sustainability

MDPI

Article

A Study on Factors Influencing the Efficiency of Rural Agriculture Financial Support in China

Bo Song, Jing Zhao and Panpan Zhang *

School of Economics and Trade, Henan University of Technology, Zhengzhou 450001, China
* Correspondence: panpandazhang@haut.edu.cn

Abstract: The development of rural finance has an important impact on agricultural development. This study is to quantitatively evaluate the efficiency of rural agriculture financial support in China and empirically analyze its influencing factors. Based on the panel data of 30 provinces in China from 2014 to 2018, this study uses the DEA model to quantitatively evaluate the efficiency of rural agriculture financial support and uses the panel Tobit model to form an empirical analysis of its influencing factors. The results show that: (1) The efficiency of rural agriculture financial support in the eastern region is significantly higher than that in the central and western regions; (2) The efficiency of rural agriculture financial support in Beijing, Zhejiang, and Guangdong are on the production frontier over the years, while other provinces have a large space to improve efficiency; (3) The strength of rural financial support as well as the level of regional economic development has a significant positive impact on the efficiency of rural agriculture financial support, while the intensity of rural financial services, as well as the scale of agricultural production and operation, has a significant negative impact. Finally, this study puts forward policy recommendations on rural financial support for the development of "agriculture, rural areas and farmers".

Keywords: efficiency evaluation; rural finance; DEA model; tobit model

Citation: Song, B.; Zhao, J.; Zhang, P. A Study on Factors Influencing the Efficiency of Rural Agriculture Financial Support in China. *Sustainability* **2022**, *14*, 14954. https://doi.org/10.3390/su142214954

Academic Editors: Margarita Maria Brugarolas Molla-Bauza and Laura Martinez-Carrasco

Received: 9 October 2022
Accepted: 9 November 2022
Published: 11 November 2022

1. Introduction

In 2021, the "No. 1 Central Document" of the China government focused on "agriculture, rural areas and farmers" issues, and emphasized the need to adhere to solving the issues as the top priority of all the work. In 2022, the "No. 1 Central Document" of the Chinese government put forward Opinions on Comprehensively Promoting the Key Work of Rural Revitalization, which pointed out that financial services for rural revitalization should be strengthened and the assessment of financial institutions serving rural revitalization should be carried out. Serving "agriculture, rural areas and farmers" is the social objective of rural financial institutions and the mission entrusted by governments around the world [1]. Therefore, rural financial institutions can better serve the rural revitalization only by improving the efficiency of supporting agriculture.

In fact, as early as 2017, China put forward the Rural Revitalization Strategy. In the announcement issued by the Ministry of Agriculture and Rural Affairs of China in 2019, it was mentioned that rural finance should focus on the implementation of a Rural Revitalization Strategy and the urgent needs of farmers, especially new agricultural business entities, which were based on breaking the bottleneck constraints of rural finance and the accuracy of rural financial services. At present, China's rural revitalization is facing the practical problems of a relatively weak national agricultural support system and the heavy task of rural financial reform. Financial support for agriculture is a mission entrusted by the state to China's rural financial institutions, which has become the focus of rural revitalization. Many studies have shown that the development of rural finance has an important role to improve the socio-economy of rural areas [2–4]. The rural agriculture financial support can effectively alleviate farmers' livelihood difficulties [5], increase agricultural

and rural investment [6], and narrow the urban–rural income gap [7,8]. Therefore, rural agriculture financial support can better serve "agriculture, rural areas and farmers" and help rural revitalization. In this context, it is of great significance to quantitatively evaluate the efficiency of rural agriculture financial support in China and empirically analyze its influencing factors.

Against this background, some scholars have built an indicator system to quantitatively evaluate the realization of the social goals of rural financial institutions from the aspects of the inclusive level, service depth, and coverage [9–11]. On this basis, the literature review part of this paper will focus on the relevant research on the efficiency of rural financial institutions to support agriculture to sort out and comment in order to provide a useful reference for this study.

2. Literature Review

Financial support for rural agriculture is a topic of great concern all over the world, and many researchers have performed beneficial explorations of it. This study combs the existing literature from the following two aspects.

The first aspect is the evaluation research on the efficiency of rural agriculture financial support. The efficiency evaluation of financial support for rural agriculture should follow the principles of goal orientation, applicability, and operability [12]. Based on this, some researchers choose rural financial institutions as their research object to focus on their efficiency of support for rural agriculture [13–15]. Other researchers choose regions as the research object to study the efficiency of rural agriculture financial support in a region, look at the whole from the part, and provide some references for national research through the study of various regions [16–18]. Meanwhile, there are also some researchers who have conducted research on the efficiency of financial support for rural agriculture nationwide [19]. In addition, there are some researchers who found another way and adopted a unique perspective to study the efficiency of financial support for rural agriculture from the perspective of farmers as well as rural revitalization listed companies' credit availability, external financing efficiency, satisfaction, and welfare effect [20]. However, the above research conclusions on the efficiency of rural agriculture financial support in various regions are quite different. Scholars found that the financial support policy for agriculture has promoted the income of farmers [21]. The average efficiency of financial support for rural revitalization is also generally high [18]. However, other scholars found that the effect of financial policy implementation is not necessarily positive, while in some underdeveloped areas, it is negative [22]. At the same time, the overall efficiency of China's financial support for rural agriculture has not reached an effective state, and the average level of rural agricultural support efficiency is low [19].

The second aspect is the research on the factors influencing the efficiency of rural agriculture financial support. Part of the study found that the main influencing factors include the concentration of the rural financial market, rural financial intermediary efficiency, and rural financial development structure [23]. Other studies divided the factors affecting the agricultural support level of rural financial institutions into internal factors and external factors and analyzed the factors influencing the rural agricultural support efficiency of financial institutions from these two perspectives [24,25]. Some scholars found evidence of a significant positive relationship between social efficiency and financial efficiency of microfinance institutions, which tends to indicate that financial efficiency will harmonize the social performance efficiency [26,27]. Meanwhile, scholars analyzed the factors influencing the agricultural support efficiency of new rural financial institutions in Heilongjiang Province and found that the main factors are actually their own operating factors [28]. Other scholars analyzed the impact of the policy on the efficiency of financial support for rural agriculture and found that government subsidies played a positive role [29]. At the same time, based on the perspective of the relative development gap between the agricultural sector and the industrial and commercial sectors, some scholars analyzed the

heterogeneous impact of the marketization reform of rural financial institutions at different stages on support for agriculture [30].

To sum up, the evaluation research on the efficiency of rural agriculture financial support is mainly from the perspective of evaluation principles and indicator systems, rural financial institutions, and regional differences. Most of the existing literature found that rural agriculture financial support has indeed played a positive role in local agricultural development, but there is still a low efficiency of financial support for rural agriculture, uneven resource distribution, insufficient utilization, and other problems. At the same time, as for the research on the factors influencing the efficiency of rural agriculture financial support, most studies insist that it should be considered from the perspectives of internal factors and external factors and believe that the impact of internal factors is greater. The existing literature provides some references and ideas for this study. Based on inter-provincial panel data, this study quantitatively evaluates the efficiency of rural agriculture financial support in China and forms an empirical analysis of its influencing factors.

3. Efficiency Evaluation

3.1. Construction of Evaluation Indicator System

This study refers to the relevant research results of the existing literature when constructing the evaluation indicator system of rural agriculture financial support [16,19] and makes adjustments according to the research direction and data availability. First of all, small rural financial institutions have a large number and wide distribution and go deep into rural areas. They are deeply rooted in rural areas and have greatly contributed to agricultural development. They have gradually become the main body of rural financial institutions supporting agriculture and played a practical supporting role in agricultural development. We can regard the number of farmers served by the outlets of small rural financial institutions as an input indicator to reflect the support of rural finance for agricultural development. The funds invested by rural financial institutions to support agricultural development are mainly issued in the form of loans. Therefore, the balance of agriculture-related loans per capita of rural residents is also an important input indicator of rural financial support. The purpose of financial support for agriculture is to promote rural economic development and improve the living standards of rural residents. The basis of rural economic development is agricultural economic growth, so the total agricultural output value is an output indicator to reflect the level of rural economic development. The income of rural residents determines the living standard of farmers. So the per capita income of rural residents is an output indicator to reflect the living standard of rural residents. The input–output indicator system for the efficiency evaluation of rural agriculture financial support is shown in Table 1.

Table 1. The input-output indicator system.

Indicator Type	Indicator Name	Indicator Description	Economic Meaning
Input Indicator	Number of farmers served by outlets of rural financial institutions (ten thousand people)	Rural population/Number of small rural financial institutions	Reflect the intensity of rural financial services
	Balance of agriculture-related loans per capita of rural residents (ten thousand CNY)	Balance of agriculture-related loans/Rural population	Reflect the strength of rural financial support
Output Indicator	Total agricultural output value (trillion CNY)	Gross output value of primary industry	Reflect the level of rural economic development
	Per capita income of rural residents (ten thousand CNY)	Per capita disposable income of rural residents	Reflect farmers' economic living standards

In Table 1, the data of the rural population, the total agricultural output value, and the per capita disposable income of rural residents involved in the above indicators are mainly

from the National Bureau of Statistics of China, the balance of agriculture-related loans is from the China Financial Statistics Yearbook, and the number of small rural financial institutions is from the Wind Database.

3.2. Selection of Efficiency Evaluation Method and Result Analysis

Efficiency evaluation methods generally include parametric methods and nonparametric methods. The former is the most representative of stochastic frontier analysis (SFA), and the latter is the most representative of data envelopment analysis (DEA). Compared with the DEA model, the SFA model has the advantage of considering the influence of environmental factors and random factors on efficiency values; however, the disadvantage is that it is not suitable for efficiency evaluation in the case of multiple output indicators, and there are preset model deviations [31]. The DEA model can evaluate the efficiency in the case of multiple inputs and multiple outputs and does not need to set the model form in advance.

It can be seen from Table 1 that the input–output indicator system in this study belongs to the case of multiple inputs and multiple outputs. Therefore, this study selects the DEA model to evaluate the efficiency of rural agriculture financial support. However, the DEA model assumes that random errors have no effect on production activities, so the evaluation results cannot be statistically tested, making it vulnerable to extreme values of input–output indicators [32]. Because the research data selected in this paper are macro statistical data, which are generally the sum of micro individual data, they largely avoid the occurrence of extreme values, thus reducing the adverse impact of extreme values on the DEA model. For n decision-making units (DMUs), the construction process of the input-oriented DEA model is as follows [33]:

$$\begin{aligned} &\min \theta = V_D \\ s.t. &\begin{cases} \sum_{i=1}^{n} \lambda_i x_i + S^- = \theta x_t \\ \sum_{i=1}^{n} \lambda_i y_i - S^+ = y_t \\ \sum_{i=1}^{n} \lambda_i = 1 \\ \lambda_i \geq 0, i = 1,\ 2,\ \ldots\ ,\ t,\ \ldots\ ,\ n \\ S^- \geq 0 \\ S^+ \geq 0 \end{cases} \end{aligned} \tag{1}$$

In the above formula, θ is the efficiency value of the t-th DMU, and $0 \leq \theta \leq 1$; V_D is the effective efficiency value; λ_i is the weight of the i-th DMU; x_i is the input vector of the i-th DMU, and S^- is the relaxation variable of the input; y_i is the output vector of the i-th DMU, and S^+ is the relaxation variable of the output. Among them, θ, λ_i, S^- and S^+ are parameters to be estimated.

Considering that the change of the DMU's return to scale may be caused by a variety of factors, the model adds a convexity constraint $\sum_{i=1}^{n} \lambda_i = 1$ to the constraint set, which makes the production characteristics of the DMUs change from constant returns to scale (CRS) to variable returns to scale (VRS). Therefore, the model can calculate the production efficiency of DMUs under the condition of CRS and VRS, respectively, by changing the convexity constraint conditions. The former is generally called comprehensive efficiency (*CE*), and the latter is called pure technical efficiency (*PTE*). The scale efficiency (*SE*) can be further decomposed by the following formula:

$$CE = PTE \times SE \tag{2}$$

The *CE* reflects the maximum output level under the minimum input of economic resources. The *PTE* represents the minimum input under the same maximum output. The *SE* refers to the ratio of the input under the production boundary to the input under the optimal scale.

Since the Wind Database does not include the number data of China's small financial institutions after 2019, and the relevant data in Tibet are also seriously missing, based on the availability of the research data, this study selects the relevant indicator panel data of 30 provinces (autonomous regions and municipalities directly under the central government) in China from 2014 to 2018. Apply the statistical analysis software of DEAP2.1 for econometric analysis to obtain the measurement values about the efficiency of rural agriculture financial support in different regions of China in different years, as shown in Table 2. In order to avoid the table being too large, only the calculation results of 2014, 2016, and 2018 are reported in Table 2.

Table 2. Efficiency values of rural agriculture financial support in China.

Item	Year	2014			2016			2018		
Region	**Province**	**CE**	**PTE**	**SE**	**CE**	**PTE**	**SE**	**CE**	**PTE**	**SE**
Eastern Region	BJ	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	FJ	0.606	0.772	0.785	0.608	0.788	0.772	0.635	0.778	0.817
	GD	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	HE	1.000	1.000	1.000	0.751	0.852	0.881	0.724	0.783	0.925
	HI	0.680	0.770	0.883	0.650	0.718	0.905	1.000	1.000	1.000
	JS	0.642	1.000	0.642	0.815	1.000	0.815	0.831	1.000	0.831
	LN	0.707	0.792	0.892	0.625	0.731	0.855	0.632	0.688	0.918
	SH	1.000	1.000	1.000	0.936	1.000	0.936	1.000	1.000	1.000
	SD	0.822	1.000	0.822	0.952	1.000	0.952	1.000	1.000	1.000
	TJ	0.835	0.881	0.948	0.815	0.877	0.929	0.885	0.894	0.990
	ZJ	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Average	0.845	0.929	0.907	0.832	0.906	0.913	0.882	0.922	0.953
Central Region	AH	0.811	0.862	0.941	0.714	0.758	0.943	0.511	0.694	0.737
	HA	1.000	1.000	1.000	1.000	1.000	1.000	0.722	0.871	0.829
	HB	0.831	0.928	0.895	0.752	0.903	0.832	0.489	0.804	0.607
	HL	0.628	0.807	0.778	0.546	0.730	0.748	0.571	0.715	0.798
	HN	1.000	1.000	1.000	0.957	0.990	0.967	0.650	0.741	0.878
	JL	0.672	0.791	0.849	0.542	0.635	0.853	0.532	0.564	0.944
	JX	0.762	0.815	0.934	0.614	0.701	0.876	0.487	0.635	0.767
	SX	0.615	0.629	0.977	0.500	0.514	0.973	0.477	0.493	0.968
	Average	0.790	0.854	0.922	0.703	0.779	0.899	0.555	0.690	0.816
Western Region	CQ	0.654	0.711	0.920	0.621	0.648	0.959	0.589	0.612	0.963
	GS	0.486	0.504	0.964	0.393	0.406	0.968	0.377	0.393	0.958
	GX	0.793	0.817	0.971	0.794	0.806	0.986	0.460	0.681	0.675
	GZ	0.572	0.596	0.960	0.438	0.524	0.836	0.378	0.506	0.747
	IM	0.713	0.727	0.982	0.754	1.000	0.754	0.736	1.000	0.736
	NX	0.435	0.499	0.871	0.389	0.422	0.924	0.351	0.402	0.872
	QH	0.382	0.434	0.882	0.317	0.356	0.889	0.310	0.358	0.865
	SC	0.887	0.908	0.977	0.844	0.952	0.886	0.962	1.000	0.962
	SN	0.711	0.713	0.996	0.630	0.638	0.988	0.542	0.560	0.969
	XJ	0.400	0.589	0.679	0.388	0.568	0.683	0.336	0.539	0.623
	YN	1.000	1.000	1.000	0.936	1.000	0.936	0.257	0.582	0.442
	Average	0.639	0.681	0.927	0.591	0.665	0.892	0.482	0.603	0.801
National Average		0.755	0.818	0.918	0.709	0.784	0.902	0.648	0.743	0.861

Note: CE (Comprehensive Efficiency), PTE (Pure Technical Efficiency), SE (Scale Efficiency); AH (Anhui), BJ (Beijing), CQ (Chongqing), FJ (Fujian), GD(Guangdong), GS (Gansu), GX (Guangxi), GZ (Guizhou), HA (Henan), HB (Hubei), HE (Hebei), HI (Hainan), HL (Heilongjiang), HN (Hunan), IM (Inner Mongolia), JL (Jilin), JS (Jiangsu), JX (Jiangxi), TJ (Tianjin), LN (Liaoning), NX (Ningxia), QH (Qinghai), SC (Sichuan), SD (Shandong), SH (Shanghai), SN (Shaanxi), SX (Shanxi), XJ (Xinjiang), YN (Yunnan), ZJ (Zhejiang).

According to Table 2, the means of CE, PTE, and SE in the eastern region are all relatively high, followed by the central region, while the western region is relatively low. This shows that no matter which efficiency, the efficiency of rural agriculture financial support in the eastern region is significantly higher than that in the central and western regions. Additionally, this spatial difference is consistent with the existing literature research conclusions [19]. From the perspective of the time dimension, except that the efficiency in the eastern region remained stable during the sample period, the efficiency in the central and western regions showed a downward trend. As a result, the efficiency of rural agriculture financial support has shown a downward trend under the national average level. This situation may have a negative impact on farmers' poverty reduction and rural economic development, which is particularly noteworthy when implementing the Rural Revitalization Strategy [34].

Specific to the provinces in different regions, the efficiency of Beijing, Zhejiang, and Guangdong provinces in the eastern region are on the production frontier, which indicates that the efficiency of rural agriculture financial support in these provinces has been very high, while other provinces in the region still have room to improve at least one aspect of efficiency in some years. In the central region, only Henan and Hunan provinces are on the production frontier in some years and there is still room for improvement in efficiency in some years, while the efficiency values of other provinces are relatively low, indicating that there is a large room for improvement in various efficiency in these provinces. In the western region, only Yunnan Province was on the production frontier in 2014, but then all efficiency decreased significantly, while the efficiency of other provinces was relatively low, indicating that there is a large room for improvement in the efficiency of all provinces in the western region.

4. Empirical Analysis of Influencing Factors

4.1. Variable Selection and Theoretical Expectation

Panel data can not only effectively solve the problem of missing variable deviation to a certain extent but can also provide more information on the dynamic behavior of individual samples. Therefore, panel data are generally preferred in the empirical research of influencing factors [35]. This study forms an empirical analysis of the influencing factors regarding the efficiency of rural agriculture financial support based on panel data. As comprehensive efficiency (CE) is the key to measuring the efficiency of rural agriculture financial support, this study takes the CE as the dependent variable calculated by the DEA model. The selection of independent variables is shown in Table 3.

Table 3. Independent variables influencing the efficiency level of rural agriculture financial support.

Variable Code	Variable Name	Method of Calculation	Indicator Unit	Expected Influence Direction
X1	Intensity of rural financial services	Rural population/Number of small rural financial institutions	Ten thousand people	-
X2	Strength of rural financial support	Balance of agriculture-related loans/Rural population	Ten thousand CNY	+
X3	Level of regional economic development	Per capita GDP	Ten thousand CNY	+
X4	Cultural level of rural residents	Average education age of rural population	Year	+
X5	Scale of agricultural production and operation	Total sown area of crops	Million hectares	-

(1) **Intensity of rural financial services.** Relevant literature studies have shown that the intensity of rural financial services has an important impact on the efficiency of rural financial institutions in supporting agriculture [8]. China's rural financial institutions provide farmers with financial products such as agricultural loans, which promote farmers to reduce production costs and expand production funds. Therefore, the larger the X1, the

higher the service intensity of China's rural financial institutions, which means that the rural population in this area is too large, the number of small rural financial institutions is too small, and the services that a rural financial institution outlet can provide are limited. Therefore, theoretically, it can be expected that the X1 has a negative influence.

(2) **Strength of rural financial support.** Ensuring agriculture-related loans is an important means for the country to realize financial support for agriculture. The issuance scale of agriculture-related loans and the impact on local agricultural economic production are important indicators to evaluate the agricultural support efficiency of rural financial institutions [9]. Therefore, the higher the X2, the greater the per capita loan amount obtained by rural residents, and the more it can help local agricultural production, so as to improve the efficiency of rural agriculture financial support. Therefore, theoretically, it can be expected that the X2 has a positive influence.

(3) **Level of regional economic development.** The existing literature research shows that the efficiency of rural agriculture financial support is related to the level of local economic development [23]. Therefore, the larger the X3, the higher the level of economic development in the region, the more perfect the general rural financial market, the more rural financial institutions, and the more fully the financing function is played, which is more conducive to improving the efficiency of local rural agriculture financial support. Therefore, theoretically, it can be expected that the X3 has a positive influence.

(4) **Cultural level of rural residents.** Farmers with low education levels also have a poor understanding of credit policies, loan procedures, and other financial knowledge, which reduces their access to financial services to some extent [24]. Therefore, the efficiency of rural agriculture financial support is generally also affected by the cultural level of rural residents, which is measured by the average years of education of rural residents. Therefore, the higher the X4, the higher the general level of financial knowledge, the better they can understand the relevant national financial policies and financial products, and the difficulty of supporting agriculture by local rural financial institutions will be greatly reduced. Therefore, theoretically, it can be expected that the X4 has a positive influence.

(5) **Scale of agricultural production and operation.** The total sown area of crops reflects the scale of agricultural production in a region and also reflects the region's dependence on the agricultural industry to some extent. According to relevant literature research, the demand for credit funds from agricultural production and operation also has an impact on the efficiency of rural agriculture financial support [23]. Therefore, the larger the X5 is, the stronger the dependence of the region on the agricultural industry and the greater the demand for agricultural credit funds. Therefore, theoretically, it can be expected that the X5 has a negative influence.

4.2. Descriptive Statistical Analysis

In Table 3 above, the number of small rural financial institutions is from the Wind Database, the per capita GDP and rural population are from the China Statistical Yearbook, and the balance of agriculture-related loans and the total sown area of crops are from the China Rural Statistical Yearbook; the average years of education of rural population comes from the China Statistical Yearbook of Population and Employment. We have created descriptive statistics on the collected data, and the descriptive statistical results of the independent variables based on panel data are shown in Table 4.

As shown in Table 4, the overall mean of X1 is 0.7762, and the overall standard deviation is 0.2666. Combined with the standard deviation between and within groups, it can be seen that the difference in X1 is largely caused by regional differences, and the effect of time difference is very weak. The overall mean of X2 is 5.2726, and the overall standard deviation is 3.0913. Combined with the standard deviation between and within groups, the difference of X2 mainly comes from regional differences, but the role of time difference is also large. The overall mean of X3 is 5.6505, and the overall standard deviation is 2.5603. Combined with the standard deviation between and within groups, it can be seen that the difference of X3 mainly comes from regional differences, while the role of time difference is

relatively weak. The overall mean X4 is 8.5399, and the difference between the minimum value and the maximum value is very small, which indicates that the education level of different farmers is very small and relatively low; the standard deviation overall, between, and within groups are all very small, which indicates that the cultural level difference of different rural residents is very small, and there is no significant difference whether in different regions or in different years. The overall mean of X5 is 5.4829, and the overall standard deviation is 3.8483. Combined with the standard deviation between and within the groups, it can be seen that the difference of X5 mainly comes from regional differences, while the role of time difference is very weak.

Table 4. Descriptive statistics of independent variables based on panel data.

Variable Code	Sample Group	Mean	Standard Deviation	Minimum Value	Maximum Value
X1	overall	0.7762	0.2666	0.4018	1.8313
	between	–	0.2678	0.4237	1.7890
	within	–	0.0359	0.5740	0.8739
X2	overall	5.2726	3.0913	0.0406	19.9395
	between	–	2.6795	1.9185	13.7151
	within	–	1.6029	8.2854	11.4970
X3	overall	5.6505	2.5603	2.6165	14.0211
	between	–	2.4196	2.8015	11.5869
	within	–	0.9263	1.3280	9.7937
X4	overall	8.5399	0.4562	7.6739	10.5275
	between	–	0.4720	7.8908	9.8910
	within	–	0.2164	7.7287	10.0761
X5	overall	5.4829	3.8483	0.1038	14.9022
	between	–	3.7826	0.1480	14.6442
	within	–	0.9409	0.8541	11.6425

4.3. Analysis of Empirical Results

As the value range of comprehensive efficiency (CE) is between 0 and 1, it will cause inconsistency in parameter estimation if the ordinary least square (OLS) method is used for parameter estimation [35]. The Tobit model, also known as the restricted dependent variable model, is a parameter estimation method of intercept regression that can be applied to the case that the dependent variable can only randomly extract sample observations from some individuals, and the sample observations are limited to a certain range of determined values. Therefore, this study uses the Tobit model to empirically analyze the factors influencing the efficiency of rural agriculture financial support. Based on the panel data of 30 provinces in China from 2014 to 2018 constructed above, we used Stata15.1 software of Stata Corp (College Station, TX, USA) to carry out panel Tobit regression for the whole country and the eastern, central, and western regions, respectively. The parameter estimation results are shown in Table 5.

According to the Hausmann test results in the last row of Table 5, the model based on the nationwide, eastern, and western regions cannot reject the original assumption that "the random effect model is the correct model" at the significance level of 10%, while the model based on the central region rejects that original assumption at the significance level of 5%. Therefore, the fixed effect model is selected for the central region, while other regions select the random effect models. In addition, according to the parameter estimation results of the four models in Table 5, the independent variables of the factors that have a significant impact on the efficiency of rural agriculture financial support are highly consistent among different regions, and the influence direction is the same, which shows that the parameter estimation results of each model are robust. The following only analyzes the regression results of the panel Tobit model nationwide.

Table 5. Parameter estimation results of the Tobit model based on panel data.

Variable Code	Nationwide	Eastern Region	Central Region	Western Region
X1	−0.1858 *	−0.5243 **	−2.9502 **	−0.2335 ***
	(0.1113)	(0.2384)	(0.8893)	(0.0589)
X2	0.0064 **	0.0009 ***	0.0010 *	0.0437 ***
	(0.0077)	(0.0049)	(0.0581)	(0.0150)
X3	0.0237 ***	0.0075 **	0.0560 **	0.0531 **
	(0.0087)	(0.0050)	(0.0016)	(0.0252)
X4	0.0305	0.0257	0.5584	0.2321
	(0.0386)	(0.0384)	(0.2294)	(0.1122)
X5	−0.1752 ***	−0.0152 **	−0.0152 *	−0.0552 ***
	(0.0074)	(0.0067)	(0.0221)	(0.0095)
cons	0.8653 ***	1.2672 ***	2.4973 **	2.3118 **
	(0.3052)	(0.2407)	(2.4973)	(0.9291)
Hausman Test				
Chi2(n)	2.17	4.32	13.16	6.14
p-value	0.3241	0.6328	0.0219	0.4072
Test Results	Random effect model	Random effect model	Fixed effect model	Random effect model

Note: ***, ** and * represent the significance levels of 1%, 5% and 10%, respectively, and the values in ( ) represent the standard deviation.

The intensity of rural financial service (X1) has a negative impact on the efficiency of rural agriculture financial support at the significance level of 10%; therefore, the empirical test result is consistent with the theoretical expectation. The strength of rural financial support (X2) has a positive impact on the efficiency of rural agriculture financial support at the significance level of 5%; therefore, the empirical test result is consistent with the theoretical expectation. The level of regional economic development (X3) has a positive impact on the efficiency of rural agriculture financial support at the significance level of 1%; therefore, the empirical test result is consistent with the theoretical expectation. The scale of agricultural production and operation (X5) has a negative impact on the efficiency of rural agriculture financial support at the significance level of 1%; therefore, the empirical test result is consistent with the theoretical expectation.

Finally, it should be noted that the cultural level of rural residents (X4) did not pass the statistical test at the significance level of 10%, indicating that the cultural level of rural residents had no significant impact on the efficiency of rural agriculture financial support. The reason may be that the average education level of rural residents in all regions is generally low, so they lack an effective understanding of the relevant policies and financial services of financial support for agriculture [24]. This is also reflected in Table 4. The overall mean of the cultural level of rural residents is only 8.6 years, which has not reached the cultural level of nine-year compulsory education. Moreover, the overall standard deviation is only 0.47 years, indicating that the gap between different individuals is very small.

4.4. Robust Test

The previous part has verified the good robustness of the parameter estimation results from the perspective of different regions. This section further tests the robustness of the above empirical analysis results from the perspective of replacing dependent variables. The specific path is to replace the dependent variable comprehensive efficiency (CE) of the Tobit model with the pure technical efficiency (PTE) and scale efficiency (SE) in the efficiency of rural agriculture financial support and compare the empirical analysis results. Based on the panel data constructed above, we use stata15.1 software to carry out panel Tobit regression on samples nationwide, and the parameter estimation results are shown in Table 6.

Table 6. Panel Tobit model parameter estimation results after replacing dependent variables.

Variable Code	Model I (PTE)		Model II (SE)	
	Regression Coefficient	Standard Deviation	Regression Coefficient	Standard Deviation
X1	−0.0922 *	0.0869	−0.1877 ***	0.0525
X2	0.0175 **	0.0084	0.0094 *	0.0051
X3	0.0712 ***	0.0124	0.0048 *	0.0070
X4	0.0458	0.5356	0.0261	0.0324
X5	−0.0281 ***	0.0056	−0.0014	0.0034
cons	−0.1120	0.4546	0.8406 ***	0.2760
Hausman Test				
Chi2(n)	23.50		12.27	
p-value	0.6235		0.5621	
Test Results	Random effect model		Random effect model	

Note: ***, ** and * represent the significance levels of 1%, 5% and 10%, respectively.

According to the Hausmann test results in the last row of Table 6, the panel Tobit model based on the nationwide PTE and SE cannot reject the original assumption that "the random effect model is the correct model" at the significance level of 10%. Therefore, the random effect model should be selected for model I and model II. At the same time, comparing the parameter estimation results of the two models in Table 6 with the nationwide model parameter estimation results in Table 5, it can be seen that, except that the variable of agricultural production and operation scale (X5) in model II fails to pass the statistical test at the significance level of 10%, the influence direction and significance of the other explanatory variables are highly consistent, which further verifies the good robustness of the empirical analysis results of this study.

5. Conclusions and Policy Recommendations

5.1. Conclusions

Based on the panel data of 30 provinces in China from 2014 to 2018, this study uses the DEA model to quantitatively evaluate the efficiency of rural agriculture financial support and uses the panel Tobit model to form an empirical analysis of its influencing factors. The main results are summarized as follows.

(1) In terms of comprehensive efficiency, pure technical efficiency, and scale efficiency, the mean of the eastern region is relatively high, followed by the central region and the western region. This shows that no matter which efficiency, the efficiency of rural agriculture financial support in the eastern region is significantly higher than that in the central and western regions. From the perspective of the time dimension, except that the efficiency in the eastern region remained stable during the sample period, the efficiency in the central and western regions showed a downward trend. As a result, the efficiency of rural agriculture financial support has shown a downward trend under the national average level.

(2) The efficiency of Beijing, Zhejiang, and Guangdong provinces in the eastern region over the years are on the production frontier, indicating that the efficiency level of rural agriculture financial support in these provinces has been very high, while other provinces in the region still have room to improve at least one aspect of efficiency in some years. In the central region, only Henan and Hunan provinces are on the production frontier in some years, while the efficiency values of other provinces are relatively low, indicating that there is a large room for improvement in various efficiency in these provinces. In the western region, only Yunnan Province was on the production frontier in 2014, while the efficiency of other provinces was relatively low, indicating that there is a large room for improvement in the efficiency of all provinces in the western region.

(3) The intensity of rural financial services has a negative impact on the efficiency of rural agriculture financial support at the significance level of 10%, which shows that the more the rural population is served by per small rural financial institution, the worse the

efficiency of rural agriculture financial support. The strength of rural financial support has a positive impact on the efficiency of rural agriculture financial support at the significance level of 5%, which shows that the greater the support of rural financial institutions for the development of "agriculture, rural areas and farmers", the higher the efficiency of rural agriculture financial support. The level of regional economic development has a positive impact on the efficiency of rural agriculture financial support at the significance level of 1%, which shows that the higher the level of regional economic development, the more conducive to the improvement of rural agriculture financial support. The scale of agricultural production and operation has a negative impact on the efficiency of rural agriculture financial support at the significance level of 1%, which shows that the larger the scale of agricultural production and operation, the lower the efficiency level of rural agriculture financial support.

5.2. Policy Recommendations

Based on the above research conclusions, the following policy recommendations are obtained.

(1) In view of the low efficiency of rural agriculture financial support in the central and western regions and the obvious downward trend, it is suggested that the government give more rural financial policy support to the central and western regions and strive to narrow the efficiency gap between the central and western regions and the eastern regions, especially the pure technical efficiency.

(2) In view of the regional inter-provincial differences in the efficiency of rural agriculture financial support in different regions, it is suggested that relevant departments should encourage priority to carry out exchanges and cooperation among provinces in the region. The eastern region should learn from Beijing, Zhejiang, and Guangdong, the central region should learn from Henan and Hunan, and the western region should learn from Yunnan.

(3) In view of the key factors affecting the efficiency of rural agriculture financial support, it is suggested that the People's Bank of China and the China Banking and Insurance Regulatory Commission urge rural financial institutions to set up more service outlets in rural areas and increase their support for agriculture-related loans. At the same time, every province should also try its best to improve the level of economic development and reduce its dependence on agricultural industry.

Finally, the conclusions of this study have reference value for the government to introduce relevant financial policies to support agriculture, reduce poverty, and promote the sustainable development of rural agriculture, but the limitations of this paper also need to be further discussed. In the face of changes in the global economy, including the crisis of 2020–2022, the policy recommendations issued on data analysis from 2014 to 2018 have some limitations. However, this has also prompted us to consider including the impact of economic uncertainty in the analysis framework in future related research and to adopt the latest data for more systematic research.

Author Contributions: Conceptualization, B.S.; Data curation, J.Z.; Formal analysis, B.S. and J.Z.; Investigation, B.S.; Methodology, B.S., J.Z. and P.Z.; Writing—original draft, B.S. and J.Z.; Writing–review & editing, P.Z. All authors have read and agreed to the published version of the manuscript.

Funding: This study was funded by the National Social Science Foundation of China (19CJY044).

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Wakunuma, K.; Siwale, J.; Beck, R. Computing for social good: Supporting microfinance institutions in Zambia. *Electron. J. Inf. Syst. Dev. Ctries.* **2019**, *85*, e12090. [CrossRef]
2. Arisudi, M.A.; Gapor, S.A. The role of micro financial institution to improve socio-economic of the rural communities. *J. Keuang. Dan Perbank.* **2010**, *14*, 122–130.
3. Jalil, M.F. Microfinance towards micro-enterprises development in rural Malaysia through digital finance. *Discov. Sustain.* **2021**, *2*, 55–69. [CrossRef]

4. Zeb, N.; Jalal, R.N.; Fayyaz, U.; Zaheer, M.A. Microfinance and Economic Development: The Role of Microfinance Institutions Outreach in Pakistan. *J. Asian Financ. Econ. Bus.* **2021**, *8*, 117–126.
5. Jude, I.I.; Shingo, T. Food consumption-production adjustments to economic crises under credit constraints in Nigeria. *Sustainability* **2022**, *14*, 8599.
6. Hu, J.Y.; Jiang, F.R. Target deviation of small loan companies: Case of Shandong Province. *Reform* **2018**, *2*, 105–115.
7. Zhao, H.; Zheng, X.; Yang, L. Does Digital Inclusive Finance Narrow the Urban-Rural Income Gap through Primary Distribution and Redistribution? *Sustainability* **2022**, *14*, 2120. [CrossRef]
8. Sainz-Fernandez, I.; Torre-Olmo, B.; López-Gutiérrez, C.; Sanfilippo-Azofra, S. Development of the Financial Sector and Growth of Microfiifinance Institutions: The Moderating Effect of Economic Growth. *Sustainability* **2018**, *10*, 3930. [CrossRef]
9. Zhang, H.; Luo, J.C.; Hao, Y.F. An analysis of the rural inclusive finance and its determinants: An empirical analysis based on data collected from 107 rural credit cooperatives in Shaanxi Province. *China's Rural. Econ.* **2017**, *1*, 2–15.
10. Yang, Y.; Yang, S.G. Study on the effectiveness of rural commercial banks in supporting agriculture from the mission drift perspective: Based on the data of 107 rural commercial banks in Hunan Province. *China Soft Sci.* **2018**, *2*, 42–53.
11. He, Y.Y.; Ahmed, T. Farmers Livelihood capital and its impact on sustainable livelihood strategies: Evidence from the poverty-stricken areas of southwest China. *Sustainability* **2022**, *9*, 4955. [CrossRef]
12. Zou, L.Y. Construction of performance audit and evaluation indicator system of financial support for agriculture. In Proceedings of the International Conference on Future Information Technology and Management Engineering (FITME), Changzhou, China, 9–10 October 2010; Volume 2, pp. 356–359.
13. Zhang, B.X.; Xiao, S.S. Up or down? On the performance of rural banks in supporting agriculture. *Financ. Dev. Res.* **2015**, *11*, 50–56.
14. Deng, X.N. Spatial econometric analysis of operating efficiency and influencing factors of rural financial institutions: Also on the reform of rural financial institutions. *Financ. Regul. Res.* **2020**, *2*, 51–66.
15. Song, B.; Hong, Y.S. Research on dual objective performance evaluation and influencing factors of rural financial institutions. *J. Contemp. Financ. Res.* **2021**, *3*, 50–59.
16. Kolesnyak, A.A.; Naydanova, E.B.; Polyanskaya, N.M.; Kolesnyak, I.A. State financial support for agricultural sector in region. *Earth Environ. Sci.* **2020**, *2*, 22–30. [CrossRef]
17. Zhan, X.Y.; Lu, Z.R. Can the dual objectives of rural financial institutions be taken into account: Empirical test based on the balanced panel data of 88 County Agricultural commercial banks. *Financ. Econ.* **2022**, *3*, 72–80.
18. Zhou, L.L.; Sim, J. Efficiency Evaluation of Financial Support for Rural Industry Revitalization in Eastern China. *Int. J. Adv. Smart Converg.* **2022**, *11*, 101–110.
19. Lei, X.; Guo, S.W. An empirical study on the performance level of regional financial support for agriculture in China: An analysis of inter provincial differences based on DEA model. *Jiangxi Soc. Sci.* **2016**, *2*, 44–49.
20. Tan, X.; Na, S.; Guo, L.; Chen, J.; Ruan, Z. External Financing Efficiency for rural Revitalization Listed Companies in China: Based on Two-Stage DEA and Grey Relational Analysis. *Sustainability* **2019**, *11*, 4413. [CrossRef]
21. Gao, Y.D.; Wen, T.; Wen, Y.; Wang, X.H. A spatial econometric study on effects of fiscal and financial supports for agriculture in China. *Agric. Econ. Czech* **2013**, *64*, 315–332.
22. Beachy, R.N. Building political and financial support for science and technology for agriculture. *Philos. Trans. R. Soc. B Biol. Sci.* **2014**, *369*, 20120274. [CrossRef] [PubMed]
23. Zhang, Z.H.; Ru, S.F. Evaluation and influencing factor analysis of financial support efficiency for agriculture in Shaanxi Province. *J. Agrotech. Econ.* **2011**, *7*, 82–89.
24. Luo, H.H.; Luo, L. Analysis on Influencing Factors of agricultural support ability of rural small financial institutions in China. *Hainan Financ.* **2011**, *10*, 75–78.
25. Luo, H.H.; Li, M.X. Analysis on Influencing Factors of agricultural support level of GSP rural financial institutions in China. *Contemp. Econ. Manag.* **2012**, *9*, 86–90.
26. Louis, P.; Seret, A. Financial Efficiency and Social Impact of Microfinance Institutions Using Self-Organizing Maps. *World Dev.* **2013**, *46*, 197–210. [CrossRef]
27. Mobin, M.A.; Alhabshi, S.O.; Masih, M. *Religiosity and Threshold Effect in Social and Financial Performance of Microfinance Institutions: System GMM and Non-Linear Threshold Approaches*; MPRA Paper 65242; University Library of Munich: Munich, Germany, 2015.
28. Xin, L.Q.; Qin, S.K.; Liu, W.Q. Analysis on Influencing Factors of effective agricultural support of new rural financial institutions in Heilongjiang Province. *J. Northeast. Agric. Univ. (Soc. Sci. Ed.)* **2015**, *6*, 15–20.
29. Peng, H. Research on government financial support policy for agriculture. *Rural. Econ. Technol.* **2017**, *11*, 111–112.
30. Ma, J.J.; Qi, H.; Wu, B.J. The impact of marketization of rural financial institutions on financial support for agriculture: Inhibition or promotion–Evidence from the restructuring of rural credit cooperatives into rural commercial banks. *China Rural. Econ.* **2020**, *11*, 79–96.
31. Wang, H.; Mu, Y.Y. Study on vegetable production resource allocation in China based on micro-perspective of farmers: With modification of Three-stage DEA model. *J. China Agric. Univ.* **2014**, *6*, 221–231.
32. Han, D.Y.; Liu, H.W. Technical Efficiency and Influencing Factors of China's Logistics Industry—Empirical Research from Listed Companies. *China's Circ. Econ.* **2019**, *11*, 17–26.

33. Banker, R.D.; Charnes, A.; Cooper, W.W. Some Models for Estimating Technical and Scale Inefficiencies in DEA. *Manag. Sci.* **1984**, *9*, 1078–1092. [CrossRef]
34. Xu, W.; Fu, H.Y.; Liu, H. Evaluating the Sustainability of Microfinance Institutions Considering Macro-Environmental Factors: A Cross-Country Study. *Sustainability* **2019**, *11*, 5947. [CrossRef]
35. Chen, Q. *Advanced Econometrics and Stata Application*; Higher Education Press: Beijing, China, 2010.