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How Does Green Finance Policy Affect the Capacity Utilization Rate of Polluting Enterprises?

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Abstract: Effectively addressing overcapacity is the main task of China's deepening supply-side reform and represents an intrinsic requirement for achieving sustainable economic development. Green finance policy, as a kind of environmental regulation policy that influences the behavior of polluting enterprises, can not only effectively facilitate the green transformation of production methods but also have a significant effect on the capacity utilization rate of enterprises. We use the promulgation of the *Guidance on Building a Green Financial System* in 2016 as a quasinatural experiment and the differences-in-differences (DID) method to study the effect of green finance policies on the capacity utilization rates of polluting enterprises based on data from 2012 to 2020 on A-share listed companies on the Shanghai Stock Exchanges (SSE) and Shenzhen Stock Exchanges (SZSE). We obtained the following results: (1) The implementation of green finance policies markedly improved polluting enterprises' capacity utilization rate, which was supported by a sequence of robustness tests; (2) The mechanism test revealed that green finance policies serve to rectify information asymmetry and constrain improper government interventions through credit resource allocation mechanisms, thereby inhibiting overinvestments in polluting enterprises and ultimately increasing the capacity utilization rate. Additionally, green finance policies can improve product quality and diversity by incentivizing polluting enterprises' technological innovation, enabling products to better meet market demand, and ultimately improving the capacity utilization rate; (3) The results of the heterogeneity analysis indicate that, for state-owned and large-scale polluting enterprises, green finance policies play a stronger role in increasing the capacity utilization rate. We have enriched the research related to the policy effects of green finance and the impact of environmental regulation on the capacity utilization rate, thus providing a useful reference for China to utilize green finance policies to address overcapacity, promote the transition to a more environmentally sustainable economic society, and achieve sustainable development.

Keywords: green finance policy; capacity utilization rate; credit resource allocation; technological innovation; differences-in-differences

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1. Introduction

To accelerate China's economic transformation and upgrading and to realize sustainable development, during the 75th session of the United Nations General Assembly (UNGA) on 22 September 2020, the Chinese government proposed the "dual carbon" target, which entails reaching the peak of carbon dioxide emissions before 2030 and attaining carbon neutrality before 2060. To achieve these goals, the Chinese government has constructed a "1 + N" policy framework. The "1" in "1 + N" refers to the top-level design of the "dual carbon" target, namely, the *Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy* (hereinafter called *Working Guidance*). The "N" in "1 + N" refers to the *Action Plan for Carbon Dioxide*

Peaking Before 2030 (hereinafter called *Action Plan*) and the policy measures in key sectors and regions. Both core documents have explicitly stated that green finance should be used to help achieve the "dual carbon" target.

China was late to engage in green finance, but it has developed quickly in recent years. In 2015, the *Integrated Reform Plan for Promoting Ecological Progress* first proposed the overall goal of establishing a green financial system. In 2016, the *Guidelines for Establishing the Green Financial System* (hereafter called *Guidelines*) was jointly issued by the People's Bank of China and seven other departments, establishing the top-level framework for the green financial system. China is the first country to build a green financial system under the full leadership of the central government. In 2017, "pilot zones for green finance reform and innovations" were approved by the State Council to be set up in several areas in seven provinces, and China began to explore a "bottom-up" approach to green finance development. In October 2021, according to the requirements of the *Working Guidance* and *Action Plan*, the People's Bank of China listed "implementing the major deployment of the 'dual carbon' target and improving the green finance field's incentive mechanism and policy framework" as key tasks and established policy thinking for the growth of green finance, namely, the "three functions" and "five pillars" [1]. By the end of 2022, China's green loans balance was CNY 22.03 trillion, up 38.5% from the previous year, ranking top in the world in regard to the stock scale. A total of 66.7% of these green loans have been invested in projects with direct and indirect carbon reduction benefits, CNY 8.62 trillion and CNY 6.08 trillion, respectively [2]. In 2022, China's green bond issuance at home and abroad increased by CNY 983.899 billion, and the stock scale reached approximately CNY 3 trillion. In addition, green financial products and markets, green funds, green insurance, green PE/VC, and ESG investments have also made great progress [3]. In a relatively short period, a rather complete green financial system has been constructed in China, which has laid a solid foundation for green financial product innovation and green financial market development.

Green finance, as a type of "sustainable finance" [4], has developed rapidly under the background of a "dual-carbon" target. A growing number of scholars have paid attention to the economic effects of green finance. Previous studies have explored the effect of green finance development on green economic transformation and the economy's sustainable growth, mainly from the perspectives of green innovation [5–8], environmental investments [9], and corporate social and environmental responsibility [10,11]. In addition, other studies have examined how green finance affects investments and financing [12,13], financialization [14], and banks' cost-effectiveness [15].

In recent years, China has entered an important period of economic structural transformation. Some industries have emerged with prominent contradictions between supply and demand. The overcapacity problem is becoming more pronounced. On 18 October 2013, the *Guidelines for Resolving Serious Contradictions in Overcapacity* issued by the State Council stated that not resolving the overcapacity problem in a timely and appropriate manner means that industry losses and enterprise employee unemployment will expand, bank nonperforming assets will increase, energy resource constraints will be exacerbated, the ecological environment will deteriorate, and so on, causing a shackle that hinders the economy's sustainable development. Overcapacity prevails in China's traditional manufacturing industry, especially in energy-intensive and highly polluting industries, which include steel, coal, cement, plate glass, and so on [16–18]. Green finance policies drive polluting enterprises' technological innovation, inhibit overinvestments of polluting enterprises by optimizing credit resource allocations, and provide advantages for the effective management of overcapacity in polluting enterprises. Accordingly, exploring how green finance policies affect capacity utilization rate can not only effectively expand the comprehension of green finance policies' microeconomic effects but also provide a reference for the upgrading of traditional capacity and the green transformation of polluting enterprises.

China's overcapacity phenomenon is mainly explained from two aspects: market failure and governmental intervention. The "wave phenomenon" is the most important viewpoint from the perspective of market failure; that is, enterprises in developing countries can easily reach a consensus on promising industries for the future; however, incomplete information can lead to overinvestments in promising industries [19]. Based on this viewpoint, some scholars conducted further analyses and found that improving enterprise informatization and promoting enterprise digital transformation can effectively reduce information incompleteness and alleviate overcapacity [20,21]. Similarly, Banerjee argues that incomplete information can lead to misjudgments of the external environment and trigger herding among enterprises, which can lead to overcapacity [22]. Research from the perspective of governmental intervention suggests that the main causes of overcapacity include governmental intervention policies favoring large enterprises, key enterprises, and new strategic industries [23,24], excessive preferential policies implemented by local governments under political tournaments [25,26], and similarities among local leading industries [27].

The primary function of green finance is to promote economic transformation by optimizing the allocation of financial resources; essentially, it is an environmental regulation [6]. Therefore, the literature on how environmental regulation affects capacity utilization rate is also highly related to this paper. According to Han, environmental regulation resolves overcapacity mainly through the elimination of capacity that does not meet environmental standards, while the role of the technological innovation channel is limited [28]. Du has a similar view, arguing that environmental regulation can improve backward production capacity by increasing investments in cleaning equipment for state-owned enterprises, and it can also increase production costs for enterprises, thereby eliminating backward production capacity [29]. Other studies have explored the effect of environmental taxes on capacity utilization rate. Han and Wang find that an increase in environmental protection taxes can enhance the manufacturing capacity utilization rate [30]. Yu et al. argue that reforming the environmental protection fee to a tax in China effectively increased enterprises' capacity utilization rate [31]. However, Domicián Máté et al. found that the impact of taxation is more fiscal than an incentive, arguing that increased environmental taxes do not reduce carbon emissions and denying the role of environmental taxes in green growth, such as improving capacity utilization rate [32]. Although related studies have been relatively abundant, little is known about the policy effects of green finance policies on the capacity utilization rate, and this paper extended the research on the impact of environmental regulation on the capacity utilization rate. We use the promulgation of *Guidelines* in 2016 as a quasinatural experiment and the difference-in-differences (DID) to study the effects and mechanisms of green finance policies on polluting enterprises' capacity utilization rate. The results demonstrate that green finance policies greatly increase the capacity utilization rate of polluting enterprises, mainly by optimizing the allocation of financial resources and promoting technological innovation. Moreover, green finance policies have a greater effect on the capacity utilization rate of state-owned and large-scale polluting enterprises.

This paper includes the following contributions. Firstly, by studying the microeconomic effects of green financial policies from the new perspective of the capacity utilization rate, we expand the research on the economic effects of green finance policies and the effect of environmental regulations on the capacity utilization rate. We also provide decision support for optimizing the production capacity structure and accelerating the sustainable development process. Secondly, we explore the mechanisms by which green finance policies affect the capacity utilization rate of polluting enterprises from both empirical and theoretical perspectives. We identify and test the mechanisms of credit resource allocation and technological innovation to provide a basis for better utilizing financial tools and environmental regulation policies to address overcapacity. Thirdly, from the aspects of enterprise ownership and scale, we explore the heterogeneity of green financial policies that affect polluting enterprises' capacity utilization rate to assist in accurately solving their overcapacity problems.

The remaining parts of this paper are as follows: Section 2 analyzes the impact mechanism of green finance policies on polluting enterprises' capacity utilization rate and proposes the relevant research hypotheses; Section 3 introduces the models and variables of the empirical study; Section 4 reports the results of the empirical study; Section 5 conducts the test of the influence mechanism and heterogeneity analysis; Section 6 concludes and makes recommendations.

2. Theoretical Analysis and Research Hypotheses

The ratio of actual output to potential capacity (or desirable capacity) is known as the capacity utilization rate. When the actual output of an enterprise is below its potential capacity (or desirable capacity), then it has overcapacity problems [17,33]. The overcapacity problem is essentially caused by an unbalanced supply and demand in the market and needs to be investigated from both the supply and demand sides. On the supply side, market failure and undue governmental interventions can trigger excessive investments by enterprises and make their supply capacity exceed the actual market demand, thus leading to overcapacity [19,23,24]. From the demand side, insufficient enterprise innovation results in product homogenization, low value added, and low product competitiveness, which means that market demand cannot be met, thus inducing overcapacity. Therefore, to improve enterprises' capacity utilization rates, on the one hand, correcting market failures, restraining government intervention, and inhibiting enterprise overinvestments are necessary. On the other hand, improving enterprise technological innovation to better meet market demand is necessary. Most overcapacity industries in China are polluting industries, and studies have shown that environmental regulation policies can greatly improve the capacity utilization rate of polluting enterprises [28,30,31]. Implementation of green finance policy, which is a special environmental pollution regulation measure, changes the investment and technological innovation behavior of polluting enterprises, thereby greatly affecting the capacity utilization rate.

First, green financial policies can inhibit overinvestments in polluting enterprises and enhance their capacity utilization rate through the credit resource allocation mechanism. As an instrument for policy that promotes the green transformation of the economy, the main function of green finance policies is to prioritize the allocation of credit resources to green and nonpolluting enterprises. The implementation of green finance policies signals green development to the market, providing enterprises and investors with more complete information and, thus, avoiding the "wave phenomena" of investments in polluting industries. In addition, it can improve the level of enterprise environmental information disclosure, thereby hindering polluting enterprises' greenwashing behavior to mislead investors, weakening their external financing ability, and inhibiting their overinvestments [34]. On the other hand, in the context of fiscal decentralization and political tournaments, local governments often have a significant incentive to influence enterprise investments to meet the needs of political performance evaluations, local fiscal revenue growth, and the promotion of employment. Local governments allocate substantial credit funds to polluting and inefficient enterprises so they can keep expanding their production and investments, which, in turn, leads to an overcapacity problem [26,35]. The *Guidelines* put forward several measures. First, the statistical system of green credit is to be improved, and green credit is to be incorporated into the macroprudential assessment framework to establish an effective incentive and restraint mechanism. Second, gradually setting up a green assessment mechanism for banks is proper to allow for the evaluation of the performance of banks' green financial businesses. Third, lenders' environmental legal responsibilities should be clarified to enable laws and regulations to constrain their actions. The implementation of these measures forces banks to raise the credit threshold, making enterprises' (especially polluting enterprises) environmental compliance an important basis for lending to produce strong constraints on local governments' excessive intervention motives [12]. In short, green finance policies can improve polluting enterprises' capacity utilization rate by inhibiting overinvestments in polluting enterprises, which is achieved by alleviating market failures and constraining excessive government interventions.

Second, green financial policies can stimulate polluting enterprises to increase investments in technological innovation and the capacity utilization rate. In new classical economics, the belief is that environmental regulations make enterprise production produce "costs following", which means that environmental regulation policies cause polluting enterprises to purchase or upgrade pollution control equipment, pay more pollution control fees, increase their production costs, and reduce their profits and the scale of production investments [36]. Green finance policy, as a special environmental regulation policy, also increases the financing and production costs of polluting enterprises to reduce the inefficient backward production capacity and raise the enterprise capacity utilization rate. On the other hand, environmental regulations may also produce "innovation compensation". According to the Porter hypothesis, appropriate environmental regulations can force technological innovation in enterprises and improve their degree of technological innovation and production efficiency [37]. In the long run, green financial policies raise the financing threshold and cost of polluting enterprises, forcing them to increase investments in technological innovation and achieve "innovation compensation" by improving production technology [8]. Polluting enterprises can improve the capacity utilization rate through technological innovation. Technological innovation not only reduces polluting enterprises' production costs and product prices to stimulate market demand but also improves the quality and differentiation of their products to better meet market demand [38,39]. In other words, green financial policies increase polluting enterprises' production costs, eliminate backward production capacity, force polluting enterprises to increase investments in technological innovation, and ultimately improve their capacity utilization rate. The following research hypotheses are put forth:

Hypothesis 1. *Green finance policies have a significant positive effect on the capacity utilization rate of polluting enterprises.*

Hypothesis 2. *Green finance policies improve the capacity utilization rate of polluting enterprises by restricting their allocation of credit resources.*

Hypothesis 3. *Green finance policies improve the capacity utilization rate of polluting enterprises by stimulating their technological innovation.*

The effect of green finance policies on the enterprise capacity utilization rate varies significantly amongst enterprises with different ownership properties. On the one hand, unlike nonstate-owned enterprises (non-SOEs), state-owned enterprises (SOEs) are not only responsible for the main task of promoting national economic development but also shoulder social responsibilities such as scientific and technological progress, improving people's livelihoods and environmental protection [40]. Moreover, SOEs are often characterized by their large scale of business and assets and, thus, naturally have the advantage of serving the national strategy [41]. Green finance policies often make state-owned polluting enterprises consciously take on greater responsibility for promoting green transformation and the development of production methods. By reducing production capacity and output, state-owned enterprises can reduce pollutant emissions, thereby significantly improving their capacity utilization rate. On the other hand, due to the closer political connection between SOEs and local governments, bank loans and preferential policies have a higher probability of being granted to SOEs, possibly leading to overcapacity [42]. Green finance policies strictly limit banks' lending to polluting enterprises (including state-owned polluting enterprises) by imposing strict green monitoring and performance evaluations. Accordingly, compared with nonstate-owned polluting enterprises, state-owned polluting enterprises' financing behavior is more significantly impacted by the green finance policies, which also has a stronger inhibiting effect on their overinvestment behavior. Based on this point, we propose the following hypothesis:

Hypothesis 4. *Green finance policies have a greater effect on the capacity utilization rate of state-owned polluting enterprises than of nonstate-owned polluting enterprises.*

The impact of green finance policies on enterprises' capacity utilization rate is significantly different among enterprises of different scales. Large-scale polluting enterprises typically have better and more assets than those of small-scale polluting enterprises, which facilitates their ability to obtain bank mortgages. The implementation of green finance policies not only raises the financing threshold and costs faced by large-scale polluting enterprises; these enterprises also must face more stringent environmental protection controls, thus strictly restricting their capacity expansion. In addition, according to the Schumpeterian hypothesis, enterprises' scale is positively correlated with technological innovation efficiency, and large-scale enterprises usually have more advantages in technological innovation [43]. Therefore, green financial policies can provide stronger incentives for the technological innovation of large-scale polluting enterprises and, thus, increase the capacity utilization rate more substantially. Based on this point, we propose the following hypothesis:

Hypothesis 5. *Green finance policies have a greater effect on the capacity utilization rate in large-scale polluting enterprises than in small-scale polluting enterprises.*

3. Research Design

3.1. Models

3.1.1. Baseline Regression Model

To assess how green finance policies affect the capacity utilization rate of polluting enterprises, we adopted the promulgation of *Guidelines* in 2016 as a quasinatural experiment. Referring to Wang et al. [6], Su and Lian [12], and Lu et al. [44], we use polluting enterprises as the experimental group and nonpolluting enterprises as the control group. The following DID model was set:

$$CU_{i,t} = \alpha_0 + \alpha_1 Du_{i,t} * Dt_{i,t} + \beta_k X_k + \gamma_i + \delta_t + \epsilon_{i,t} \tag{1}$$

where i denotes enterprises, and t denotes time; CU is the core explained variable and represents the enterprise's capacity utilization rate; Du is the grouped dummy variable that takes the value of 1 for polluting enterprises and 0 for nonpolluting enterprises; Dt is the time dummy variable, which is assigned a value of 1 for 2016 onward (excluding 2016) and 0 otherwise; $Du_{i,t} * Dt_{i,t}$ is the DID variable, which is the product of Du and Dt, and X_k represents the control variables. γ_i represents the individual fixed effects; δ_t denotes the time fixed effects, and $\epsilon_{i,t}$ denotes the stochastic disturbance term.

3.1.2. Mechanism Testing Models

To further test the mechanism of green finance policies on the enterprise capacity utilization rate, we construct the following difference-in-difference-in-difference (DDD) model:

$$CU_{i,t} = \alpha_0 + \alpha_1 Du_{i,t} * Dt_{i,t} + \alpha_2 Levl_{i,t} * Du_{i,t} * Dt_{i,t} + \beta_k X_k + \gamma_i + \delta_t + \epsilon_{i,t} \tag{2}$$

$$CU_{i,t} = \alpha_0 + \alpha_1 Du_{i,t} * Dt_{i,t} + \alpha_2 Inno_{i,t} * Du_{i,t} * Dt_{i,t} + \beta_k X_k + \gamma_i + \delta_t + \epsilon_{i,t} \tag{3}$$

Models (2) and (3) are used to test the credit resource allocation mechanism and technological innovation mechanism, respectively. Since enterprises' long-term borrowing is mostly used for project construction and capacity expansion, which are positively correlated with the amount of credit resource allocation, we refer to the treatment in Fang [45] and Qian and Fu [46] and take enterprises' long-term leverage ratio (*Levl*) as a measure of credit resource allocation. The credit resource allocation mechanism is tested using the DDD variable in model (2) ($Levl_{i,t} * Du_{i,t} * Dt_{i,t}$), which is the product of the long-term leverage ratio (*Levl*) and the DID variable ($Du * Dt$). Referring to Liu and Liu [47], we use the proportion of R&D investment (*Inno*) as a measure of the level of technological innovation. The mechanism of technological innovation is tested using the DDD variable in model (3) ($Inno_{i,t} * Du_{i,t} * Dt_{i,t}$), which is the product of the R&D investment ratio (*Inno*) and the DID variable ($Du * Dt$).

3.2. Variables

The core explained variable is the enterprises' capacity utilization rate (*CU*), which is the ratio of actual to potential capacity; this indicator reflects the degree of utilization of enterprise capacity and the level of overcapacity [48]. Currently, *CU* can be measured in many ways, including the direct investigation method [49], peak method [50], functional method [33,51], data envelopment analysis (DEA) [52–54], and financial index method [46,55,56]. Considering the availability of the data, we refer to Qian and Fu [46] and Peng et al. [56], who use total asset turnover (operating income/total assets) to measure the enterprises' capacity utilization rate from a financial perspective. The basis for this measurement approach is as follows. When an enterprise has overcapacity, it may respond to the sluggish market demand by expanding its investments (such as increasing the input of fixed and variable production factors), resulting in an increase in total assets. Additionally, the incongruity between market demand and capacity expansion can lead to intensified price competition, causing operating revenue growth to lag behind asset scale growth. Under the combined effect of these two factors, the total asset turnover of the enterprise decreases [46]. The total asset turnover is positively related to the enterprises' capacity utilization rate.

The following variables are controlled: enterprise scale (*SCALE*), expressed as Ln (total assets); corporate leverage ratio (*LEV*), equal to total liabilities/total assets; tangible assets ratio (*FIX*), the ratio of net fixed assets to total assets; firm investment opportunities (*TBQ*), measured as (aggregate value of all shares + book value of liabilities)/total assets; cash flow (*CF*), the ratio of net cash flow from operating activities to total assets; cash holding (*CASH*), measured as (monetary fund + trading financial assets)/total assets; return on equity (*ROE*), the ratio of net profit to owner's equity; enterprise age (*AGE*), expressed as Ln (the enterprise's years in existence); separation rate of two rights in enterprises (*SEP*), which is the difference between a listed company's control and ownership by the actual controller; enterprise ownership (*SOE*), which equals to 1 if the enterprise is state-owned and 0 otherwise.

3.3. Data

Data from Chinese A-share listed companies on the Shanghai Stock Exchanges (SSE) and Shenzhen Stock Exchanges (SZSE) from 2012 to 2020 were collected. Referring to the practice of Pan [57], we define enterprises in 15 heavily polluting industries as polluting enterprises. The samples of enterprises in ST, *ST, and PT situations during the sample period, financial industries, and enterprises with serious missing financial data are removed. Finally, we obtained 12,348 qualified observations, which included 3150 polluting enterprises or 25.5% of the total number of samples.

We performed 1% winsorization on all variables, which reduced the negative effect of outliers on the regression results, and the number of samples remained unchanged after processing. The China Stock Market & Accounting Research (CSMAR) database is the source of all data. Table 1 reports the descriptive statistics of the main variables.

Table 1. Descriptive statistics.

Variables	Definition	Obs	Mean	Std.Dev.	Min	Max
CU	operating income/total assets	12,348	0.628	0.410	0.068	2.378
$Du * Dt$	DID variable, polluting enterprises after 2016 are equal to 1; otherwise, equals 0	12,348	0.113	0.317	0	1
Du	polluting enterprises = 1, nonpolluting enterprises = 0	12,348	0.255	0.436	0	1
Dt	2016 onwards = 1, 2016 and pre-2016 = 0	12,348	0.444	0.497	0	1
SCALE	Ln (total assets)	12,348	22.418	1.304	20.067	26.483
ROE	net profit/owner's equity	12,348	0.055	0.118	−0.617	0.316
CASH	(monetary fund + trading financial assets)/total assets	12,348	0.185	0.129	0.016	0.634
CF	net cash flow from operating activities/total assets	12,348	0.050	0.065	−0.138	0.239
FIX	net fixed assets/total assets	12,348	0.235	0.164	0.004	0.715
LEV	total liabilities/total assets	12,348	0.428	0.201	0.056	0.887
AGE	Ln (the enterprise's years in existence)	12,348	2.867	0.336	1.792	3.466
SEP	the difference between a listed company's control and ownership by the actual controller	12,348	4.579	7.405	0	28.283
SOE	state-owned enterprises = 1, nonstate-owned enterprises = 0	12,348	0.427	0.495	0	1
TBQ	(aggregate value of all shares + book value of liabilities)/ total assets	12,348	2.005	1.271	0.843	8.137
Levl	long-term loan/total assets	12,348	0.040	0.069	0	0.340
Inno	R&D investment/total assets	12,348	0.037	0.042	0	0.239

4. Empirical Analysis

4.1. The Baseline Regression Results

The results of baseline regression are presented in Table 2. Without adding control variables, the regression coefficient of the DID variable ($Du * Dt$) is 0.0409, which is significantly positive at the 1% level. With the inclusion of the control variables, the regression coefficient of the DID variable ($Du * Dt$) is still significantly positive at the 1% level. Based on the results above, after the release of the *Guidelines* in 2016, the capacity utilization rate of polluting enterprises has been concluded to have significantly increased relative to that of nonpolluting enterprises. This result suggests that green finance policies can raise polluting enterprises' capacity utilization rate significantly, which verifies Hypothesis 1.

Table 2. The results of baseline regression.

Variables	(1) *CU*	(2) *CU*
$Du * Dt$	0.0409 ***	0.0332 ***
	(0.0000)	(0.0000)
Control Variables	No	Yes
Constant	0.6238 ***	1.3386 ***
	(0.0000)	(0.0000)
Fixed Effect	Yes	Yes
R^2	0.8404	0.8550
Obs	12,348	12,348

Note: () is the standard error. *** $p < 0.001$.

4.2. Robustness Test

4.2.1. Parallel Trend Test

DID requires that the target variables of the experimental and control groups exhibit parallel trends before processing. To conduct the parallel trend test, we draw the trend lines of the *CU* of polluting enterprises and nonpolluting enterprises. Figure 1 shows the results of the parallel trend test. Before the implementation of the *Guidelines* in 2016, the trend in the changes in the capacity utilization rate between the experimental and control groups tended to be the same. After the *Guidelines* were put into effect in 2016, although both groups showed increased and then decreased capacity utilization rates, the increase for the experimental group was significantly greater than that for the control group. This result indicates that the parallel trend assumption is satisfied, and the implementation of green finance policies has produced a stronger enhancement effect on the polluting enterprises' capacity utilization rate.

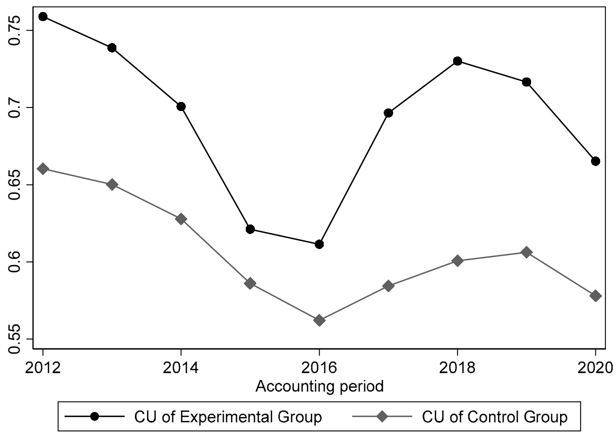

Figure 1. Parallel trend test.

4.2.2. Placebo Test

As there are many factors affecting enterprises' capacity utilization rate, the results of the baseline regression might be due to unobservable factors. To eliminate the above concerns, we conducted a placebo test using the following steps. First, all sample enterprises are randomly assigned to experimental and control groups, and the relative proportions of the generated experimental and control groups remain unchanged. Subsequently, the product term of the newly grouped dummy variable and time dummy variable is constructed ($DuVirtual * Dt$). Finally, $Du * Dt$ in the model (1) is replaced by $DuVirtual * Dt$, and the estimation proceeds. The process is repeated 500 times to obtain 500 estimated coefficients for $DuVirtual * Dt$. The distribution of all estimated coefficients is plotted in Figure 2, which shows that the mean of the estimated coefficients is close to 0, and these coefficients follow a normal distribution. The estimated coefficient of the DID variable in column 2 of Table 2 is 0.0332, which is far from the distribution. The results of the baseline regression are robust and not due to unobservable factors.

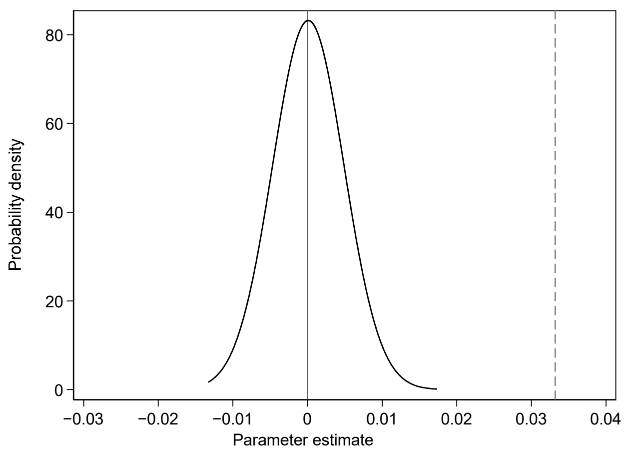

Figure 2. Placebo test.

4.2.3. PSM-DID

To address endogeneity issues induced by sample selection bias, we further used propensity score matching (PSM) to process samples. The control group with the most similar characteristics to the experimental group was selected using a 1:1 caliper nearest neighbor matching method. After PSM, the differences between the two groups were significantly reduced. Figures 3 and 4 show the kernel density distributions of the experimental and control groups before and after PSM. A significant difference in the kernel density distribution existed between the two groups before matching, which decreased significantly after matching.

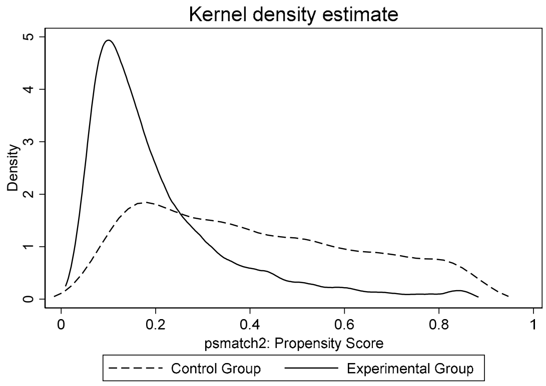

Figure 3. Pre-matching.

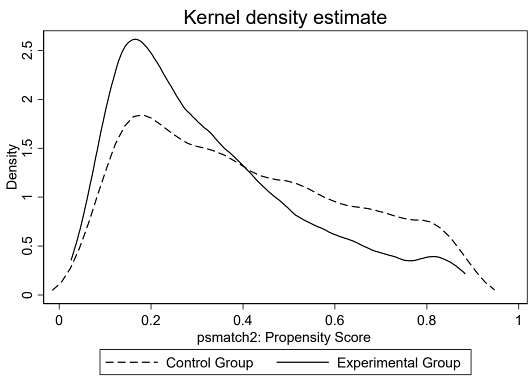

Figure 4. Post-matching.

According to the Rosenbaum and Rubin perspective [58], PSM is considered successful when the absolute values of the standard errors of all variables remain below 20% after matching. Table 3 reports the results of PSM (1:1) for various variables, and the standard errors of the experimental and control groups are significantly reduced after matching, indicating good matching quality. For example, the standard error of enterprise-scale (*SCALE*) decreased by 75.5%; return on equity (*ROE*) decreased by 91.2%; cash holding (*CASH*) decreased by 98.5%; cash flow (*CF*) decreased by 85.7%; tangible asset ratio (*FIX*) decreased by 97.8%; leverage (*LEV*) decreased by 55.3%; enterprise age (*AGE*) decreased by 58.9%; separation of ownership and control (*SEP*) decreased by 79.5%; enterprise ownership (*SOE*) decreased by 83.1%, and firm investment opportunities (*TBQ*) decreased by 81.2%. Moreover, the absolute values of the standard errors for all variables were below 20% after PSM, indicating no significant between-group differences after matching.

Table 4 shows the PSM-DID results. When controlling for fixed effects but not including control variables, the regression coefficient of $Du * Dt$ is 0.0401 and significantly positive at the 5% level. With the inclusion of control variables, the regression coefficient of $Du * Dt$ is still significantly positive. These results indicate that green finance policies continue to significantly increase the capacity utilization rate of polluting enterprises, and the results in Table 2 are robust.

Table 3. Propensity Score Matching.

Variables	Mean		Standard Deviation (%)	Reduction in Standard Deviations (%)	t-Values
	Experimental Group	Control Group			
SCALE	22.737	22.632	8.0	75.5	3.04
ROE	0.051	0.052	−0.5	91.2	−0.20
CASH	0.140	0.141	−0.8	98.5	−0.36
CF	0.062	0.065	−3.7	85.7	−1.51
FIX	0.354	0.358	−2.3	97.8	−0.82
LEV	0.466	0.443	11.6	55.3	4.80
AGE	2.895	2.879	4.9	58.9	1.92
SEP	5.680	5.364	4.1	79.5	1.55
SOE	0.530	0.507	4.8	83.1	1.88
TBQ	1.701	1.778	−6.4	81.2	−3.05

Table 4. The results of the PSM-DID.

Variables	(1) *CU*	(2) *CU*
$Du * Dt$	0.0401 **	0.0353 **
	(0.0013)	(0.0029)
Control Variables	No	Yes
Constant	0.6516 ***	1.8546 ***
	(0.0000)	(0.0000)
Fixed Effect	Yes	Yes
R^2	0.8712	0.8846
Obs	3716	3716

Note: () is the standard error. ** $p < 0.05$; *** $p < 0.001$.

4.2.4. Replacing the Core Explained Variable

To remove the potential interference of the measurement method of the explained variable on the regression results, we follow the approach of Zhang and Jiang [54] and select the capacity utilization rate calculated using the DEA method for the robustness test. To ensure robustness, we conducted regressions using both the full and the PSM samples, and the results are shown in Table 5. The results in Table 5 show that $Du * Dt$ is significantly positive. The previous conclusion still holds.

Table 5. The regression results after replacing core explained variable.

Variables	Full Samples		Samples of PSM	
	(1) *CU*	(2) *CU*	(3) *CU*	(4) *CU*
$Du * Dt$	0.0120 ***	0.0107 ***	0.0116 ***	0.0105 ***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Control Variables	No	Yes	No	Yes
Constant	0.0821 ***	0.1905 ***	0.0852 ***	0.2627 ***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Fixed Effect	Yes	Yes	Yes	Yes
R^2	0.7639	0.7737	0.7808	0.7903
Obs	12,348	12,348	3716	3716

Note: () is the standard error. *** $p < 0.001$.

5. Test of the Influence Mechanism and Heterogeneity Analysis

5.1. Test of Influence Mechanism

According to the theoretical analysis in the previous sections, green finance policies primarily affect enterprises' capacity utilization rate through two mechanisms: the credit resource allocation mechanism; and the technological innovation mechanism. In this section, we utilize the DDD method to examine the mechanisms mentioned above.

5.1.1. Test of Credit Resource Allocation Mechanism

Model (2) is used to test the credit resource allocation mechanism. The results of the test are reported in columns (1) and (2) of Table 6. In column (1), the regression results for the full sample show that the coefficient of long-term leverage (*Levl*) is −0.5224 and is significant at the 1% level. This finding suggests that an increase in *levl* decreases the capacity utilization rate of polluting enterprises. The coefficient of the DDD variable ($Levl * Du * Dt$) is −0.2084 and is significant at the 5% level, indicating that green finance policies can weaken the negative impact of long-term leverage on the capacity utilization rate of polluting enterprises. Additionally, similar results were obtained based on the PSM sample, and hypothesis 2 was verified.

Table 6. The results of the mechanism test.

Variables	**Credit Resource Allocation Mechanism**		**Technological Innovation Mechanism**	
	Full Samples	**Samples of PSM**	**Full Samples**	**Samples of PSM**
	(1)	**(2)**	**(3)**	**(4)**
	CU	***CU***	***CU***	***CU***
$Du * Dt$	0.0458 ***	0.0469 ***	0.0050	0.0193
	(0.0000)	(0.0003)	(0.5930)	(0.1954)
Levl	−0.5224 ***	−0.3448 ***		
	(0.0000)	(0.0001)		
$Levl * Du * Dt$	−0.2084 **	−0.2142 **		
	(0.0026)	(0.0472)		
Inno			4.2032 ***	5.3281 ***
			(0.0000)	(0.0000)
$Inno * Du * Dt$			2.0241 ***	1.2004 **
			(0.0000)	(0.0369)
Control Variables	Yes	Yes	Yes	Yes
Constant	1.1916 ***	0.0852 ***	1.0935 ***	1.4782 ***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Fixed Effect	Yes	Yes	Yes	Yes
R^2	0.8570	0.8857	0.8608	0.8897
Obs	12,348	3716	12348	3716

Note: () is the standard error. ** $p < 0.05$; *** $p < 0.001$.

5.1.2. Test of Technological Innovation Mechanism

Model (3) is used to test the technological innovation mechanism. The results are reported in Table 6, columns (3) and (4). The full sample regression results in column (3) make it evident that the coefficient of the R&D expenditure ratio (*Inno*) is 4.2032 and significantly positive. This finding shows that technological innovation significantly enhances the capacity utilization of polluting enterprises. The coefficient of the DDD variable ($Inno * Du * Dt$) is 2.0241 and is significantly positive at the 1% level. These results mean that green finance policies can significantly strengthen the positive impact of technological innovation on polluting enterprises' capacity utilization rate. Moreover, similar results are obtained from the regression using the PSM sample, and hypothesis 3 is verified.

5.2. Heterogeneity Analysis

5.2.1. Analysis of Enterprise Ownership Heterogeneity

We separate the sample of enterprises into an SOEs and a non-SOEs sample. Table 7 displays the results. The regression coefficient of the DID variable ($Du * Dt$) for the SOEs sample is 0.0449 and is significantly positive at the 1% level. The regression coefficient of the DID variable ($Du * Dt$) for the non-SOEs sample is 0.0210, which is significantly lower than the regression coefficient of the SOEs sample. Similar results are obtained in the regression of the PSM samples. These results indicate that green finance policies have a greater impact on improving SOEs' capacity utilization rate. Hypothesis 4 is verified.

Table 7. The results of enterprise ownership heterogeneity analysis.

Variables	**Full Samples**		**Samples of PSM**	
	SOEs	**non-SOEs**	**SOEs**	**non-SOEs**
	CU	***CU***	***CU***	***CU***
$Du * Dt$	0.0449 ***	0.0210 **	0.0319 *	0.0280 *
	(0.0000)	(0.0319)	(0.0942)	(0.0630)
Control Variables	Yes	Yes	Yes	Yes
Constant	2.2305 ***	1.4019 ***	2.6758 ***	2.0196 ***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Fixed Effect	Yes	Yes	Yes	Yes
R^2	0.8858	0.8244	0.8944	0.8763
Obs	5255	7065	1745	1943

Note: () is the standard error. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.001$.

5.2.2. Analysis of Enterprise Scale Heterogeneity

Using the sample enterprises' mean value of the total assets, we divide them into large-scale and small-scale enterprise samples. Table 8 presents the regression results. The full sample regression coefficient of the DID variable ($Du * Dt$) for the large-scale enterprise sample is 0.0531, with significance at the 1% level. The full sample regression coefficient of the DID variable ($Du * Dt$) for the small-scale enterprise sample is 0.0199 and significant at the 5% level. The PSM samples' regression results show that the coefficient of the DID variable ($Du * Dt$) for the large-scale enterprise sample is 0.0744, which is significantly positive. However, the coefficient of the DID variable ($Du * Dt$) in the small-scale enterprise sample is not significant. Therefore, there is a stronger effect of green finance policies on large-scale polluting enterprises' capacity utilization rate, and hypothesis 5 is verified.

Table 8. The results of enterprise-scale heterogeneity analysis.

Variables	**Full Samples**		**Samples of PSM**	
	Large-Scale Enterprises	**Small-Scale Enterprises**	**Large-Scale Enterprises**	**Small-Scale Enterprises**
	CU	***CU***	***CU***	***CU***
$Du * Dt$	0.0531 ***	0.0199 **	0.0744 ***	0.0080
	(0.0000)	(0.0458)	(0.0001)	(0.6486)
Control Variables	Yes	Yes	Yes	Yes
Constant	2.3983 ***	1.4905 ***	1.9941 ***	2.5354 ***
	(0.0000)	(0.0000)	(0.0007)	(0.0000)
Fixed Effect	Yes	Yes	Yes	Yes
R^2	0.9006	0.8478	0.9056	0.8874
Obs	5327	6913	1633	1920

Note: () is the standard error. ** $p < 0.05$; *** $p < 0.001$.

6. Conclusions and Suggestions

Green financial policies, as an important means for advancing China's production method transition to a low-carbon, green economy, may help resolve overcapacity and, thus, promote the formation of a sustainable capacity structure and economic structure. The main purpose of this paper is to investigate the impact of green financial policies on polluting enterprises' capacity utilization rates, which provides a new perspective for studying the microeconomic effects of green financial policies and resolving the overcapacity in enterprises. We use the promulgation of the *Guidelines* in 2016 as a quasinatural experiment and employ the DID, a powerful tool for policy assessment, to examine the effect of green finance policies on polluting enterprises' capacity utilization rate based on data of Chinese A-share listed companies on the SSE and SZSE from 2012 to 2020.

The empirical results verify the five hypotheses proposed in this paper; the following conclusions were drawn:

(a) Green financial policies can significantly increase the capacity utilization rate of polluting enterprises, which is supported by a series of robustness tests such as the parallel trend test;
(b) The test of the influence mechanism shows that green finance policies increase the capacity utilization rate of polluting enterprises through credit resource allocation mechanisms and technological innovation mechanisms;
(c) Heterogeneity analysis shows that green finance policies have a greater effect on the capacity utilization rate in state-owned and large-scale polluting enterprises.

Thus, we put up the following suggestions in conjunction with the previously stated conclusions.

First, the results show that the capacity utilization rate of polluting enterprises is significantly improved by the green finance policies. This conclusion provides a new idea and tool for China to further solve overcapacity. China's green finance has developed rapidly but started relatively late. Currently, China still faces issues such as incomplete policy frameworks and inadequate incentive and constraint mechanisms. Therefore, the policy system should be further improved to protect the long-term development of green finance. Moreover, the clearance of overcapacity industries through green finance should be accelerated, supply-side reforms should be deepened, and policy and financial assistance for the sustainable development of the economy should be offered.

Second, we found that green financial policies increase the capacity utilization rate of polluting enterprises through the credit resource allocation mechanism. Therefore, relevant management departments should adopt measures to further strengthen the credit resource allocation role of green financial policies. First, financial institutions' participation in green financial businesses should be increased. Only when financial institutions actively participate in green finance businesses can the financing "threshold" of polluting enterprises be truly raised. Improving relevant laws and regulations, clarifying the system of "exemption if due diligence" for financial institutions and environmental protection legal responsibilities, and strongly constraining the behavior of financial institutions are necessary. Also necessary is establishing and improving business statistical monitoring, assessing the evaluation system of green finance, and incentivizing financial institutions to actively participate by establishing corresponding reward systems. Furthermore, a green financial information disclosure system should be formulated as soon as possible to alleviate asymmetric information and improve the accuracy of financial institutions' green financial business.

Third, the results show that green financial policies improve polluting enterprises' capacity utilization rate by incentivizing technological innovation. Therefore, relevant management departments should adopt measures to further strengthen the role of green finance policies in stimulating technological innovation. Financial institutions should be inspired to provide "green funds" for the technological innovation and green transformation of polluting enterprises. Moreover, preferential taxation, subsidies for innovation, and risk insurance should be provided by the government to polluting enterprises engaged in technological innovation to stimulate their subjective initiative of technological innovation and improve product quality and product differentiation. By expanding high-quality incremental supply, we can better meet market demand.

Fourth, the heterogeneity analysis shows that green finance policies have a greater effect on state-owned and large-scale polluting enterprises. Based on this, we should formulate differentiated green finance policies and implement constraint and incentive policies for state-owned and large-scale polluting enterprises. Since nonstate-owned and small-scale polluting enterprises have relatively limited access to financing, they should be subject to a policy that focuses on incentives for innovation.

The limitations of this research are as follows: First, since the samples in this paper are limited to listed companies, it cannot reflect the impact of green finance policies on non-listed companies' capacity utilization rate. Second, this paper solely focuses on the impact of green finance policies on polluting enterprises' capacity utilization rate without exploring the impact of different types of green finance policies on polluting enterprises' capacity utilization rate. Policies such as green credit and green bonds may have completely different impacts on polluting enterprises' capacity utilization rate.

In the future, the research on this issue can be further developed from the following aspects: First, by collecting data from non-listed companies through questionnaires and other means, we can examine the impact of green finance policies on non-listed companies' capacity utilization rate. Second, we can explore the mechanisms and effects of different types of green finance policies on polluting enterprises' capacity utilization rate.

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