

Green Policy and Green Finance Allocative Efficiency

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Abstract

Under the background of introducing green credit policy in China, this paper finds that the higher the level of corporate pollution, the greater the external financing pressure the firms are facing through an empirical research on the high-polluting listed companies of China during 2012-2016. As the debt ratio of local government increases, the role of corporate environment performance in obtaining new loans decreases significantly. This paper has made significant contribution to the green finance literature by using the index of local fiscal situation to measure the regional economic development level instead of local GDP and explored the role of local fiscal situation in financing the polluting enterprises.

Keywords

Local financial situation, Corporate environmental performance, Financing constraints, China.

1. Introduction

In recent years, ecological destruction and environmental deterioration have become more and more serious in China, and the extensive economic growth model needs green transformation. The government plays a key role in solving the dilemma between ecology and economic growth so as to realize green development. Zhou shouhua, wu chunlei and liu guoqiang(2015) find that the higher the ecological efficiency of manufacturing export enterprises or the lower the degree of financing constraint, the more inclined they are to choose the direct export mode; otherwise, the more inclined they are to choose the indirect export mode. Based on a strategic vision, the report of the Nineteenth National Congress of the Communist Party of China (CPC) is had a thorough interpretation and proposed a long-term plan about green transformation, green economy and green finance. Under the call of government policy, China has witnessed a rapid development of green finance encouraged the private capital to enter the green industry. Xu songtao, wan hongyan(2011) find that environmental regulations have eased the financing constraints of central soes in heavily polluting industries. It has no significant impact on local state-owned enterprises, but increases the financing constraints of non-state-owned enterprises. Xu songtao and wan hongyan(2018) find that by the end of 2017, the green credit balance of 21 banking institutions in China hit RMB77.5 trillion, accounting for 9% of all credit balances. China's green bonds reached RMB 240 billion in 2016, becoming the largest green bond market in the world. The proportion of global green bonds issued was more than 20% in 2017 At the same time, green securities, green funds, green trust, green insurance have been introduced and witnessed rapid development. But compared with the real economy demand for the green investment capital, the supply of green finance is still limited. How to speed up the development of green financial system and increase the effective supply of green capital is one of the important strategic issues in the course of developing ecological civilization and sustainable development in China. Wu hongjun, liu qiren and wu shinong(2017) find that Improving the level of environmental information disclosure can significantly reduce the financing constraints faced by the company; Further analysis shows that this effect is more significant in the case of low corporate financial transparency, indicating that environmental information disclosure has a complementary role to financial information disclosure.

Meanwhile, the central government of China has been determined to deleverage very strongly in recent years. Some local governments, whose fiscal income used to rely on the land sales, are in poor financial situation. Some polluting enterprises have become one of the main sources of fiscal income for the local government, so some of them Some local governments with high debt ratios have

loosened their supervision of the environmental protection over the local firms. As a result, the environmental awareness of financial institutions and the local firms have declined, reducing the allocation efficiency of green finance. Therefore, it is argued in this paper that the fiscal situation of local governments is closely related to the allocation efficiency of green finance.

This paper has made significant contribution to the green finance literature by using the index of local fiscal situation to measure the regional economic development level instead of local GDP and explored the role of local fiscal situation in financing the polluting enterprises. This paper consists of seven sections. The second section is literature review. Research hypotheses are developed in the third section. The fourth part is data source and research design, and the fifth is empirical test results and analysis, robustness test is developed in sixth section, and the last part is research conclusion.

2. Literature review

Based on the risk theory of financial economics and the institutional theory of economic sociology, this study analyzes how the corporate environmental performance of listed firms in the high-polluting industry in China affect their debt financing, and how the pressure of regional economic development have influenced the relationship between corporate environmental performance and debt financing.

2.1 Corporate environmental performance and debt financing

From the creditor's point of view, the environmental problems of firms have brought about three kinds of risks including the direct risk caused by environmental responsibility. The first is the direct risk caused by environmental responsibility, which may occur when the cleaning cost of the contaminated assets invested in May exceed the initial loan value. The second is the indirect risk of default. When the losses caused by environmental problems or the costs caused by environmental regulations rise, enterprises cannot repay the loans. Third, reputation risk. Creditors may damage their reputation due to their lending relationship with borrowers involved in environmental accidents (Thompson and Cowton, 2004). Good environmental performance of firms can avoid compensation payments and cleaning costs resulting from serious environmental accidents, reduce the likelihood of a business going bankrupt, and at the same time avoid reputational damage and a decline in the value of assets resulting from negative impacts. The firm's investment in controlling environmental risk is usually long-term, unchangeable and more reliable for future creditors (Aintabliand et al., 2007).

Several scholars have analyzed how environmental performance affects corporate financing activities. Garber and Hammitt (1998) examined the relationship between superfund liability and equity capital cost of national chemical companies in the United States. There was a significant positive correlation between the two in the large companies. Sharfman and Fernando (2008) examined the relationship between corporate environmental risk management and financing using S & P firms in the United States as a sample. The results showed that the improvement of environmental risk management can reduce the cost of equity capital. Increasing the proportion of debt financing could raise the tax-saving revenue. Elias Erragragui (2018) find that environmental concerns increase firms' cost of debt while governance concerns have no impact on it. Secondly, the results also confirm that environmental and governance strengths reduce firms' cost of debt as demonstrated in prior works. Considering that polluting enterprises are regarded as high-risk investments in debt equity markets, firms with poor environmental performance would face the huge environmental debt caused by pollution control in the future in the face of increasingly stringent environmental laws and regulations. Therefore, creditors would demand higher returns to compensate for environmental risks. Their evidence indicated that there was a significant negative correlation between corporate environmental performance and debt equity cost. However, these studies mainly focused on the equity capital cost and debt capital cost without taking into account of firms' debt financing ability.

China's Green Credit Policy launched in 2002 is one popular environmental protection measure adopted by the international banking industry. In order to promote the implementation of China's green credit policy, the Ministry of Environmental Protection and the Banking Regulatory Commission in China signed an information sharing agreement and jointly issued the Circular on the

Comprehensive Implementation of the Green Credit Policy and the further improvement of the work of information sharing with the People's Bank of China in which year. The environmental performance information of enterprises has been incorporated into the credit information management system of the People's Bank of China. Up to now, nearly 10,000 items of environmental protection information have been accepted by the credit information system of the People's Bank of China. A number of provinces and cities have introduced their local administration measures, such as the Evaluation Method for the Effect of Green Credit Policy in Hebei Province, which has been formulated in Hebei Province. The implementation of the green credit policy by local banks has been assessed and issued to the community with a positive response. Each bank formulates and implements its credit environment risk control system differently.

Therefore, with the implementation of the green credit policy in China, the corporate environment performance has become an important factor affecting firms' debt financing activities. It has been widely used by the creditors to assess the uncertain corporate environment, predict the future operating performance and cash flow of firms, become one of the important criteria to evaluate the credit risk.

2.2 The impact of local government financial situation on the relationship between environmental performance and debt financing of firms

In the context of transition economy, green finance, which is in the period of construction, is essentially the institutional change promoted by the government. The government support policy has been critical in the course of green finance development in China.

At present, the development of green finance in China is faced with many problems, such as insufficient supply, lack of incentive, term mismatch and so on. Only the government can accelerate the development of green financial system and improve the efficiency of the green finance allocation provide the multi-dimensional policies such as the green industry policy, the energy conservation policy and the green finance policy. Cheng Z, Wang F, Keung C, et al.(2017) claimed that firstly, while environmental disclosure level has improved over time, negative information that reflects the real status of environmental management has also been concealed. Secondly, although corporate political connection can influence companies to more actively disclose environmental information, it can also mask political rent-seeking in the guise of protecting the environment.

Firstly, green finance has the nature of public goods or quasi-public goods. A complete set of energy-saving and environmental protection policies and legal regulations can establish a good institutional framework for the financial institutions to carry out green financial services. Jo H, Kim H, Park K(2015) find that reducing environmental costs has a more immediate and substantial effect on the performance of financial services firms in well-developed financial markets than in less-developed financial markets.

Secondly, green finance is faced with the externality problem. The government provides the policy guarantee for the green finance to serve the green development of the real economy by introducing the policy measures to implement the responsibility of environmental risks to the specific responsible party. Wong C W Y, et al.(2018) find that CER has a positive impact on operating income, while regional disparities influence the relationship between CER and corporate operating income.

Finally, green investment is often difficult to generate income in the short term. The green financial system with bank credit is faced with term mismatch problem. Green financial policies to promote the financial products innovation such as green bonds, green stocks, green funds, can provide more suitable financing options to overcome the problem of term mismatch so as to improve the green finance allocation efficiency. It is especially noteworthy that in China and other emerging market economies, the lack of external constraints such as public supervision and environmental information disclosure frequently leads to environmental scandals, which have reduced the green finance allocation efficiency. It is an important way to break through the difficulties of green finance development and improve the efficiency of green finance allocation by promoting financial

institutions to combine third party independent institutions with the government policies to establish an environmental information sharing platform.

The green policy in China can be decomposed into the economic means such as fiscal allocation and favourable tax, the administrative and legal means such as the restriction or regulation of investment direction, product nature, production quantity. Since the green policy is still in the development stage in China, currently the most relevant policy tools related to the development of green finance are mainly green fiscal policy (economic means) and green regulatory policy (administrative and legal means). The green fiscal policy, which provides the financial foundation for green finance, can improve the green finance allocation efficiency. The government can increase green fiscal expenditure and make more investment in green infrastructure. In addition, the green fiscal expenditure can induce social investment and guide the private capital into the green financial system. However, under the long-term extensive economic growth model, the fiscal expenditure can be mostly locked in the manufacturing projects, aiming at energy-saving and emission-reduction services. At the same time, under the existing promotion system and inspection mechanisms, some local governments in China have ignored the environmental performance of "green" fiscal expenditure, and frequently spent energy saving and environmental protection funds in the repetitive or ineffective projects, resulting in the inefficient green fiscal expenditure efficiency.

3. Research hypotheses

3.1 The pollution and financing constraints of firms

The green supervision policy is an institutional condition to ensure the rational allocation of green financial funds.

With the continuous development of financial transaction markets and financial measurement tools, the negative externalities of pollution have been gradually priced correctly, which has enhanced the initiative of financial institutions to participate in green finance. Specifically, financial development can bring about scale effect, structural effect and technological effect, thereby improving the green financial allocation efficiency .

Compared with bank intermediaries, financial markets can guide the public and external investors to supervise the polluting enterprises and strengthen the financing constraints of polluting enterprises through more standardized and mandatory environmental information disclosure mechanisms based on individualized supervision to improve the green financial allocation efficiency . However, the current green financial regulatory policy in China, which is mainly aimed at green credit and green bonds, has limited regulation on green stocks. The green access and green supervision mechanism of capital market is far from mature. The financial market in China lacks the environmental protection inspection before listing and the supervision of environmental protection after listing. The quality and scope of environmental information disclosure have been far from being in place. It is difficult for the investors to distinguish green and non-green projects effectively, which leads to the mismatch of green financial funds. In recent years, the central government of China has been determined to deleverage. Some local government, whose main revenue used to rely on the land sales, have been in a tight financial situation. As a result, they may relax their supervision over the environmental protection of enterprises, and fail to implement the green policy effectively. In order to increase the revenue, the deregulation of polluting enterprises has reduced the enthusiasm of financial institutions to develop green finance, affecting the green finance allocation efficiency. Corporate debt financing includes short-term and long-term debt financing. Short-term debt financing is mostly used for liquid assets. The structure and value of assets are not easy to change in a short period of time. Therefore, compared with long-term debt financing, short-term debt financing enables creditors to grasp timely information on the production and operation of enterprises and is conducive to creditor supervision and control (Diamond, 1991; Rajan, 1992). Short-term debt financing is better for creditors to recover funds when businesses face bankruptcy (Diamond and Rajan, 2001). Stiglitz and Weiss (1998) indicated that companies cannot obtain long-term debt financing when the information asymmetry

problem is very serious and the default risk is huge. Environmental problems have strong specialization and concealment. There is serious information asymmetry between creditors and indebted enterprises. Once environmental accidents occur, enterprises will not only be punished severely, but also be shut down. Therefore, environmental performance can have an important impact on the maturity of debt financing of firms. Thus, Hypothesis 1 has been proposed:

Hypothesis 1 The higher the pollution level, the greater the external financing pressure, the lower the financing satisfaction of firms.

3.2 The influence of local government debt status on the relationship between enterprise pollution and debt financing

In the contemporary world, the political, economic, and social systems have become more and more complex, and their impact on access to resources is becoming more and more significant (March and Olsen, 1984). A revival of institutional research has taken place throughout social sciences (Powell and Dimaggio, 2008). Finance has also introduced institutional factors into the study of the influencing factors on corporate debt financing. Traditionally, the research on corporate capital structure and debt financing was mainly based on the characteristics of firms. In recent years, some scholars have started to examine the impact of external institutions on debt financing of firms. Dem Irguc-Kunt and Maksimovic (1999), Faccio (2002), Giannetti (2003) and Fan et al (2010) argued that corporate debt financing was affected by a series of institutional factors such as the degree of investors protection, market development, tax system, government intervention and political relations through a series of international comparative studies.

The empirical study on how institutional factors affect corporate debt financing has been mainly carried out from the perspective of firms (Khwaja and Mian, 2005; Charumilind, 2006). These studies have confirmed that politically connected firms can obtain more loans from banks, especially more long-term bank loans, with less guaranteed assets. Sapienza (2004) and Dinc (2005) from the perspective of banks also found that the interest rate required by the state-owned banks is lower and will be intervened by political parties and local governments. The fiscal decentralization reform in China in the 20th century provides an opportunity to study how government intervention, especially the intervention of local governments, affects corporate debt financing (. Zheng et al. 2005, Jiang Li 2006, Li Ye 2007). The results show that firstly, while environmental disclosure level has improved over time, negative information that reflects the real status of environmental management has also been concealed. Secondly, although corporate political connection can influence companies to more actively disclose environmental information, it can also mask political rent-seeking in the guise of protecting the environment.

This study analyzes the relationship between corporate environmental performance and debt financing in the context of the implementation of green credit policy in China. It examines the impact of environmental regulatory system on corporate debt financing as well as the effect of government intervention on the relationship between corporate environmental performance and debt financing. Because of the close relationship of interests between local governments and enterprises, some polluting enterprises, which are the important sources of local financial revenue, are being protected by the local government. Environmental protection departments and local financial institutions affiliated with the local government are inevitably interfered with by the local government in China, which makes the green credit policy fail to function effectively. Especially when the local economy is growing at a slower pace, the local government is likely to sacrifice long-term environmental benefits in return for short-term economic performance when they face local economic growth pressures. Therefore, the following hypothesis has been proposed:

Hypothesis 2: The worse the local financial situation has become, the smaller impact the corporate pollution has on the external financing of local firms.

4. Data source and research design

According to Industry Classification Guidelines for the Listed Companies issued by China Securities and Futures Commission in 1998, this study has merged the high-polluting industries specified in the list of Classified Management of Environmental Protection Verification Industries of listed companies published by the Ministry of Environmental Protection (No. 2008) into the following eight categories including extractive industry, textile, clothing, leather and wool industry, metal and non-metal industry, petrochemical and plastics industry, food and beverage industry, water and gas industry, biopharmaceutical industry, as well as papermaking and printing industry. The research chose the high-polluting listed companies at Shanghai Stock Exchange and Shenzhen Stock Exchange, which published their CSR reports from 2012 to 2016, as sample firms.

The measurement of green financial allocation efficiency lies in measuring the sensitivity of external capital changes to corporate pollution. Based on the ideas of FHP investment-cash flow, ACW cash-flow model and the research of Hongtao Shen and Zhengbiao Ma (2014), this paper has constructed the green financial allocation efficiency index at the micro (firm) level. The sensitivity of external financing demand satisfaction to corporate pollution level has been measured with the following specific indicators:

First, based on the investment-driven economic growth model and bank dominated financing in China in the past decades, the firm growth in China has mainly depended on debt financing. Therefore, the leverage rate has been used as a proxy variable to measure the firm's external financing demand satisfaction.

Second, the lack of environmental information disclosure data of listed firms in China makes it difficult to choose the variables of corporate pollution level. Xu et al. (2016) indicated that sewage levy as one of the manifestations of Pigou tax is an important way to internalize the pollution cost for the firms. Zhang (2015) remarked that sewage charges, which reflect the discharge of many pollutants of Chinese enterprises, can be used to compare the environmental pollution level of different enterprises. Lu and Jiao (2011) used the punishment for excessive emissions of pollutions and the type of pollution punishment as a proxy variable of environmental performance of listed firms. This paper used the sewage discharge fee per unit income as a proxy variable to represent the environmental pollution following Hu (2012).

Theoretical models:

Model one:

$$\Delta Debt_{i,t} = \alpha + \beta_1 Charge_{i,t} + \beta_2 Size_{i,t} + \beta_3 ROA_{i,t} + \beta_4 Struc_{i,t} + \beta_5 Growth_{i,t} + \epsilon_{i,t}$$

Model two:

$$\Delta Debt_{i,t} = \alpha + \beta_1 Charge_{i,t} + \beta_2 Size_{i,t} + \beta_3 ROA_{i,t} + \beta_4 Struc_{i,t} + \beta_5 Growth_{i,t} + \beta_6 Rate_{i,t} + \beta_7 Charge_{i,t} \times Rate_{i,t} + \epsilon_{i,t}$$

Following Shen and Ma (2014), this paper used the enterprise scale (natural logarithmic) (Size), profitability (ROA), asset structure (fixed assets / total assets) (Struc), Growth (Growth) as the controlling variables of corporate characteristics. $\Delta Debt$, which indicates the change of enterprise debt ratio, was used as a proxy variable of external financing demand. Charge is the ratio of sewage charges to operating income, which is a proxy variable of environmental pollution. Among all the evaluation parameters, β_1 reflects the sensitivity of external financing demand satisfaction to the pollution level, so it is particularly important. When the allocation efficiency of green finance is high, the greater the external financing pressure for the high-polluting, the lower the financing satisfaction of firms, so it is expected that the estimated value of β_1 should be significantly negative.

In order to investigate the effect of government financial situation on the efficiency of green finance allocation, the debt ratio of local government and its cross term with environmental pollution (Charge) were introduced from the above model to test the impact of local government financial position on corporate environmental problems and financing pressure.

(2) Descriptive statistics

Table 1 Descriptive statistics

Var	Obs	Mean	Std.Dev	Min	Max
Δ Debt	687	0.0012	0.0829	-0.3548	0.2284
charge	687	0.0019	0.0030	0.0000	0.0201
Size	687	22.5124	1.3479	19.8377	26.2067
ROA	687	0.0335	0.1623	-0.8948	0.4324
Stru	687	0.3622	0.1704	0.0594	0.8081
Growth	687	0.1915	0.5960	-0.7136	3.5655
Rate	687	0.4190	0.0418	0.2150	0.6190

5. Empirical results and discussion

Table 2 Regression results

Variables	(1) Δ Debt	(2) Δ Debt
Charge	-1.1141*** (-3.24)	-2.0262*** (-2.84)
Rate		-0.5254*** (-2.86)
Charge \times Rate		0.0468 (-3.02)
Size	2.398*** (0.006)	2.507*** (0.007)
ROA	0.0966 (0.351)	0.0685 (0.456)
Stru	3.748* (0.096)	3.674* (0.099)
Growth	0.00634 (0.183)	0.00631 (0.186)

The meaning of significant level is * $p < 0.01$, * $p < 0.05$, * $p < 0.1$

As shown in Table 2, Charge is the ratio of sewage charges to operating income and acts as a proxy variable for environmental pollution. Among all the evaluation parameters, it reflects the sensitivity of external financing demand satisfaction of firms to the pollution level. The higher the corporate pollution, the greater external financing pressure firms are facing, the lower the financing satisfaction of firms. As can be seen from the first line of Table 2, the impact of enterprise pollution on external financing is significantly negative at the level of 1%, as can be seen from the debt ratio, the amount of loan and the amount of newly-added loan, which supports Hypothesis 1.

Although the cross term Charge \times Rate parameters are all positive, it is not significant, which indicates that under the influence of local financial situation, the influence of corporate environmental performance on the firms' financing constraints becomes smaller, which supports Hypothesis 2.

6. Robustness test

In order to ensure the robustness of empirical results, we have used new loans (Δ Loan) and new long-term loans (Δ Long-Loan) to replace Δ Debt as dependent variables, to make a regression analysis to test the reliability of the empirical results. The empirical models are as follows:

$$\Delta\text{Loan}=\alpha+\beta_1\text{Charge}_{i,t}+\beta_2\text{Size}_{i,t}+\beta_3\text{ROA}_{i,t}+\beta_4\text{Stru}_{i,t}+\beta_5\text{Growth}_{i,t}+\beta_6\text{Rate}_{i,t}+\beta_7\text{Charge}_{i,t}\times\text{Rate}_{i,t}+\varepsilon_{i,t}$$

$$\Delta\text{Long-Loan}=\alpha+\beta_1\text{Charge}_{i,t}+\beta_2\text{Size}_{i,t}+\beta_3\text{ROA}_{i,t}+\beta_4\text{Stru}_{i,t}+\beta_5\text{Growth}_{i,t}+\beta_6\text{Rate}_{i,t}+\beta_7\text{Charge}_{i,t}\times\text{Rate}_{i,t}+\varepsilon_{i,t}$$

The regression results are as follows :

Table 3 Robustness test regression results

Variables	(1) ΔLoan	(2) $\Delta\text{Long-Loan}$
Charge	-0.9245*** (-2.43)	-0.6324*** (-2.76)
Charge×Rate	0.0624 (-4.21)	0.0432 (-3.64)
Size	1.739*** (0.008)	1.567*** (0.009)
ROA	0.0825 (0.542)	0.0574 (0.651)
Stru	2.784* (0.112)	2.562* (0.115)
Growth	0.00435 (0.224)	0.00368 (0.246)

The meaning of significant level is * $p < 0.01$, * $p < 0.05$, * $p < 0.1$

The above regression result shows that when the dependent variable is replaced by the amount of new loan and new long-term loan, the parameter value of cross item Charge×Rate is positive although the significant level is not high. It indicates that under the influence of local financial situation, the impact of corporate environmental performance on corporate financing constraints is smaller, which is consistent with the empirical results of the study.

7. Conclusions

Under the background of the introduction of green credit policy in China, this paper has analyzed the impact of corporate environmental performance on the debt financing of the high-polluting listed companies in China when the local government faces the pressure of sustainable economic growth. Based on the research data of 2012-2016, we have found that the better environmental performance helps the listed firms in China obtain more new loans with longer term, but when the local economy is under pressure, the significance of corporate environment performance in the firms' securing new loans has declined significantly.

This study shows that since the implementation of green credit policy in China, the financial institutions have really paid attention to the corporate environmental performance in the process of granting credit to the firms, and taken into account environmental risk in making credit decision-making. However, when the rate of local economic development has declined, the grant of bank credit the environmental performance of enterprises and environmental risks to promote economic development speed is more urgent, occupying the upper hand of environmental protection work. Therefore, in the implementation of green credit policy, there is still the possibility of local government intervention in the allocation of credit resources in China. Local governments are not indifferent to environmental protection, but their drive for the local economic growth is higher. In 2003, economic measures were gradually used to promote the environmental protection, and a series of green financial policies were introduced. At the same time, the enterprises in China also began to

disclose environmental performance information actively. This paper has extended the existing research on debt financing in the following two ways. One is to extend the factors that affect debt financing of firms from economic factors to non-economic factors the influence of financial services is closely related to the monitoring of regulatory authorities on the corporate environmental activities. In this sense, institutional change has played an important role in the impact of environmental performance on debt financing. The variable has reflected the extent of local government intervention but cannot reveal the motives and specific ways of local government intervention.

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