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AI Based Intelligent Blockchain Model for Resource Allocation and Management in Internet Finance and Ecological Economy

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Abstract The rapid progress of Artificial Intelligence (AI) offers promising solutions to address the challenges associated with building a sustainable and environmentally conscious industry, a critical step towards achieving an ecological civilization. Environmental financing plays a pivotal role in driving the development of a low-carbon, circular, and eco-friendly economy, thereby facilitating industrial growth and societal advancement. However, the precise relationship between environmental financing and the development of the green industry has not been thoroughly explored. This research aims to analyze the coordinated development between environmental financing and the green industry, with a specific focus on the Yangtze River Economic Region in China. A comprehensive evaluation model was constructed utilizing data from 11 provinces and autonomous regions, combining cluster finance and economic efficiency models. The findings reveal an increasing level of financial groups across different provinces and cities along the Yangtze River in the economic zone, accompanied by a convergence of urban ecological and economic efficiency. This paper proposes measures to enhance the ecological and financial efficiency of the Yangtze River economic zone, including strengthening regional financial and economic cooperation and promoting the construction of an ecological civilization.

Index Terms coupling coordination, internet finance, financial agglomeration, ecological economy, empirical analysis

I. Introduction

In the process of countries around the world seeking economic growth, the rapid development of industry is accompanied by the emergence of phenomena such as ecosystem degradation and tightening resource constraints. In 1972, the Club of Rome released a related report, simulating the dynamic evolution of the global economic system in the “finite world” [1]. Due to the early start of industrialization in developed countries, their development process reached the in-flection point of the environmental Kuznets curve earlier. In order to deal with the increasingly severe environmental threats, some countries, as the pioneers of green development, took the lead in combining environmental benefits with economic benefits, and in stable development on the premise of trying to achieve a virtuous circle of the ecosystem [2]. Since the 21st century, different countries have made efforts to varying degrees, but the Bank for International Settlements in 2020 indicated that climate change may lead to a systemic financial crisis and send a strong early warning signal of environmental risks. Today, the world has built a green and recyclable development model. become the general trend [3].

To strengthen the development of green industries, countries have made the following efforts. In Asia, Japan, as the first country to try green industry, mainly creates market demand for green products through green procurement, which is of great benefit to cultivating the public’s green consumption habits [4]. In the EU, Denmark, as a country with the lowest energy consumption per unit of economic growth, has not only stipulated strict emission standards for hazardous wastes such as exhaust gas, wastewater, solid waste, etc., but also established a good public-private cooperation mechanism. To fund the research and development of innovative technologies for emission reduction and pollution control [5]. In 1998, the German government realized the urgency of developing green industries and raised the whole society’s sense of responsibility for the importance of protecting the ecological environment while guiding industrial upgrading and technological innovation. Socioeconomics” [6]–[8].

Financial agglomeration - eco-efficiency is a complex system. On the one hand, financial agglomeration can promote economic growth by making full use of resources and optimizing the investment of credit funds, thereby improving the level of ecological efficiency. On the other hand, improving ecological efficiency will also promote the level of financial agglomeration. The improvement of ecological efficiency means that because of reducing resource use and environmental damage, higher economic value can be obtained at lower environ-mental costs. The agglomeration of financial institutions, financial products, technologies, etc. in a specific space can form financial agglomeration. Financial agglomeration is an important form of the financial industry. By optimizing the industrial structure to improve economic benefits, it has a positive effect on ecological efficiency [9], [10].

Eco-finance in Western countries started early, with distinct and diverse financial products, and accumulated rich experience in how to balance the nature of financial institutions' profit-seeking nature and the nature of resource allocation [11]. First of all, from the perspective of implementation entities, it is di-vided into four categories: retail, investment banking, asset management and insurance. The target group of its green gold products is not only for enterprises, but also covers families and individuals. The retail side mainly provides ecological financial tools for residents, including green housing credit, new energy vehicle credit, green credit cards, etc.; investment banks mainly provide ecological financial products for government agencies and institutions, including green project financing and credit guarantee, technology leasing, private equity In-vestment and other products; asset management departments, such as public funds, provide low-carbon funds, green industry funds, new energy funds, etc.; insurance services cover a wide range, involving auto insurance, commercial insurance and carbon insurance.

The restrictive indicators and policies introduced by my country in the field of energy conservation and environmental protection have created a broad demand space for green industries. To promote green development, the state has continuously raised the environmental protection access threshold, strengthened the constraints of indicators such as total energy consumption and total pollutant discharge, and implemented systems such as ecological externality assessment and environmental performance assessment. The push-back of environmental policies has brought huge investment demands for green industries [12]. At the same time, the power change, green industry, as the best choice for economic development, resource conservation and environmental protection, has strong vitality [13]. However, in general, the current industrial policies and supporting mechanisms are not perfect. In the current free competition market structure, the comprehensive competitiveness of single-subject enterprises is weak, and the industrial concentration is low, making it difficult to form the core cohesion of industrial development. In particular, green small and micro enterprises with light asset attributes are in urgent need of help and support in the face of difficulties in financing and technological innovation.

The research on the relationship between economic agglomeration and ecological economic efficiency puts forward a new idea of model construction and economic development, which has certain practical significance.

The primary research question of this study is to examine the coordinated development between environmental financing and the green industry in the Yangtze River Economic Region of China. By utilizing data from 11 provinces and autonomous regions, a comprehensive evaluation model combining cluster finance and economic efficiency models was constructed. The findings of the study demonstrate an increasing level of financial groups in different provinces and cities along the Yangtze River economic zone, indicating a positive trend in the development of environmental financing. Furthermore, the research highlights the convergence of urban ecological and economic efficiency, suggesting that the promotion of environmental financing contributes to the overall sustainability and progress of the green industry in the region. Based on these findings, the paper proposes measures to further enhance ecological and financial efficiency, emphasizing the importance of regional financial and economic cooperation and the construction of an ecological civilization.

II. Ecological Finance and Coupling Collaboration Model

A. Ecological Finance

It has been more than 20 years since the birth of ecological finance. From the perspective of its development process, it generally shows the characteristics of "practice first and theory second". Since a unified theoretical framework has not yet been formed, scholars have different opinions on the concept of "ecological finance". Foreign scholars refer to ecological finance as environmental finance and believe that ecological finance is a means of environmental protection. Domestic scholars regard ecological finance to transform the financial industry and emphasize the importance of the financial industry as a medium in the connotation grasp.

At present, in the overall structure of ecological finance in my country, more than 90% of the scale is occupied by green credit. According to data from relevant research institutions, as of 2020, my country's green credit balance has grown to 11.95 trillion yuan, an increase of 17% from 10.33 trillion yuan in 2019. In recent years, commercial banks have launched mortgage and pledge financing services for the property rights of environmental assets, which revitalized the environmental property rights of enterprises and improved the financing difficulties of light-asset enterprises. Figure 1 shows the development of green credit after the central bank standardized the statistical caliber of green credit.

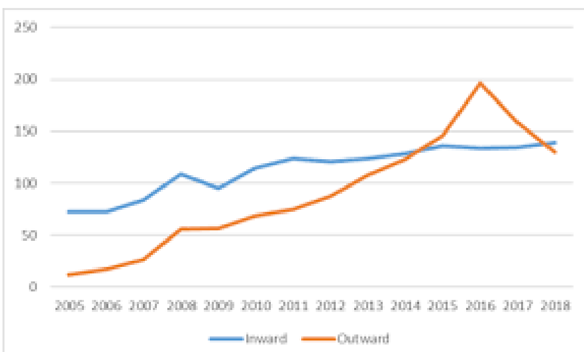

Figure 1: Year-End Growth Rate of My Country's Ecological Finance

Overall, the domestic green bond market has become more active, with richer maturities and an improved overall rating. Figure 2 shows the custody volume of green bonds in my country since 2016, and Figure 3 shows the China Green Bond Index compiled by China Bond since 2010.

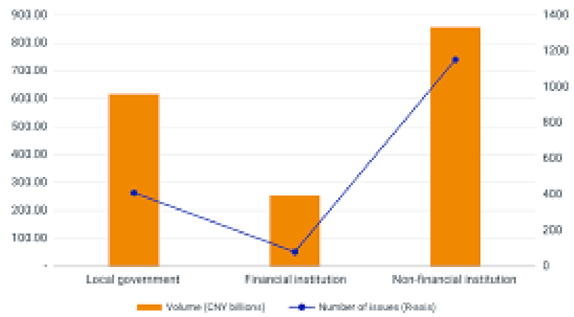

Figure 2: My Country's Green Debt Custody Situation

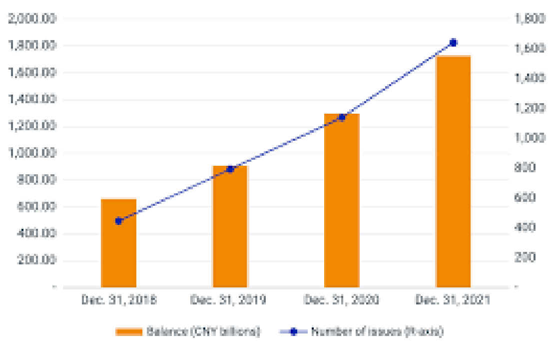

Figure 3: Shows My Country's Green Bond Index

In recent years, the original premium income and insurance compensation expenditures in the Yangtze River Economic Belt have continued to rise, but the insurance depth is still lower than the national insurance depth, and the insurance industry in this region has a lot of room for development. As shown in Table 1.

Table 1: Green Credit Expenditure in the Yangtze River Basin

Years	Original insurance premium income (100 million yuan)	Insurance compensation expenditure (100 million yuan)	Insurance depth (%)
2009	4582.42	1270.5	3.13
2010	5957.52	1310.02	3.37
2011	5940.78	1643.72	2.81
2012	6565.24	1990.17	2.76
2013	7175.58	2647.93	2.77
2014	8246.11	3069.77	2.92
2015	9787.49	3715.04	3.22
2016	12591.86	4495.95	3.74
2017	15160.54	4795.32	4.12
2018	15564.63	5241.69	3.66

Eco-efficiency integrates economy, environment and resources into a system, reflecting the relationship between economic development, environmental pollution and resource consumption. The connotation of eco-efficiency includes many aspects. Based on operability and scientific Ty, an eco-efficiency evaluation system should be constructed from different dimensions and in all directions.

B. Coupling Cooperation Model

This paper selects the three indicators in Table 2 as circular economy indicators, reflecting the status of the Yangtze River Economic Belt in harmony with nature while the economy is developing.

Table 2: Circular Economy Indicators of the Coupled Synergy Model

System layer	Level I indicator	Secondary indicators	Positive and negative indicators
Ecological efficiency system Y	Y_1 environmental pollution	Y_{11} Industrial wastewater discharge	-
		Y_{12} Industrial sulfur dioxide emissions	-
		Y_{13} Output of industrial solid waste	-
	Y_2 resource consumption	Y_{21} Annual electricity consumption	-
		Y_{22} Annual water consumption	-
	Y_3 economic performance	Y_{31} Per capita GDP	+
		Y_{32} Total industrial output value	+

We take q factors as output factors, denoted as y_r $(r = 1, \ldots, q)$, and because of the difference in factor weights, we denote the weights of different output factors as u_r $(r = 1, \ldots, q)$. Finally, when we measure the efficiency of decision-making units, we denote the decision-making unit currently being measured as DMU_k, then the ratio of output and input of this group of decision-making units is expressed by Eq. (1) as:

$$h_k = \frac{u_1 y_{1k} + u_2 y_{2k} + \cdots + u_q y_{qk}}{v_1 x_{1k} + v_2 x_{2k} + \cdots + v_m x_{mk}} = \frac{\sum_{r=1}^{q} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \quad (u \geq 0; v \geq 0), \tag{1}$$

and, since the efficiency value cannot be greater than 1 and cannot be less than 0; so the efficiency value of this measure is limited to a minimum value greater than or equal to 0, and a maximum value less than or equal to 1, namely:

$$\frac{\sum_{r=1}^{q} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \leq 1. \tag{2}$$

This model is based on constant returns to scale, and its linear programming model is:

$$
\left.\begin{aligned}
\max \quad & \frac{\sum_{r=1}^{q} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \\
\text{s.t.} \quad & \frac{\sum_{r=1}^{q} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \leq 1, \\
& u \geq 0;\ v \geq 0, \\
& i = 1,2,\ldots,m;\ r = 1,2,\ldots,q; \\
& k = 1,2,\ldots,n.
\end{aligned}\right\} \tag{3}
$$

Although the CCR model and the BCC model have natural advantages for measuring efficiency, these basic models still have many defects in practical application. For example, these basic models cannot compare these decision-making units when they are all at the frontier of production; and these basic models cannot measure all slack variables, and measurement errors will occur in actual operation; and these basic models also Dynamic changes in efficiency cannot be measured. The planning formula of the BCC model is as Eq. (4):

$$
\left.\begin{aligned}
\min \quad & \rho \\
\text{s.t.} \quad & \sum_{j=1}^{n} \lambda_j x_{ij} \leq \rho x_{ik}, \\
& \sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{rk}, \\
& \sum_{j=1}^{n} \lambda_j = 1, \\
& \lambda_j \geq 0, \\
& i = 1,2,\ldots,m;\ r = 1,2,\ldots,q; \\
& j = 1,2,\ldots,n.
\end{aligned}\right\} \tag{4}
$$

Its algorithm flowchart is shown in Figure 4 and its technical framework is shown in Figure 5. The coordinated development of ecological finance and green industry is a multi-objective system decision, and suppose the system has N targets, and now give the targets a certain efficacy coefficient X_{kij}, $0 \leq X_{kij} \leq 1$, because there are two subsystems, so $K = 1, 2$, when the target is the most satisfactory, $X_{kij} = 1$, when the target When most dissatisfied, $X_{kij} = 0$.

$$
U_{ki} = \begin{cases} 1, & X_{ki} = \alpha_{ki}, \\ \dfrac{X_{ki} - \beta_{ki}}{\alpha_{ki} - \beta_{ki}} * 0.99 + 0.01, & \beta_{ki} < X_{ki} < \alpha_{ki}, \\ 0, & X_{ki} = \beta_{ki}. \end{cases} \tag{5}
$$

For a negative power function, the larger the index value, the smaller its positive contribution to the system, as shown in the Equation.

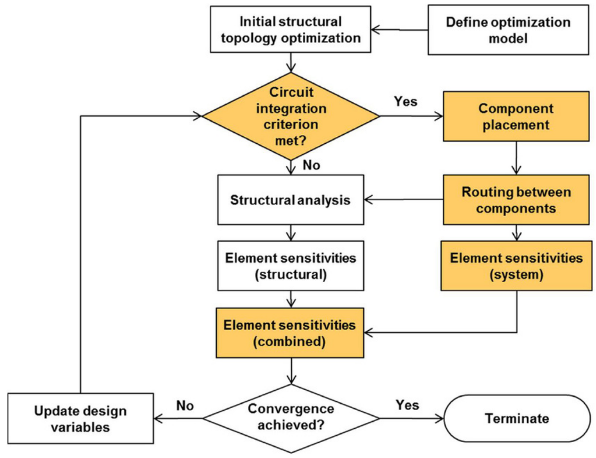

Figure 4: Flowchart of the Coupled Model Optimization Algorithm

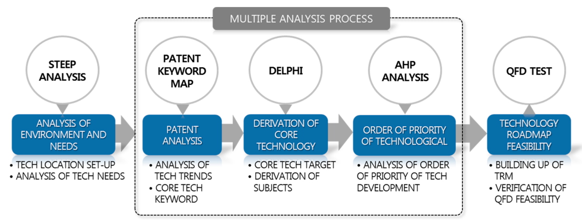

Figure 5: Technical Roadmap for Eco Economic Efficiency Analysis for Methods

$$
U_{ki} = \begin{cases} 1, & X_{ki} = \beta_{ki}, \\ \dfrac{\alpha_{ki} - X_{ki}}{\alpha_{ki} - \beta_{ki}} * 0.99 + 0.01, & \beta_{ki} < X_{ki} < \alpha_{ki}, \\ 0, & X_{ki} = \alpha_{ki}. \end{cases} \tag{6}
$$

Use the above calculation formula for the orderly efficacy of each order parameter and the following weighted arithmetic mean method to calculate the order degree of each order parameter in the ecological finance subsystem, the green industry subsystem and the ecological finance and green industry coupling system respectively. Total Contribution", as shown in the following Equation:

$$
U_{1i} = \sum_{j=1}^{p} \omega_{1j} X_{1ij} \tag{7}
$$

$$
U_{2i} = \sum_{j=1}^{p} \omega_{2j} X_{2ij} \tag{8}
$$

$$
T_i = \alpha U_{1i} + \beta U_{2i} \tag{9}
$$

The calculation parameters of coupling collaboration are shown in Table 3 and the coupling coordination degree division table are shown in Table 4.

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Table 3: Coupling Degree Classification

C reference interval	Coupling stage
0.00–0.09	Low level coupling stage
0.10–0.19	
0.20–0.29	
0.30–0.39	Antagonistic phase
0.40–0.49	
0.50–0.59	Running in stage
0.60–0.69	
0.70–0.79	High level resonance stage
0.80–0.89	
0.90–1.00	

Table 4: Coupling Coordination Degree Classification

Coordination type	D reference interval	Coordination level	U_2i Relationship with U_1i
Dysfunctional recessive type	0.00–0.09	Extreme disorder (I)	$U_{2i} \to 0.1$ zero-point one Green finance lagging type $\lvert U_{2i} - U_{1i} \rvert \leq 0.1$ Synchronous type of green finance and green industry $U_{1i} \to 0.1$ Lagging green industry
	0.10–0.19	Severe disorder (II)	
	0.20–0.29	Moderate disorder (III)	
	0.30–0.39	Mild disorder (IV)	
Transitional type	0.40–0.49	Near disorder (V)	
	0.50–0.59	Reluctant coordination (VI)	
Coupling coordination type	0.60–0.69	Primary coordination (VII)	
	0.70–0.79	Intermediate coordination (VIII)	
	0.80–0.89	Benign coordination (IX)	

III. Variable Selection

First, in terms of ecological financial indicators, ecological financial instruments mainly include green credit, green credit is the earliest ecological financial practice in my country, and the data structure is relatively complete. The development time of green bonds in my country is short and the availability of relevant scale data is low, so the China Green Bond Index released by China Bond Valuation Center since 2018 is used as the measurement index. The green insurance market is still in its infancy and underrepresented. As shown in Table 5.

Table 5: Variable Value Table of Different Cities

region	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Shanghai	0.801	0.796	0.738	0.699	0.717	0.694	0.721	0.721	0.653	0.678
Jiangsu Province	0.631	0.657	0.694	0.696	0.677	0.723	0.768	0.752	0.795	0.724
Zhejiang Province	0.561	0.601	0.623	0.607	0.625	0.645	0.710	0.666	0.692	0.645
Anhui Province	0.244	0.225	0.225	0.226	0.227	0.248	0.263	0.283	0.284	0.256
Jiangxi Province	0.087	0.113	0.087	0.084	0.085	0.112	0.128	0.114	0.115	0.107
Hubei province	0.225	0.212	0.227	0.219	0.221	0.246	269	0.247	0.274	0.257
Hunan Province	0.179	0.178	0.194	0.185	0.185	0.246	0.285	0.246	0.275	0.259
Chongqing City	0.192	0.195	0.169	0.163	0.161	0.159	0.147	0.122	0.139	0.156
Sichuan Province	0.364	0.382	0.377	0.377	0.378	0.394	0.418	0.429	0.402	0.364
Yunnan Province	0.136	0.117	0.105	0.104	0.106	0.121	0.106	0.124	0.104	0.088
Guizhou Province	0.078	0.090	0.114	0.085	0.055	0.054	0.054	0.058	0.085	0.087

A. Empirical Analysis

It is necessary to adopt the objective weighting method to analyze the correlation and information between the indicators. The subsystems allocate the weights separately. In the specific implementation of the calculation, the specific operation of the modified entropy weight method is as follows:

$$x_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} * 0.99 + 0.01, \quad \text{(positive indicator)} \tag{10}$$

$$x_{ij} = \frac{\max(x_j) - x_{ij}}{\max(x_j) - \min(x_j)} * 0.99 + 0.01. \quad \text{(positive indicator)} \tag{11}$$

The single-index evaluation score is shown in the following Equation:

$$S_{ij} = \omega_{ij}^{*} x_{ij}. \tag{12}$$

B. Construction of Evaluation Index System

The large scope has a great impact on it; regarding the degree of correlation between the two, some scholars have studied the impact of ecological finance on the industrial structure, and most of them focus on the research on industrial optimization of green credit and related qualitative analysis, and neither ecological finance nor green industry has formed a standard. Comprehensive evaluation index system. As shown in Table 6:

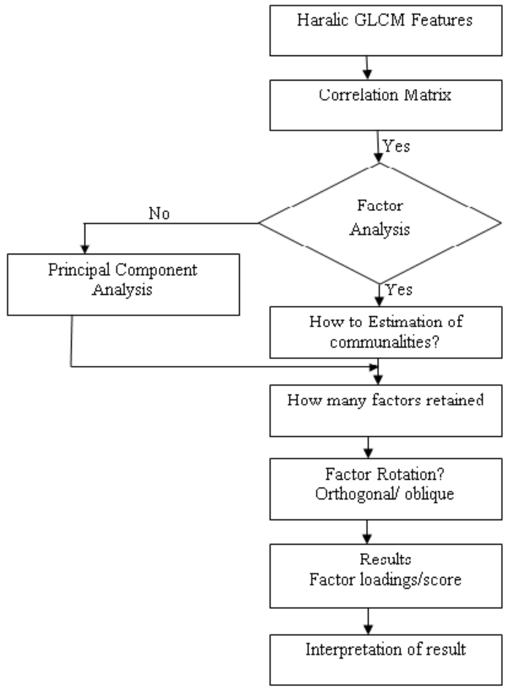

Figure 6: Research Model of Algorithm Factor Extraction

IV. Case Study

Combined with the weight of the ecological finance single indicator proposed by the previous model, multiplied with the normalized data of the original data, and then summed up different indicators to obtain the evaluation index of ecological finance for each year. Among them, the weight of the single index obtained by calculating the difference coefficient using the entropy weight method is different, and the effect of different indexes on the overall evaluation of ecological finance is also different. In the evaluation system of ecological finance, the balance of green credit accounts for 20%, the role of green credit in the balance of RMB loans accounts for 18%, the role of China's green bond index accounts for 28%, and the six energy-intensive industries account for industrial, the proportion of industrial interest expenses accounted for 20%, and the proportion of public financial expenditures invested in energy conservation and environmental protection accounted for 15%. The experimental results are shown in Figure 7.

The results obtained through the objective weighting method are more reasonable. Green credit in ecological fi-

Table 6: Construction of Evaluation Index System

Target layer	Criterion layer	Indicator layer	Single finger	Single indicator weight	Criteria layer weight
Green Finance		Green credit balance	RMB100mn	0.21	1
		Proportion of green credit in RMB loan balance	%	0.019	
		China Green bond index	Spot	0.29	
Green industry	Green upgrading of infrastructure	Annual cumulative amount of air pollution prevention and control equipment	Platform	0.02	0.06
		Environmental protection equipment industry index	Spot	0.03	
		Completion of fixed assets investment in manufacturing of special equipment for environmental protection	Ten thousand yuan	0.01	
		Number of measuring points of environmental acoustic cover	individual	0.01	
	Energy saving and environmental protection	GDP energy intensity	Tons of standard coal / 10000 yuan	0.03	0.20
		Water resource consumption per unit of agricultural added value	(100 million / m3)		
		Environmental protection engineering and service industry index	Spot		
		Total investment in national environmental pollution control	Single finger		
		Total investment in national industrial pollution control	Ten thousand yuan		
		Recovery of main renewable resources	10000 tons		
	Green clothes	Proportion of tertiary industry in GDP	%		0.19
		Total amount of pollutant discharge fee paid into the warehouse	Ten thousand yuan		
		Amount of environmental protection products purchased by the National Government	Single finger		

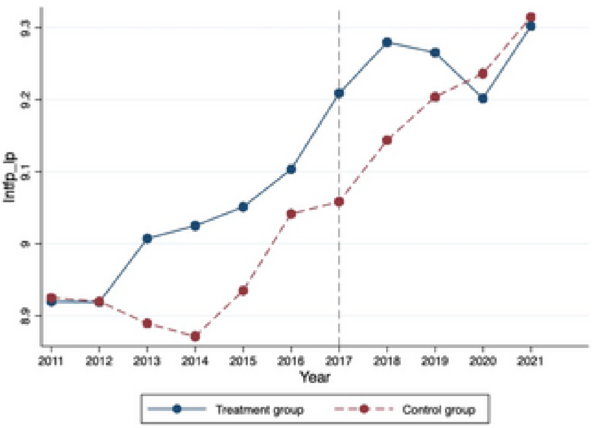

Figure 7: China's Eco-Finance Annual Evaluation Index

nance has the most mature development in China, occupying half of the ecological finance. Its development has a greater impact on ecological finance. Its positive evaluation index green credit balance and negative the six high-energy-consuming industries account for 40% of the industrial industry's interest expenditure in the evaluation index system; the number of bond types has exceeded 80, and the number is nearly 2,100. The government, finance and public utilities are the three issuers, and their overall scale is difficult to calculate [14]–[16].

As the second largest type of eco-finance product in China, this paper selects the China Green Bond Index issued by China Bond Valuation Center as a measure of 28% of eco-finance development. The last item that accounts for 15% of the power is the proportion of public financial expenditures invested in the field of energy conservation and environmental protection. Ecological finance has obvious top-down attributes in China, and the role of government expenditure cannot be underestimated. The proportion as a measure more accurately removes the influence of the total amount, showing how the government's cake is divided into the fields of energy conservation and environmental protection in different years, which is of representative significance for the study of the implementation progress of ecological finance. It is difficult to obtain accurate statistics on the premium income of other green insurance and the specific data of green funds, and this article does not consider it here. According to the above formula, these indexes are used to analyze the development level index of the ecological financial subsystem. The specific calculation results are shown in Table 7.

Overall, the green industry has ushered in a periodical peak in 2014 and 2016, and the growth rate compared with the previous year is particularly significant, 79.30% and 32.33% respectively, of which energy conservation and environmental protection and ecological environment have obvious driving effects. Observing the development trend of the six major criteria layers.

In addition, according to the above formula, this section also uses the subsystem development level index to performs statistical analysis on the calculation results according to the corresponding grading standards. The calculation results are shown in Table 8.

V. Conclusion

Eco-finance is also a branch of green development from a macro perspective and is inseparable from the performance of green industries. However, due to the special positioning of finance in the economic system, this paper considers it as a subsystem to consider whether it truly supports green industries. Its coupling degree C has always been higher than 0.9, indicating that regardless of the development level, the two have the nature of "sharing weal and woe" at any stage. The speed achieves the coupling effect of "hand in hand". When calculating the coupling coordination degree D, the weighted average result T of the two subsystems is used as a variable, which balances the insignificant value of C, and considers the development level other than the development speed. From 2013 to 2020, the coupling coordination degree of the two climbed at a growth rate of 5.14%, 21.89%, 9.25%, 22.37%, 7.04%, 6.28%, from high-level coupling in low-level states to coordinated resonance in high-level states, this indicator

Table 7: Evaluation Index of Eco-finance Annual Development Level

Indicator / year	2013	2014	2015	2016	2017	2018	2019
Yearend balance of green credit	0.0024	0.0353	0.0755	0.0957	0.1359	0.1829	0.2309
Green credit balance / RMB loan balance	0.0629	0.0865	0.1036	0.0287	0.0351	0.0372	0.0012
Proportion of public financial expenditure invested in energy conservation and environmental protection	0.1267	0.0361	0.0628	0.0539	0.1998	0.2172	0.2651
China Green bond index	0.0014	0.0365	0.0735	0.0781	0.0785	0.1138	0.1344
China Green bond index	0.2391	0.1632	0.3251	0.3504	0.6127	0.7534	0.8976

Table 8: Levels of Empirical Results

particular year	Coupling degree (c)	Coupling stage	Coupling coordination degree D	Coordination level		Coordination type
2013	0.9921	High level of	0.4591	Near disorder (V)	-0.0535	Synchronous type
2014	0.9396	Vibration stage	0.4826	Near disorder (V)	0.1699	Green finance lagging type
2015	0.9982		0.5883	Barely coordinated (VI)	0.0427	Synchronous type
2016	0.9867		0.6427	Primary coordination (VII)	0.1367	Green finance lagging type
2017	1.0000		0.7864	Intermediate coordination (VIII)	0.0122	Synchronous type
2018	0.9982		0.8416	Benign coordination (IX)	-0.0871	Synchronous type
2019	0.9937		0.8945	Benign coordination (IX)	-0.1838	Green finance lagging type

reflects that the rapid development of ecological finance and green industry in recent years has achieved a leap from a low level to a high level of resonance. According to the data and results, the two carriages to achieve green development—ecological finance and green industry have cooperated tacitly in recent years. Although the level is still not stable, the growth process is full of leap forward and cyclical retreat. From quantitative change to qualitative change, we must continue to vigorously develop ecological finance and green industries and expand the green scope in the market environment. Since ecological finance has achieved a high level of coupling and coordination with the green industry, we should innovate the ecological financial service model and develop financial products suitable for different green sub-sectors, to drive the green industry to maintain vitality in the future economic environment.

While this study provides valuable insights into the coordinated development between environmental financing and the green industry in the Yangtze River Economic Region, it is important to acknowledge certain limitations. Firstly, the research focuses specifically on the Yangtze River Economic Region in China, which may limit the generalizability of the findings to other regions or countries. Additionally, the study relies on data from 11 provinces and autonomous regions, and expanding the dataset to include a broader geographical scope could enhance the robustness of the analysis. Furthermore, the evaluation model used in this research could be further refined and validated through additional empirical studies. For future directions, it would be beneficial to explore the long-term impacts of environmental financing on the sustainable development of the green industry, and to investigate the effectiveness of specific measures proposed in this study. Moreover, considering the rapidly evolving nature of environmental challenges and financial mechanisms, continuous monitoring and updating of the evaluation model will be essential to capture changing dynamics and ensure the relevance of the findings in informing policy and decision-making processes.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares no conflicts of interest regarding this work.

Funding Statement

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