm catering behavior; $\overline{edi}$ is the average firm environmental information disclosure score; σ_{edi} is the variance of this score; $\overline{ers}$ and σ_{ers} are the average and variance, respectively, of the firm environmental responsibility fulfillment score. A higher value of *cater* indicates greater engagement in catering behavior.

Importantly, the firm's environmental responsibility fulfillment score data used in this study stems from a third-party evaluation agency, which is expected to reduce the possibility of environmental responsibility fulfillment falsification, especially in comparison to the use of the companies' own fulfillment scores. Furthermore, this agency's scores may more accurately reflect the genuine actions of firms regarding environmental governance. In light of this, we consider that if the actions of a firm regarding its environmental information disclosure are overstated compared to its actions regarding environmental responsibility fulfillment, it engages in catering behavior. These explanations showcase how the metric used in this study can reflect whether firms' environmental strategy caters to the green credit policy.

3.3.4. The interaction term

To promote green credit among banking institutions, the former China Banking Regulatory Commission developed key evaluation indicators for the green credit policy implementation in 2014. According to these indicators, firms are classified into three categories (A, B, and C) based on their degree of environmental and social risk. Firms in categories A or B may cause harm to the environment and society when engaged in construction, production, and operation projects. Consequently, when these firms use green credit resources, they must undergo continuous evaluation and risk monitoring by the banking institutions. We therefore regard firms belonging to categories A and B as having been impacted by the green credit policy and as the treatment group, and other firms as the control group. According to the "Industry Classification Management Directory for the Environmental Check of Listed Companies", we use the two-digit industry codes to match the industry of a firm with the industries associated with categories A and B. Specifically, the variable *treat* is valued at one if a firm belongs to an industry associated with categories A and B, and zero otherwise; if the period is after 2012, the variable *post* is valued as one and zero otherwise. Subsequently, we obtain the interaction term, *did_2012*, using the multiple of treat and post. **Table A2** in the Appendix reports details about the industry of firms in categories A and B.

3.3.5. Control variables

The model used in this study also considers some important basic characteristics of listed companies as references by Li and Wang [31] and Zhang and You [45], including enterprise size (the logarithm of total assets), debt-to-assets ratio (the ratio of total liabilities to total assets), return on equity (the ratio of net profit to average shareholder equity), cash flow ratio (the ratio of net cash flow from operating activities

to total assets), revenue growth rate (the revenue of a given year divided by the previous year's revenue minus one), and firm age (the logarithm of the difference between the current year and the year of company establishment).

Considering that a firm's internal governance structure can influence its environmental information disclosure [21], we further control for the equity and ownership structure of listed companies. The specific indicators include the proportion of independent directors (the number of independent directors divided by the total number of board members), whether the roles of the chairperson and general manager are combined (one if the same person, and zero otherwise), the proportion of institutional investor holdings (the total number of shares held by institutional investors divided by the circulating stocks), the proportion of management holdings (management holding shares divided by total shares), and whether the company is state-owned (one if so, and zero otherwise).

3.4. Descriptive statistics

Table 1 reports the descriptive summary of all variables included in Equation (11). The average scores for environmental information disclosure and environmental responsibility fulfillment are 6.284 and 2.676, respectively. **Table 1** also features a descriptive summary according to group (treatment and control groups) and period (before 2012 and after 2012). As shown in **Table 1**, both the average scores for environmental information disclosure and environmental responsibility fulfillment in the treatment group are higher than those in the control group (8.682 > 4.924 and 3.373 > 2.280, respectively). The figure for catering behavior is −0.162 in the control group and 0.276 in the treatment group. Regarding the period, the average score for environmental information disclosure after 2012 is higher than that before 2012 (6.616 > 4.992), while the opposite is true for the average environmental responsibility fulfillment score (2.377 < 3.838).

Table 1. The descriptive summary.

Panel A: Full samples	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
	N	**mean**	**s.d**	**min**	**max**
cater	14,031	−0.004	1.035	−16.390	5.716
edi	14,031	6.284	6.288	0	37
ers	14,031	2.676	6.113	0	30
Dual	14,031	0.233	0.423	0	1
SOE	14,031	0.436	0.496	0	1
FirmAge	14,031	2.757	0.379	0.693	3.761
Mshare	14,031	0.111	0.197	0	5.910
Sizew	14,031	22.110	1.258	19.570	26.090
Levw	14,031	0.434	0.211	0.048	0.904
ROEw	14,031	0.068	0.116	−0.634	0.394
Cashfloww	14,031	0.043	0.069	−0.161	0.246
Growthw	14,031	0.207	0.483	−0.561	3.240

Table 1. (*Continued*).

Panel A: Full samples	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
	N	**mean**	**s.d**	**min**	**max**
Indepw	14,031	0.372	0.053	0.308	0.571
INSTw	14,031	0.407	0.230	0.0008	0.884

Panel B: Sub-samples	**(1)**	**(2)**	**(3)**	**(4)**
	Control group	**Treatment group**	**Before 2012**	**After 2012**
	mean	**mean**	**mean**	**mean**
cater	−0.162	0.276	−0.001	−0.005
edi	4.924	8.682	4.992	6.616
ers	2.280	3.373	3.838	2.377
Dual	0.252	0.199	0.208	0.239
SOE	0.391	0.514	0.519	0.414
FirmAge	2.744	2.780	2.571	2.805
Mshare	0.125	0.087	0.097	0.115
Size	21.980	22.350	21.810	22.190
Lev	0.418	0.462	0.444	0.431
ROE	0.071	0.064	0.092	0.062
Cashflow	0.038	0.052	0.038	0.045
Growth	0.218	0.187	0.288	0.186
Indep	0.373	0.370	0.368	0.373
INST	0.399	0.422	0.404	0.408

4. Empirical results

4.1. Baseline regression results

The baseline regression results based on Equation (11) are presented in **Table 2**. In Column (1), the outcome is catering behavior, and the interaction term has a significant and positive coefficient (i.e., 0.346). This suggests that treatment group firms significantly cater to the green credit policy, supporting H1. In Columns (2) and (3), the outcomes are the scores for environmental information disclosure and environmental responsibility fulfillment, respectively. We can see a significantly positive coefficient of the interaction term for environmental information disclosure (1.686) and a significantly negative coefficient for environmental responsibility fulfillment (−0.942). In the last two columns, we report the robustness tests using additional measures of firm catering behavior (*cater_r*) and firm environmental responsibility fulfillment score (*ers_r*). The results show a positive coefficient of the interaction term for catering behavior in Column (4) and a negative coefficient for environmental responsibility fulfillment in Column (5). These results provide evidence that firms in the treatment group are more prone to improving their environmental information disclosure, supporting H2, but fulfilling less of their environmental responsibility, supporting H3, after green credit policy implementation.

Table 2. The baseline regression results.

	(1)	(2)	(3)	(4)	(5)
	cater	***edi***	***ers***	***cater_r***	***ers_r***
did_2012	0.346***	1.686***	−0.942**	0.312***	−0.111**
	(0.077)	(0.401)	(0.359)	(0.071)	(0.047)
Size	−0.047*	0.498***	1.047***	−0.049*	0.152***
	(0.027)	(0.136)	(0.151)	(0.030)	(0.019)
Lev	−0.073	−1.310***	−0.612	−0.125	−0.095
	(0.092)	(0.396)	(0.476)	(0.099)	(0.078)
ROE	−0.336***	−0.353	1.476***	0.140*	−0.194***
	(0.121)	(0.343)	(0.527)	(0.078)	(0.051)
Cashflow	0.058	1.299**	0.059	0.066	0.107
	(0.129)	(0.491)	(0.842)	(0.133)	(0.103)
Growth	−0.026*	−0.182**	−0.056	0.041**	−0.073***
	(0.015)	(0.075)	(0.092)	(0.020)	(0.015)
FirmAge	0.065	0.432	0.536	−0.254	0.356**
	(0.177)	(0.562)	(1.224)	(0.162)	(0.144)
Indep	−0.307	0.219	3.064***	−0.165	0.211
	(0.361)	(1.768)	(1.154)	(0.270)	(0.183)
Dual	0.050**	−0.101	−0.350**	0.041	−0.063**
	(0.024)	(0.097)	(0.153)	(0.026)	(0.025)
INST	−0.012	−0.012	0.478	−0.082	0.071
	(0.058)	(0.256)	(0.305)	(0.053)	(0.056)
Mshare	0.294***	0.005	−2.406***	−0.080	0.033
	(0.104)	(0.499)	(0.458)	(0.089)	(0.066)
SOE	−0.097	−0.187	0.392	−0.076	0.037
	(0.095)	(0.409)	(0.523)	(0.058)	(0.068)
Constant	0.924	−5.791	−22.654***	1.871***	−4.353***
	(0.712)	(3.521)	(3.919)	(0.652)	(0.423)
Observations	14,014	14,014	14,014	14,001	14,001
R-squared	0.424	0.771	0.585	0.625	0.625
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All regressions are clustered at the industry level.

The results reported in **Table 2** hence confirm the three hypotheses. Therefore, after green credit policy implementation, treatment group firms prefer to disclose more environmental information to claim more green financing resources but do not seem to engage in similar efforts to ensure that their actions align with their words, as they fulfill less of their environmental responsibilities. In other words, firms cater to the green credit policy in order to obtain more green financing resources from banking institutions. This emphasizes a greater likelihood of firms engaging in hypocritical

environmental information disclosure in the absence of an efficient system for assessing the consistency between the disclosed information and their actions.

4.2. Robustness tests

4.2.1. Parallel-trend assumption

In our empirical strategy, there is the assumption that the outcome gaps between the treatment and control groups have evolved similarly before the green credit policy implemented. That is, we assume a parallel trend. Therefore, we adopt the event study method and construct the model shown in Equation (13) to assess this trend:

$$Y_{it} = \alpha_0 + \gamma_{-2} pre(2) * treat_i + \gamma_0 cur(0) * treat_i + \sum_{t=1}^{5} \gamma_t post(t) * treat_i + \gamma_6 \boldsymbol{Z}_{it} + \mu_i + \eta_j + \lambda_t + \varepsilon_{it} \quad (13)$$

where *pre*(2) is the second year before policy implementation; *cur*(0) is the current year of policy implementation; *post*(*t*) is the *t*th year after policy implementation. The other variables are identical to those in Equation (11). If the parallel trend assumption is valid, the interaction term, *pre*(2)**treat*, should have a nonsignificant coefficient. The outcome variables in Equation (13) are catering behavior (*cater*), environmental information disclosure (*edi*), and environmental responsibility fulfillment (*ers*).

Because the green credit policy was implemented in 2012, we set 2011 as the baseline when estimating Equation (13). **Figures 2–4** plot the dynamic effects of the interaction term on the outcome variables. The coefficient of *pre*(2) is not significant in **Figures 2–4**, and **Figure 2** also shows that firms' catering behavior becomes increasingly noticeable during and after the year of policy implementation. This finding confirms the assumption H1 again.

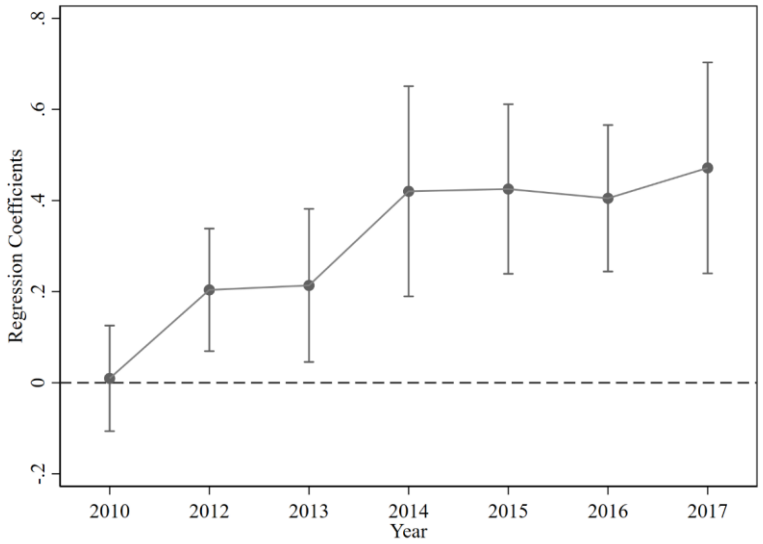

Figure 2. The dynamic effects on catering behavior.

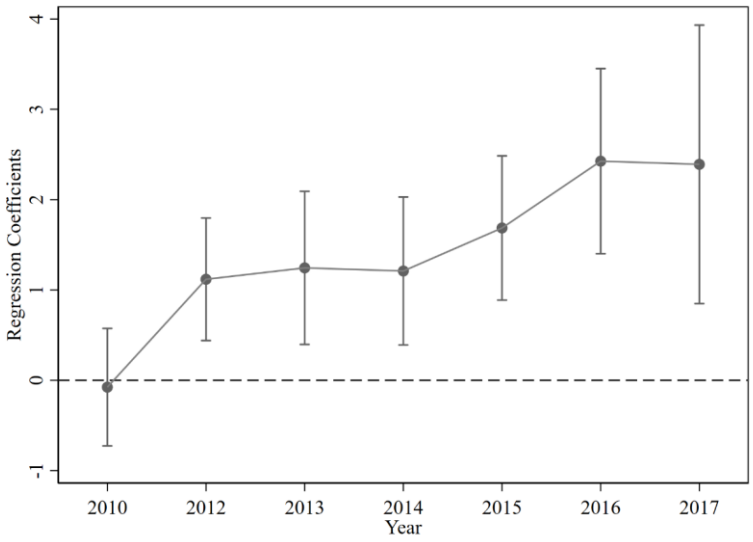

Figure 3. The dynamic effects on environmental information disclosure.

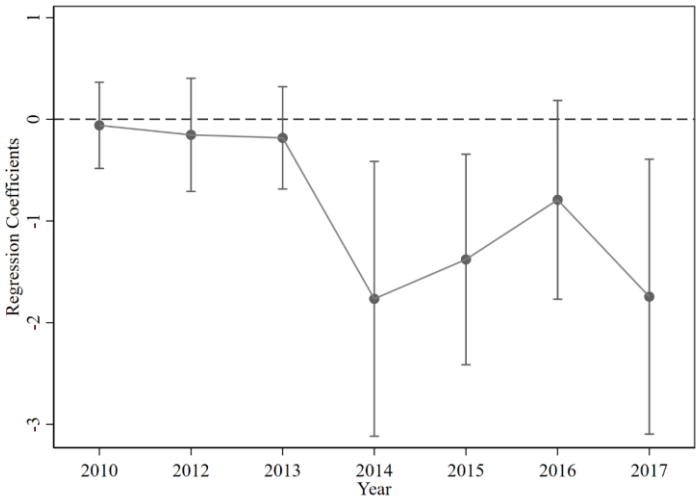

Figure 4. The dynamic effects on environmental responsibility fulfillment.

4.2.2. PSM-DID model

There is a probability that the treatment group in our sample is not randomly assigned. To rule out this concern, we adopt propensity score matching (PSM) to estimate Equation (11), as this method affords us the possibility of using alternative treatment and control groups through a random selection process. Specifically, we use a one-to-one matching approach and consider firms' basic features as covariates to find the most similar treatments.

Table 3 reports the results estimated by a propensity score matching difference-in-differences model, showing that the interaction term in the three columns, which use different outcome variables, is significant and has the expected signs. These findings confirm the baseline regression results.

Table 3. The results of PSM-DID.

	(1)	**(2)**	**(3)**
	cater	***edi***	***ers***
did_2012	0.346***	1.687***	−0.941**
	(0.077)	(0.401)	(0.359)
Constant	0.882	−6.045*	−22.452***
	(0.718)	(3.513)	(3.917)
Observations	14,011	14,011	14,011
R-squared	0.424	0.771	0.585
Firm Characters	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Matching	One-to-one	One-to-one	One-to-one

Notes: Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All regressions are clustered at the industry level.

4.2.3. Placebo tests

The results presented thus far provide evidence that the parallel trend assumption is valid. However, we are still concerned that other confounding factors, such as macro policies, could disturb this parallel trend. Therefore, we conduct a placebo test and randomly withdraw the interaction term, repeating the estimation 500 times. **Figures A1–A3** in the Appendix plot the *t*-value distribution across the 500 estimations. The results suggest the robustness of the baseline regression results and that the estimates are hardly affected by the confounding factors.

4.2.4. Sensitivity analysis

Although the estimation results based on Equation (11) show the significant treatment effect of the green credit policy on firm catering behavior, concerns remain regarding the possible violation of parallel trends in a difference-in-differences setting. As suggested by Rambachan and Roth [47], we conduct sensitivity analyses to illustrate the sensitivity of our causal conclusions to alternative assumptions considering violations of the parallel trend. A major concern here is that unobserved factors could influence firm catering behavior in the absence of the green credit policy. It is reasonable to assume that the size of the effects of unobserved factors on firms in the post-treatment period are not significantly larger than the size of the effects in the pre-treatment period. Therefore, we impose restrictions on the possible violations of the parallel trends through relative magnitude bounds ($\Delta^{RM}(\bar{M})$).

In **Figure 5**, the red solid line is the confidence interval for γ0 from Equation (13), and the blue solid lines are robust confidence sets of treatment effects in 2012 for $\Delta^{RM}(\bar{M})$ using different values of $\bar{M}$. The results in **Figure 5** show that if $\bar{M}$= 1.5, we obtain a robust confidence set of [0.012, 0.420] for the causal effect on firm catering behavior in 2012. This is slightly wider than the original ordinary least squares confidence interval of [0.071, 0.336], which is valid only if the parallel trend holds.

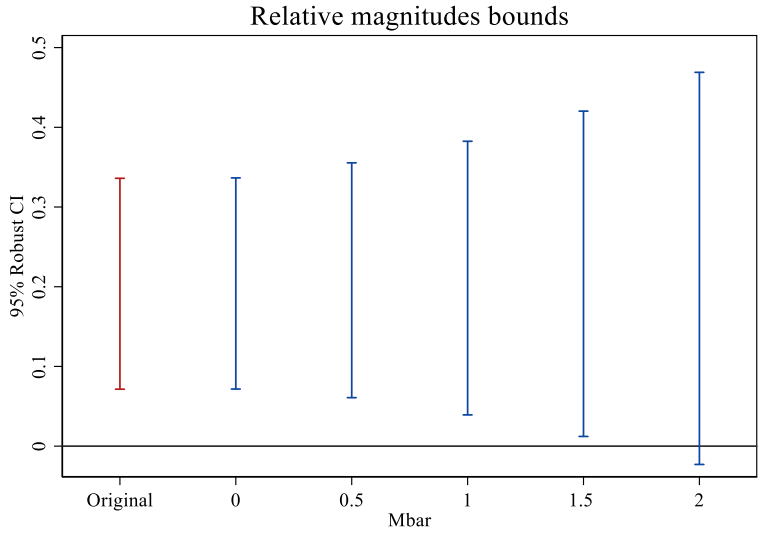

Figure 5. Sensitive analysis using relative magnitudes bounds.

However, when $\bar{M}$= 2, we cannot reject the null effect on firm catering behavior in 2012 because the confidence interval includes zero. We can see that the "break-down value" for the null effect is around 1.5. We conclude that the causal effect of the 2012 green credit policy on firms' catering behavior is robust if the possible violation of the parallel trend is bound to a relative magnitude of 1.5.

4.2.5. Other policies

Table 4. The regression results controlling for the energy efficiency credit policy.

	(1)	**(2)**	**(3)**
	cater	***edi***	***ers***
did_2012	0.314***	1.527***	−0.689**
	(0.076)	(0.403)	(0.297)
did_2015	0.097**	0.476	−0.759**
	(0.043)	(0.340)	(0.311)
Constant	0.732	−6.736*	−21.147***
	(0.715)	(3.448)	(3.894)
Observations	14,014	14,014	14,014
R-squared	0.425	0.771	0.586
Firm Characters	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Notes: Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For simplicity, we omit the results of control variables. All regressions are clustered at the industry level.

During the sample period (2010–2017), the Chinese government also implemented the energy efficiency credit policy, which was enacted in 2015. Thus, it is only natural to have concerns about the potential influence of this policy on our results. Based on this, we introduce an additional interaction term, *did_2015*, to proxy

whether the firm belongs to energy-related industries after 2015 according to the energy efficiency credit policy [48]. **Table 4** reports the results after adding this interaction term, with Column (1) (i.e., outcome: catering behavior) showing a significantly positive result, Column (2) (i.e., outcome: environmental information disclosure) also showing a significantly positive result, and Column (3) (i.e., outcome: environmental responsibility fulfillment) showing a significantly negative coefficient of the interaction term *did_2012*. These results are consistent with our baseline results.

4.2.6. Sample restrictions

As industries are the primary sources of pollution emissions, they are more likely to be restrained by the green credit policy than other sectors of the economy. Therefore, we consider industrial companies to be extensively impacted by the policy. To eliminate the possible impact of certain industries on the estimations, we drop firms that belong to other industries and re-estimate Equation (11). **Table 5** presents the regression results for this restricted sample, which depict that the coefficient of *did_2012* is positive and significant at the 1% level in Column (1), positive and significant at the 1% level in Column (2), and negative and significant at the 5% level in Column (3). These results once more verify the robustness of the baseline regression results. The conclusion based on all these analyses is that listed companies in China adopt catering strategies after green credit policy implementation.

Table 5. The regression results with restricted samples.

	(1)	**(2)**	**(3)**
	cater	***edi***	***ers***
did_2012	0.279***	1.375***	−0.756**
	(0.085)	(0.426)	(0.369)
Constant	1.455*	−5.771	−25.394***
	(0.778)	(4.519)	(4.611)
Observations	10,429	10,429	10,429
R-squared	0.422	0.765	0.591
Firm Characters	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Notes: Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For simplicity, we omit the results of control variables. All regressions are clustered at the industry level.

4.3. Heterogeneity analysis

Thus far, the study delivers an empirical investigation into the impact of the green credit policy on firm catering behavior. Now, to enhance the credibility of our conclusions, we conduct a series of heterogeneity analyses.

The signal transmission theory indicates firms are inclined to be 'greener' when applying for green loans. In the process of greening, non-heavily polluting firms have advantages of environmental information disclosure over heavily polluting firms. Moreover, the less stringent environmental regulation enables the less heavily regulated firms to conduct hypocritical environmental information disclosure [49]. In

this aspect, non-heavily firms are more likely to engage in catering behavior. Hence, we analyze the differential impact between heavily polluting firms and non-heavily polluting firms.

In addition, green credit as one of the important loan sources may induce competitiveness among firms, especially in the course of capital deficiency. Due to an imperfect green finance system in banks, firms face ineffective external oversight, which in turn makes it easier for them to adopt greenwashing tactics to circumvent the restrictions of green credit policies [50]. Therefore, the high level of city financial development will induce higher competition in the green loan. In this case, we wonder if there is a differential impact on the firms located in different levels of financial development.

From the above analyses, we investigate the differential impact of green credit policy based on pollution intensity and the financial development of cities in this section.

4.3.1. Heavily polluting vs. non-heavily polluting firms

In June 2008, the Ministry of Ecology and Environment issued the Industry Classification Management Directory for the Environmental Check of Listed Companies, which identifies 14 heavily polluting industries. Banking institutions have placed greater attention on these industries owing to their high energy consumption and pollutant emissions. For companies in these industries to receive a restriction reduction and greater access to credit, they must improve their environmental governance and fulfill more of their environmental and social responsibilities. Therefore, heavily polluting firms are less likely to cater to the green credit policy than non-heavily polluting firms.

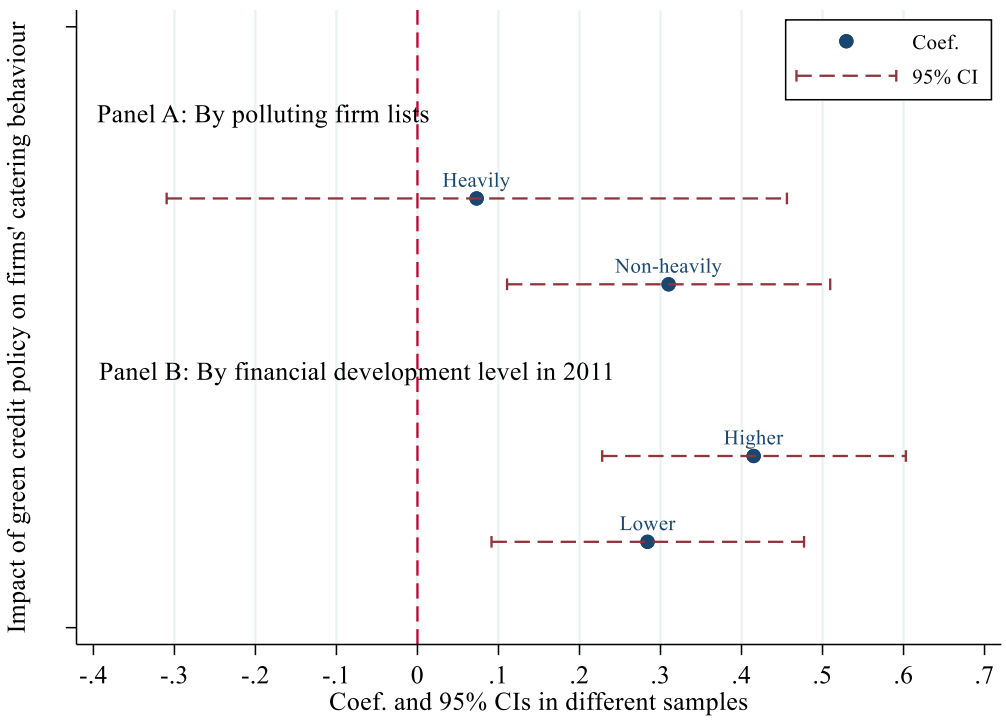

Figure 6. Impact of green credit policy on firms' catering behavior in different samples.

We divide our samples into two groups, heavily polluting and non-heavily polluting firms, according to the guidelines on the Industry Classification Management Directory for the Environmental Check of Listed Companies. As seen in Panel A of **Figure 6**, the regression coefficient of *did_2012* is nonsignificant in the heavily polluting group, and significantly positive in the non-heavily polluting group. We conclude that there is a significant difference regarding catering behaviors between these groups, with non-heavily polluting firms being more likely to engage in intensive catering behavior under the green credit policy. This finding is similar to that in the study by He et al. [2], where the green credit policy is shown to restrict the greenwashing of heavily polluting firms.

4.3.2. High vs. low level of city financial development

We use the ratio of loan balance in 2011 (in the city where the listed company is registered) to GDP as an indicator of city financial development. If the ratio is above its mean value, the firm is regarded as registered in a city with a high level of financial development.

According to Panel B in **Figure 6**, the regression coefficient of *did_2012* is significantly positive as long as the ratio is above the mean value in the high financial development group. Our findings suggest that compared with firms in cities with a low level of financial development, those in cities with a high level of financial development are more likely to engage in catering strategies. This may be attributed to the fact that banking institutions in cities with high levels of financial development already comprehensively know the relevant information of firms within the city. Therefore, after green credit policy implementation, banking institutions do not significantly strengthen their supervision, which incentivizes firms to adopt a catering strategy. Conversely, in cities with low financial development, there tends to be a greater information asymmetry between financial institutions and firms. This leads these financial institutions to significantly increase their audit and supervision measures after green credit policy implementation, thereby inhibiting firm engagement in catering behaviors.

5. Mechanism analysis

Our baseline results and robustness tests verify the hypotheses of the study. Thus far, we empirically show that firms engage in catering behavior regarding their environmental information disclosure after green credit policy implementation. At this point, it is but logical to question why firms adopt this hypocritical strategy in response to the green credit policy. In this section, after observing the substitution relationship between environmental information disclosure and environmental responsibility fulfillment, we next to explore the underlying mechanisms of firms' environmental strategies from the perspective of internal and external motivations. First, we assess the changes in financial costs and credit allocation structures. Second, we analyze the capital market's response to the firms' catering behavior.

5.1. The potential substitution relationship between environmental information disclosure and environmental responsibility fulfillment

Suppose that the firm adopts a strategic environmental action; one may ask whether there is a substitution relationship between environmental information disclosure and environmental responsibility fulfillment. To explore this, by referring to Ying and He [51], we present the yearly trends of firm's environmental information disclosure and environmental responsibility fulfillment in **Figure 7**. We can see that the trend across the year in the full sample is straightforward in the first graph. The environmental information disclosure increases across years while the environmental responsibility fulfillment decreases a lot after 2013. Furthermore, when splitting the sample into a catering group and a non-catering group, the significant difference turns out between the firm's environmental information disclosure and environmental responsibility fulfillment. As seen in the second graph, such difference becomes more and more apparent after 2012 in the catering group. However, there is no obvious gap between them in the non-catering group, as shown in the third graph. Therefore, what is shown in **Figure 7** enables us to infer the significant substitution relationship between environmental information disclosure and environmental responsibility fulfillment.

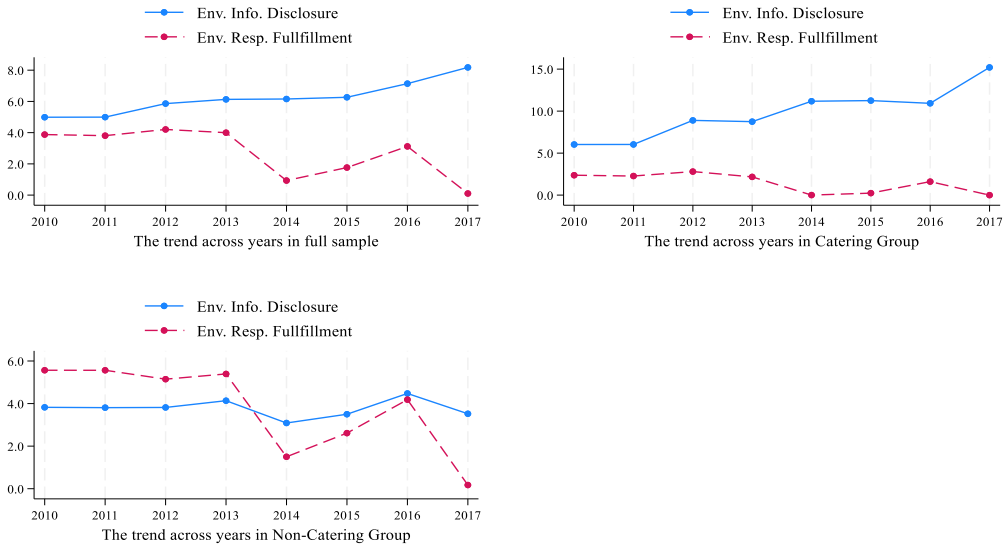

Figure 7. The yearly trends of environmental information disclosure and environmental responsibility fulfillment in different samples.

5.2. The green credit policy, financial costs, and credit allocation structure

The green credit policy aims to curb harmful environmental and social investments by means of promoting higher loan interest rates for and stringent inspection over less "green" companies. These actions create a financial constraint effect that can incentivize firms to engage in catering strategies. Therefore, we investigate changes in firms' loan interest rates and credit allocation structures, as shown in **Figure 8**[6].

It can be seen that the difference in interest rates between the treatment and control groups is wider after 2012 and until 2015. Thus, firms in the treatment group acquire banking loans at higher interest rates after the green credit policy implementation. The ratio of debt finance in treatment group firms also decreases significantly after 2012, whereas that of control group firms shows a slight increase. This implies that firms in the treatment group suffer more from the crowding-out effect of the green credit policy compared with the control group. This point is illustrated in **Figure 8**, showcasing an increase in the business finance of treatment group firms, even if this increase is smaller after 2012. In other words, treatment group firms seek business finance because of the green credit policy's financing constraint effect. Hence, we infer that firms are motivated to adopt a catering strategy, as illustrated in the first cell of **Figure 8**, and that the differences regarding catering behaviors between the treatment and control groups increase consistently after 2012.

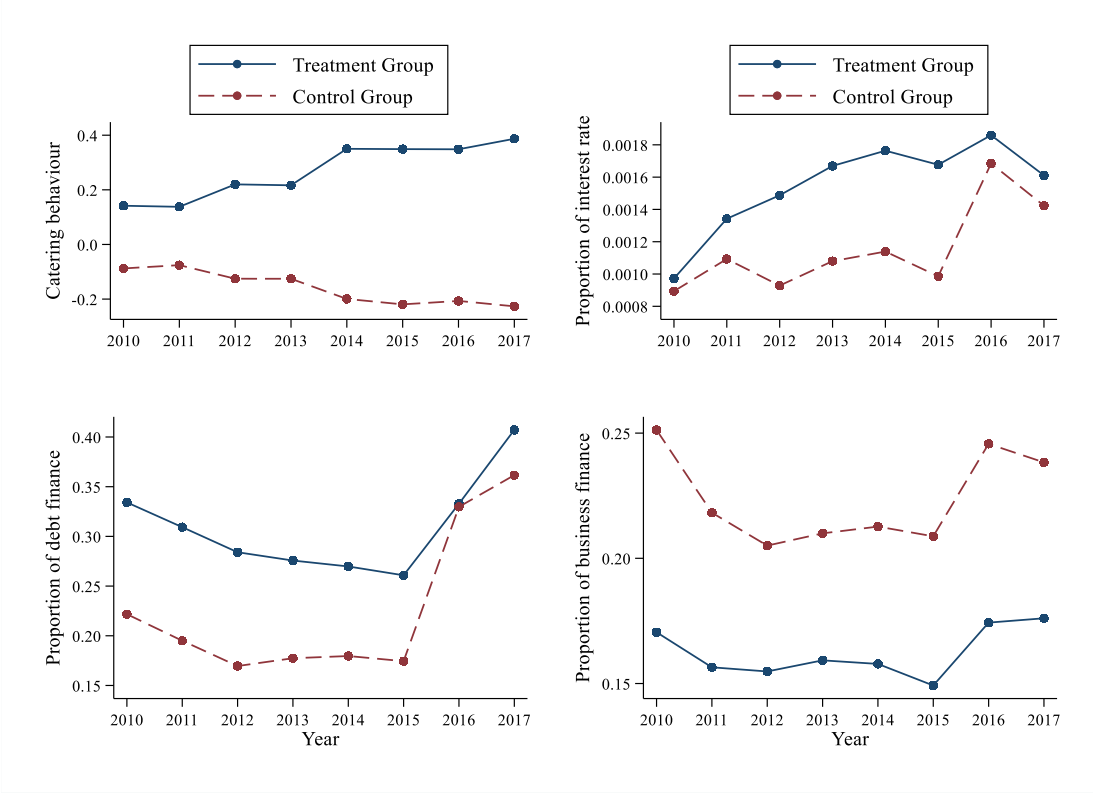

Figure 8. The time trends of catering behavior and credit allocation structure.

To ensure that our exploration onto this matter is robust, we empirically examine the relationships among the green credit policy, financial costs, and the credit allocation structure. **Table 6** shows the results based on Equation (11), but with the dependent variables of ratio of interest payable (*RR*), ratio of debt finance (*DR*), and ratio of business finance (*TR*). The coefficient of the interaction term, *did*_2012, has the expected sign. In other words, after green credit policy implementation, firms in the treatment group acquire banking loans at higher interest rates (vs. the control group); thus, their debt finance decreases while their business finance increases, the latter serving as an alternative financing source. All these results are consistent with the view that the financing constraint effect caused by the green credit policy is the

main reason why firms are prone to adopting a catering strategy post-policy implementation.

Table 6. The impact of the green credit policy on financial cost and credit allocation structure.

	(1)	**(2)**	**(3)**
	RR	***DR***	***TR***
did_2012	0.0003**	−0.017**	0.019**
	(0.0001)	(0.007)	(0.009)
Constant	−0.009***	−2.197***	−0.762***
	(0.003)	(0.223)	(0.113)
Observations	12,196	10,244	12,137
R-squared	0.592	0.868	0.831
Firm Characters	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Notes: Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For simplicity, we omit the results of control variables. All regressions are clustered at the industry level.

5.3. The green credit policy, capital market responses, and firm catering behavior

Sun et al. [15] noted that one significant obstacle for banks related to green credit policy implementation has been the information asymmetry between banks and companies; that is, banks do not have much knowledge on firms' records on environmental performance. In general, symbolic environmental gestures may not necessarily be beneficial for firm financial performance [52]. However, in uncompetitive market environments that lack adequate regulation, investment stakeholders may struggle to assess and interpret firms' environmental behaviors, which may then become a driving force of firms' adoption of catering strategies.

Accordingly, we explore the external reasons behind firm catering strategy adoption by considering how the capital market responds to firms' catering behaviors. If the market can unveil the symbolic environmental gestures associated with these catering behaviors, the market value of firms in the treatment group would shrink after 2012. Referencing prior research [53,54], we select four indicators to proxy the response of the capital market to firms' catering behaviors, as follows: (a) The cash dividend reinvestment considered by firms regarding annual individual stock returns (*yretwd*); (b) the cash dividend reinvestment not considered by firms regarding annual individual stock returns (*yretnd*); (c) the Tobin Q in category A (*tobin_qa*); (d) the Tobin Q in category B (*tobinq_b*).

Table 7 reports the estimation results based on Equation (11), but with the dependent variables being the four aforementioned proxies of capital market response to firm catering behavior. We can see that the interaction term has nonsignificant coefficients across Columns (1–4), suggesting that the capital market does not respond to firms' catering behaviors after green credit policy implementation. This finding

provides evidence for our conclusions based on the baseline regression results. The capital market seems to rarely respond to firms' catering behaviors, which increases the motivation of these firms to falsify their environmental information disclosure.

Table 7. The capital market's response to the firms' catering behavior.

	(1)	**(2)**	**(3)**	**(4)**
	yretwd	***yretnd***	***tobin_qa***	***tobin_qb***
did_2012	−0.014	−0.015	−0.019	−0.009
	(0.028)	(0.028)	(0.082)	(0.101)
Constant	2.407***	2.507***	17.991***	16.257***
	(0.781)	(0.812)	(2.338)	(2.593)
Observations	5593	5593	5495	5495
R-squared	0.486	0.484	0.762	0.755
Firm Characters	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Notes: Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For simplicity, we omit the results of control variables. All regressions are clustered at the industry level. The sample is restricted to firms that have the catering behavior, namely, the variable of *cater* is larger than 0.

6. Conclusion and policy implications

The green credit policy configures an important step toward securing sustainable financial resource allocation in China, and attempts to guide firms to fulfill their environmental and social responsibilities by supporting firm engagement in environmentally friendly production and business activities. This policy helps the Chinese government achieve its goals of securing coordinated environmental governance and economic development at the regional level, constraining and incentivizing different behaviors from firms and influencing their environmental strategy choices. This study uses the Green Credit Guidelines issued in 2012 as an exogenous shock to empirically investigate the impact of the green credit policy on firms' environmental strategies. We take listed companies in China as the study sample and identify the changes in their environmental information disclosure and environmental responsibility fulfillment after green credit policy implementation.

The results show that firms tend to engage in catering behaviors to supposedly comply with the requirements of the green credit policy and then acquire more financial resources. That is, firms are prone to disclosing more and more positive information about their environmental initiatives while they fulfill less of their environmental responsibilities. The findings also show that firms' catering behaviors have some heterogeneous characteristics, as firms that are not heavily polluting and located in cities with high financial development are more likely to cater to the green credit policy. The main internal reason for firms to adopt this catering strategy is the financing constraint effect caused by the green credit policy, while the main external reason is the capital market rarely responding to firms' catering behaviors.

Our findings indicate that the mechanisms through which the green credit policy acts, encompassing both incentives and constraints, induce listed companies to engage in catering behaviors regarding environmental information disclosure. At the same time, the capital market has yet to react to these strategic actions by the part of listed companies, which implies, among other things, that the environmental information disclosure system remains flawed and hampers the identification of firms' false statements regarding environmental activity engagement—which in turn are used to obtain more green credit. In other words, firms' engagement in catering behaviors implies that the green credit policy has not played a positive role in environmental governance. Meanwhile, the recent digital transformation seems to have brought with it a double-edged sword, especially if firms choose to falsify the details of their environmental information disclosures through digital measures.

Based on our findings, we propose the following policy implications for improving the performance of governance for the green financial system. First, it is essential to strengthen the technological capacities of banking institutions, ensuring that they can more accurately assess the authenticity of the details in firms' environmental information disclosures, and whether enterprises fulfill their environmental and social responsibilities. This is likely to reduce the inconsistencies between firms' environmental information disclosure and responsibility fulfillment. Furthermore, policymakers involved with the green credit policy should attempt to incorporate into the policy the unique characteristics of heavily polluting firms, minimize credit restrictions, and enhance the role of credit-based incentives to support environmental technology upgrades.

Second, in the absence of standardized environmental information disclosure guidelines, firms have been making use of voluntary disclosure to engage in catering behaviors. Therefore, it is crucial to expedite the development of mandatory environmental information disclosure regulations and guidelines. The government should provide stricter guidance to companies on how to disclose environmental information in a standardized manner, strengthen their consciousness of the importance of complying with the guidance, and proactively assume environmental governance responsibilities.

Third, to enhance the reliability of environmental information disclosures, it is essential to fully leverage the role of independent third-party institutions in the assessment of firms' environmental responsibility fulfillment. Simultaneously, the government should provide diversified channels for corporate supervision through public participation, prompting companies to disclose environmental information truthfully and fulfill their environmental and social responsibilities.

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Notes

[1] From 2014 to 2021, the issued scale of global green securities has increased from 37 to 509 billion dollars, respectively, and the amount of global green credit has increased from 0.3 to 300 billion dollars, respectively.

[2] In April 2018, China integrated the Banking Regulatory Commission with the Insurance Regulatory Commission, and then established the China Banking and Insurance Regulatory Commission.

[3] Article 17 of the "Key Evaluation Indicators for the Implementation of Green Credit" issued by the China Banking Regulatory Commission provided the related requirements.

[4] Although the difference-in-differences method is useful for assessing the impact of policies, issues such as endogeneity in policy implementation, spillover effects after policy implementation, and potential omitted variables in the model may still lead to estimation bias. Therefore, future research needs to adopt the instrumental variable approach for correction.

[5] Since Hexun issued data on environmental responsibilities fulfillment scores from 2010 to 2017, we restrain our sample to the period of 2010–2017.

[6] To proxy financial cost, we use the ratio of interests payable to total assets. To proxy the credit allocation structure, we use the ratio of debt finance (i.e., short- and long-term borrowings, non-current liabilities due within one year, and debt securities issued by firms) to total assets. To proxy the crowding-out effect of bank debt, we use the rise in the ratio of business finance (i.e., accounts payable, notes payable, and payments received in advance by firms) to total assets. The data source is the China Stock Market and Accounting Research database.

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Appendix

Table A1. Assessment contents of environmental information disclosure.

Primary indicator	Secondary indicator	Definition
Environmental management (10 Points)	Environmental concept	Dummy variable with a value of 1 if the firm discloses environmental concepts, environmental policy and management organization structure, circular economy development model, and green development, otherwise 0.
	Environmental goal	Dummy variable with a value of 1 if the firm discloses past environmental goals' fulfillment and future environmental goals, otherwise 0.
	Environmental management system	Dummy variable with a value of 1 if the firm discloses a series of management systems and other information such as relevant environmental rules, regulations, and responsibilities, otherwise 0.
	Environmental education and training	Dummy variable with a value of 1 if the firm discloses environmentally related education and training information, otherwise 0.
	Environmental campaign	Dummy variable with a value of 1 if the firm discloses information on special environmental activities and other social welfare activities, otherwise 0.
	Environmental emergency response mechanism	Dummy variable with a value of 1 if the firm discloses information on established relevant environmental emergency response mechanisms, emergency measures and pollution treatment, otherwise 0.
	Environmental honors or awards	Dummy variable with a value of 1 if the firm receives honors or awards in the field of environmental.
	Three Simultaneities system	Dummy variable with a value of 1 if the firm discloses information on implementation of three simultaneities system, otherwise 0.
Environmental liability (12 Points)	Pollutant emission	The variable equals 0 if the firm did not disclose information on pollutants such as wastewater, COD, SO_2, CO_2, industrial solid waste, smoke and dust; it equals 1, meaning the firm adopts qualitative disclosure; and 2 means the firm adopts quantitative disclosure.
Environmental performance and governance (12 Points)	Pollutant emissions reduction and treatment	The variable equals 0 if the firm did not disclose information on the emission reduction and control of waste gas, wastewater, smoke dust, solid waste, noise, light pollution, and radiation; it equals 1, meaning the firm adopts qualitative disclosure; and 2 means the firm adopts quantitative disclosure.
	Cleaner production implementation	The variable is equal to 0 if the firm did not disclose information on cleaner production; 1 means qualitative disclosure; 2 means quantitative disclosure.
Disclosure form (3 Points)	Annual reports of listed companies	Dummy variable with a value of 1 if the firm discloses relevant environmental information, and otherwise 0.
	Social responsibility report	Dummy variable with a value of 1 if the firm discloses relevant environmental information, and otherwise 0.
	Environmental report	Dummy variable with a value of 1 if the firm separately discloses environmental reports, and otherwise 0.
Environmental regulation and certification (7 Points)	Major pollution monitoring objects	Dummy variable with a value of 1 if the report discloses that the firm is the major pollution monitoring object, and otherwise 0.
	Pollutant discharge reach the standard	Dummy variable with a value of 1 if the pollutant discharge reaches the standard, and otherwise 0.
	Environmental emergencies	Dummy variable with a value of 1 if there are environmental emergencies, and otherwise 0.
	Environmental violations	Dummy variable with a value of 1 if there are environmental violations, and otherwise 0.
	Environmental petitions	Dummy variable with a value of 1 if there are environmental petitions, and otherwise 0.
	ISO14001 Certification	Dummy variable with a value of 1 if the firm passes the ISO14001 certification, and otherwise 0.
	ISO9001 Certification	Dummy variable with a value of 1 if the firm passes the ISO9001 certification, and otherwise 0.

Table A2. The noted industries in the green credit guidelines.

Industry code	The noted industries
B06	Coal Mining and Washing Industry
B07	Oil and Gas Mining Industry
B08	Ferrous Metal Mining Industry
B09	Non-Ferrous Metal Mining Industry
B10	Non-Metallic Mining Industry
B12	Other Mining Industry
C17	Textiles Industry
C19	Leather, Fur, Feather and Feather Products and Footwear Industry
C22	Paper and Paper Products Industry
C25	Petroleum Processing, Coking and Nuclear Fuel Processing Industry
C26	Chemical Materials and Chemical Products Manufacturing Industry
C27	Pharmaceutical Manufacturing Industry
C29	Rubber and Plastic Products Industry
C30	Non-Metallic Mineral Products Industry
C31	Ferrous Metal Smelting and Rolling Processing Industry
C32	Non-Ferrous Metal Smelting and Rolling Processing Industry
C44	Electricity, Heat Production and Supply Industry
D45	Gas Production and Supply Industry
E47	Housing Construction Industry
E48	Civil Engineering Construction Industry
G53	Railway Transport Industry
G54	Road Transport Industry
G57	Pipeline Transport Industry

Notes: The classification of industry is based on the industry code issued by the China Securities Regulatory Commission in 2012. The noted industries are based on the category A and B industries defined in the 'Key Evaluation Indicators for the Implementation of Green Credit' issued by the China Banking Regulatory Commission (CBRC; now the China Banking and Insurance Regulatory Commission, CBIRC).

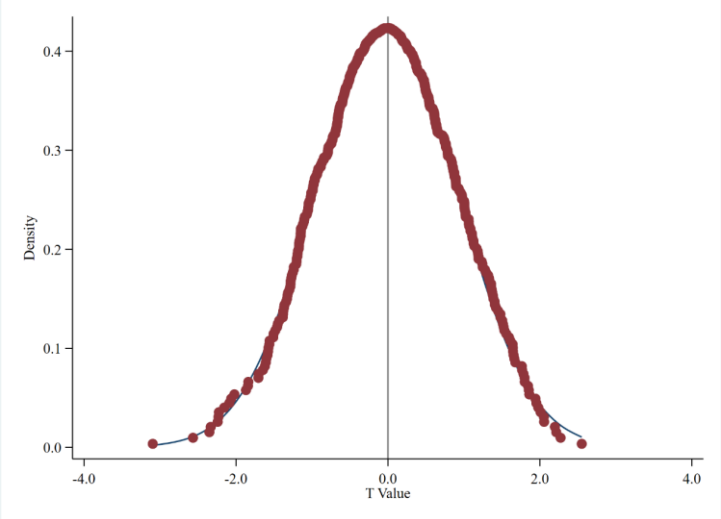

Figure A1. The placebo test of catering behavior.

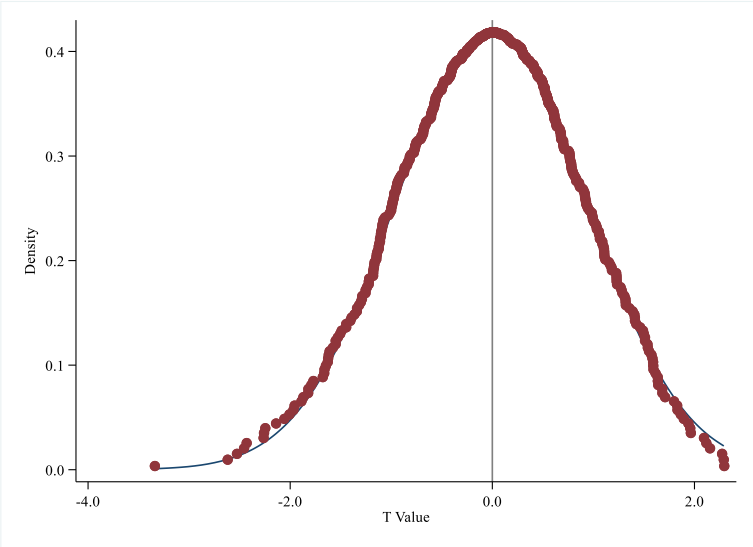

Figure A2. The placebo test of environmental information disclosure.

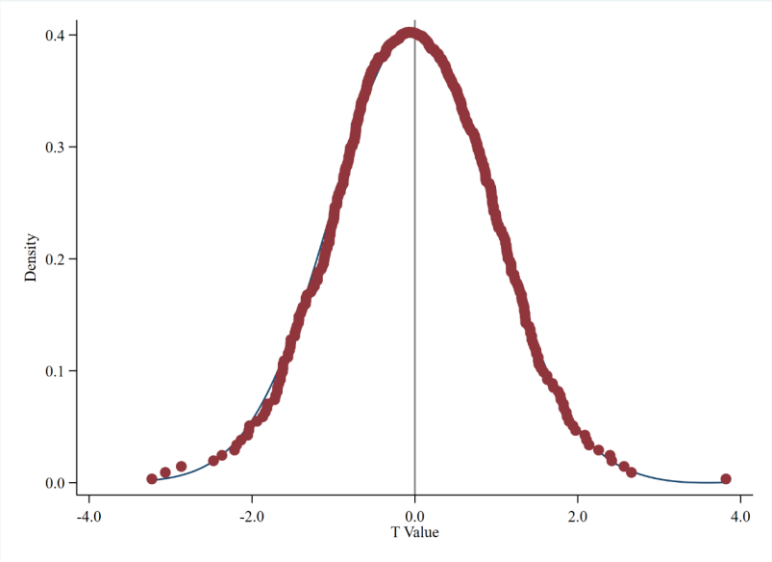

Figure A3. The placebo test of environmental responsibility fulfillment.