

An Empirical Study on the Coupling Development of Culture Industry and Green Finance Industry in Jiangsu Province

Yan Han

Nanjing Normal University, Nanjing, 210023, China

Abstract

Based on the analysis of the development status on culture industry and green finance industry in Jiangsu Province, this paper uses the coupling model to empirically analyze the degree of coupling and coordination between culture industry and green finance industry from 2017 to 2019. The research shows that the integrated development of culture industry and green finance industry in Jiangsu Province has been declining in recent years, and the degree of integrated development between the two is unsatisfying. The culture industry and green finance industry in Jiangsu province fall into the category between basic coordination type and mild imbalance type driven by cultural resources. This study suggests that in the future, Jiangsu Province should incorporate elements of science and technology to lead the high-quality development of culture industry and green finance industry, embrace elements of innovation to promote the in-depth integrated development of culture industry and green finance industry, and integrate elements of ecological civilization to create an eco-industrial chain of culture industry and green finance industry, thereby promoting the accelerated development on the coupling and coordination between culture and green finance industries in Jiangsu Province.

Keywords

Culture Industry; Green Finance Industry; Integrated Development; Jiangsu Province.

1. Introduction

Since the 19th national congress, it has put forward the concept of modernization and green development to realize the harmonious coexistence between human and nature, proposed the establishment of a green financial system, and issued guidance on the construction of a green financial system. Green finance refers to a set of financial activities with specific "green" preferences. Financial institutions should fully consider the impact of environmental factors in investment and financing decisions, and invest more funds in sustainable enterprises and projects such as environmental protection, energy conservation and emission reduction and resource recycling through institutional arrangements and product innovation, while reducing investment in polluting and high energy consuming enterprises and projects, in order to promote sustainable economic development. The development of industry needs financial support. Capital is an effective driving force for industrial development. The adjustment of cultural industry structure in Jiangsu Province must be inseparable from the support of capital. Green finance can manage the source and demand of capital for the development of cultural industry, guide the adjustment direction of cultural industry structure, and more importantly, create credit for cultural industry. Under the guidance of the development of green finance, it is particularly important to expand the scale of green credit, improve financial infrastructure services, and increase credit support for upstream and downstream affiliated enterprises and projects in the cultural industry.

At present, the supportive policies of green finance for cultural industry in Jiangsu Province are not well-established, the awareness of supporting development is not strong, and the strength of supporting development is not adequate, which seriously hinders the development of cultural industry and the popularity of green consciousness in Jiangsu Province. Therefore, for the sustainable development of Jiangsu Province, based on the integrated relationship between cultural industry and green finance, it is of great theoretical and practical significance to study the current situation and countermeasures of the coupled and coordinated development of cultural industry and green financial industry in Jiangsu Province.

2. Measurement of Coupled Harmonic Degree between Cultural Industry and Green Financial Industry in Jiangsu Province

2.1. Coupling Degree and Index System

Given that the index system must be operable and systematic, the index system of cultural industry reflects the competitive strength and development power of cultural industry, including the development status, cultural demand and innovation ability of cultural industry, cultural resources and related industries, government behavior, etc. In the index system of green financial industry, it mainly focuses on improving the overall value of green financial industry and promoting the development of other industries, and concentrates on technological progress, industrial upgrading, ecological civilization, etc.

Table 1. Index System for Overall Evaluation of Cultural Industry and Green Financial Industry in Jiangsu Province

Primary index	Secondary index	Unit
cultural industry	Expenses for cultural undertakings	10,000 yuan
	Operating income of cultural enterprises above Designated Size	10,000 yuan
	Number of cultural market operating institutions	unit
	Employees of cultural market operating institutions	unit
	Number of public libraries	unit
	Number of art performance organizations	unit
	Number of cultural institutions for general public	unit
	Number of art exhibitions and creation institutions	unit
	Number of performances of art performance groups	10,000 times
	Number of literary and artistic activities organized by general public cultural institutions	times
green financial industry	Evaluation score of green financial development index	points
	Green credit balance	0.1 billion yuan
	Number of green bonds (excluding ABS) issued	unit
	Number of green ABS issued	unit
	Proportion of listed companies disclosing social responsibility reports	percent
	Average ESG score of listed companies	points
	Number of green PPP projects received	unit
	Number of new green fund products	unit
	Proportion of market value of high energy consumption industry	percent
	Agricultural catastrophe insurance coverage	percent

Note: the data in the above table are from China Statistical Annals, Jiangsu Statistical Annals, China Cultural Relics Statistical Annals, China Cultural Statistical Annals and China Financial Statistical Annals over the years.

When the concept of coupling is applied to the field of economics, it is to measure the closeness between interrelated and interplaying industries, and use quantitative analysis method to explain the mutual influence between the two industries. This paper uses the coupling degree as an index to measure the coupled and cooperative development of cultural industry and green financial industry in Jiangsu Province, draws lessons from the relevant calculation methods of industrial integration degree, and constructs a coupled harmonic degree model to quantitatively describe the characteristics of the integrated development of cultural and green financial industry in Jiangsu Province.

2.2. Standardized Processing of Data

In light of the dimensional differences of various indicators, it requires the use of maximum difference dormalization method to standardize the raw data for the calculation of coupled harmonic degree:

$$y'_{ij} = \frac{x_{ij} - x_{j\min}}{x_{j\max} - x_{j\min}} \quad (i = 2017, 2018, B ; j = 1, 2, B, m) \text{ (positive indicator)}$$

$$y'_{ij} = \frac{x_{j\max} - x_{ij}}{x_{j\max} - x_{j\min}} \quad (i = 2017, 2018, B ; j = 1, 2, B, m) \text{ negative indicator (according to the}$$

context, the market value of high-energy consumption industry is a negative indicator)

In the above formula, x_{ij} is the raw value of index j in the year of i ; $x_{j\max}$ and $x_{j\min}$ represent the maximum and minimum values of index j in 2017-2019, respectively. y'_{ij} is the data after standardized processing. In order to ensure the data of logarithm is valuable, it is necessary to avoid the possibility of 0 value after standardization. Therefore, all data after standardization need to be shifted to the right by 0.01 units, i.e., $y_{ij} = y'_{ij} + 0.01$

Overall development level of cultural industry and green financial industry

Proportion of index j in the year of i to the indicator:

$$p_{ij} = y_{ij} / \sum_{i=2017}^{2019} y_{ij}$$

Information entropy of index j :

$$E_j = - \sum_{i=2017}^{2019} p_{ij} \log p_{ij}$$

Utility value of indicator j :

$$D_j = 1 - E_j$$

Weight of indicator j :

$$W_j = D_j / \sum_{j=1}^m D_j$$

In the above formula, m represents the number of indicators. The standardized data can be calculated through the above formula to obtain the function weight of relevant evaluation indicators in the cultural industry and green financial industry system.

Table 2. Function Weight of Relevant Evaluation Indicators in the Cultural Industry and Green Financial Industry System

Primary index	Secondary index	Weight
Cultural industry	Expenses for cultural undertakings	0.092898834
	Operating income of cultural enterprises above Designated Size	0.122233322
	Number of cultural market operating institutions	0.098075032
	Employees of cultural market operating institutions	0.093234759
	Number of public libraries	0.092898834
	Number of art performance organizations	0.115331261
	Number of cultural institutions for general public	0.097264229
	Number of art exhibitions and creation institutions	0.090389402
	Number of performances of art performance groups	0.092898834
	Number of literary and artistic activities organized by general public cultural institutions	0.104775537
Green financial industry	Evaluation score of green financial development index	0.119802779
	Green credit balance	0.102284687
	Number of green bonds (excluding ABS) issued	0.100174552
	Number of green ABS issued	0.099915889
	Proportion of listed companies disclosing social responsibility reports	0.101943598
	Average ESG score of listed companies	0.099189845
	Number of green PPP projects received	0.102380026
	Number of new green fund products	0.099063141
	Proportion of market value of high energy consumption industry	0.099915889
	Agricultural catastrophe insurance coverage	0.075329538

Overall evaluation function of cultural industry:

$$z_x = \sum_{j=1}^m W_j x_{ij}$$

Overall evaluation function of green financial industry:

$$h_y = \sum_{j=1}^m W_j y_{ij}$$

In the above formula, m represents the number of indicators in the relevant industrial system, W_j represents the weight of relevant indicators, x_{ij}, y_{ij} represent the value after standardization.

Coupling degree formula of cultural industry and green financial industry:

$$C = \left\{ \frac{z_x h_y}{\left[\frac{z_x + h_y}{2} \right]^2} \right\}^k$$

In the above formula, C represents the coupling degree and k represents the adjustment coefficient. The range of k is $[2,5]$ and the value of k is 4. The degree of coordination between cultural industry and green financial industry can be directly reflected by the size of C and the range of C is $[0,1]$. The closer the value is to 1, the better the coupling between the two systems; On the contrary, the less ideal the coupling is.

Coupled harmonic degree between cultural industry and green financial industry Comprehensive evaluation index:

$$P = \alpha * z_x + \beta * h_y$$

Coupled harmonic degree:

$$R = \sqrt{C * P}$$

In the above formula, α , β represent the weight of cultural industry and tourism industry respectively, with the set value $\alpha = \beta = 0.5$. R represents the degree of coupling and P represents the overall evaluation index between the cultural industry and green financial industry of the two systems. In some cases, it is difficult to accurately reflect the integrated development level between the two systems by the coupling degree. Based on this, this study adopts the coupled harmonic degree with higher stability and wider adaptability to reflect the integrated development level of the two industries. The range of R is $[0,1]$, the closer the value is to 1, the higher the degree of industrial integration; On the contrary, the lower the degree of coordinated development.

3. Empirical Analysis and Countermeasures

3.1. Empirical Analysis

Given that the relevant data of green finance industry were only available since 2016 and some data were available since 2017, and in order to make the data comprehensive, this paper mainly calculates the integration of cultural industry and green finance industry in Jiangsu Province from 2017 to 2019. Through the coupled harmonic degree formula, the overall value of cultural industry, the overall value of green financial industry and the coupled harmonic degree of Jiangsu Province are calculated (see Table 3).

Table 3. Overall Statistics of Coupled Harmonic Index in Jiangsu Province

Year	Overall value of cultural industry u1	Overall value of green financial industry u2	Coupled harmonic degree (R)	u1/u2
2019	0.7446	0.3543	0.566	2.1016
2018	0.4028	0.4231	0.6418	0.952
2017	0.4303	0.4858	0.6718	0.8857

3.1.1. Analysis on the Overall Development Trend of Cultural Industry and Green Financial Industry in Jiangsu Province

Based on the calculation results in Table 3, the overall development level of cultural industry in Jiangsu Province has increased rapidly, and the overall value of cultural industry has increased from 0.4303 in 2017 to 0.7446 in 2019, demonstrating the determination and effect of Jiangsu Province to build a strong cultural province; The green financial industry in Jiangsu Province is

still emerging. In the early stage of development, the level was fast and gradually slowed down in the later stage. Therefore, the overall value of the green financial industry decreased from 0.4858 in 2017 to 0.3543 in 2019, indicating that the green financial industry should be slowed down and attention should be paid to practical effectiveness. In terms of development trend, the overall development of cultural industry in Jiangsu Province has shown an upward trend year by year, with a growth rate of 73.04% from 2017 to 2019, while the development of green finance industry in Jiangsu Province showed a declining trend year by year, mainly because it was over-pursued in the beginning, and slowed down in the later stage to seek effectiveness. Jiangsu Province has strong comprehensive development capability, profound cultural and historical heritage, and a solid economic foundation which lay a strong foundation for the development of its cultural green financial industry, leading to the well-developed cultural industry and green financial industry. In recent years, cultural and green financial industry has been progressing well in Jiangsu Province, on one side, owing to the strong support of the state for cultural industry, ecological civilization construction and the development of green financial industry under the macro background, on the other side, benefiting from the increasing demand for green cultural elements in the green financial industry, so as to jointly promote the high-quality and sustainable development of cultural and green financial industry in Jiangsu Province.

3.1.2. Analysis on the Integrated Development Level and Trend of Culture and Green Financial Industry in Jiangsu Province

According to the calculation results in Table 4, the overall development level of cultural and green financial industry integration in Jiangsu Province is medium to low, which has been staying within 0.7, with the highest index of 0.6718 in 2017; From the perspective of development trend, the overall development of the integration of culture and green finance industry in Jiangsu Province has shown a downward trend year by year. In 2019, the integration degree of culture and tourism industry in Jiangsu Province was 0.566, which decreased by 15.75% compared with 2017. This is mainly due to the decline of the development trend of green finance industry in Jiangsu Province. In order to more intuitively reflect the current situation of the coupled and coordinated development of the two industries in Jiangsu Province, this study classifies the coupled harmonic degree of cultural industry and green financial industry in Jiangsu Province according to the calculated value of the coupled harmonic degree of the two industries (see Table 4).

Table 4. Level of Coupled Harmonic Degree

Degree of Coordination	Coordination phase	Degree of Synergy	Coordination phase
0—0.09	Extreme disorder	0.50—0.59	Mild disorder
0.10—0.19	Severe disorder	0.60—0.69	Primary coordination
0.20—0.29	Moderate disorder	0.70—0.79	Intermediate coordination
0.30—0.39	Mild disorder	0.80—0.89	Good coordination
0.40—0.49	Verge of disorder	0.90—0.99	High quality coordination

According to the different development levels of cultural industry and green financial industry, the degree of integration can be divided into three different types: (1) when $U_1 > U_2$, it belongs to the lagging type of green financial industry (2) When $U_1 = U_2$, it belongs to the synchronous development of cultural green financial industry (3) When $U_1 < U_2$, it belongs to the lag type of cultural industry development. Therefore, we can obtain the development types of the integration degree of Jiangsu culture and green finance (Table 5), and analyze the influencing

factors of the integration of the two major industries in Jiangsu. From the overall situation, the development level of Jiangsu's green finance industry is slightly higher than that of the cultural industry, but there is a declining trend. In the later stage, it is between the primary coordination type driven by cultural resources and the mild disorder type, pending the development policy of Jiangsu's green finance.

Table 5. Types of Coupled Harmonic Degree

Year	Type
2017	Cultural lag
2018	Cultural lag
2019	Green finance lag

3.2. Countermeasures and Suggestions

The integrated development of cultural industry and green financial industry in Jiangsu Province coexists with differences and commonalities. Under the current concept of modernization and green development of harmonious coexistence between human and nature, under the background of national advocacy to improve cultural soft power, under the new situation of industrial integration, and in combination with the development status of cultural and green financial industry in Jiangsu Province, this paper presents the following three countermeasures and suggestions to promote the sustainability and high quality of the integrated development of culture and green financial industry in Jiangsu Province.

3.2.1. Integrate Scientific and Technological Elements to Lead the High-quality Development of Cultural Industry and Green Financial Industry

With science and technology, green financial industry can enrich green financial means, such as green stocks, green bonds, and green funds, etc; It can broaden the coverage of green finance. For example, in addition to traditional banks and other financial institutions, Internet financial institutions can also participate in financing; It can improve the development quality of green finance and its comprehensive economic value. With scientific and technological elements, the cultural industry can enrich the forms of artistic works, improve the number of performances and income, enhance people's participation and improve the comprehensive quality of the entire population. Therefore, we need to build a high-tech team, especially professionals with financial knowledge, culture and art, to form a platform for talents and science and technology. In short, scientific and technological elements can enable the two industries to develop towards a better direction, so as to achieve the purpose of industrial integration.

3.2.2. Integrate Innovative Elements and Promote the In-depth Integrated Development of Cultural Industry and Green Financial Industry

For the green financial industry, it needs the innovation of industrial structure, the innovation of economic growth mode, the innovation of industrial policy system, the innovation of talent structure and so on. For the cultural industry, it needs ideological innovation, environmental innovation, market innovation and so on. The combination of the two industries can lead to a complete overall innovation pattern.

At present, the green financial industry in Jiangsu Province is in a stage of groping forward, and there are bottlenecks in the development process. It is in need of innovative diversified cultural resources to give full play to the radiation and driving role of the cultural industry, comprehensively improve the cultural soft power of Jiangsu Province, and innovate the integrated development model from the establishment of industrial test field. For example, we can explore the use of financial leasing loans, industrial chain financing, joint guarantee and joint loan and other credit products, withdraw from the package of financial services, and ensure good connection of financing methods for all stages of the development of cultural

industry. We can also learn from the successful cases of direct financing of enterprises, explore the connection between the cultural industry and the capital market, and broaden the financing channels for cultural enterprises.

3.2.3. Integrate the Elements of Ecological Civilization and Build an Ecological Industrial Chain of Cultural Industry and Green Financial Industry

The core tenet of Xi Jinping's thought on ecological civilization is to achieve a harmonious and win-win situation between human and nature, economic development and ecological protection. Under the guidance of Xi Jinping's idea of ecological civilization, we should establish and improve a policy system conducive to the development of the two industries. In order to build a strong cultural province and promote the ecological development of green finance industry in Jiangsu Province, we must take ecological civilization as an important starting point. On one hand, China is now facing the dual problems of economic transformation and environmental pollution. We should use a variety of green financial means to promote the industrial transformation of Jiangsu Province, build a green industrial system and realize the ecological and environmental protection of industrial structure, to facilitate the realization of "beautiful China"; On the other hand, building the brand of Jiangsu's ecological culture industry, enhancing the contribution of culture to the economy, strengthening and deepening its industrial chain effect, and promoting the development of Jiangsu's ecological culture industry is conducive to realizing a strong cultural province in Jiangsu, so as to promote the formation of the ecological development industrial chain of Jiangsu's cultural industry and green financial industry.

4. Conclusion

Since the 19th national congress, it has presented the concept of modernization and green development to realize the harmonious coexistence between human and nature, proposed the establishment of a green financial system, and issued guidance on the construction of a green financial system. Jiangsu Province should improve the overall value of the development of cultural industry by supporting the development of cultural enterprises above designated size, raising the number of art performance groups, increasing the number of cultural organizations for general public, and organizing multiple literary and artistic activities. In terms of increasing the number of green PPP projects admitted into libraries, increasing the balance of green credit, increasing the proportion of listed companies that disclose social responsibility reports, and increasing the issuance of green bonds, we will improve the comprehensive value of the green financial industry and strive to promote the simultaneous development of the cultural industry and the green financial industry. At the same time, we should integrate scientific and technological elements, innovation elements and ecological civilization elements to build an ecological industrial chain of cultural industry and green financial industry, so as to accelerate the improvement of the coupled and coordinated development ability of culture and green financial industry in Jiangsu Province.

References

- [1] Y.L. Sun, Q.Q. Chen: The impact of Green Financial Development on Technological Advancement and Economic Growth -- An Empirical Study Based on PVARModel [J]. Finance and Economy,(2019) No.05, p.28-33.
- [2] Q. Cao:On the Innovation Path of China's Green Financial System [J]. Research on Financial Development,(2012), No.03, p.46-52.
- [3] Z. Xu, L. Guo, Y.N. Feng:Sustainable Development of Green Finance [J]. Southern Finance,(2018) No.10, p.3-14.

- [4] L.L.Zhang, L.M.Xiao, J.F. Gao: Measurement and Comparison of Development Level and Efficiency of Green Finance in China -- Based on the Micro Data of 1040 Public Companies [J]. China Science and Technology Forum,(2018) No.9, p.100-112+120.
- [5] X. Xiao: Green Financial Reform Contributes to the Construction of Ecological Civilization [J]. China's Finance,(2018) No.13, p.20-22.
- [6] H.Y. Fan, B.Q. Xue: Study on the Coupling and Coordination Degree of Tourism Industry and Cultural Industry in Henan Province [J]. Regional Research and Development, (2016) No. 4, p. 104-109.
- [7] D.F. Meng: Research on the Evaluation of the Competitiveness of Cultural Industry under the Background of the New Economic Normal -- Also on the Path to Enhance the Competitiveness of Cultural Industry [J]. Exploration, (2015) No. 4, p. 158-161.
- [8] W. Wang: Accelerating the Development of Jiangsu's Cultural Industry [N]. China Culture Daily, Vol. 3 (2016) No. 31, p. 2.