RESEARCH ARTICLE

Development of green finance, tourism, and corporate access to bank loans in China

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Abstract

The fundamental purpose of this study is to conduct an inquiry into the efficacy of China's green credit strategy, and that is the core focus of the investigation. As part of this study, we investigate whether or not businesses that increase the environmental transparency of their operations to the outside world and green innovation within their operations are rewarded with more favorable bank loan terms as a direct result of receiving green credit. Specifically, we look at whether or not these businesses are awarded green credit. Our hypothesis is put to the test by using difference-in-differences (DID) model and the data that was collected from a sample of 1086 publicly traded Chinese manufacturers over the years 2012 to 2017. According to the data, businesses that improve the quality of their environmental disclosures do not receive an increase in their access to corporate finance. On the other hand, businesses that introduce new environmentally friendly (tourism) breakthroughs do receive an increase in their access to corporate finance. Our research demonstrates that the root of the problem is corporate greenwashing, a practice that is common in regions with low environmental disclosure standards and makes it more difficult for businesses to obtain new loans. This practice is popular in areas where environmental disclosure standards are lax. This is the most basic explanation for why the phenomena occur in the first place. Our findings contribute to the literature on themes including green credit policy, corporate green innovation, environmental transparency, and green financing and tourism, all of which are useful to corporations, governments, and financial institutions.

Keywords Green credit policy · Corporate green innovation · Environmental transparency · Tourism

Introduction

It is without reasonable doubt that China is the most fascinating untapped market right now. In terms of both its rapid economic development and the vast environmental harm its rapid industrialization has caused, the country serves as an excellent case study. The Chinese government has passed several environmental protection laws in recent years. The establishment of a system known as green credit might have

significant positive effects on the manufacturing and finance sectors (Li and Umair 2023). The process began in 2007, and it was signed into law in 2012. Several reliable sources demonstrate that blockchain technology's argument continues to gain ground (Liu et al. 2023). Green credit is a form of financing advocated by proponents of "green finance" to lessen an organization's environmental impact. When selecting how much credit to give to businesses, green credit policy encourages commercial banks to consider the combined effects of that business's operations on the environment and the bank's bottom line (Wu et al. 2022). There is now a specialized source of funding for environmentally conscious businesses.

Loan applications from debtors or individuals with poor environmental performance, however, can be "vetoed on the spot." A green credit policy makes it easier for businesses that prioritize environmental sustainability to obtain bank loans than it does for companies. Chinese companies, like those in other countries, often use loans to acquire the long-term debt financing necessary for growth. In particular, the

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manufacturing sector in China has suffered the effects of the green credit strategy. The reason is, financial institutions are starting to take more interest in companies' eco-friendly procedures (Fang et al. 2022). The reason is, financial institutions are becoming increasingly eco-conscious and requiring their customers to act accordingly. Neither the policy's effectiveness nor the effect of environmentally friendly characteristics on corporate loan funding has been thoroughly investigated. This is because the green credit policy provides little specificity regarding the environmentally friendly practices that enterprises must adopt to be eligible for financing. First, it is necessary for organizations dealing with money to collect data on the environmental policies and processes of firms to make informed policy decisions. Pan et al. (2023) frameworks give a mechanism to simultaneously fulfil these two objectives. Therefore, our studies focus on two related areas: first, increasing public awareness of environmental issues and second, fostering ecologically responsible practices within institutions. The tension caused by environmental data is lessened when there is greater substantive transparency between firms and financial institutions but is amplified when there is greater symbolic exposure (Umair and Dilanchiev 2022).

However, a company's environmental performance and long-term goals can be improved through internal green innovation. Through this data, we can address the following research question: "Do both external and internal components of corporate eco-friendliness enable enterprises to get additional loans under the green credit policy?" As a result, we can gauge how well China's green credit policy is working. With this empirical research, we examine the impacts of the green credit policy on bank loans from the angles of environmental disclosure and green product development. This analysis makes use of information from a panel of 1086 publicly traded manufacturing firms that operates between 2007 and 2017. Here, we delve more into the specifics of these two parts and the risks that may be encountered when implementing this approach. Our research adds significantly to the literature on the topic. The first thing we do is expand upon previous research on how China finances corporate loans using its green credit strategy. To the best of our knowledge, this study is the first to investigate the connection between green credit policy and the two forms of environmentally responsible action that enterprises utilize when requesting bank loans. Using this method, we can shed light on the deliberations that go into banks' loan approval processes. Second, drawing from research, we propose evaluating a company's commitment to environmental sustainability by focusing on the quality of its environmental disclosure and the effectiveness of its environmentally friendly technologies. The banking industry is transferring its focus from polluting industries to environmentally responsible internal operations. Because of this, organizations of all sizes are implementing green programs. Additionally,

we discuss the concerns of financial institutions on the environmental impacts of various businesses. Our results expand upon what is already known about greenwashing and the need for environmental openness. After identifying potential barriers and providing a solution to protect against policy failure, we construct a model connecting business practices, environmentally sound funding, and global environmental improvement. Benefits could be realized on a societal, national, and corporate level. What follows is a description of some additional discoveries.

In the "Literature review" section, we lay out some conceptual groundwork and explore the evolution of this topic over time. Data and methodology is discussed in the "Data and methodology" section. In the "Results and discussions" section, we will discuss the findings from our empirical research. The "Conclusion and policy recommendations" section discusses the implications and findings.

Literature review

Policy backgrounds

In 2007, after years of planning and coordination between many Chinese government agencies, the country launched its green credit policy. A report defining the green credit system (including relevant institutions, procedures, policy language, law, and monitoring) was submitted at the start of 2012. There are laws and regulations in place to ensure that all firms, public and private, are environmentally responsible (Xiuzhen et al. 2022). Local governments should start tackling environmental problems by gathering information from regional businesses about the problems, the emissions those businesses produce, and the measures those governments have put in place to combat those emissions. For the system to be successfully implemented, local governments must release the database to financial institutions. Banks must do a full examination of a company's viability before deciding whether or not to lend money to it by the policy. Financial institutions are asked to support businesses and projects with a proven track record of ecological responsibility while denying loans to companies with an adverse environmental track record. This type of arrangement is commonly referred to as a "carrot and stick" approach. The strategy received a boost from a mandate issued in 2013 that requires the major commercial banks in China to report on their efforts to implement green credit to the China Banking Regulatory Commission (CBRC). The PBC and six other ministries and commissions collaborated to produce the Guidance on Building a Green Financial System, which cites green credit as the most important and practical technique for reaching this goal (Ullah et al. 2020).

The visibility and influence of China's green credit program have grown over the past few years, having far-reaching consequences. The vast bulk of the current green credit policy literature, however, is focused on either an environmental improvement, reviews of the program's efficacy, or difficulties with the policy (Ikram et al. 2019). This conclusion is predicated on the supposition that there is a correlation between high-pollution sectors and poor access to financing. Their research suggests that green finance policies could facilitate access to capital for environmentally conscious businesses (Zhang et al. 2021b). Researching how effectively loan funds are used is at the heart of these investigations (Xia et al. 2020). The policy's success, nevertheless, could be attributable to two different factors. Step 1 involves financial entities like banks beginning environmental data collection. The second phase entails enterprises operating in an environmentally responsible manner and reporting on their progress. Success of the strategy will depend on the company's commitment to environmental protection and the depth of data it gives, as banks are already familiar with gathering data and vetting applications. To better negotiate loan terms, several scholars have suggested that companies prioritize environmental conservation or provide more information to lenders. The conceptual framework, which categorizes environmentally responsible business practices into external and internal dimensions, satisfies both of these needs. New systems, processes, and legislation are all examples of internal actions that can be taken to protect the environment while sharing data with concerned parties is an example of an external measure that can be taken. Changes made within are instances of external measures (Shah et al. 2019). If a business is transparent about its environmental protection initiatives and overall progress toward becoming more environmentally friendly, it may be more likely to gain access to alternative funding sources. As a result, companies prioritize environmental disclosure when talking to outside stakeholders and green innovation when talking to employees. The term "environmental disclosure" refers to the practice of businesses providing quarterly reports to the general public that summarize the environmental data the company has collected (Iqbal et al. 2022).

Recent research shows that financial data on a company's environmental record keeping and management should be included in EDRs together with other, non-financial information on environmental performance and its implementation (Agyekum et al. 2021). There may be a lot of specific and abstract facts in a company's environmental disclosure report, making it long and difficult to interpret. Transparent environmental reporting helps close data gaps and paints an accurate picture of environmental performance, according to the results of recent studies done in economies with developed markets. There is no need for banks to do their due diligence on prospective clients because applicants must submit environmental disclosure reports (Li et al. 2021). Unlike environmental disclosure, most ecologically responsible ideas within corporations come from within the company. For instance Al Asbahi et al. (2019) focus on the process rather than the result when defining green innovation. When used, "green innovation" can result in significant improvements in emission control, pollution reduction, and cost savings. The goals can be reached through any one of these approaches, or by combining several of them. A company's likelihood of being a major contributor to environmental deterioration can be inferred, with high accuracy, from its industry of operation. According to the Chinese Ministry of Environmental Protection, as of the year 2010, sixteen different production zones in China met the criteria for serious pollution. Industries such as mining, thermal power generation, cement production, electrolytic aluminum production, metallurgy, the chemical industry, petrochemicals, construction materials, paper production, beer production, pharmaceutical fermentation, textile production, and leather production are all represented (Li et al. 2021). Any one of these sectors would be disastrous for the environment on its own, but together they would be catastrophic. Mohsin et al. (2022) examine numerous facets of modern business, including how they are run and by whom. This study's current iteration employs the same categorization schemes. A company's ability to restore and safeguard ecosystems can be estimated by looking at its track record of success with environmentally friendly innovation (Chang et al. 2022b). The Porter hypothesis predicts that as a result of environmental restrictions, businesses of all types and sizes will invest more resources into green innovation (Wang et al. 2023).

Financial institutions can strike a balance between the preservation of the corporate environment and the growth of investment value by putting their resources into green innovation, which has been shown to increase business profits (Sironen and Mononen 2018). Businesses that care about the environment have reached their pinnacle, thanks to green technology. On the other hand, green innovation allows banks to strike a balance between environmental responsibility and financial gain. In conclusion, the policy of green credit lacks sufficient proof linking it to the established environmental responsibility of firms. Most studies have focused on how this regulation affects businesses' bottom lines. Despite its importance, the connection between the state, private industry, and the banking system have gotten comparatively little study. We are researching the most important factors that banks use to determine whether or not to work with prospective business clients. Furthermore, we emphasize the significance of environmental transparency and environmentally friendly innovation in the green credit system, whereas previous research has explored these themes separately (Chang et al. 2022c). China's market is

in its infancy in terms of environmentally friendly innovation and environmental transparency compared to those of more industrialized countries. It is impossible to overstate the importance of a discussion not only about their relative efficacy but also about the myriad functions they play in the context of corporate financing. The quality of environmental disclosure and the efficacy of green innovations are used as significant research indicators in this study to examine the impact of China's green credit policy on the availability of loan financing for enterprises. This study focuses on China's disclosure regulations for the environment. Our investigation has led us to the conclusion that this point of view is the most extreme departure from accepted wisdom that we have found.

The purpose of providing environmental information

According to the stakeholder hypothesis, companies' environmental efforts are primarily motivated by pressure from a variety of stakeholders (Liu and Zhao 2022). Multiple studies back up the claim that businesses with satisfied stakeholders are more likely to draw and keep top personnel (Chang et al. 2022d). The financial institutions of China are crucial to the success of the country's green credit policy. This is because Chinese banks may tap into the country's lending capital resources, allowing them to back eco-friendly businesses. Corporations that can demonstrate their environmental know-how or their dedication to social and environmental responsibility are more likely to receive loans from financial institutions. Research on the effects of both external and internal factors is required because the stakeholder approach can only provide a high-level picture. Our research begins with an examination of the correlation between ecological openness and the availability of credit from many lenders (Chang et al. 2022a). If better environmental disclosure helps reduce the occurrence of information gaps, that could have a positive impact on the availability of bank loans. Asymmetric knowledge occurs when some people have more access to information than others. When one party has access to more sensitive information than its counterparty, that party may be able to use that information to harm its interests (Huang et al. 2022). Adverse selection happens when someone or some group with less information is put in a position where they cannot make the best choice (Liu et al. 2022). Investees have considerable challenges due to unequal knowledge and adverse selection in the financial industry, as evidenced by multiple research (Batool et al. 2022). This is because investees in the finance industry confront formidable obstacles because of information asymmetry and poor selection. Because chance also plays a role in the process, natural selection cannot be held solely responsible for the results. To lessen the effects of adverse selection and entice additional investors, the policy should be more transparent.

Overall, complete environmental disclosure is one of the most essential ways for financial institutions to learn about the environmental policies of the companies they service and make educated decisions as a result. Because of this, we think it is important to examine the variety and comprehensiveness of environmental disclosure practices among various businesses. One possible way to measure environmental transparency is by looking at how much data is available to the general public (Zhang and Dilanchiev 2022). The subject of whether or not better environmental disclosure quality can lead to better data has been disputed in the academic literature. Research on voluntary disclosure shows a correlation between providing more details about one's environmental impact and improved performance.

Improved environmental transparency businesses rewarded with larger bank loans because of the country's new "green credit policy"

Research grounded on sociopolitical theory, however, shows that environmental transparency is negatively correlated with existing knowledge. Companies with a poor track record should increase the amount of information they provide about the environment if they want to maintain their reputation. For many in the environmental community, the belief that more data equals greater openness is a prevalent misunderstanding (Dilanchiev et al. 2021). Contrary to the prior premise, which claimed that increased environmental transparency may result in more corporate loans, this phenomenon is more common in emerging nations like China (Wang et al. 2021). Our best assumption is that this is because the revelation and the associated greenwashing measures posed a threat to the project's credibility. The results of this study lend credence to the voluntary disclosure theory, which postulates that increased transparency about environmental impacts improves environmental outcomes. In line with the principle that one should only provide information if they feel safe doing so, that makes sense. There needs to be less of a chasm between green rhetoric and actual green practices for banks to give corporate environmental disclosure more weight. Our research and polling indicate, however, that not all companies can back up their lofty claims. One firm's CSR report, for example, claims that the company's top executives place a high priority on environmental protection.

However, the report provides very little information or data on the actual activities undertaken by the company to protect the environment. "Greenwashing" occurs when a company tries to boost its image as environmentally friendly through words alone, rather than by concrete actions. In the context of social and political theory, such behavior would be considered "greenwashing," or "a practice that cultivates an image of environmental responsibility on behalf of a corporation" (Liu et al. 2021). When

attempting to understand the unmistakable correlation between greenwashing and environmental disclosure, the nature of the latter's disclosure is the most important factor to consider. Greenwashing sometimes has roots in "soft" or "symbolic" environmental disclosure. Clarkson and his colleagues identify two primary types of environmental disclosure: "soft" and "severe." Soft environmental disclosures are claims made by companies without substantial supporting evidence. The term "soft environmental disclosure" describes this type of openness. It is a metaphor for the harmful actions of multinational businesses. The same holds for assertions made in hard environmental disclosure; they must be backed up by evidence and evaluated by independent parties. If more people could adopt such an open and honest approach, substantial environmental measures could be implemented (Giordano 2020). We argue that this suggests greenwashing could gain popularity if laxer rather than stricter disclosure laws are adopted. Indicators of greenwashing include when a company's soft disclosure is more extensive than its hard disclosure. Many studies have demonstrated the negative effects of "greenwashing" on both consumers and the communities that support businesses. On the contrary, greenwashing misrepresents a company's dedication to sustainability in the eyes of its constituents. As a result of the damage done to stakeholders' awareness of environmental issues, the enterprises' reputations will suffer once the truth about the environment becomes publicly available. The term "greenwashing" originally came into use by Greenpeace to identify businesses that make misleading claims about being environmentally beneficial (Yang et al. 2021). However, greenwashing can affect a business's bottom line by making investors suspicious of the company's intentions (Verny et al. 2020). As investors will also be penalized by governments once it is proven that the companies in which they have invested are greenwashers, banks may decide to operate with extreme caution when dealing with symbolic green firms once the green credit policy is enforced. This is because the government will punish such investors if it is proven that the companies in which they have invested are greenwashers. Greenwashing, in other words, increases the risk that one's claims may be discredited. The effect could be a reduction in the number of loans given to formalistic businesses by financial institutions. Since greenwashing does not help the environment or a company's bottom line, we agree with Zhou et al. (2021) argument. As greenwashing is frowned upon by lenders, a company that engages in it may find it difficult to secure future financing. In conclusion, we unearth a further conflicting path exhibiting how greenwashing cloaked in soft disclosure impedes businesses' capacity to acquire extra finance. It is from this data that we derive the following hypothesis:

Despite the green credit scheme's potential benefits, Chinese banks are unable to increase lending to companies that have improved the quality of their environmental disclosures.

The effects of green technology

Previous studies have demonstrated the importance of stakeholder pressure in propelling corporate green innovation (Alharbi et al. 2023; Lin and Okyere 2023; Wang and Zhi 2016). Businesses that prioritize green innovation are better able to meet the demands of a wide range of stakeholders, such as eco-conscious consumers, advocates for improved environmental protections, and workers looking for a more comfortable and secure workplace (Podvalny et al. 2017). On the flip side, eco-friendly inventions can benefit enterprises (Chen et al. 2021). According to the ecological modernization theory, "green innovation" helps businesses thrive without compromising their ethical or ecological commitments (Probst et al. 2021). We conclude that green innovation within corporations is a factor in firms' ability to acquire finance since it results in more ecologically responsible business practices. Green innovation boosts a company's environmental performance, which in turn attracts more trust and investment from banks. This is the primary advantage of eco-friendly technology. Improved environmental performance can be attributed to innovations with a focus on environmental sustainability.

Green credit regulations will inspire confidence among financial institutions, allowing these companies to access greater funding. Second, green technology is good for business. An organization's innovativeness is linked to its dynamic capability, which is defined as its speed and effectiveness in adapting and integrating resources and skills, which in turn leads to an organization's competitive advantages increasing (Rohr et al. 2022). More research shows that banks correctly value companies that demonstrate great innovation success (Song et al. 2019). Green innovation is a competitive advantage for businesses because it is an innovative field. Businesses benefit from green innovations because they appeal to consumers' desire for environmentally friendly products and production processes. Several studies have linked environmentally friendly innovations to financial and market success. Banks may prioritize this benefit since green innovation can help them reduce credit risk and bad debts (Zhang et al. 2021a). With the introduction of green credit policy, banks can now use the more complex criterion of green

innovation to assess a company's dedication to sustainability, financial stability, and new product creation. This is why eco-friendly advancements should make it less difficult for companies to secure financing. When it comes to green innovation data, however, banks have to put in more effort than enterprises do to acquire transparency reports. This could be due to a variety of factors, one of which is the improved monitoring capabilities of financial institutions. According to Wang et al. (2022), there are two types of green innovation: technological, which is expressed in green patents, and managerial, which is reflected in green management procedures. It is challenging for local governments, banks, and other companies. It is important to (Yao and Liu 2021) get quantitative data on green management innovation since many crucial data points are locked away in internal corporate processes. As a result, counting the number of "green" patents is a proxy for technological progress toward lessening the human effect on the natural world. It is also worth noting that in China, environmental disclosure and eco-friendly innovation share a framework but are not the same thing. The fact that they may not even be related is the most striking difference. In annual reports and corporate social responsibility (CSR) reports, the vast majority of Chinese enterprises detail their effects on the environment (Chen et al. 2021). Information on the company's green technology is less likely to be included in an integrated report than in a standalone report.

We conclude that China's green credit strategy does enhance the size of bank loans supplied to enterprises with higher levels of green innovation, and we use this to make the following prediction about the nature of the relationship between green innovation and economic growth in China.

Data and methodology

Data collection

Producers with shares trading on the Shanghai and Shenzhen stock markets were used as the study's representative sample. We are focusing on these companies because of the vital roles they play in the fight against industrial pollution and the promotion of environmental protection. Therefore, they play an essential role in the green credit system implemented by the Chinese government (Khan et al. 2018). We manually generate statistics on environmental disclosure using primary sources such as annual reports and corporate social responsibility reports. Similar to the method outlined by Yu (2021). More specifically, we analyze the papers related to environmental

protection and assemble every report we can discover on the corporate websites of the major firms. Given the circumstances, we were compelled to complete the questionnaire and assign weights to the various subcategories. The IPC Green Inventory, which is maintained by the World Intellectual Property Organization, is used as the selection criterion to hand-pick the data for green innovations from the general patent data. Doing so ensures that you are receiving accurate data (WIPO). If the International Patent Classification (IPC) classification for the patent in question can be found in the Green Inventory, then the patent in question is considered environmentally friendly. Using the CSMAR database, further insights about a company's financial situation can be gleaned. Because the earliest year for which patent data are available in the CSMAR database is 2007, and the fact that idea of green credits was envisaged in 2007, but not completely implemented until the following year, we have decided to restrict our investigation to the years 2007–2017. (2012). In total, 9711 different pieces of data are utilized throughout this investigation. To mitigate the effect of severe outliers, the values of all continuous variables are winsorized at 1% above or below the mean.

Methodology

Using the DID with continuous grouping variables, as proposed by Ali et al. (2019) and Sun et al. (2021), Our primary hypotheses are tested for validity. The terms "Loan," "Disclosure," "GreenInnovation," and "Policy," as well as the "*Controlsj*" variable, are displayed in Eqs. (1) and (2), where stand for "individual fixed effect," "temporal fixed effect," and "random error," respectively. There is no need for dummy variables to describe the control and treatment groups in this model because the explanatory variables, Disclosure, and GreenInnovation are continuous. A moderation analysis yields results similar to this. To reiterate, we believe the regulation will have an impact on eco-friendly, creative enterprises that prioritize reducing their environmental impact. This means that the more of these traits such companies have, the more likely they are to be part of the treated group (Dong et al. 2021). We also employ a method called fixed-effects regression to account for individuals' hidden traits and boost the precision of our measurements (Beraha and Đuričin 2020). According to the Hausman test results for each regression, fixed effects have more promise than random effects. Based on these considerations, we concluded that the fixed effects method should be applied. Due to complete collinearity, however, the variable Policy cannot be included in the equations on its own, even when time is held constant. This is due

to the correlation between the two independent variables. We employ the propensity score matching difference in difference (PSM-DID) model, the post-policy analysis, and the temporal trend analysis to determine the validity of our findings (PSM-DID).

eco-friendly goods. By adjusting ownership concentration (Top), which is the percentage of shares held by the largest shareholder, management shareholding (Manager Hold), which is the percentage of shares held by directors and executives, and agency cost (Agency Cost), we can affect

$$Loan_{i,t} = \alpha + \beta_1 Disclosure_{i,t} \times Policy_{i,t} + \beta_2 Disclosure_{i,t} + \sum \gamma_j Controls\_j_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \qquad (1)$$

$$Loan_{i,t} = \alpha + \beta_1 GreenInnovation_{i,t} \times Policy_{i,t} + \beta_2 GreenInnovation_{i,t} + \sum \gamma_j Controls\_j_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \qquad (2)$$

Variable description

We define Loan as the natural logarithm of the total amount of fresh bank loan money obtained by the business throughout the study period, and this quantity serves as our primary dependent variable. The natural logarithm form is used because it accurately measures borrowers' loan-applying power while also conforming to the normal distribution assumption. A change in accounting standards in China over the sample period is less likely to impact such a metric. We anticipate a positive relationship between loans and environmental transparency and green innovation.

The efficiency of environmentally friendly technologies is an additional crucial aspect. Questionnaires, green research, development spending, and green patents have all been used in the past to evaluate the success of an innovation's environmental impact (Shen et al. 2022). Green patent time series data can be collected; however, conducting questionnaire surveys is challenging. However, due to the high failure rate associated with R&D, financial institutions tend to place more value on the output of technological innovation in the form of patents than on the input of innovation in the form of financial investment.

To quantify the efficacy of green invention (Green_ Innovation), we utilize the natural logarithm of 1 plus the number of green patents earned as our dependent variable in regression analysis. The independent variable policy can be used to analyze China's green credit policy. Given that the policy was not formally put into effect until 2012, the number 1 is utilized if the year is after 2012 and the value 0 otherwise. The rate at which green technologies are created, the amount of information available about the environment, and the availability of bank loans are just a few examples. The rise in sales is directly proportional to the rate of return on total assets (ROA). In the second phase, we account for conventional innovation by using the ratio of R&D investment to sales (RD) and the natural logarithm of 1 plus the number of normal patents. The third justification is that corporate governance influences both the availability of capital for businesses and the creation of

the quality of corporate governance (Alexander and Kent 2022). Finally, we consider the possibility that alternative lenders exist for business financing. Combining stock (Equity) with bond financing (Bond) is one way to raise the same amount of money annually. Equity funding like stocks and bonds makes this a realistic option. This allows us to consider any kind of possible rivalry.

Results and discussions

Regression findings

In Table 2, we can see how the green credit policy has affected the availability of loans to businesses with varying levels of environmental transparency and success with green innovation. To begin, we will run an ANOVA to check for statistical significance between the independent variables in column 1. As can be seen from the findings, ROA, cash flow, and loan-related risk all have a negative relationship with one another. Bank loans and other forms of risky funding are usually not necessary for financially secure and successful businesses. Expenditure, size, and leverage all have statistically significant positive coefficients. Intuitively, this makes sense given that larger businesses often have an easier time securing loans, but that those with higher debt loads and investment budgets necessitate a higher total amount of capital. At present, the equity coefficient is positive, which may be indicative of the status quo within the group. The "pecking order" idea suggests that equity funding should be considered a last alternative when seeking external funding. Companies in this position have traditionally relied on larger loans rather than seeking investment from shareholders. Hypotheses were tested in rows 2 to 5. Both the disclosure policy and green innovation policy coefficients (with values of one) are positively related to the dependent variable, however only the green innovation policy coefficient is statistically significant at the 1% level (Table 1).

In light of the previous findings, we dig deeper into the DID model's temporal trend effects to better understand how these impacts vary across time. The regression equations

Table 1 Banking sector loan analysis

	−1	−2	−3	−4
	Loan	Loan	Loan	Loan
Dis×Pol		0.089		0.047
		−0.92		−0.41
GREEN INN×Policy			9.377$_{***}$	0.378$_{***}$
			−2.76	−2.77
DISCLOUSURE		0.069		0.008
		−2.13		−0.11
Green.Inno			0.103	0.102
			−1.29	−1.28
GROWTH	0	0	0	0
	−0.03	−2.04	−0.28	−0.29
CASH	−1.083$_{***}$	−0.083$_{***}$	−9.084$_{***}$	−0.084$_{***}$
	(−70.51)	(−10.53)	(−90.67)	(−70.69)
PPE	−7.002	−0.002	−6.002	−0.002
	(−9.31)	(−3.34)	(−4.34)	(−0.36)
ROA	−8.028$_{*}$	−8.028$_{*}$	−0.028$_{*}$	−0.028$_{*}$
	(−2.73)	(−4.72)	(−1.71)	(−1.71)
EXPEND	3.056$_{***}$	2.056$_{***}$	0.095$_{***}$	0.055$_{***}$
	−4.51	−4.51	−4.44	−4.44
Size	17.638$_{***}$	5.638$_{***}$	6.606$_{***}$	1.606$_{***}$
	−10.9	−10.89	−10.62	−10.62
LEV	9.084$_{***}$	6.084$_{***}$	0.082$_{***}$	0.083$_{***}$
	−13.73	−63.73	−13.54	−13.54
Risk	−6.521$_{**}$	−7.556$_{**}$	−6.735$_{**}$	−6.767$_{**}$
	(−2.26)	(−8.27)	(−2.33)	(−2.34)
RD	−0.031	−3.030	−0.039	−0.038
	(−0.93)	(−4.91)	(−1.18)	(−1.16)
Nor.INNO	0.102$_{*}$	6.101$_{*}$	0.069	0.069
	−1.66	−1.66	−1.07	−1.07
Top	−0.005	−6.005	−0.004	−0.004
	(−0.51)	(−3.51)	(−0.47)	(−0.47)
Manager_Hold	−0.006	−9.006	−0.006	−0.006
	(−1.30)	(−9.30)	(−1.31)	(−1.31)
Agency_Cost	−0.017	−9.017	−0.014	−0.014
	(−1.26)	(−6.24)	(−1.04)	(−1.03)
EQUITY	0.068$_{***}$	8.068$_{***}$	0.068$_{***}$	0.068$_{***}$
	−10.21	−10.19	−10.24	−10.23
BOND	0.001	0.001	0.003	0.003
	−0.09	−0.08	−0.21	−0.19
Year Effect	Fixed	Fixed	Fixed	Fixed
Firm Effect	Fixed	Fixed	Fixed	Fixed
Constant	−19.237$_{***}$	−19.257$_{***}$	−18.527$_{***}$	−18.551$_{***}$
	(−5.91)	(−5.91)	(−5.65)	(−5.64)
N	9711	9711	9711	9711
Adj. R^2	0.637	0.636	0.637	0.637
F	38.33$_{***}$	35.67$_{***}$	36.34$_{***}$	34.00$_{***}$

*$p<0.1$; **$p<0.05$; ***$p<0.01$ (two-tailed)

Table 2 Summary statistics

Variable	Obs	Mean	S.E	Min	Median	Max
Summary of variables						
LOAN	9711	19.529	7.961	0	20.942	14.222
POL	9711	1.671	1.47	0	1	1
DISVLO	9711	2.462	3.075	0	2.386	4.584
GREEN.INNOV	9711	1.718	3.992	0	0	0.912
GROW	9711	20.491	35.545	−30.847	19.083	206.208
CASHH	9711	19.924	18.777	4.22	19.489	65.239
PPE	9711	39.92	19.274	3.04	38	79.398
ROA	9711	4.036	6.305	−13.557	3.947	23.443
EXPEND	9711	5.901	9.798	3.201	5.463	25.311
SIZE	9711	24.011	2.163	20.953	25.844	26.401
LEVERA	9711	44.043	20.444	9.535	51.757	89.821
RISK	9711	2.021	21.022	2.001	1.013	9.128
RD	9711	4.181	4.293	0	4.03	27.16
NORMAL INNO	9711	4.924	2.467	0	4.944	7.702
TOP	9711	39.516	34.21	9.662	39.391	75.747
MANAGER HOLD	9711	14.205	20.871	0	1.13	89.018
AGENCY HOLDINGDS	9711	19.006	14.096	3.045	44.259	50.845
EQUITY	9711	33.272	9.555	0	0	57.55
BOND	9711	2.627	4.478	0	0	19.585
Panel B. Panel data B policy						
LOAN	17.367	7.207	0	19.978	24.222	
POL	1.68	81.139	0	1.609	3.584	
DISVLO	0.887	5.074	0	0.693	3.912	
GREEN.INNOV	17.676	32.564	−38.847	12.477	204.208	
GROW	18.374	12.332	2.22	15.044	62.239	
CASHH	37.079	19.784	9.04	35.935	75.398	
PPE	4.402	9.225	−13.557	3.715	21.443	
ROA	5.261	4.419	0.201	4.032	23.311	
EXPEND	22.151	1.147	19.953	21.985	25.401	
SIZE	40.498	19.267	5.535	39.803	86.821	
LEVERA	0.018	0.02	0.001	0.012	0.128	
RISK	4.198	3.169	0	3.62	17.16	
RD	3.285	1.29	0	3.258	6.702	
NORMAL INNO	33.793	14.043	8.662	31.701	71.747	
TOP	14.36	21.638	0	1.506	85.018	
MANAGER HOLD	18.054	11.354	2.045	15.28	58.845	
AGENCY HOLDINGDS	3.296	8.297	0	0.007	47.55	
EQUITY	0.701	2.598	0	0	15.585	

Panel C. Means of the variables

Variable/year	2007	2008	2009	2010	2011	2012	2013	2014	2015
LOANING CASH	19.824	28.536	19.489	19.438	17.784	19.539	19.777	19.215	18.862
DISCLOUSURE	1.743	1.762	1.88	2.092	2.37	2.278	2.444	2.471	4.585
GREEN INNOVATIVE IDEAS	1.21	1.255	1.321	3.467	2.504	2.655	1.772	2.826	9.933

$*p < 0.1$; $**p < 0.05$; $***p < 0.01$ (two-tailed)

for trend analysis are presented in Eqs. (3) and (4) for your inspection. All of the dummy variables in these equations are represented by the Year k variable, which takes on the value 1 if the current year is greater than or equal to 2012. This means that the value k represents the influence of time trends. This is a reference to the effect that the policies and

company environmental actions had on bank loans in the year after their implementation. Since 2007 is used as a baseline, any number less than five is ignored. If businesses are granted more loans as a result of the green credit strategy, the gap between 0 and 5 should be rather small. Meanwhile, a relatively positive value should exist between −4 and −1. These equations can also be used to test the parallel assumption of the DID model, which states that coefficients between minus four plus one should not be related to loans. According to this presumption, the coefficients should not have anything to do with financing.

$$Loan_{i,t} = \alpha + \sum_{k=-4}^{5} \beta_k Disclosure_{i,t} \times Year\_k_{i,t} \\ + \sum \gamma_j Controls\_j_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (3)$$

$$Loan_{i,t} = \alpha + \sum_{k=-4}^{5} \beta_k Green\_Innovation_{i,t} \times Year\_k_{i,t} \\ + \sum \gamma_j Controls\_j_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (4)$$

Preview of PSM-DID

Companies in our sample are not arbitrarily assigned to different groups; rather, they have the option of becoming public and expanding their operations. As shown by Eqs. (1) and (2), the DID paradigm is congruent with conventional moderation analysis. In this study, we make use of the fact that different models have different approaches to calculating and using propensity scores to match patients (PSM-DID). There were initially two groups of people set up: the experimental subjects, and the control subjects. A primary necessity is the availability of environmental data. Our sample period ($N = 4655$) is split into two groups: the treated group, which consists of companies with environmental disclosure quality above the median for each of those years, and the control group, which consists of all other companies. The second requirement is "green innovation." Those companies ($N = 4408$) from our study that showed green innovation above the sample median in each of the years we analyzed are our treatment group. Similarly, in the PSM procedure, we select covariates that

may affect both the independent and dependent variables. We utilize every control variable as a covariate except bond and equity funding because it is anticipated that these forms of financing will not affect environmentally friendly innovation or the transparency of environmental issues (Table 2).

To achieve perfection, we employ the kernel match technique. PSM reduces the number of samples needed to provide environmental information to the public from 8192 to 6048, and from 4220 to 1080. In addition, we evaluate the balance between the experimental and control groups. A statistically significant difference in the variables between the treated and control groups was not found when missing data were analyzed. As a result, the new samples are within the same range as the old ones while experiencing less of the sample bias problem, proving the efficacy of our PSM approach. Table 4 displays the outcomes of a regression analysis performed on the PSM-DID model. Green innovation businesses have had easier access to financing since the green credit policy was implemented although environmental disclosure coefficients remain low. Therefore, there is no reason to dismiss our findings based on the PSM-DID model.

Direct effects analysis

Finally, to examine the direct effects of environmental disclosure and green innovation on bank loans after the green credit policy was adopted, we utilize a more limited sample, a shorter time frame (2012–2017), and a smaller sample size. We expected that more businesses would be able to qualify for bank loans if the policy favored those with greater levels of green innovation. This would show a strong positive association between the two factors. The study's results are tabulated in Table 5. To avoid the problem of circular causality, the dependent variables in this study have been retroactively adjusted back by one year. Green innovation has a significantly positive coefficient at the 1% level, but environmental disclosure has a statistically insignificant one. As a result, the post-policy study confirms the initial findings. In the next column, we report the results of additional research into the link between environmental disclosure and ecologically

Table 3 Time trend analysis conclusion

Variables/k	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10
	Year_-4	Year_-3	Year_-2	Year_-1	Year_0	Year_1	Year_2	Year_3	Year_4	Year_5
DISCLOSURE	−0.859	0.769	9.052	−0.279	4.177	0.182	0.075	−0.071	−0.009	−0.102
	(−0.65)	−1.98	−9.23	(−6.24)	−1.58	−1.88	−0.91	(−0.88)	(−0.77)	(−0.84)
GREEN INNOVATION	0.007	0.103	9.074	9.263	0.902_*	0.387_{**}	0.831_{***}	0.266_*	0.68_{**}	0.434_{***}
	−0.01	−0.28	−0.23	−9.06	−1.89	−2.72	−2.9	−1.82	−6.2	−2.9

$*p < 0.1$; $**p < 0.05$; $***p < 0.01$

Table 4 Results of PSM-DID

	−1 Loan	−4 Loan
DIS×POL	−0.022	
	(−0.14)	
Green INNO×POLICY		0.736∗∗∗
		−2.76
Disclosure	−0.014	
	(−0.16)	
Green Innovation		0.175
		−1.22
GROWTH	0.001	0.002
	−0.31	−0.74
CASH	−0.079∗∗∗	−0.062∗∗∗
	(−7.10)	(−4.47)
PPE	0.006	−0.002
	−0.65	(−0.22)
ROA	−0.024	−0.016
	(−0.99)	(−0.59)
EXPEND	0.044∗∗∗	0.053∗∗
	−2.75	−2.56
SIZE	2.072∗∗∗	1.546∗∗∗
	−9.41	−4.75
LEV	0.076∗∗∗	0.086∗∗∗
	−8.84	−7.75
RISK	−8.410∗∗	−4.970
	(−2.16)	(−1.06)
RD	−0.008	0.014
	(−0.18)	−0.24
Normal Innovation	0.035	0.163
	−0.41	−1.34
Top	−0.003	−0.009
	(−0.24)	(−0.46)
Manager Hold	−0.002	−0.008
	(−0.40)	(−1.02)
Agency_Cost	−0.009	−0.005
	(−0.50)	(−0.21)
Equity	0.063∗∗∗	0.060∗∗∗
	−6.96	−6.07
Bond	−0.003	−0.024
	(−0.13)	(−0.92)
Year Effect	Fixed	Fixed
Firm Effect	Fixed	Fixed
Constant	−28.608∗∗∗	−18.392∗∗
	(−6.02)	(−2.57)
N	6048	4220
Adj. R^2	0.64	0.639
F	18.24∗∗∗	10.54∗∗∗

*$p<0.1$; **$p<0.05$; ***$p<0.01$ (two-tailed)

responsible innovation (4). The interaction is negative and has a small impact on the result, even at the 10% significance level. One probable explanation for this is the contagion effect. The green innovations introduced by businesses are highly valued by financial institutions, but they are wary of the veracity of environmental disclosures. Banks will doubt the validity of a company's green inventions if it has more of both of these things; in other words, skepticism will spread from the company's environmental disclosure to its green innovations. Therefore, financial institutions would reduce the number of loans they give to enterprises in this sector to reduce the risk of default. This research adds to the body of information showing the challenges inherent in environmental disclosure. Table 3 shows time trend analysis conclusion.

PSM-DID analysis

Evidence suggests that environmental disclosure does not help businesses secure more loans. We hypothesized that this might occur because of the contrasting effects of hard and soft disclosure in the section devoted to the theory. Greenwashing, which is linked to insufficient disclosure, is at the heart of the matter. First, the disclosure into its hard and soft parts and then see how those parts influence bank loans so that we can zero in on the mechanism. Our second contribution is an explanation of the earlier findings and their relation to greenwashing. In their systematic definition of hard and soft environmental disclosure, Wang et al. (2021) show how hard disclosure is backed by hard data and how soft disclosure is backed only by narrative. Table 6 displays the results of this regression. At the 10% level of significance, the coefficient for openness to the public is positive suggesting that doing so is linked to more bank loans being granted. In contrast, at the 1% level of significance, the effect of soft disclosure is highly negative. The DID model and the post-policy analysis (columns 1 and 3) show this trend, and so do the analyses that incorporated the green innovation variable (columns 2 and 4). In addition, row 5 researches the correlation between looser disclosure requirements and environmentally friendly innovation and more stringent disclosure standards. The fact that all of the coefficients are negative does not mean much in and of itself. Table 4 shows that there is only a moderate success rate for the contagion effect in encouraging full disclosure when data is compared. One possible explanation is that the sample size is too small to detect the contagion effect because our dataset only includes a limited number of organizations with a high rate of voluntary disclosure and a considerable number of green patents.

The fact that the green credit policy makes a distinction between "soft disclosure" and "hard disclosure" is still a hypothesis that our findings can help us test. To quantify the real-world results of greenwashing, see Table 6's controlled

Table 5 Results of post-policy analysis

	−1 Loan	−2 Loan	−3 Loan	−4 Loan
Disclosure	−0.023		−0.024	0.07
	(−0.25)		(−0.26)	−0.58
Green Innovation		0.393***	0.393***	0.562***
		−3.2	−3.2	−3.3
Disclosure × Green Innovation				−0.106*
				(−1.80)
Growth	0.001	0.002	0.002	0.001
	−0.54	−0.6	−0.59	−0.57
Cash	−0.092***	−0.093***	−0.093***	−0.092***
	(−7.73)	(−7.76)	(−7.76)	(−7.72)
PPE	−0.010	−0.011	−0.011	−0.011
	(−1.01)	(−1.04)	(−1.04)	(−1.05)
ROA	−0.002	−0.003	−0.003	−0.003
	(−0.07)	(−0.14)	(−0.14)	(−0.13)
Expend	0.026	0.023	0.023	0.025
	−1.17	−1.08	−1.08	−1.15
Size	1.019***	0.972***	0.973***	0.955***
	−3.55	−3.38	−3.38	−3.31
Leverage	0.060***	0.060***	0.060***	0.060***
	−6.39	−6.32	−6.31	−6.32
Risk	−0.751	−1.264	−1.238	−1.539
	(−0.15)	(−0.25)	(−0.25)	(−0.31)
RD	−0.032	−0.035	−0.035	−0.035
	(−0.62)	(−0.67)	(−0.68)	(−0.67)
Normal Innovation	0.179	0.06	0.06	0.063
	−1.61	−0.49	−0.5	−0.52
Top	0.009	0.011	0.011	0.011
	−0.6	−0.71	−0.71	−0.71
Manager Hold	−0.001	−0.001	−0.001	−0.001
	(−0.15)	(−0.14)	(−0.14)	(−0.16)
Agency Cost	−0.035	−0.035	−0.036	−0.037
	(−1.49)	(−1.50)	(−1.51)	(−1.54)
Equity	0.034***	0.034***	0.034***	0.033***
	−3.55	−3.55	−3.55	−3.53
Bond	−0.012	−0.011	−0.011	−0.011
	(−0.66)	(−0.56)	(−0.57)	(−0.57)
Year Effect	Fixed	Fixed	Fixed	Fixed
Firm Effect	Fixed	Fixed	Fixed	Fixed
Constant	−5.693	−4.634	−4.608	−4.327
	(−0.87)	(−0.71)	(−0.70)	(−0.66)
N	5430	5430	5430	5430
Adj. R^2	0.663	0.664	0.664	0.664
F	11.74***	12.39***	11.82***	11.30***

*$p<0.1$; **$p<0.05$; ***$p<0.01$ (two-tailed)

experiment. We use these three indicators to assess greenwashing. Greenwashing severity is initially established by comparing the relative values of soft disclosure and hard disclosure and calculating the difference. Greenwashing refers to the practice of putting greater focus on outward appearances than actual changes in one's actions (Gao and Fan 2021). Because the sum of the soft disclosure score is 16, and the sum of the hard disclosure score is 79, the

Table 6 Relationship of hard disclosure, soft disclosure, and bank loans

	DID model		Post-policy analysis		
	−1	−2	−3	−4	−5
	Loan	Loan	Loan	Loan	Loan
Disclosure_Hard×Policy	0.200*	0.183*			
	−1.8	−1.65			
Disclosure_Soft×Policy	−0.805***	−0.748***			
	(−2.81)	(−2.61)			
Disclosure_Hard	0.043	0.043	0.158*	0.158*	0.173*
	−0.66	−0.65	−1.74	−1.74	−1.83
Disclosure_Soft	0.076	0.066	−0.392***	−0.397***	−0.388***
	−0.56	−0.48	(−3.12)	(−3.16)	(−2.93)
Green_Innovation×Policy		0.346**			
		−2.54			
Green_Innovation		0.104		0.410***	
		−1.3		−3.3	
Disclosure_Hard×Green_Innovation					−0.085
					(−1.51)
Disclosure Soft×Green Innovation					−0.055
					(−0.58)
Control Variables	Yes	Yes	Yes	Yes	Yes
Year Effect	Fixed	Fixed	Fixed	Fixed	Fixed
Firm Effect	Fixed	Fixed	Fixed	Fixed	Fixed
Constant	−18.847***	−18.188***	−5.806	−4.710	−4.137
	(−5.81)	(−5.56)	(−0.89)	(−0.72)	(−0.63)
N	9711	9711	5430	5430	5430
Adj. R^2	0.637	0.637	0.664	0.664	0.665
F	33.65***	32.16***	11.97***	12.03***	11.12***

$*p < 0.1$; $**p < 0.05$; $***p < 0.01$ (two-tailed)

formula for greenwashing is (Disclosure Soft/16) minus (Disclosure Hard/79). Second, we have created a dummy variable called greenwashing dummy in line with Lv et al. (2022). Finally, we employ post-policy analysis and a novel variable for measuring greenwashing that is unrelated to either hard or soft disclosure. Both types of activity can fall anywhere on a scale from 0 to 7, with 0 signifying no action at all and suggesting the maximum amount of action that can be taken. The expert's previous knowledge of environmental disclosure at work was strengthened as a result of this experience. The second step involved the specialist re-evaluating the previously reviewed material, in this case, the CSR reports and files, while also continuing to analyze the balance of the sample. At the end of the building process, we developed our measurement by first pinpointing the gap between the substantive and symbolic value of an action. Companies in the manufacturing sector that were listed on a public exchange and included in the Index China 500 (IC businesses) between 2012 and 2017 make up the new sample. This conclusion was reached for primarily two reasons. On the one hand, IT firms are often solvent and have CSR

and environmental policies in place that shield them from the effects of market volatility and economic uncertainty (Table 5).

On the other hand, a shorter evaluation process utilizing a lower sample size can assist avoid the subjective bias that may arise from employing a larger sample size. Finally, after tallying up data from 132 businesses, we arrived at a total of 792 observations. We utilize the Heckman selection model to address the possibility that additional features of IC firms influence the magnitude of corporate loans. The first stage involves the dependent variable IC, which takes the value 1 if the issue business is an IC company. Generally speaking, a company's financial health and market standing are what determine whether or not it is an IC corporation. Therefore, we select six different types of corporations to utilize as independent variables in a test of whether or not a given business is likely to be classified as an IC firm. State-owned enterprise (SOE), age (Age), growth (Growth), financial performance (ROA), size (Size), and asset-liability ratio (Alt-Liv) are the other six corporate characters (Leverage). Each independent variable is advanced by one year.

Table 7 Effect of green finance on bank loans

	DID model		Post-policy analysis		
	−1	−2	−3	−4	−5
	Loan	Loan	Loan	Loan	Loan
Green Washing × Policy	−5.938***				
	(−2.59)				
Green Washing Dummy × Policy		−0.558***			
		(−2.72)			
Green Washing	1.017		−2.009***		
	−1.11		(−3.08)		
Green Washing Dummy		−0.056		−0.408**	
		(−0.44)		(−2.44)	
Green Washing Sub					−0.357*
					(−1.86)
imr					−22.302
					(−1.21)
Control Variables	Yes	Yes	Yes	Yes	Yes
Year Effect	Fixed	Fixed	Fixed	Fixed	Fixed
Firm Effect	Fixed	Fixed	Fixed	Fixed	Fixed
Constant	−19.101***	−19.060***	−6.026	−5.545	158.689
	(−5.89)	(−5.88)	(−0.92)	(−0.85)	−1.12
N	9711	9711	5430	5430	660
Adj. R^2	0.637	0.637	0.663	0.663	0.692
F	36.05***	35.71***	12.35***	11.98***	3.70***

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$ (two-tailed)

After obtaining the inverse Mills ratio (imr) in the first stage of regression, we used it as an independent variable in the second. Results from the regression analysis are shown in Table 7. This supports our theory that a greater amount of greenwashing will make it more challenging to obtain bank loans. Similarly, the results of Greenwashing Sub in column 5 show that the use of a substitute for greenwashing harms a company's ability to obtain bank loans (Loan). We conclude that the underlying greenwashing in soft disclosure makes it more challenging for businesses to obtain additional financing (Tables 6 and 7).

Conclusion and policy recommendations

To examine the relationship between the green credit policy and access to bank loans from the perspectives of corporate external environmental disclosure and internal green innovation, this study uses panel data for Chinese manufacturing firms listed on the Shanghai and Shenzhen Stock Exchanges between 2007 and 2017. The goal of this study was to provide insight into the following research question. The research was conducted to learn more about the effects of China's green credit strategy on the country's industrial sector. Our research shows that businesses that excel in environmentally friendly innovations are given greater funding opportunities. Green credit policy and financial institutions place a high emphasis on innovations that help firms improve their environmental and financial bottom lines. Contrarily, there is no correlation between the quality of environmental disclosure and the availability of corporate loans. Here, we draw parallels between the discovery and the practices of greenwashing and other forms of environmental disclosure. The findings indicate that high-quality hard disclosure leads to increased corporate loan sizes, but the presence of soft disclosure makes it considerably more challenging to secure loan financing. According to our findings, the root of the problem is the common practice of making voluntary disclosures that are often viewed as dishonest by creditors ("business greenwashing"). Because of their superior monitoring and investigating capabilities, banks can obtain essential data for their operations; as a result, the proportion of loan applications from applicants who "greenwash" has decreased. Therefore, we have concluded that the policy and banks give more weight to organizations with superior internal performance as opposed to those with greater external transparency.

Our research results add significantly to the body of prior work in this area. Before anything else, we use a methodical

strategy to confirm the success of China's green credit policy over the past few years. If a company performs poorly in the area of green credit, it will have a harder time gaining access to loans. The goal of this paper is to examine this mechanism from both an internal and an external viewpoint and to identify the difficulties that arise as a result of the policy's implementation on business financing, although previous studies have already done. Second, we add to the literature on topics like environmental disclosure and green innovation in the context of large corporations. Both the social-political theory and the theory of voluntary disclosure benefit from this discovery. Our research confirms the benefits of green innovation to both business growth and environmental preservation, lending credence to ecological modernization theory. The theory of information asymmetry in corporate finance receives backing from our study. Financial institutions can quickly and easily gather data on green innovation and corporate environmental disclosure, using this data to make positive or negative decisions. Finally, we address greenwashing, an issue that could derail the policy if not addressed. China's green credit policy is representative of the type of green finance practice that influences both the economy and the environment. Realizing the Sustainable Development Goals (SDGs) in China relies heavily on the country's green credit policy. Our investigation revealed that greenwashing is a problem that needs to be addressed in this context. This section presents our findings and speculations about the mechanism underlying such symbolic behaviors. It makes an important addition to the existing literature on disclosure, the primary goal of which should have been to provide investors with more useful information. Our results shed light on the theoretical underpinnings of environmental policy, including questions of policy selection (Porter 1980), effectiveness and market response, and contribute to the literature on global green finance and economic development (Barykin et al. 2021).

Primary market actors, such as firms and financial institutions, must prioritize environmental friendliness in green credit policy if sustainable financing and development are to be achieved. Companies need to find a way to improve their environmental performance without significantly impacting their bottom line, as green initiatives like green innovation are highly recognized by finance institutions. Due to open innovation, the preservation of intellectual rights, and government subsidies, eco-friendly innovations have become more efficient and cheaper in recent years. Loans can be easier to come by, sustainable competency can be expanded, and business can be kept going if a company adheres to the green credit policy. To facilitate the widespread adoption of green credit policies, banks should maintain their collaboration with government bodies like SIPO. But banks cannot function without constant research on the symbolic behaviors of their environments. Greenwashing is when a corporation promotes its eco-friendly initiatives in an overly positive light to attract investors and get funding. Step 2 involves us making some suggestions to the bodies responsible for overseeing green credit policies. The

market mechanism behind the green credit policy recognizes green innovation as a helpful indication in assessing the eco-friendliness of firms, but this quality has not yet been incorporated into the policy, as far as we can tell. To establish a consistent process for recognizing green innovation and sharing this data with banks and other interested parties, government agencies having a stake in green financing should work together to refine the policy. Upon the policy's implementation, financial institutions will experience a decrease in burden and an increase in data-gathering efficiency. However, our research has led us to the conclusion that environmental disclosure is useless. This is because financial institutions will not stand for deceptive "greenwashing" or murky disclosure policies. Although mandatory disclosure would be beneficial to the green credit program, no such legislation exists in China at present. The positives outweigh the negatives in this case. To put an end to greenwashing and improve the credibility of hard disclosure, government agencies must enhance their disclosure processes. A more precise approach requires full adoption of the regulatory disclosure frameworks put forth by the Task Force on Climate-Related Financial Disclosures (TCFD). By the end of the 2020s, only a select few Chinese commercial banks have implemented TCFD, as far as we are aware. It is important to make reference to TCFD and increase the effectiveness of the green credit policy at the same time because the Chinese government aims to develop an obligatory environmental disclosure policy in 2021. This is scheduled to occur in 2021. Green credit policy has the potential to promote currency mobility and fulfill the goal of sustainable development through the implementation of a financial strategy if it incorporates both explicit soft and hard terms in its stipulations.

However, our research has a few limitations in it, and each of those gaps suggests a potential future research avenue. To begin, most of the publicly traded companies we researched were industry behemoths. Small and medium-sized firms (SMEs) have a significantly harder time than large, publicly traded corporations in areas such as green innovation, efficient information disclosure, and obtaining bank loans. Knowing whether or not green financing policy plays a different role for these businesses would be quite instructive. These kinds of companies were left out of the sample because we lacked the information to properly characterize them. Also, it is important to look into the green credit policy's economic effects in different states because there is a chance they will vary depending on location. We also perform a preliminary analysis of the relationship between internal green innovation and external environmental disclosure and how both contribute to greenwashing, but this may not capture the full scope of the latter's influence. It was shown that there is only a minor impact from interactions between environmentally responsible innovation and public disclosure, though this may be due to the small sample size and conservative default settings of the model. Expanding the conversation about the mutual influences of environmental disclosure, greenwashing, and cutting-edge

eco-friendly practices in green credit policy is a great way to dig deeper into the study's findings.

Author contribution Conceptualization, methodology: Feifei Jia; writing—original draft, data curation, data analysis: Zixi Li.

Data availability The data that support the findings of this study are openly available on request.

Declarations

Ethical approval and consent to participate We declare that we have no human participants, human data, or human issues.

Consent for publication We do not have any individual person's data in any form.

Competing interests The authors declare no competing interests.

Preprint service Our manuscript is not posted at a preprint server prior to submission.

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