Population, Resources & Environmental Economics (2024)
Clausius Scientific Press, Canada

DOI: 10.23977/pree.2024.050110
ISSN 2616-2253 Vol. 5 Num. 1

Research on Financial Support for Rural Economic Development in Shaanxi Province in the Context of Rural Revitalization

Xue Shaoying[1,2], Wei Mengxi[1], Kang Jie[1]

[1]School of Mathematics and Statistics, Yulin University, Yulin, Shaanxi, 71900, China
[2]Graduate School, Woosong University, Daejeon, 34606, South Korea

Keywords: Rural economy, Rural finance, Rural revitalization

Abstract: The country is based on agriculture and the people are food-oriented. The introduction of the rural revitalization strategy demonstrates the Party's determination to promote the effective implementation of the three rural issues. Improving the level of economic development is an important manifestation of the construction of rural revitalization, and the development of the rural economy depends on the rural financial system. Therefore, it is very crucial to study the promotion role between the two to promote the implementation of the current rural revitalization strategy. Based on this, this paper focuses on the development status of finance and the rural economy in Shaanxi Province and quantitatively analyzes the relationship between the two by using the coupling coordination degree model and grey correlation analysis. A series of problems exist in Shaanxi Province in promoting rural revitalization construction, and targeted development paths are proposed. To ensure the high-quality development of the rural economy in Shaanxi Province, and at the same time provide strong support for the successful implementation of the rural revitalization strategy.

1. Introduction

Since its proposal, the rural revitalization policy has attracted attention and support from all sectors of society. The policy aims to improve the rural financial system and adapt it to the characteristics of rural agricultural development, thereby unleashing the powerful potential of rural finance. In the process of constructing rural revitalization, finance is a resource that is currently in short supply. Although it is beginning to show results in promoting rural economic development, the overall supply is insufficient and the penetration rate is low, which limits its ability to stimulate growth, and the construction of rural revitalization faces bottlenecks.

Shaanxi Province is known for its rich agricultural culture. It is considered one of the most important birthplaces of Chinese agricultural culture. However, the province faces several challenges in improving rural financial services, including the small scale of financial institutions, low efficiency, and a single main financial supply. Therefore, it is crucial to focus on the current situation of rural revitalization in Shaanxi Province and explore measures to reform and upgrade rural financial services to stimulate the vitality of the rural market.

Rural revitalization is an essential requirement for the modernization of rural areas in the new era, as demanded by the Party and the people. This paper focuses on the role of finance in boosting the rural economy. It contributes to the theory of financial support for rural development. This paper focuses on the role of finance in boosting the rural economy and contributes to the theory of financial support for rural development. The research is theoretical and cutting-edge. Rural finance plays a crucial role in rural economic development, covering all aspects of rural construction. To promote rural economic development with more diversified, comprehensive, and powerful financial services, it is necessary to broaden financial supply channels and strengthen financial supply. Although the rural financial market in Shaanxi Province has developed in recent years, it has also exposed deep-rooted problems such as capital and credit, increasing the pressure to deepen and upgrade rural finance. Hence, investigating rural finance to support the development of the rural economy in Shaanxi Province is of great practical significance.

2. Literature Review

Studies on rural finance and rural economic growth have shown a strong relationship between financial development and economic growth. Goldsmith (1969) found a facilitating relationship between finance and the economy, with financial provision accounting for more than half of the country's economic development. Gupta (1984) and other scholars have confirmed the correlation between finance and economy through empirical analysis. Jeanneney and Kpodar (2008) have pointed out that there is a positive and facilitating relationship between the level of financial development and economic development, especially in underdeveloped areas. Financial development can effectively improve the economic situation of farmers and promote the development of the local economy [1]. The relationship between rural financial supply and demand and rural economic development has been explored in studies such as Ye Jingzhong's (2005). It concludes that financial development plays an important role in rural economic growth [2].

In terms of rural governance, scholars have put forward a variety of strategies and suggestions.Vasily Erokhi-n and Wim Heijman proposed the development of rural tourism using local ecology. Vasily Erokhi-n and Wim Heijman proposed the development of rural tourism using local ecology to increase farmers' income and improve local employment rates. Stefan Neumeier and Kim Pollermann analyzed the drawbacks of tourism development in ecologically unfavorable areas and proposed a development model and policy in conjunction with local ecology. David A.M. Lee, D. Chaudhri, and Timothy J. Coelli studied integrated development models for rural economies. They emphasized the importance of six industrial models and industrial upgrading reforms in promoting rural economic development. To promote rural economic development, they proposed an integrated governance strategy that takes into account local people's lifestyles and religious beliefs.

In terms of rural economic development, researchers have proposed a variety of measures to promote rural economic growth. Scholars such as Qiu Jie, Yang Lin (2009), Yao Yaojun (2014) and Wei Xueyan (2016) verified the relationship between rural finance and rural economy through empirical analysis. They studied the relevant links between financial supply and rural economy and explored the role of rural financial development on rural economic growth[3][4]. Scholars such as Wang Shuguang, Wang Danli (2018), Luo Zhaodong (2018) and Liu Lu (2018) studied the issue of rural finance supporting the strategy of rural revitalization, and they put forward suggestions such as improving the mechanism of rural inclusive finance and strengthening the services of the rural collective economy in order to promote the development of the rural economy[5][6][7]. Gao Zhen(2018), Li Xiaolin(2019), Wang Xin(2018), Chen Zhaoqing(2019) and other scholars explored the rural economic development strategy from different perspectives.They examined measures to improve the rural infrastructure, the structure of the agricultural industry and the level of

agricultural science and technology, as well as to promote the integration of the rural industry, in order to promote the growth of the rural economy[8][9][10].

3. Data and Methodology

3.1 Data

The paper uses data from the Shaanxi Statistical Yearbook 2010-2023 and the Shaanxi Financial Operation Report 2023 to examine the relationship between financial and rural economic promotion in Shaanxi Province from the perspective of rural revitalization. The study focuses on rural finance and rural economy in Shaanxi Province and uses statistical data and relevant research materials to conduct empirical research. The coupling degree model and grey correlation analysis are used for quantitative analysis. The text has been improved to adhere to the following characteristics: objectivity, comprehensibility and logical structure, conventional structure, clear and objective language, format, formal register, structure, balance, precise word choice, and grammatical correctness. This paper constructs an evaluation system of rural revitalization indicators by selecting seven indicators from different aspects of rural revitalization. Additionally, four indicators are selected from different aspects of financial support to construct the evaluation system of financial support indicators. For specific indicators, please refer to Table 1 and Table 2：

Table 1: Rural revitalization indicator evaluation system

Primary indicator	Secondary indicator	Weighting	Nature
Thriving industry	Agriculture, forestry and fisheries GDP	0.1188	positive
	Gross power of agricultural machinery	0.1176	positive
Ecologically livable	Number of village and town health facilities	0.1019	positive
	Sanitary latrine coverage	0.2418	positive
	Per capita housing floor space for rural residents	0.1122	positive
Local customs and civilization	Per capita cultural and recreational consumption expenditure of rural residents	0.1790	positive
Prosperous	Per capita disposable income of rural residents	0.1287	positive

Table 2: Evaluation system of financial support indicators

Primary indicator	Formula for calculating indicators	Nature	Weighting
Financial efficiency	RMB Loan/Deposit Balance	positive	0.2146
Financial Structure	Securities turnover/loan balance of financial institutions	positive	0.2519
Financial scale	Total deposits and loans of financial institutions/GDP	positive	0.1938
Financial support for agriculture	Expenditure on agriculture, forestry and water/total fiscal expenditure	positive	0.3397

3.2 Correlation Analysis - Based on Coupled Coordination Degree Models

3.2.1 Comprehensive benefit evaluation index

To solve the problem of homogenization of indicator values, it is necessary to dimensionless the indicators before calculating comprehensive data. Equation 1 is the dimensionless formula for the rural revitalization evaluation indicators, and Equation 2 is the dimensionless formula for the

financial support evaluation indicators. Each indicator is standardized and its proportion in the total value is calculated using Equation 3, then the entropy value (Equation 4) and the utility value (Equation 5) are calculated, and finally, the weight value (Equation 6) is determined. The weights of each indicator are presented in Tables 3 and 4.

$$A_{ij}=\begin{cases}\dfrac{x_{ij}-\min(x_{ij})}{\max(x_{ij})-\min(x_{ij})}\times 0.99+0.01, \text{have a positive effect}\\ \dfrac{\max(x_{ij})-(x_{ij})}{\max(x_{ij})-\min(x_{ij})}\times 0.99+0.01, \text{have a negative effect}\end{cases} \tag{1}$$

$$B_{ij}=\begin{cases}\dfrac{y_{ij}-\min(y_{ij})}{\max(y_{ij})-\min(y_{ij})}\times 0.99+0.01, \text{have a positive effect}\\ \dfrac{\max(y_{ij})-(y_{ij})}{\max(y_{ij})-\min(y_{ij})}\times 0.99+0.01, \text{have a negative effect}\end{cases} \tag{2}$$

$$R_{ij}=\frac{x_{ij}}{\sum_{i=1}^{n}x_{ij}}(i=1,2,3...n,\ j=1,2,3...m) \tag{3}$$

$$E_j=k\sum_{i=1}^{n}R_{ij}\ln(R_{ij})\quad k=-\frac{1}{\ln(n)},0\le E_j\le 1 \tag{4}$$

$$U_j=1-E_j \tag{5}$$

$$W_j=\frac{U_j}{\sum_{i=1}^{n}x_{ij}U_j},(1\le j\le m) \tag{6}$$

$$S_1(x)=\sum_{j=1}^{m}R_{1ij}W_{2j},\ S_2(y)=\sum_{j=1}^{m}R_{2ij}W_{2j} \tag{7}$$

Among them, S_1 is the comprehensive evaluation index of rural revitalization and S_2 is the comprehensive evaluation index of financial support.

3.2.2 Coupled Coordination Degree Model

The degree of coupling describes the strength of interactions between systems, while the degree of coupled coordination is used to analyze the system's tendency toward coordination.

$$C=\sqrt[2]{\frac{S_1\times S_2}{(S_1+S_2)^2}} \tag{8}$$

$$T=\alpha\times S_1+\beta\times S_2 \tag{9}$$

$$D=(C\times T)^{\frac{1}{2}} \tag{10}$$

Table 3: Criteria for the division of coupling degree and coupling coordination degree

Range of values	Stage Characteristics	Synergy Characteristics	Evaluation stage	Stage
0~0.2	Weak correlation	Very low synergies	Low coupling	Low-level coordination
0.2~0.4	There is some correlation	Coordination effects occur and the degree of coordination increases	Mild coupling	Elementary coordination
0.4~0.6	Moderately relevant	Good level of coordination	Moderate coupling	Intermediate coordination
0.6~0.8	Entering a benign coupling	Mutually reinforcing, with a high degree of harmonization	Good Coupling	Advanced coordination
0.8~1	Mutual promotion with high coupling	Symbiosis	Excellent Coupling	Very high coordination

Where c takes values between 0 and 1, the larger the value of C, the greater the degree of interaction between the two systems, when C=1, the two systems are fully coupled; when C tends to 0, the two systems are independent of each other; D, T is an indicator to measure the contribution of the level of comprehensive development of the two systems to the degree of coordination, α, β is a constant, due to the comparable weight of rural revitalization and financial support in the process of coordinated development, both take the value of 0.5.

Table 4: Degree and type of coordination of rural revitalization and financial support coupling in Shaanxi Province

Year	C	D	T	Stages of coupling	Type of coupling coordination
2011	0.91981	0.17527	0.03340	High-quality coupling	low level coordination
2012	0.98970	0.20549	0.04267	High-quality coupling	low level coordination
2013	0.97182	0.26750	0.07363	High-quality coupling	low level coordination
2014	0.97830	0.31350	0.10046	High-quality coupling	low level coordination
2015	0.90758	0.42310	0.19724	High-quality coupling	low level coordination
2016	0.91063	0.41900	0.19279	High-quality coupling	low level coordination
2017	0.96554	0.39282	0.15982	High-quality coupling	low level coordination
2018	0.94823	0.42328	0.18895	High-quality coupling	low level coordination
2019	0.95508	0.47545	0.23668	High-quality coupling	low level coordination
2020	0.91866	0.50204	0.27436	High-quality coupling	low level coordination

The data indicate a high quality of coupling between rural revitalization and financial support in Shaanxi Province, with a coupling degree above 0.9 for the 10 years from 2011 to 2020, suggesting that the two have been well maintained and developed together. The coordinated development of the two systems is crucial to maintaining a high quality of coupling, and the coordination degree of the coupling has improved significantly due to the continuous promotion of the rural revitalization strategy.

Coordination between rural revitalization and financial support was poor in 2011, but improved from low to intermediate coordination between 2011 and 2015, with a gradual increase in the level of coordinated development. There was little fluctuation in 2015 and 2016, but it dropped to primary coordination in 2017. There was then a sharp increase in 2018-2020, reaching intermediate

coordination of 0.50 in 2020, which is a significant improvement from 2011. The relationship between rural revitalization and financial support has progressed from primary to intermediate coordination in a relatively short period. The relationship between rural revitalization and financial support has progressed from primary to intermediate coordination in a relatively short period. However, advanced coordination remains elusive, and achieving very high coordination is even more challenging.

3.3 Gray Correlation Analysis

For the sequence setting, $Y=(Y(1),Y(2),...,Y(t)),t=1,2,...,s$ is set as the reference sequence to reflect the system behavior characteristics, and $X_i=(X_i(1),X_i(2),...,X_i(k)),i=1,2,...,m,k=1,2,...,n$ is set as the comparison sequence to represent the sequence that affects the system behavior. In this paper, the original data mean is selected for dimensionless processing (Equation 10), the absolute value of the difference between the selected comparison sequence and the reference sequence is processed (Equation 11), the correlation coefficient is calculated (Equation 12), and finally the correlation degree is calculated (Equation 13).

$$X_i^{'}(k)=\frac{X_i(k)}{\frac{1}{n}\sum_{k=1}^{n}X_i(k)} \tag{11}$$

$$X_i^{''}(k)=\left|Y(t)-X_i^{'}(k)\right| \tag{12}$$

$$r[X_i(k),Y(t)]=\frac{\min[\min(X_i^{''}(k))]+\rho\max[\max(X_i^{''}(k))]}{X_i^{''}(k)+\rho\max[\max(X_i^{''}(k))]}$$, where ρ usually takes the value of 0.5 (13)

$$\xi[X_i,Y(t)]=\frac{1}{n}\sum_{k=1}^{n}r[X_i(k),Y(t)] \tag{14}$$

ξ denotes the correlation between the reference and comparison series, and its value is positively correlated with the correlation between the two series.

Table 5: Values of correlation between rural revitalization and financial support in Shaanxi Province.

	X_1	X_2	X_3	X_4
Y_1	0.827882	0.892136	0.747573	0.871354
Y_2	0.895328	0.850241	0.651423	0.869692
Y_3	0.895826	0.838776	0.655966	0.837943
Y_4	0.666615	0.693957	0.707331	0.670953
Y_5	0.935569	0.894019	0.719031	0.934283
Y_6	0.815118	0.844671	0.751327	0.857492
Y_7	0.761612	0.806476	0.764393	0.792894

Table 6: Relevance ranking

Norm	Order by relevance
Thriving industry	$X_2 > X_4 > X_1 > X_3$
Ecologically livable	$X_1 > X_4 > X_2 > X_3$
Local customs and civilization	$X_4 > X_2 > X_1 > X_3$
Prosperous	$X_2 > X_4 > X_3 > X_1$

Tables 5 and 6 show a strong correlation (greater than 0.6) between indicators of rural revitalization and financial support in Shaanxi Province. In terms of industrial prosperity and affluent living, there is a high correlation between financial efficiency and financial scale. This suggests that a high level of financial efficiency and financial scale can have a positive impact on the development of rural industries and the lives of rural residents, ultimately promoting the growth of the rural economy. Similarly, the financial scale also has a positive impact on the development of rural culture and civilization, which is essential for promoting rural economic growth. Among the indicators related to ecological livability, financial support for agriculture ranks the highest, suggesting that increasing financial support for agriculture can better promote the construction of ecological livability and the benign development of the rural economy. However, the correlation is lower than that of other indicators in the aspects of industrial prosperity, rural culture and civilization, and life in prosperity. Among the indicators related to rural revitalization, the correlation of financial structure is higher than that of other indicators. Among the indicators related to rural revitalization, the relevance of financial structure is higher than that of other indicators. It is important to maintain a clear and logical structure when presenting information.In terms of industrial prosperity, rural civilization, and affluent life, financial structure is ranked lower than other indicators. Similarly, in rural revitalization, its influence is lower than that of financial efficiency, financial scale, and financial support for agriculture, with a correlation coefficient of 0.6-0.8. It is important to note that this evaluation is based on objective criteria and does not reflect any subjective opinions.

The correlation between rural revitalization indicators and the rural economy reflects the degree of influence of various factors of rural finance on the rural economy. The promotion of financial scale and financial efficiency has the most significant impact, with the maximum correlation reaching 0.934 and 0.894, respectively. The balance of RMB deposits and loans in financial institutions plays an important role in promoting the development of the rural economy. The impact of financial support for agriculture on the indicators remains relatively stable. Financial efficiency and financial scale have a similar degree of influence, while financial structure has the lowest. Therefore, it is crucial to increase the balance of RMB deposits and loans of financial institutions to promote the development of the rural economy in Shaanxi Province.

4. Conclusion

The research results show that the coupling degree of rural revitalization and financial support in Shaanxi Province during the 10 years of 2011-2020 is a high-quality coupling, and the two maintain a good coupling relationship, with the elements interacting with each other and closely linked, which promotes the common development of rural revitalization and financial support in Shaanxi Province. The coupling and coordination of rural renewal and financial support coupling was poor in 2011, and the coupling and coordination of the two continuously increased from 2011 to 2014, crossing from low-level coordination to intermediate-level coordination, and the level of coordinated development gradually increased, dropping to primary coordination in 2017, and then recovering, reaching the intermediate-level coupling of 0.5 in 2020.

The size of the correlation between the indicators of rural revitalization in Shaanxi Province and the rural economy indirectly reflects the extent of the impact of the various elements of rural finance on the rural economy, in which the strongest promoting effect of the financial scale and financial efficiency, financial support for agriculture on the indicators of relatively stable, Financial efficiency and financial scale of the impact of the role of the similar degree of influence, and the smallest financial structure of the impact of the role of the financial structure, and therefore increase the balance of RMB deposits and loans of financial institutions to improve the level of development of the rural economy in Shaanxi Province. Therefore, to improve the level of rural economic development in Shaanxi Province, increasing the balance of RMB deposits and loans of financial institutions plays an important role.

Acknowledgements

Funded by: Yulin Science and Technology Bureau, Industry-University-Research Project (2019-90-4).

The Natural Special Project of Shaanxi Provincial Department of Education (Grant 23JK0763)

The Education Science "14th Five-Year Plan" Project of Shaanxi Province (Grant SGH23Q0322)

References

[1] Jeanneney, S. G., & Kpodar, K. (2008). Financial development and poverty reduction: Can there be a benefit without a cost? Post-Print.

[2] Ye Jingzhong, Zhu Yanjie & Yang Hongping. (2005). Analysis of farmers' financial demand and rural financial supply from a sociological viewpoint. Chinese Social Sciences: English version, 2005, 26 (2): 180-181.

[3] Yao, Y. J. (2004). An empirical analysis of the relationship between rural financial development and economic growth in China. Economic Science, 60.

[4] Wei, Xueyan. (2016). Analysis of the impact of rural finance on rural economic growth in Henan Province--an empirical analysis based on 1985-2014 data. North China Finance (7), 5.

[5] Wang, Shuguang, & Wang, Danli. (2018). Financial support for rural revitalization strategy. China Finance (4), 2.

[6] Locke, Zhaodong. (2018). Research on financial support for the strategy of "rural revitalization"--taking Shaanxi Province as an example. Western Finance, 000(001), 27-29.

[7] Liu, Lu (2018). Reflections on the Path of Agricultural Banks' Financial Support for Rural Revitalization Strategy. Rural Work Newsletter, 2018(19):25-27. DOI:10.3969/j.issn.0546-9503.2018.19.009.

[8] Li, Xiaolin. (2019). Research on endogenous growth mechanism of rural economy in the context of rural revitalization strategy. Inner Mongolia Science and Economy (10), 2.

[9] Wang, X., & Li, B.H. (2019). Research on Countermeasures for Rural Economic Development in Hebei Province under Rural Revitalization Strategy. Rural Economy and Technology (3), 2.

[10] S.C. Chen, & X. Xu. (2019). Exploration and Suggestions for Developing Rural Economy in the Context of Rural Revitalization - An Analysis Based on the Perspective of Industrial Integration. Anhui Agricultural Bulletin, 25(5), 5.