

Research on Green Inclusive Finance to Promote Rural Revitalization under the Goals of Carbon Peaking and Carbon Neutrality—Take Heilongjiang Province as an Example

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Abstract: Taking Heilongjiang Province as an example, this study explores ways and means to promote sustainable development in rural areas by strengthening the synergistic development of green inclusive finance and rural revitalization in the context of the goals of carbon peaking and carbon neutrality. The study concludes that the establishment of a green inclusive financial service center, optimization of policy environment and increase of investment are important means to achieve this goal. Among them, establishing a green inclusive financial service center can provide comprehensive financial service support for rural green industries; optimizing the policy environment can attract more green investment and improve the competitiveness of rural economy; increasing investment can expand the scale of green industries and form a virtuous cycle of rural green economic system. This study aims to provide a reference basis for promoting the development of rural green industries and rural revitalization.

Keywords: dual-carbon target; green finance; inclusive finance; rural revitalization

1. Introduction

Table 1: Measurements and rankings of IFI of financial inclusion indicators in 13 municipalities in Heilongjiang Province.

Region	2016	Ranking	2017	Ranking	2018	Ranking	2019	Ranking	2020	Ranking
Harbin	0.426	1	0.463	1	0.485	1	0.507	1	0.531	1
Daqing	0.264	2	0.281	2	0.293	2	0.313	2	0.328	2
Mudanjiang	0.223	4	0.237	3	0.258	3	0.279	3	0.305	3
Qiqihar	0.225	3	0.236	4	0.253	4	0.269	4	0.284	5
Jiamusi	0.218	5	0.232	5	0.246	5	0.263	5	0.293	4
Shuangyashan	0.213	7	0.229	7	0.237	7	0.252	7	0.275	6
Jixi	0.215	6	0.231	6	0.241	6	0.251	6	0.264	9
Hegang	0.207	8	0.225	9	0.236	9	0.248	9	0.261	11
Suihua	0.204	10	0.227	8	0.238	8	0.254	8	0.272	7
Qitaihe	0.201	12	0.214	11	0.229	11	0.245	11	0.266	8
Yichun	0.202	11	0.213	12	0.228	12	0.236	12	0.258	12
Heihe	0.205	9	0.223	10	0.235	10	0.247	10	0.263	10
Greater Khingan Range	0.197	13	0.209	13	0.214	13	0.225	13	0.249	13

With the increasing global climate change, the Chinese government has put forward the "double carbon" goal, which is to achieve both peak carbon and carbon neutrality as soon as possible. In this context, green development has become the development direction of more and more countries and regions, and it is also the inevitable choice for China's future development. And rural revitalization, as an important national strategy at present, also needs to be continuously promoted on the basis of green development. Green inclusive finance is a new type of financial tool to promote green development and rural revitalization. In Heilongjiang Province, rural economic development is relatively lagging behind

and the income level of rural residents is low, so promoting green inclusive finance can also provide a new boost to the development of the local economy. Through the research of this paper, it can provide reference and reference for the development of rural revitalization and green finance in other regions.

2. Indicator selection and data source

(1) Green financial business ratio: This indicator can reflect how much of the business of banks, insurance, securities and other financial institutions is invested in the green field, and the data can be obtained from the annual reports of financial institutions. (2) Inclusive financial coverage: This indicator can reflect the scope and coverage of inclusive financial services, and the data can be obtained from the annual reports of local financial regulators and financial institutions. (3) Rural loan balance: This indicator can reflect the loans granted by banks and other financial institutions in rural areas, and the data can be obtained from the annual reports of the People's Bank of China and local financial institutions. (4) Rural residents' savings deposits: This indicator can reflect the income level and savings awareness of rural residents, as well as the funding sources of financial institutions in rural areas, and the data can be obtained from the annual reports of the People's Bank of China and local financial institutions (as shown in Figure 1). (5) Carbon emissions: This indicator can reflect the local carbon emissions, and the data can be obtained from local environmental protection departments, enterprise pollution emission regulators, and public environmental reports. (6) Rural economic growth rate: This indicator can reflect the local rural economic growth. The data can be obtained from the local statistics bureau and annual reports. As shown in Table 1.

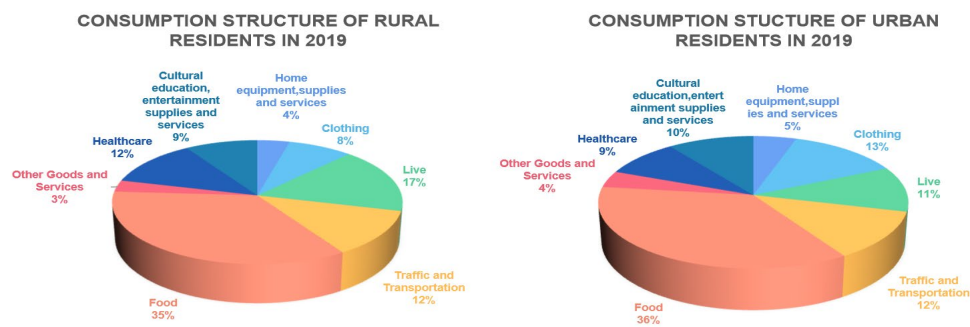


Figure 1: People's consumption in Heilongjiang in 2019

3. Entropy value method to construct a comprehensive index of the contribution of green finance, inclusive finance and rural development

3.1. Determine the index system

The impact of green finance and inclusive finance on rural development can be considered from several aspects, such as the coverage rate of financial services, the innovation ability of financial products, the degree of financial support for small and micro enterprises, and the process of financial digitalization. Therefore, we need to select relevant indicators in these aspects.

3.2. Data processing

The selected indicators will be quantified, which can usually be done by standardization methods (e.g. min-max standardization).

3.3. Calculation of weights

The weights of each indicator are calculated using the entropy method, which is a multi-criteria decision-making method based on the information entropy theory that avoids the problems of subjectivity and incompleteness. The method calculates the entropy value and correlation index of each indicator to derive the weight of each indicator.

3.4. Constructing a comprehensive index

The standardized value of each indicator is multiplied with its corresponding weight to get the weighted score of each indicator, and then these scores are summed to get the comprehensive index. The higher the composite index, the greater the role of green finance and inclusive finance in promoting rural development.

3.5. Interpreting the results

By comparing the composite indices of different regions or different time periods, the effectiveness of green finance and inclusive finance in promoting rural development can be assessed, and corresponding policy recommendations can be made accordingly.

4. The three-system coupling coordination degree model explores the coupling coordination degree of green inclusive finance and rural revitalization

The model takes the economic system, social system and environmental system as three major systems and considers the interaction relationship among them respectively. On this basis, green inclusive finance and rural revitalization can be considered as two important subsystems and their interactions with the main systems can be considered to assess their coupling coordination degree. Specifically, the following aspects can be taken into account:

(1) The degree of support of green inclusive finance to rural revitalization: By studying the business development, loan interest rate and financial product innovation of green inclusive finance in rural areas, the degree of its support to rural revitalization can be assessed.

(2) The degree of demand for green inclusive finance in rural revitalization: By studying the development of local rural economy, income level of rural residents and demand for ecological environmental protection, the degree of demand for green inclusive finance in rural revitalization can be evaluated.

(3) The influence of environmental protection and sustainable development on green inclusive finance and rural revitalization: by studying aspects such as environmental pollution control, ecological protection, and carbon emission limitation, the influence of environmental protection and sustainable development on green inclusive finance and rural revitalization can be assessed and the degree of coordination between them can be explored [1].

5. Significant factors affecting coupling coordination

5.1. Resource allocation

The optimal allocation of resources is the basis of coupling coordination, and the unreasonable allocation of resources will lead to the decrease of coupling coordination between different fields.

5.2. Institutional environment

The role of institutional environment is very important for coupling coordination in different fields, and different institutional environments will have a direct or indirect impact on coupling coordination.

5.3. Technological level

The improvement of technology level can promote the synergy and interaction between different fields, thus improving the coupling coordination.

5.4. Economic development level

The higher the level of economic development, the closer the connection and cooperation between different fields, and the higher the degree of coupling coordination.

5.5. Socio-cultural society

Social culture also has a direct or indirect influence on the coupling and coordination between different fields, which will affect people's behavior and way of thinking, and thus influence the synergy between different fields.

6. The direct impact effect of Spatial Dubin Model on green inclusive finance among different regions and the indirect impact effect on the surrounding regions

In the study of green inclusive finance, the spatial Dubin model can be used to assess the direct impact effect of green inclusive finance among different regions and the indirect impact effect on the surrounding areas. Specifically, the model can be built by collecting data on the development of green inclusive finance in different regions and spatially correlated data (e.g., transportation, resources, population, etc.). Then, the direct contribution of green inclusive finance among different regions and the indirect effects on surrounding regions can be assessed through parameter estimation of the model. These investigations and modeling can provide policy makers with information and recommendations on the development of green inclusive finance among different regions [2].

In addition, the Spatial Dubin Model can be used for spatial forecasting, i.e., the model is used to predict the future development of green inclusive finance in a region and further assess the impact of such development on the surrounding regions. This helps policy makers to formulate green inclusive finance policies more accurately and promote sustainable development.

Table 2: Indicator system for measuring the level of financial inclusion in Heilongjiang Province.

Indicator dimension	Descriptive measure	Specific indicators
Geographical penetration of financial services	Number of financial network / million square kilometers	Number of financial institutions per 10,000 square kilometers
	Financial Practitioners / million square kilometers	Number of financial employees per 10,000 square kilometers
	Number of financial outlets / 10,000 people	Number of financial outlets per 10,000 people
	Financial employees / 10,000 people	Number of financial services personnel per 10,000 people
Accessibility of financial services	Farmers' loan access rate	Percentage of farmers receiving loans
	Micro and small business loan acquisition rate	Proportion of micro and small enterprises receiving loans
Financial Services Usability	Deposit Services	Deposit balance as a percentage of GDP
	Loan Services	Loan balance as a percentage of GDP

7. Green and Inclusive Finance to Promote Rural Revitalization Policies under the Goal of "Double Carbon" - Taking Heilongjiang Province as an Example

7.1 Strengthen the support of green inclusive finance

(1) Increase the policy support for green inclusive finance. The government should increase the policy support for green inclusive finance, and guide financial institutions to strengthen green financial services and enhance support for green industries and rural revitalization by formulating relevant policies, regulations and plans. Combined with the existing index system construction methods, this paper constructs the index system of inclusive finance as shown in Table 2 above.

(2) Expand the coverage of green inclusive finance. Financial institutions should expand the coverage of green inclusive finance through innovative financial products and services, including providing low-interest loans, credit guarantees, financial leasing and other financing methods for green projects.

(3) Improve the risk management level of green inclusive finance. Financial institutions should

establish a perfect risk management mechanism to improve financial institutions' support and risk controllability for green inclusive finance by assessing the risk level of green projects and conducting effective risk control and supervision [3].

(4) Establishing an ecosystem for the development of green inclusive finance. The government, financial institutions, enterprises and society should form a win-win cooperation ecosystem to promote the development of green inclusive finance and accelerate the revitalization of the countryside and the realization of the goal of "double carbon".

7.2. Promote the transformation and upgrading of green industries

First of all, we can attract more capital to invest in rural green industries through financial tools such as green credit and green bonds to support the development and transformation and upgrading of green industries. For example, support the construction of green projects such as biomass energy and agricultural water-saving irrigation in the countryside. Secondly, the risk of green industry operation can be reduced and the risk resistance of green industry can be enhanced through green insurance and other means. This is conducive to attracting more investors and entrepreneurs to enter the green field in the countryside and promote the rapid development of the industry. Finally, farmers and villagers can be supported to participate in the development of green industries through green inclusive finance [4]. For example, farmers can be guided to plant green crops, raise green livestock and poultry, and process green food to improve their income and living standards and promote rural revitalization.

7.3. Establish a county-based green inclusive financial service network

(1) Establish a perfect service mechanism: through the establishment of green inclusive financial service points or financial service centers, provide rural residents with all kinds of financial services, such as loans, insurance, savings, etc. At the same time, pay attention to the improvement of service quality and efficiency, establish a service evaluation mechanism, and provide timely feedback to rural residents' opinions and suggestions.

(2) Strengthen financial product innovation: according to the needs of rural residents and the characteristics of rural development, innovate financial products and develop financial products related to green industries to provide financial support for rural revitalization. For example, special credit products suitable for green energy projects can be developed to provide preferential interest rates and repayment terms.

(3) Increase financial support for poverty alleviation: Give play to the role of financial support for poverty alleviation and help rural residents start their own businesses and employment through issuing microcredit and microloans to promote rural economic development.

(4) Strengthen financial education and propaganda: through financial knowledge popularization and propaganda activities, improve the financial literacy of rural residents and enhance their financial risk awareness and financial investment ability.

7.4. Guide financial institutions to participate in rural construction

(1) Increase policy support. The government should formulate and introduce more specific and powerful financial support policies to encourage financial institutions to increase their financial support for rural construction.

(2) Broaden the field of financial services. Financial institutions should actively carry out diversified services such as rural credit cooperatives, microcredit, financial leasing and insurance to meet the needs of different levels and fields in the countryside.

(3) Improve the level of financial services. Financial institutions should grasp the development trend of rural economy, precisely customize financial products and services for different industries and enterprises, and improve the quality and efficiency of financial services.

(4) Strengthen risk management capacity. Financial institutions should strictly implement the risk management system, protect the safety of funds by assessing the investment risks of projects, and provide financial innovation products, such as green credit and green bonds, to attract more funds to the rural construction field.

(5) Strengthen propaganda and promotion. The government and financial institutions should jointly

carry out publicity and promotion activities to increase rural residents' awareness and usage of financial services and encourage more rural residents to participate in the financial service system.

8. Green finance and inclusive finance on rural development horizontal and vertical combing

From a horizontal perspective, green finance and inclusive finance are two independent but mutually reinforcing fields. Green finance mainly serves the fields of clean energy, environmental protection and sustainable agriculture, aiming to promote the development of green economy; while inclusive finance focuses on the financial needs of disadvantaged groups and small, medium and micro enterprises, providing them with financing, savings and insurance services, aiming to promote the economic development of poor areas. Green finance can provide more high-quality financial products and services for inclusive finance and expand the business fields of inclusive finance; while inclusive finance can provide a wider user base and market opportunities for green finance and promote the development and promotion of green finance. Therefore, the cooperation between the two can form a virtuous circle and promote the overall promotion of rural development [5].

From a vertical perspective, green finance and inclusive finance are two different levels but interdependent fields. Green finance is mainly oriented to enterprises and projects, providing long-term and large amount of financing support, involving technological research and development and industrial upgrading, while inclusive finance is mainly oriented to individuals and small and micro enterprises, providing small amount and short-term financing support, involving consumption and entrepreneurship. In rural development, green finance and inclusive finance can start from both industry and people's livelihood respectively, forming a complete financial support chain. Due to the different characteristics and needs of the rural economy, green finance and inclusive finance also need differentiated service design and product promotion according to the actual situation of different regions and industries.

9. Factors influencing the development of rural revitalization in Heilongjiang Province

9.1. Natural environment factors.

Heilongjiang Province is located in the cold zone, with a cold and dry climate and relatively poor land resources, and these conditions limit the development and efficiency of agricultural production.

9.2. Talent resource factor

With the continuous promotion of urbanization, many rural populations have flowed to cities, resulting in shortage of rural labor, which not only affects the development of agricultural production, but also restricts the development of rural economy.

9.3. Capital investment factor

At present, Heilongjiang Province needs a large amount of capital investment in rural infrastructure and modern agriculture, but there are certain difficulties in the development of rural revitalization because of uneven distribution of funds and insufficient capital investment [6].

9.4. Policy environment factor

Policy plays a crucial role in rural revitalization; unfavorable policy environment will inhibit the investment and development of related projects, while favorable policy environment can provide a good impetus to rural revitalization development.

9.5. Market demand factor

With the upgrading of consumption and changes in lifestyle, rural market demand is also changing, which requires rural revitalization projects to strengthen market research and product development to better meet market demand.

10. Conclusion

In the context of global response to climate change, green inclusive finance has become a new financial model to promote sustainable development. In China, rural revitalization is an important strategy for economic and social development, and green inclusive finance can provide more comprehensive, fair, inclusive and sustainable financial services for rural areas to help rural revitalization. Taking Heilongjiang Province as an example, this paper discusses the methods and approaches to strengthen the synergistic development of green inclusive finance and rural revitalization in the context of the "double carbon" goal. By establishing a green inclusive financial service center, optimizing the policy environment and increasing investment, the paper can promote the sustainable development of rural areas. The findings of this paper provide references and lessons for the development of green inclusive finance in other regions, and hopefully contribute to the sustainable development of China's economy and society [7].

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