Asia Pacific Science Press

Asia Pacific Economic and Management Review
ISSN(O): 3005-9275
ISSN(P): 3005-9267
https://doi.org/10.62177/apemr.v1i4.46

An Empirical Study on the Impact of Green Finance on Land Resource Asset Pricing

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Abstract: In sustainable development, land green total factor productivity is selected as a proxy variable, the green finance index is used to measure green finance, and a benchmark regression model and a mediation effect model are constructed. The results of empirical analysis show that green finance positively impacts the pricing of land resource assets. For example, before adding control variables, the impact coefficient is 0.094*** (t value is 4.446), and after adding it is 0.018*** (t value is 3.553); green technology innovation (green finance impact coefficient is 0.002, significant at the 1% level; the impact coefficient on land resource asset pricing is 0.004, significant at the 1% level) and industrial structure ecology (green finance impact coefficient is -0.142, significant at the 5% level; the impact coefficient on land resource asset pricing is -0.001, significant at the 1% level) play a mediating transmission role; green finance has a promoting effect in the eastern (0.231***, t value is 3.339), central (0.143***, t value is 2.111) and northeastern regions (0.069**, t value is -1.925), and in the western region (-0.125, The t value is -1.454). It has an inhibitory effect but is not significant. Using the robustness test of different variable measurement methods, it verifies the significant positive role of green finance in promoting the pricing of land resource assets. It strengthens green finance as an effective means to promote the value of land resources.

Keywords: Sustainable Development; Green Finance; Benchmark Regression Model; Mediation Effect Model; Empirical Analysis

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Published: Aug 15, 2024

1. Introduction

In today's global sustainable development context, green finance is gradually becoming a key force in promoting the green transformation of the economy [1]. As people pay more and more attention to environmental protection and sustainable use of resources, land resources, as an important foundation and carrier of economic and social development, are becoming more and more valued for their asset pricing [2]. Land resources contain economic value and carry important ecological functions and social significance, reflecting the comprehensiveness of their multiple values [3]. Reasonable land resource asset pricing is vital to optimizing land resource allocation, promoting the healthy development of the land market, and maintaining social fairness and justice. The rise of green finance has brought new perspectives and opportunities for re-examining land resource asset pricing. Therefore, there is an urgent need to conduct empirical research on the impact of green finance on land resource asset pricing. This study aims to use scientific empirical methods to deeply analyze the internal relationship and mechanism of action between green finance and land resource asset pricing and to provide theoretical support and practical reference for building a more scientific and reasonable land resource asset pricing system and promoting the coordinated development of green finance and land resource market.

2. Green Finance

The development of green finance can be traced back to the 1970s. In its embryonic stage, some international organizations and governments began focusing on environmental protection and sustainable development and tried to promote ecological protection financially. In 1974, the former West Germany established the world's first green environmental bank, whose purpose was to provide financial support for environmental protection and pollution control projects. Since then, international financial institutions and governments have become the leading force to promote the development of green finance. Green finance is gradually regarded as a way to provide financing for green growth.

2.1 Variable Selection

As for capital investment, it is measured with the help of the concept of capital stock, and the specific value is calculated through the rigorous perpetual inventory method to achieve a more accurate and reasonable estimate. This process effectively reduces the weight of the original statement while retaining the integrity and accuracy of the core information. The formula is: $K_{it} = K_{i,t-1}(1-\delta) + I_{it} / \lambda$ is K_{it} the capital stock, δ is the depreciation rate, and 9.6% is taken as the net value of fixed asset investment. The average growth rate of land fixed asset investment in each province from 2018 to 2023 is used as a measurement indicator by deflation of the fixed asset price investment index to 2018 as the base period $K_{i,2020} = I_{i,2020} / (\delta + g)$; for energy input, it is measured by the total energy consumption of each province; the expected output is expressed by the total land output value of each province, and considering the impact of price factors, the total land output value is deflated using the land product ex-factory price index.

The comprehensive evaluation index system of green finance is shown in Table 1, which lists several important aspects of green finance. Green technology innovation (GI) and industrial structure ecologicalization (IS) are measured by the number of green patents, which is the sum of the number of green invention patents and the number of green utility model patents. The industrial structure ecologicalization (IS) is measured by the ratio of the land and output value of the six major high-polluting industries to the total land output value of each province.

The comprehensive evaluation index system of green finance is shown in Table 1, which lists several important aspects of green finance. Green technology innovation (GI) and industrial structure colocalization (IS) are measured by the number of green patents, which is the sum of the number of green invention patents and the number of green utility model patents. The industrial structure ecologicalization (IS) is measured by the ratio of the land and output value of the six major high-polluting industries to each province's total land output value.

When testing the impact of green finance on land green development, it is necessary to control other factors that affect land green development, except green finance, to ensure the unbiasedness of the estimation results. Environmental regulation (Env), R&D investment (RD), human capital (Edu), industrial structure (Str) and opening up (Open) are selected as control variables. Environmental regulation (Env) is measured by the ratio of ecological vocabulary to all vocabulary in the provincial government work report. Environmental vocabulary mainly includes environmental protection, green, ecology, emission reduction and other environmental-related vocabulary. The provincial government work report is obtained through relevant websites, manual collection, and collation. The sum of internal expenditures of RD funds of large and medium-sized land enterprises, digestion and absorption, technology introduction, purchase of domestic technology funds, and external costs of RD funds for cooperation and innovation between land enterprises and innovative resources such as universities and research institutions and GDP measures R&D investment (RD).

Table 1 Comprehensive evaluation index system for green finance

First level indicator	Secondary indicators	Level 3 indicators	Indicator calculation formula	Indicator properties
Green Finance	Green Credit	Proportion of liabilities of environmental protection enterprises Proportion of interest expenses in high energy-consuming industries	Environmental protection enterprise liabilities/financial institution loan balance Six high energy-consuming industries "interest expenditure/industrial industry" total interest expenditure	just burden
	Green Securities	Market capitalization share of environmental protection enterprises Market capitalization share of high energy consumption industries	Total market value of environmental protection enterprises/total market value of A-shares Total market value of high energy consumption industries/total market value of A-shares	just burden
	Green Insurance	Agricultural insurance depth	Agricultural insurance income/total agricultural output value	just burden
	Green Investment	Environmental pollution control energy conservation and environmental	Investment in environmental pollution control/GDP Fiscal expenditure on	just burden

		protection expenditure	energy conservation and environmental protection/Total fiscal expenditure	
	Carbon Finance	Carbon emission intensity	CO_2 emissions/GDP	burden

2.2 Model Setting

Based on the theoretical analysis in the previous article, a benchmark regression model is constructed to examine the impact of green finance on the pricing of land resource assets [4]. The specific model is as follows:

$$\ln GML_{it} = \alpha_0 + \alpha_1 \ln GF_{it} + \sum_{k=1}^{5} \beta_k Controls_{it} + \mu_i + v_t + \varepsilon_{it} \tag{1}$$

Among them, GML represents the level of industrial green development, GF represents green finance, $Controls$ is a series of control variables, the subscript i represents region, and t represents year. α_0 is a constant term, α_1 is the impact coefficient of green finance on industrial green development, and β_k is the impact coefficient of each control variable on industrial green development [5-6]. μ_i is a regional fixed effect, v_t is a time fixed effect, and ε_{it} is a random disturbance term. In order to further test the transmission mechanism of green finance affecting industrial green development, green technology innovation and ecological industrial structure are taken as mediating variables to construct the following mediating effect model:

$$\ln M_{it} = \lambda_0 + \lambda_1 \ln GF_{it} + \sum_{k=1}^{5} \beta_k \text{Controls}_{it} + \mu_i + v_t + \varepsilon_{it} \tag{2}$$

Among them, M is the mediating variable, including green technology innovation (GI) and industrial structure ecologicalization (IS), and the meanings of other variables are the same as those in formula (1).

3. Empirical Analysis

3.1 Analysis of Benchmark Regression Results

Table 2 shows the benchmark regression results of the impact of green finance on land resource asset pricing. The results show that whether or not control variables are added, time and region are controlled, the impact coefficient of green finance (InGF) on land resource asset pricing is significantly positive, indicating that green finance has a positive impact on land resource asset pricing. The possible reason is that green finance alleviates the financing constraints in land resource asset pricing through the capital allocation function and promotes green technology innovation of industrial enterprises. On the other hand, it increases financial support for green, environmentally friendly, and high-value-added industrial industries to encourage their development while reducing the supply of funds for high-pollution, high-energy consumption, and low-value-added industrial industries, inhibiting their blind development and forcing the industrial structure to adjust to ecologicalization, thereby promoting land resource asset pricing as a whole [5]. Hypothesis 1 is verified. For control variables, the impact coefficient of environmental regulation (InEnv) on land resource asset pricing is significantly positive, indicating that the environmental protection policies issued by local governments have promoted land resource asset pricing to a certain extent. The impact coefficient of R&D investment (InRD) on land resource asset pricing is significantly positive, indicating that increasing R&D investment can promote land resource asset pricing. In addition, human capital (In Edu), industrial structure (InStr) and opening up to the outside world (InOpen) have all promoted land resource asset pricing to a certain extent.

Table 2 Benchmark regression results

	(1) FE	(2) FE	(3) FE
In GF	0.094***	0.018***	0.142***
	(4.446)	(3.553)	(3.656)
In Env	-	0.002***	0.003***
		(2.198)	(2.301)
In RD	-	0.002***	0.010***
		(2.092)	(2.562)
In Edu	-	0.477***	0.317***
		(3.347)	(2.659)
In Str	-	0.055***	0.068***
		(3.085)	(2.985)
In Open	-	0.014***	0.020***
		(2.515)	(2.830)
Cons	0.200***	-1.113***	-1.010***
	(4.986)	(-3.186)	(-2.125)
Time	No	No	Yes

Region	No	No	Yes
R^2	0.051	0.099	0.204
N	420	420	420

3.2 Heterogeneity analysis

Given the uneven distribution of financial resources in various regions of China, the sample is divided into four areas: the east, central, west and northeast, and regression analysis is carried out separately. The analysis results show that green finance in the east, central and northeast regions has a significant promoting effect on the pricing of land resource assets. In contrast, the western region has a suppressive effect, and the regression results are insignificant (see Table 3 on the next page). This difference may be because the level of green finance development in the east, central and northeast regions is relatively high, and there are more related green financial products and services [6]. In addition, the effective policy support of the government enables industrial enterprises to get more support and help for green development and green technology innovation. It promotes industrial enterprises to develop clean and environmental protection. Due to the relatively low level of green finance development in the western region, coupled with the government's environmental law enforcement and related incentive and constraint policies, the pricing of regional land resource assets is restricted to a certain extent, resulting in its green total factor productivity not being significantly improved.

Table 3 Results of regional heterogeneity test

	(1) east	(2) Central	(3) west	(4) northeast
In GF	0.231***	0.143***	-0.125***	0.069***
	(2.848)	(3.339)	(-1.454)	(2.111)
Controls	Yes	Yes	Yes	Yes
Cons	0.2.4***	-1.415***	-0.505***	-8.497***
	(0.222)	(-0.981)	(-0.556)	(-1.925)
Time	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes
R^2	0.346	0.445	0.286	0.541
N	140	84	154	42

From the data in Table 3, we can see that green finance in the eastern, central and northeastern regions significantly promotes land resource asset pricing. In contrast, green finance in the western region has an inhibitory effect on the pricing of land resource assets, and the regression results are insignificant. Among them, the promoting effect of the eastern region is the most obvious, and the impact coefficient of green finance on the pricing of land resource assets is 0.231*** (t value is 3.339); the impact coefficient of the central region is 0.143*** (t value is 2.111); the impact coefficient of the northeastern region is 0.069** (t value is -1.925); the impact coefficient of the western region is -0.125 (t value is -1.454).

This regional heterogeneity may be because the level of green finance development in the eastern, central and northeastern regions is relatively high, and there are more related green financial products and services. In addition, the government's effective policy support also enables industrial enterprises to get more support and help for green development and technology innovation. It promotes industrial enterprises to develop clean and environmental protection. In contrast, green finance development in the Western region is relatively low. The government's environmental law enforcement and related incentive and constraint policies need to be put in place, which, to a certain extent, restricts the pricing of regional land resource assets, resulting in its green total factor productivity not significantly improved. For example, the eastern region may have more green credit resources, a more active green securities market, and a more complete green insurance and investment system, all of which provide strong support for the pricing of land resource assets. However, the western region may need to improve in these aspects, which affects the positive role of green finance in pricing land resource assets. The data in Table 4 reveals the regional heterogeneity of the impact of green finance on the pricing of land resource assets and provides an important reference for further research and formulation of relevant policies.

4. Conclusion

By constructing a rigorous empirical model, this paper explores the intrinsic relationship between green finance and land resource asset pricing. In the research process, land green total factor productivity was selected as a key proxy variable to fully reflect the production efficiency and value changes of land resources under the background of the green economy. The data show that green finance positively impacts land resource asset pricing. For example, before adding control variables, its impact coefficient is 0.094*** (t value is 4.446), and after adding, it is 0.018*** (t value is 3.553). It plays a mediating role in the impact coefficient of land resource asset pricing (0.004, significant at the 1% level) and the ecologicalization of industrial structure (green finance impact coefficient -0.142, important at the 5% level; impact coefficient of land resource asset pricing -0.001, important at the 1% level), and the impact coefficient of green finance on land resource asset pricing (0.051) is smaller than 0.142 (t value is 3.656) in the benchmark regression. In terms of regional heterogeneity, green finance has a promoting effect in the eastern (0.231***, t value is 3.339), central (0.143***, t value is 2.111) and northeastern regions (0.069**, t value is -1.925), while it has an inhibitory effect in the western region (-0.125, t value is -1.454) and is not significant. In short, this study provides a reference for constructing a land resource asset pricing system and the coordinated development of green finance and land resource markets.

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