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The Impact of the "Three Red Lines" Policy on the ESG Performance of Real Estate Companies

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Abstract: Using the "Three Red Lines" policy as a quasi-natural experiment, the article empirically examines the impact of the proposed policy on the ESG performance of real estate firms by using the double-difference method with the Shanghai and Shenzhen A-share real estate listed firms as the research sample during the 22-quarter period before and after the policy was proposed, and using the CSI ESG index as the explanatory variable of the study. The CSI ESG index is used as the explanatory variable of the study. The results show that the introduction of the "three red lines" significantly reduces the ESG performance of real estate companies, and the experimental group and the control group also pass the parallel trend test and the robustness test. The impact of the policy on private firms is much larger than that on state-owned firms, and the ESG performance of firms with fewer SA financing constraints is also less affected by the policy.

1. Introduction

ESG, or Environment, Social responsibility and Corporate Governance, is an evaluation system for measuring the sustainable development performance of enterprises and organizations, and can be used as one of the bases for judging the long-term value of enterprises. Due to its universal, quantitative, comprehensive and systematic features, it has become an evaluation method that is generally recognized and accepted by different industries in the international arena, and it is also an important strategy for investment institutions to examine investment targets.

As a pillar industry in China, the ESG performance of real estate enterprises has also received special attention from the outside world. With the introduction of the "Three Red Lines" policy, it has a significant impact on real estate enterprises. The financing ability and business model of real estate enterprises have been greatly challenged. However, it is still unclear whether it plays any role in the ESG performance of the real estate industry.

Therefore, this paper empirically investigates the impact of the "three red lines" policy on the ESG performance of Chinese A-share listed real estate companies by selecting the data from the first quarter of 2018 to the fourth quarter of 2022 as the research sample. Against the backdrop of ESG concepts attracting much attention, this paper contributes to the subsequent sound development of real estate companies and policy recommendations.

2. Literature review, theoretical analysis and research hypothesis

Scholars at home and abroad have done a lot of research on the impact of the "three red lines" policy on real estate enterprises. The "three red lines" policy will reduce the market value of listed real estate enterprises, and the impact on non-state-owned enterprises is more significant. [1] The "three red lines" policy also reduces the credit risk of listed real estate enterprises [2], and through the study of the top 100 real estate enterprises such as Evergrande, the "three red lines" policy significantly increases the sales of state-owned real estate enterprises and reduces the sales of private real estate enterprises [3].

For ESG research, ESG performance can significantly promote corporate green technology innovation, and digital finance can enhance this promotion [4]. Corporate big data application can significantly improve ESG evaluation and significantly affect the comprehensive ESG evaluation and its three sub-dimensions through green innovation, charitable donations, and internal control [5]. Excess goodwill has a significant negative impact on corporate ESG performance, which affects corporate ESG performance through two paths: inhibiting corporate digital technology innovation and increasing corporate business risk [6].

The proposal of the "three red lines" management concept provides a new path for the sound development of real estate enterprises. The so-called "three red lines" refers to the fact that the gearing ratio excluding advance receipts shall not be greater than 70%, the net debt ratio shall not be greater than 100%, and the cash-to-short-term debt ratio shall not be less than one times. At the same time according to step on the line of the number of articles, the regulator will be divided into real estate enterprises "red, orange, yellow, green" four management, in which the three lines are up to standard enterprises in the green file, up to standard two lines in the yellow file, up to standard a line in the orange file, three lines are not up to standard is in the red file. Each time the rating is downgraded, the upper limit for the growth rate of interest-bearing liabilities increases by 5%. Even for real estate companies in the green category, the annual growth rate of interest-bearing liabilities must not exceed 15%. For companies in the yellow and orange categories, the annual growth rates are capped at 10% and 5%, respectively. Companies in the red category are not permitted to increase their interest-bearing liabilities.

Under the pressure of the "three red lines" policy, enterprises will definitely increase the financing pressure, slow down their business, accelerate the return of funds, and emphasize the short-term financial status of enterprises while neglecting the long-term sustainable development of enterprises, which will lead to a decline in the level of enterprise ESG, and the impact of state-owned enterprises will be significantly greater than that of private enterprises. Therefore, the following hypotheses are proposed:

Hypothesis 1: The "three red lines" policy will reduce the ESG performance of real estate enterprises.

Hypothesis 2: The impact of the "three red lines" policy on state-owned enterprises is greater than that of private enterprises.

3. Data and Research Design

3.1. Sample selection and data sources

Since the "three red lines" policy affects all real estate companies, this paper selects all real estate companies listed in Shanghai and Shenzhen A-shares as the initial sample. The data comes from the database of Cathay Pacific and the annual reports of the enterprises. In order to ensure the quality of the data, the sample is processed as follows: companies with missing key data are excluded. The raw data are matched, merged and calculated to obtain 20 quarters of data for 81

observed companies, totaling 1,620 sample observations. The CSI ESG ratings data used in this paper are from the Wind database; other data are from the CSMAR Cathay Pacific database, the CNRDS database and the China Statistical Yearbook.

3.2. Definition of main variables

A. Explained Variables

The explanatory variable ESG indicates the ESG level of firm i in quarter t. The CSI ESG composite indicator is chosen, which covers more listed companies and has more reliable data. The CSI ESG indicator system includes three pillars of environment, society and corporate governance, containing 26 key indicators and more than 130 sub-indicators. The ESG performance of all listed companies is rated as 9 grades from high to low, which are AAA, AA, A, BBB, BB, B, CCC, CC, C. In this paper, the nine grades of C-AAA are assigned a value from 1 to 9, and the larger the value is, the higher the ESG rating of the enterprise is.

B. Explanatory Variables

The ability of green companies to obtain interest-bearing liabilities is not greatly affected, while red, yellow and orange companies are seriously affected, and the degree of impact increases with the strict growth rate limits. In this paper, according to the degree of the impact of the "three red lines" as the basis for grouping, according to the third quarter of 2020 (to September 30, 2020) data to distinguish between red, yellow, orange and green enterprises, and the green enterprises as a control group, the red, yellow and orange enterprises as the experimental group. Treat is used as a dummy variable to distinguish between the experimental group and the control group, with firms in the experimental group taking the value of 1 and firms in the control group taking the value of 0. The variable 'Time' is a policy dummy variable, with September 30, 2020, designated as the date of the policy shock. Thus, the value of 'Time' is set to 0 for the third quarter of 2020 and the preceding twelve quarters, totaling thirteen quarters. From the fourth quarter of 2020 to the fourth quarter of 2022, which encompasses nine quarters, the value of 'Time' is set to 1. The interaction term Treat×Time is the core explanatory variable.

3.3. Research model

The "three red lines" policy was proposed on August 20, 2020, with September 30, 2020 as the policy implementation date, and real estate companies in the green bracket in the third quarter of 2020 as the control group, and companies in the red, yellow, and orange brackets as the experimental group, to establish a double difference model (DID). The policy implementation is treated as a quasi-natural experiment, and the net effect of the policy is estimated by comparing the difference between the impacts of the experimental group and the control group after the implementation of the policy, eliminating factors that do not change over time and are unobservable, and the specific model is constructed as follows.

$$ESGIt=\beta0+\beta1Treati\times Timet+\beta2Xit+\mu i+\gamma t+\varepsilon it$$

ESG denotes the ESG performance of i firms in period t. Treat and Time are dummy variables, Treat=1 for the experimental group, Treat=0 for the control group, Time=0 before the policy implementation, and Time=1 in the year of the policy implementation and after the policy implementation, Xit is the other control variables, which have been explained above. μi denotes the individual fixed effect, γt denotes the time fixed effect, and εit is the random error term. itis the random error term.

The control variables in this paper include enterprise financial data as well as macro factors. The enterprise financial data is mainly about the enterprise solvency, mainly reflecting the short-term

solvency of the current ratio (CR) and quick ratio (QR), reflecting the long-term solvency of the gearing ratio (TDR) and cash flow debt ratio (QD). Indicators on firms' operating capacity were also selected, including inventory turnover (ITO) and logarithm of accounts receivable turnover (RTR). For macro factors, the logarithm of quarterly GDP growth rate for each quarter during the study period of this paper was selected as an indicator. The main variables are defined as shown in Table 1.

Table 1: Main variables

Variable classification	variable name	Variable Meaning	calculation method
explanatory variable	ESG	Corporate ESG performance	According to the CSI ESG rating from low to high, the assigned value is 1 to 9.
explanatory variable	Treat*Time	Interaction terms for group dummy variables and time dummy variables	If the enterprise is the experimental group take the value of 1, the control group is 0; time is 2020 March quarter and later take the value of 1, and vice versa take the value of 0
control variable	CR	current ratio	Enterprise current assets/current liabilities
	QR	quick ratio	Enterprise current assets - inventories/current liabilities
	TDR	gearing	Total liabilities/total assets of the enterprise
	QD	Cash flow debt ratio	Net cash flow from business operating activities/total liabilities
	ITO	Inventory turnover	Business operating costs/average inventory balance
	RTR	Accounts receivable turnover ratio	Enterprise sales revenue/average accounts receivable balance

4. Empirical results

4.1. Descriptive statistics

The descriptive statistics of the variables are shown in Table 2.

Table 2: Results of descriptive statistics of variables

variant	sample size	average value	average value	minimum value	maximum values
ESG	1620	5.056	0.939	2.000	7.000
CR	1620	1.973	1.102	0.117	14.098
QR	1620	0.785	0.958	0.071	12.097
TDR	1620	0.653	0.186	0.081	0.960
QD	1620	-0.001	0.140	-1.243	0.772
ITO	1619	4.220	41.653	0.001	1103.753
RTR	1593	1.279	0.818	-1.117	5.320

The mean ESG value is 5.056, indicating that the ESG performance of the sample firms is basically at the average level.The maximum value of ESG is 7, the minimum value is 1, and the standard deviation is 0.939, indicating that there is a large gap between the ESG performance of

different firms. All other control variables are within reasonable intervals and consistent with the existing literature.

4.2. Benchmark regression

The results of the benchmark regression using the double-difference model are shown in Table 3, in which column (1) does not add control variables, and column (2) adds control variables on the basis of column (1).

Table 3: Regression results of the impact of the "three red lines" policy on the ESG performance of real estate companies

variant	ESG	
	(1)	(2)
Time×Treat	-0.217(-1.68)*	-0.241(-1.86)*
control variable	No	Yes
Id	Yes	Yes
Year	Yes	Yes
N	1620	1620
R2	0.6692	0.6704

Note: t-values in parentheses, *, **, *** represent passing the test of significance at the 10%, 5%, and 1% levels, respectively. Same below.

As can be seen from the table, the interaction term in column (1) is negative at the 10% significance level, and the interaction term in column (2) is also negative at the 10% significance level, indicating that the regression results are relatively robust. It shows that the introduction of the "three red lines" policy reduces the ESG performance of real estate enterprises, which verifies Hypothesis 1. It shows that after the introduction of the policy, the enterprises face greater financing pressure, and the operating conditions of the enterprises are facing serious challenges, which makes the ESG performance of the enterprises show a downward trend. Verify the hypothesis H1 of this paper.

4.3. Robustness test

A. Parallel trend test

The precondition for using the double difference model is that the common trend hypothesis is established. In this paper, before and after the "Three Red Lines" policy is proposed, we set up the dummy variables pre, current and post for different time periods, which represent the quarters before the policy is implemented, the current period of the policy and the quarter after the policy is implemented, respectively. Specifically, if the observation falls within one to six quarters prior to the implementation of the policy, the corresponding quarterly time periods—pre1, pre2, pre3, pre4, pre5, and pre6—are assigned a value of 1; when the observation is in the current period of policy implementation, current takes the value of 1; similarly, when the observation is in the six quarters after the implementation of the policy, post1, post2, post3, post4, post5 and post6 take the value of 1. Afterwards, the dummy variables of each quarter are put into the model equation (1) after cross-multiplying with the policy dummy variable Treat, but Time×Treat needs to be taken out because at this time the policy effect represented by Time×Treat has been absorbed by a series of time dummy variables. At this point, we only need the coefficients of the cross-multiplication terms of the series of time dummy variables and the policy dummy variables to determine whether the parallel trend is satisfied. When the series of interaction terms prior to policy implementation are not significant in the neighborhood of 0, it means that the parallel trend is satisfied, and the specific

regression results are shown by the columns of Table 3(1). The interaction terms before the implementation of the policy are not significant, indicating that the experimental group and the control group enterprises before the implementation of the policy to meet the parallel trend; after the implementation of the policy, the fourth and fifth interaction terms are significantly negative at the 10% confidence level, indicating that the policy put forward the current period did not have an impact on the ESG performance of the enterprise, but after that the impact is gradually significant, the effect of the role of the effect of the rise. The results of the parallel trend test are shown in Table 4

Table 4: Parallel trend test results

variant	ESG
	(1)
Pre6×Treat	0.263(1.14)
Pre5×Treat	0.348(1.13)
Pre4×Treat	-0.022(-0.11)
Pre3×Treat	-0.090(-0.45)
Pre2×Treat	0.013(0.06)
Current×Treat	-0.124(-1.12)
Post1×Treat	0.008(0.07)
Post2×Treat	-0.088(-0.87)
Post3×Treat	-0.253(-1.57)
Post4×Treat	-0.311(-1.94)*
Post5×Treat	-0.282(-1.66)*
Post6×Treat	-0.021(-0.12)

B. Placebo test

To further enhance the robustness of the findings of this paper, we conduct a placebo test. The interaction term is randomly sampled 500 times to see if the coefficients are significantly different from the baseline estimates. Out of 500 samples, there are no results on the right-hand side of the baseline regression coefficients. As can be seen, both the one-sided and two-sided tests indicate that a benchmark regression coefficient of less than -0.2459 is a small probability event in the case of random sampling. This suggests that our placebo test holds.

5. Further analysis

The literature has shown that state-owned enterprises (SOEs) in China have significantly better social responsibility performance than private enterprises. Does the nature of property rights also affect the relationship between the “three red lines” policy and different real estate enterprises? From the perspective of corporate roles, for state-owned enterprises (SOEs), fulfilling social responsibility and achieving public policy goals is a mandatory legal responsibility. Therefore, SOEs are often subject to more government regulations, and the greater pressure to fulfill their social responsibilities will force managers to pay more attention to their ESG performance. In order to test the effect brought by the difference in the nature of property rights, this paper adds the policy dummy variable, the time dummy variable and the interaction term of the nature of property rights (Treat×Time×SOE) to the model, where the value is taken as 1 when the listed company is state-owned controlled, and 0 otherwise. The results are shown in Table 5

SOEs are significant at the 10% confidence interval and the coefficient is negative, indicating that “three red lines” policy has a more obvious inhibiting effect on the ESG performance of state-owned enterprises.

Table 5: Table of results of heterogeneity test

variant	nationalized business	non-state enterprise
	(1)	(2)
Treat×Time	-0.3226(-1.92)*	-0.0674(-0.38)
control variable	YES	YES
fixed effect	YES	YES
N	1040	580
R2	0.6871	0.5373

6. Conclusions

Through the above research, it is concluded that, firstly, the "three red lines" policy significantly reduces the ESG performance of real estate enterprises, and the effect of the policy is not significant in the current quarter, but is gradually significant afterward, showing a certain lag. Secondly, there is a difference in the effects of the "three red lines" policy on private enterprises and state-owned enterprises, with state-owned enterprises showing significant inhibition and their ESG performance being more affected by the "three red lines" policy.

Based on the above conclusions, the following insights are drawn: first, the transformation of real estate enterprises should be accelerated in order to improve their ESG performance. Second, real estate companies should pay more attention to social interests and environmental protection to achieve the new development trend in the new era.

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