

Retraction

Retracted: Factors Influencing the Allocation of Regional Sci-Tech Financial Resources Based on the Multiple Regression Model

Mathematical Problems in Engineering

Received 25 July 2023; Accepted 25 July 2023; Published 26 July 2023

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their

agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] C. Zhang, "Factors Influencing the Allocation of Regional Sci-Tech Financial Resources Based on the Multiple Regression Model," *Mathematical Problems in Engineering*, vol. 2021, Article ID 6688549, 9 pages, 2021.

Research Article

Factors Influencing the Allocation of Regional Sci-Tech Financial Resources Based on the Multiple Regression Model

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Received 2 December 2020; Revised 30 December 2020; Accepted 21 January 2021; Published 2 February 2021

Academic Editor: Sang-Bing Tsai

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This article uses a multiple regression model to evaluate the extent to which financial resources in various regions can be put into the most appropriate direction through the financial system or financial market. This paper uses the Tobit model to conduct empirical analysis on the input and output data of technology finance in multiple provinces and cities and explores the impact of various factors on technology finance efficiency from the perspective of three technology finance entities: high-tech enterprises, governments, and venture capital companies. Based on the DEA model and Malmquist index model in the data envelopment analysis method, this paper uses deap software to calculate the efficiency of agricultural science and technology resource allocation in Gansu Province and the efficiency of agricultural science and technology operation in many provinces in the western region. This paper divides the allocation of scientific and technological innovation resources into the ability to allocate scientific and technological innovation resources and the allocation efficiency of scientific and technological innovation resources. By constructing a performance evaluation system for the allocation of scientific and technological innovation resources, it is found that there are obvious differences in the ability and efficiency of scientific and technological innovation resource allocation in various regions. This paper proposes the selected efficiency evaluation method, the multiple regression model, which uses the data from 2012 to 2018 to evaluate the efficiency of the allocation of scientific and technological financial resources in my country, calculates the efficiency value of each region, and conducts a comparative analysis of provinces and regions. Research shows that, through multiple regression model analysis, the total technical efficiency of technology finance in Northeast China rose from 0.759 fluctuations in 2012 to 0.922 in 2018, gradually reducing the difference with the eastern and western regions. The overall promotion plays a significant role. The innovation of this article lies in the use of multiple regression models to analyze the factors affecting the allocation of regional scientific and technological financial resources, aiming to improve the efficiency of financial resource allocation.

1. Introduction

The research in this article aims to improve the efficiency of the allocation of scientific and technological financial resources and to provide suggestions for the efficient development of technological innovation, financial innovation, and the combination of technology and finance in my country. The science and technology financial system is a complex whole, and the input and output indicators have a large correlation effect. Increasing financial investment in science and technology can effectively promote the development of science and technology. But, as a developing

country, how to improve the efficiency of scientific and technological financial output is the primary issue considered by governments at all levels. Therefore, this article explores the impact of various factors on the efficiency of science and technology finance from the perspectives of three technological finance entities, high-tech enterprises, governments, and venture capital companies, and studies how to use the least investment in science and technology to obtain the largest transformation of scientific and technological achievements, which is important for further improving China's science and technology. The allocation of financial resources has great practical significance.

On the macrolevel, foreign scholars are mainly concerned with the guiding role of scientific and technological policy support in the allocation of scientific and technological resources. In the horizontal and vertical directions, the current situation and effects of the allocation of scientific and technological resources have been explained in detail. Through empirical comparative analysis, Lashkari pointed out that the differences in technology policies and technological evolution between Italy and Germany are the main factors that cause the differences in the allocation of scientific and technological resources and the different scientific and technological systems between the two countries [1]. Mia found through research that factors such as per capita GDP and financial market development are in direct proportion to the country's investment in science and technology. From a micro point of view, it mainly takes enterprises as the research object and discusses the factors that affect the allocation of scientific and technological resources of enterprises from multiple angles [2]. Cyril built a multilevel decision-making model on the basis of the problem of R&D resource allocation for hierarchical organization in 1981. The essence is to provide a theoretical basis, so that enterprises can better analyze the strategy of scientific and technological resource allocation [3].

At present, the production cost of agricultural production is on the rise. Therefore, agricultural technology can help reduce the cost of agricultural development. Agricultural enterprises, colleges and universities, and agricultural scientific research institutions are the three main subjects of agricultural scientific and technological innovation in China, and they are also the main research objects for the allocation of agricultural scientific and technological resources. Gao used the BCC model of the DEA method to measure the allocation efficiency of agricultural science and technology resources in 31 provinces and cities and analyzed its comprehensive efficiency, technical efficiency, and scale efficiency [4]. Xu used the superefficiency DEA model and the Malmquist index method to calculate and analyze the allocation efficiency of agricultural science and technology resources in 12 western provinces (cities), including Ningxia, from 2008 to 2013. The ratio analysis method is the ratio of input to output. It is generally used for the efficiency of single-output and single-input systems. It is not applicable to the study of multiple inputs and multiple outputs [5]. Li people use statistical analysis to measure the efficiency of resource allocation using parameter methods, including cluster analysis and principal component analysis, mainly for the efficiency of multiple inputs and multiple outputs, and standardize the weights of various indicators to compensate for the ratio analysis the lack of law [6].

Based on the relevant theories and literature reviews of technology finance, this paper selects various input indicators and output indicators that reflect the level of local technology finance. Before the DEA model test, the SPSS software principal component analysis method is used to analyze the various input indicators and output indicators. Correlation analysis of indicators ensures the validity of the data used for DEA efficiency evaluation. A comprehensive performance evaluation system for the allocation of

scientific and technological innovation resources has been constructed. Domestic evaluations on the allocation of scientific and technological innovation resources mostly focus on "quantity" or "efficiency". A few studies use empirical methods to combine the two for comparative analysis and objectively reflect the specific differences between regions.

2. Influencing Factors of Regional Technology and Financial Resource Allocation Based on Multiple Regression Models

2.1. Multiple Regression Models in the Allocation of Regional Technology and Financial Resources

2.1.1. DEA Basic Model. Linear programming is the basic idea of the DEA method. By determining the input and output of the selected decision-making unit, the optimization variable is determined as the weight of each input and output, and finally, the efficiency frontier including all the decision-making units is established. Decision-making units that are on the frontier of efficiency are called DEA effective decision-making units. Decision-making units that do not fall on the frontier of efficiency are called decision-making units that are not DEA effective or DEA ineffective. You can adjust input and output by adding slack variables. Out, the decision-making unit DEA is reimplemented to be effective [7, 8].

The DEA method has no special requirements on the input-output function form and decision-making unit and does not need to know the functional relationship between the input and output in advance. It can avoid the deviation of evaluation due to the wrong function setting and is suitable for decision-making units with more complicated relationships. Efficiency evaluation: at the same time, the DEA method is not affected by different data units and is more convenient in data processing. Therefore, this paper uses the DEA method to evaluate the efficiency of technology finance [9, 10]. The DEA basic model includes the CCR model and BCC model, and then, this article will briefly introduce them.

(1) BCC Model. The abovementioned CCR model is realized under the assumption that the return to scale of the decision-making unit is unchanged, and in real life, the decision-making unit is more in the production state of the change of scale return. Assuming that the return to scale of the production unit is variable, it is called the BCC model. Because the change of production scale always affects the important premise of return to scale, the three scholars have continuously optimized the assumptions of the CCR model. Based on the variability of return to scale, the BCC model was established and the function Shepherd was introduced for the first time to divide the technical efficiency. For pure technical efficiency and scale efficiency, it successfully avoided the evaluation result of return to scale on technical efficiency [11, 12]. The efficiency value obtained under the CCR model is divided by the efficiency value under the BCC model to obtain the scale efficiency value. It is explored

whether the return to scale of each production unit is increasing, decreasing, or fixed.

Common BCC model functions are as follows:

$$\left\{ \begin{array}{l} \sum_{j=1}^n \lambda_j Y_j \geq Y_0, \sum_{j=1}^n \lambda_j = 1, \sum_{j=1}^n \lambda_j Y_j \leq \theta X_0, \quad j = 1, 2, \dots, n, \end{array} \right. \quad (1)$$

where X_0 represents the input items of the decision-making unit and Y_0 represents the output items of the decision-making unit. λ represents the ratio of the newly constructed effective decision-making unit to the original decision-making unit. In this linear programming model, θ represents the efficiency value of the decision-making unit, that is, the effective value of X input items relative to Y output items in the production unit, the degree of utilization [13, 14].

(2) *Construction of an Index System.* The composition of scientific and technological finance efficiency indicators studied in this paper is divided into input indicators and output indicators. Combined with the actual problems of the study, the following indicators are selected after screening: The selection of scientific and technological financial input indicators considers the input of human, financial, and material resources. In terms of human input elements, it mainly examines the input of personnel engaged in R&D activities. This article selects the indicator R&D personnel full-time equivalent; the financial input elements mainly include government support, enterprise R&D input, and other research funding input, considering the availability and authority of data. This article selects the indicators of local fiscal expenditures on science and technology; the material input element mainly refers to the investment of enterprises in fixed assets, so this article selects the indicator of new fixed assets in high-tech industries.

Compared with the selection of input elements, the definition of scientific and technological achievements output indicators is more controversial. This article draws on the research of previous scholars and proposes to consider both direct output and indirect output [15, 16]. Direct output refers to the direct technical output and the contract value of the market for the selected index technology; indirect output refers to the output through the transformation of technological achievements, the main business income of the index high-tech industry, the sales income of new products, and the gross domestic product.

2.1.2. *Tobit Regression Model.* The Tobit regression model is a kind of dependent variable restricted model, based on the assumption of normal distribution. Its characteristic is that the dependent variable is restricted, and some values cannot be obtained or are fragmented values. The scientific and technological financial efficiency value obtained by DEA analysis is between 0 and 1. If the ordinary least square method (OLS) is used for regression, then the parameter estimate will be biased towards 0, and the Tobit model can solve this problem well [17, 18]. Therefore, in this paper, the total technical efficiency value of science and technology

finance is used as the explained variable, a standard Tobit model is established, and the intercept point at the left end is set to 0. The formula is as follows:

$$Y_t^* = a_t + \sum_{j=1}^r \beta_j X_{tj} + \varepsilon_t \quad t = 1, 2, \dots, n; j = 1, 2, \dots, r,$$

$$Y_t^* = \begin{cases} Y_t^*, & \text{if } Y_t^* \geq 0, \\ 0, & \text{if } Y_t^* \leq 0. \end{cases} \quad (2)$$

Among them, Y_t^* is the efficiency of science and technology finance, n is the number of regions, and r is the number of factors affecting the efficiency of science and technology finance.

2.1.3. *Malmquist Index Model.* The Malmquist (TFP) index was established to examine the changes in productivity in the two periods. The Malmquist index can analyze multi-input and multioutput panel data [19, 20]. When the return to scale is variable, the technical efficiency change index can be further decomposed into a pure technical efficiency index and a scale efficiency index. Thus, the Malmquist index (TFP) can be decomposed into a technical progress change index, a pure technical efficiency change index, and a scale efficiency index 3 part, namely,

$$TFP = \text{Tech} \times \text{Pech} \times \text{Sech}. \quad (3)$$

When the Malmquist index $TFP > 1$, it means that total factor productivity is on the rise; when $TFP = 1$, it means that total factor productivity remains unchanged; and when $TFP < 1$, it means that total factor productivity is on the decline.

2.2. *Fiscal Decentralization and Technological Innovation Resources.* Government financial investment in science and technology can stimulate the enthusiasm of enterprises in the allocation of scientific and technological innovation resources and has a positive role in promoting technological innovation.

2.2.1. *Analysis of the Impact Mechanism of Fiscal Decentralization on Scientific and Technological Resources.* Under the current fiscal decentralization system, local governments are agents of the central government in the localities, and they assume most of the rights and obligations within their jurisdictions. With this kind of principal-agent relationship, on the one hand, the local government can be regarded as a community of interests, pursuing more financial power and power, and the degree of fiscal decentralization tends to expand; on the other hand, local government behavior is dominated by local officials and officials under the existing decentralization system; this behavior is affected by the promotion mechanism of officials [21, 22]. It can be said that the existing promotion mechanism largely influences the behavior of local governments. Based on existing theories and literature research, the influence of local governments on scientific and technological

innovation resources stems from two factors: fiscal decentralization and the promotion mechanism of officials. These two systems have different concepts but influence each other.

- (1) Fiscal decentralization affects government behavior. When local governments have a high degree of fiscal decentralization, the marginal cost of increased fiscal decentralization is huge. At the same time, competition among local governments forces local governments to improve government behavior and increase the supply of public products, strengthening the resources of scientific and technological innovation. Investment in turn leads to the improvement of the ability of local scientific and technological innovation resource allocation [23, 24]. The low level of fiscal decentralization of local government, local governments in pursuit of more financial power and the executive power, pays more attention to short-term interests, while ignoring the supply of public goods. The degree of fiscal decentralization can be measured by constructing a fiscal decentralization index based on data.
- (2) The promotion mechanism of officials will affect the behavior of local governments. When the promotion mechanism uses "GDP" as the evaluation standard, local government officials have to abandon the goal of equalization of public services and instead invest more resources in the region into economic construction and participate in the "GDP evaluation" competition. When the promotion mechanism pays more attention to the provision of technological innovation resources, local government officials will pay more attention to technological innovation, adjust government behavior, and adapt to the central strategic goals. Similar local officials' efforts for promotion can be approximated by the proportion of foreign direct investment in GDP.
- (3) Official promotion mechanism and fiscal decentralization affect each other. When one factor exceeds another, it will produce a substitution effect. When regions compete with GDP as the core, fiscal decentralization will have a negative effect on the allocation of scientific and technological innovation resources.

2.2.2. The Relationship between the Local Government and Each Subject of Regional Technological Innovation

(1) *The Relationship between Local Governments and Technological Innovation Enterprises.* Under the conditions of a socialist market economy, enterprises and governments are both the main economic and social activities, and the two are distinguished from each other and related to each other, especially in the field of technological innovation. In the field of taxation, the enterprises in the jurisdiction are the main taxpayers, and any changes in the fiscal and taxation policies of the local government will affect the operation of the

enterprises; in the market field, the relationship between the supervision and the supervision of the enterprises and the government in the jurisdiction is as in [25]. As the main body of scientific and technological innovation activities, enterprises themselves have spillover effects and the influence of R&D uncertainty and require government policy support and financial support.

In the factor analysis model, science and technology innovation enterprises and the government exist as the second principal component, and the explanation strength of the regional science and technology innovation resource allocation ability is more than 40%. In the specific factor loading matrix, the correlation between science and technology innovation enterprises and the government reaches more than 70%. At the same time, the government has taken the initiative to improve the supply of public products and public services, build Internet-type infrastructure, and introduce foreign direct investment to build a good macro-environment for the technological innovation of enterprises [26]. In addition, the government builds a technology market, introduces market competition mechanisms into the technology market, improves the resource allocation capabilities of technological innovation enterprises, and reduces transaction costs.

- (1) The relationship between local government and scientific research institutions and universities: scientific research institutions and universities, as the first main component to measure the ability of regional scientific and technological innovation resource allocation, are also affected by local governments. First of all, local governments are important providers of R&D funds and talent fosters for scientific research institutions and universities. According to research, among the executive bodies of local government investment in science and technology, scientific research institutions and high implementation funds reach 50%, and local governments are also the main providers of educational resources. Second, the local government is the builder of the industry-university-research system, effectively reducing the information asymmetry between research universities and the market. Finally, local governments are also major investors in industrial projects and have a guiding role for enterprises, scientific research institutions, and universities.

2.3. Factors Affecting the Efficiency of Regional Financial Resource Allocation

2.3.1. *Economic Basis.* The economic foundation is the material carrier and service object of the financial configuration subject. The basic function of finance is to act as an intermediary between the surplus party and the demander through products and services. The emergence and development of financial institutions are inseparable from the needs of financial communication in the real economy. The economic foundation determines the mode, scope, and

activity of the financial market. The economic foundation generally includes two parts: economic scale and economic structure. Economic scale represents the output capacity of all enterprises in the economy and reflects the overall economic strength of all economic sectors in the region. In regions with strong overall economic strength, the internal operating efficiency of each economic sector is relatively high, and the sustained profitability is better. To ensure a good repayment ability, the moral hazard is relatively low, and the increase in the scale and strength of the economy is conducive to curbing the generation of nonperforming assets.

2.3.2. Degree of Financial Marketization. Financial marketization can reduce the excessive control imposed on financial activities and make the behavior of financial resource allocation subjects more autonomous. Financial institutions will engage in financial activities in accordance with market-based operating mechanisms. In order to meet welfare needs to the greatest extent, each entity can make highly sensitive and efficient allocation decisions based on their own rational behaviors, which will gradually attract investment and financing. Channels refine the division of labor in the financial market and meet the needs of financiers' financial resources in a variety of ways, while fully mobilizing investors' financial resources, reducing capital costs, and improving the efficiency of financial resource utilization.

3. Influencing Factors of Regional Scientific and Technological Financial Resource Allocation Based on the Multiple Regression Model

3.1. Evaluation Methods and Data Collection for the Allocation Efficiency of Scientific and Technological Innovation Resources. As the current mainstream efficiency evaluation method, DEA can incorporate multiple inputs and multiple outputs into the evaluation system while effectively avoiding the influence of dimensions. However, its shortcomings are also very obvious. It can only evaluate the relative efficiency in the current system. The evaluated efficiency value is greatly affected by the number of input and output items. In addition, the effective efficiency value cannot be effectively distinguished. Based on this, this paper uses the data on the allocation of scientific and technological resources in 29 provinces and cities and builds the Malmquist index based on the DEA analysis method, which decomposes total factor productivity into a comprehensive efficiency change index and a technical efficiency change index. Using provincial data, the Malmquist index is constructed based on the DEA-CCR model to analyze the changes in the efficiency of provincial scientific and technological resource allocation and influencing factors.

Based on learning and reference, this paper constructs an evaluation system for the allocation efficiency of scientific and technological innovation resources. The M index based on DEA can have a more horizontal and vertical comparison of the allocation of regional scientific and technological

resources, and Malmquist can also reflect changes in the internal structure.

3.2. Index System of the Allocation Efficiency of Scientific and Technological Innovation Resources. "Efficiency" refers to the effective use of resources under given constraints (time, space, structure, etc.). The allocation efficiency of scientific and technological innovation resources is also within its scope. It is an expression of the input-output ratio, which can be understood as a cross-sectional efficiency, which has very important practical significance for optimizing the stock structure and effectively increasing the increment. It is the evaluation of the input-output ratio. When constructing the local scientific and technological resource allocation efficiency index, the common methods of economics are still used and the requirements of objectiveness, availability, comparability, science, and system are combined.

3.3. Research Methods. This paper uses the vector autoregressive model to empirically analyze the relationship between my country's fiscal decentralization and the allocation of scientific and technological innovation resources, so as to locate the financial and administrative powers of local governments when dealing with technological innovation. The process of using the VAR model is to first perform a unit root test on the original data, which is a stationarity test, establish the vector autoregressive model and Granger causality test, and analyze the impulse response and variance decomposition analysis of each variable in the model. The relationship between fiscal decentralization and the efficiency of scientific and technological resource allocation is obtained.

4. Experimental Research and Analysis of Factors Affecting the Allocation of Regional Scientific and Technological Financial Resources Based on Multiple Regression Models

4.1. Analysis of the Total Technical Efficiency of Regional Technology Finance Based on the Multiple Regression Model. To facilitate analysis, this paper divides the 24 provinces and cities in the data sample into eastern, central, western, and northeastern regions. The eastern region includes Beijing, Tianjin, Shanghai, Hebei, Shandong, Jiangsu, Zhejiang, Fujian, and Guangdong, the central region includes Shanxi, Henan, Hubei, Anhui, Hunan, and Jiangxi Provinces, the western region includes Inner Mongolia Autonomous Region, Shaanxi Province, Chongqing City, Sichuan Province, Guizhou Province, Yunnan Province, and the northeast region includes Heilongjiang Province, Jilin Province, and Liaoning Province.

It can be found from Table 1 and Figure 1 that, in 2018, the total technical efficiency of science and technology finance in various regions of China was between 0.85 and 0.98, and the total technical efficiency of eastern and western regions was the same, maintaining a high efficiency level of

TABLE 1: The total technical efficiency (TE) of my country's sub-regional technology finance from 2012 to 2018.

	2012	2013	2014	2015	2016	2017	2018
East area	0.925	0.975	0.954	0.966	0.960	0.964	0.902
Central region	0.875	0.846	0.837	0.863	0.836	0.864	0.850
Western region	0.983	0.976	0.986	0.951	0.973	0.981	0.949
Northeast area	0.753	0.752	0.861	0.823	0.855	0.912	0.926

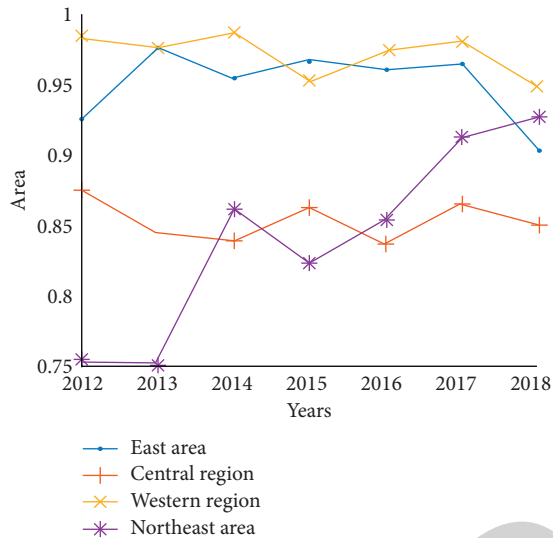


FIGURE 1: From 2012 to 2018, my country's subregional technology finance total technical efficiency trend (TE).

0.95; the total technical efficiency of the central region declined first and then increased. It declined slightly from 2012 to 2018 and rose slowly from 2015 to 2018. The overall efficiency level fluctuated around 0.85; the most outstanding performance was the total technical efficiency of technology and finance in Northeast China. The fluctuation increased from 0.759 in 2012 to 0.922 in 2018, gradually reducing the difference with the eastern and western regions, which played a significant role in the overall improvement of the overall technical efficiency of China's technology finance.

4.2. *Analysis of the Average Malmquist Index in Each Region.* According to my country's current economic region classification method, the average Malmquist index of each region can be shown as in Figure 2.

Figure 2 shows that the eastern region has the highest allocation efficiency of scientific and technological innovation resources, and its ability to allocate scientific and technological resources is also at the forefront of the echelon. The northeastern region is China's traditional old industrial base. Due to the transfer of the national strategic center, its ability to allocate innovative resources is affected by "genetic genes," but it has shown a good overall ability in the allocation efficiency of scientific and technological innovation resources. The high-quality flow and stock that transform this efficiency can be used to revitalize the northeast and supply-side reforms and lay a foundation; the central and

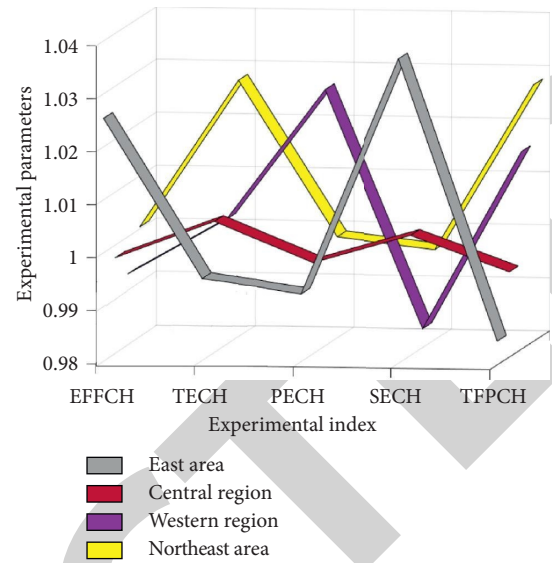


FIGURE 2: Average Malmquist index by region.

western regions have little difference in the efficiency of the allocation of scientific and technological innovation resources. At the same time, due to the small number of provinces in the central region, this averaging form of expression conceals the inadequacy of the efficiency of allocation of scientific and technological innovation resources in individual regions.

4.3. *DEA Super Efficiency Analysis.* As explained in the previous article, the traditional DEA model method can divide all DMUs into two groups. One group is at the frontier of efficiency with an efficiency value of 1; the other group is relatively inefficient with an efficiency value of less than 1. This method cannot compare effective decision-making units, and the SDEA superefficiency model can make up for the shortcomings. This article will use EMS measurement software to evaluate the superefficiency of regional financial resource allocation in my country from 2015 to 2017. For the inefficient DMU, its efficiency value is the same as the traditional DEA calculation result, so this article will not repeat it. For the effective DMU under the DEA model, its superefficiency value is different from the DEA model. The superefficiency of the relatively better decision-making unit is greater. After excluding the inefficient areas, the superefficiency calculation results are shown in Figure 3.

Beijing, Tianjin, Shanghai, and Zhejiang have been at the forefront of efficiency in all or some of the years during the inspection period. These four regions are basically the regions with the richest financial resources and relatively high degree of financial marketization in China. With the continuous deepening of economic system reform and the continuous improvement of the financial system, some positive changes have occurred in various regions. Among them, Beijing and Zhejiang have been the most efficient regions in the allocation of financial resources in the three years from 2015 to 2017. The efficiency values of Tianjin and

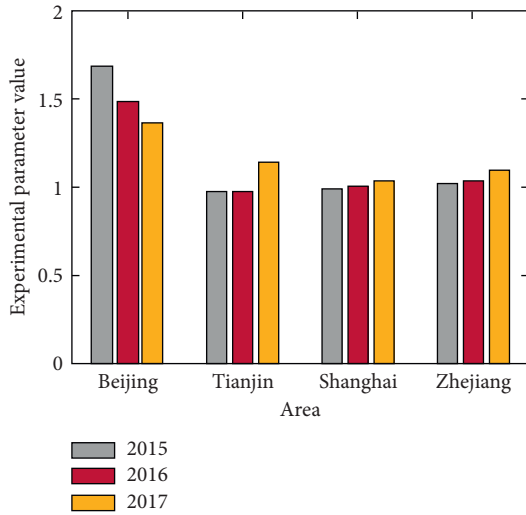


FIGURE 3: Regional superefficiency values from 2015 to 2017.

Shanghai have increased year by year from about 0.98 in 2015, and they are ultimately at the forefront of efficiency. Tianjin’s efficiency value improved most significantly in 2017. This may be related to the State Council’s promotion of the development and opening up of the Binhai New Area. Tianjin has made beneficial attempts in financial business, financial market, and financial opening reforms. Beijing has the highest allocation efficiency in three years. The efficiency value in 2017 was 1.3699, which means that even if the investment is increased by 37%, Beijing can still remain relatively effective in all regions. In the same way, other regions can also increase the corresponding amount of input to obtain the development of the financial sector and the national economy, while maintaining a higher efficiency of resource allocation.

4.4. Evaluation of the Allocation Efficiency of Agricultural Science and Technology Resources in Gansu Province under the Constant Return to Scale. The analysis in Figure 4 shows that, from 2011 to 2016, the total factor productivity of agricultural science and technology operations in Gansu Province dropped by an average of 9.5%. The main reason was the decline in the technological progress index because the technological progress index dropped by 5% and its comprehensive the average efficiency has increased by 7.1%. The experimental results are shown in Figure 4.

As can be seen from Figure 4, judging from the changes in the Malmquist index, during the six years from 2011 to 2016, Gansu Province’s total factor productivity increased for three years, namely, 2011-2012, and the total factor productivity of Gansu’s agricultural science and technology resource allocation increased by 22.3 from 2015 to 2016%; the increase was caused by the simultaneous increase of the

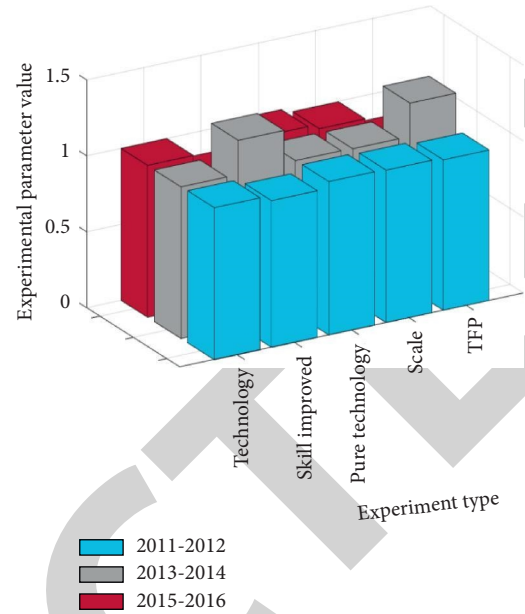


FIGURE 4: Changes in total factor productivity of agricultural science and technology in Gansu Province from 2011 to 2016.

technical efficiency and technical progress index. Its technical efficiency was 1, and the technical progress index increased by 22.3%, mainly due to the increase of the technical progress index.

5. Conclusions

In the construction of the evaluation system for the allocation efficiency of scientific and technological innovation resources, this paper finds that the “leading” position of the eastern region’s scientific and technological innovation resource allocation ability and efficiency is stable; although the central region has a strong ability to allocate scientific and technological innovation resources, its pure technical efficiency index (PECH) is less than 1, there is no such capacity and incremental capacity to convert into efficiency, and there is a waste of scientific and technological innovation resources. The ability to allocate scientific and technological innovation resources in the western and northeastern regions is not reflected in the stock. In the scientific and technological innovation resource allocation efficiency evaluation system, the pure technical efficiency index (PECH) of the two regions is relatively high and the “catch-up effect” is obvious.

From 2011 to 2016, my country’s overall technological and financial development level has steadily increased, but the distribution among regions is extremely uneven. The technological and financial development level of the eastern region is much higher than that of the central, western, and northeastern regions. From the perspective of the input and

output level of technology finance, China's technology finance investment is growing rapidly in total, but there is still a big gap between the input speed of technology finance and the speed of social and economic development. The conversion situation is not satisfactory. From the perspective of the development of high-tech industries, the scale of my country's high-tech industries continues to expand and R&D funding and personnel inputs continue to increase, but the transformation of scientific and technological achievements is not optimistic. Generally speaking, my country has a vast territory, and the development of technology and finance still has problems such as unbalanced resource distribution, unbalanced industry distribution, and mismatched input and output. The developed eastern coastal areas have good economic levels, developed high-tech industries, and high-tech financial development, while the economically underdeveloped areas such as the central and western regions have relatively slow development of scientific and technological finance, and the conversion rate of scientific and technological achievements is low.

This paper uses the Malmquist index model to calculate the total factor productivity of agricultural science and technology resource allocation in Gansu Province from 2011 to 2016 and analyzes its decomposition value. Under the condition of constant returns to scale, from 2011 to 2016, from the overall analysis, the total factor productivity of agricultural science and technology resource allocation in Gansu Province was in a state of decline, down by 9.5%. This was caused by the decline in the technological progress index because its the technical progress index dropped by an average of 5%, while the average comprehensive technical efficiency increased by 7.1%. With constant returns to scale, the main reason for the decline in total factor productivity of agricultural science and technology operations in Gansu Province is the decline in the technological progress index. Therefore, in general, the low efficiency of agricultural science and technology resources in Gansu Province is mainly caused by the low level of agricultural science and technology in the province. The innovation of this article lies in the use of multiple regression models to analyze the factors affecting the allocation of regional scientific and technological financial resources, aiming to improve the efficiency of financial resource allocation.

There are still shortcomings in the research of this paper. Due to the limitations of funds and materials, the coverage of the research data in this paper is not wide enough and the representativeness of the data is not strong enough. Future research can also analyze the factors affecting technology finance from different fields such as agriculture, industry, and manufacturing.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

- [1] M. Lashkari, "Designing a financial resource allocation model fo board of trustees medical centers using goal programming approach: case study of Afzalipour medical centers 2011–2014," *Journal of Technology Management & Innovation*, vol. 1, no. 4, pp. 10–21, 2006.
- [2] M. A. Mia, S. Nasrin, and Z. Cheng, "Quality, quantity and financial sustainability of microfinance: does resource allocation matter?" *Quality & Quantity*, vol. 50, no. 3, pp. 1285–1298, 2016.
- [3] C. Tomkins, "Corporate resource allocation: financial, strategic and organizational perspectives," *British Journal of Psychiatry the Journal of Mental Ence*, vol. 203, no. 2, pp. 126–131, 1991.
- [4] J. Gao, J. Campbell, and C. A. K. Lovell, "Equitable resource allocation and operational efficiency evaluation," *International Journal of Healthcare Technology and Management*, vol. 7, no. 1/2, pp. 143–167, 2006.
- [5] Y. Xu, J. Zhang, and M. Pinedo, "Budget allocations in operational risk management," *Probability in the Engineering and Informational Sciences*, vol. 32, no. 3, pp. 434–459, 2018.
- [6] L. X. Chen, "A study on financial resources allocative efficiency in the context of Internet finance-based on long tail theory," *Business & Globalization*, vol. 03, no. 4, pp. 75–80, 2015.
- [7] C. A. Maritan and G. K. Lee, "Resource allocation and strategy," *Journal of Management*, vol. 43, no. 8, pp. 2411–2420, 2017.
- [8] M. Nirmala, J. Cindhamani, P. Naguboyina et al., "Effective resource allocation in cloud computing using virtualization technique," *International Journal of Pharmacy and Technology*, vol. 8, no. 4, pp. 25938–25943, 2016.
- [9] H. G. Villasanti and K. M. Passino, "Feedback controllers as financial advisors for low-income individuals," *IEEE Transactions on Control Systems Technology*, vol. 25, no. 6, pp. 2194–2201, 2017.
- [10] B. Z. Khan, "The impact of war on resource allocation: "creative destruction", patenting, and the American civil war," *The Journal of Interdisciplinary History*, vol. 46, no. 3, pp. 315–353, 2015.
- [11] J. L. Bower, "Managing resource allocation: personal reflections from a managerial perspective," *Journal of Management*, vol. 43, no. 8, pp. 2421–2429, 2017.
- [12] S.-J. Kim and I. Kwon, "On a focusing-balancing dilemma in SMEs," *Academy of Management Proceedings*, vol. 2017, no. 1, p. 17630, 2017.
- [13] G. Sanjeev and V. Adrien, "Attack, defence, and contagion in networks," *Review of Economic Studies*, vol. 81, no. 4, pp. 1518–1542, 2015.
- [14] A. W. Ng, W. M. Wang, B. C. F. Cheung, R. Ma, and Y. Y. Or, "Cluster-based performance measurement system for emerging technology-based ventures," *International Journal of Entrepreneurship and Innovation Management*, vol. 21, no. 6, pp. 485–508, 2017.
- [15] K. L. Ross, Y. A. Zereyesus, A. Shanoyan et al., "The health effects of women empowerment: recent evidence from northern Ghana," *International Food & Agribusiness Management Review*, vol. 18, no. 1, pp. 127–144, 2015.
- [16] C. Mayer, R. Felkel, and K. Peterson, "Best practice on automated passenger flow measurement solutions," *Journal of Airport Management*, vol. 9, no. 2, pp. 144–153, 2015.
- [17] M. Dabbagh, B. Hamdaoui, M. Guizani, and A. Rayes, "Toward energy-efficient cloud computing: prediction,

- consolidation, and overcommitment,” *IEEE Network*, vol. 29, no. 2, pp. 56–61, 2015.
- [18] U. Ana, S. Leonidas, and D. Valerijonas, “Financial resource allocation in higher education,” *Informatics in Education*, vol. 16, no. 2, pp. 289–300, 2017.
- [19] K. Palanisami, S. Kumar, R. P. S. Malik et al., “Managing water management research analysis of four decades of research and outreach programmes in India,” *Economic and Political Weekly*, vol. 26 & 27, no. 26, pp. 33–43, 2015.
- [20] W. Du, “Research on levying of extending VAT tax of transportation industry based on fuzzy TOPSIS,” *The Open Construction and Building Technology Journal*, vol. 9, no. 1, pp. 87–91, 2015.
- [21] A. Toyin, A. Timothy, and A. Oladayo, “Explaining poverty and inequality changes in rural Nigeria,” *Asian Journal of Agricultural Extension, Economics & Sociology*, vol. 5, no. 4, pp. 227–237, 2015.
- [22] Y.-Y. Hong, Y.-M. Lai, Y.-R. Chang, Y.-D. Lee, and P.-W. Liu, “Optimizing capacities of distributed generation and energy storage in a small autonomous power system considering uncertainty in renewables,” *Energies*, vol. 8, no. 4, pp. 2473–2492, 2015.
- [23] Z. Y. Lee, G. T. R. Lin, and S. J. Lee, “Measuring dynamic operation efficiency for universal top 10 TFT-LCDs by improved data envelopment analysis,” *Journal of Entific and Industrial Research*, vol. 77, no. 8, pp. 447–450, 2018.
- [24] S. Polykarpou, M. Barrett, E. Oborn, T. O. Salge, D. Antons, and R. Kohli, “Justifying health IT investments: a process model of framing practices and reputational value,” *Information and Organization*, vol. 28, no. 4, pp. 153–169, 2018.
- [25] R. A. Layton, “Formation, growth, and adaptive change in marketing systems,” *Journal of Macromarketing*, vol. 35, no. 3, pp. 302–319, 2015.
- [26] M. S. Elsayed and A. H. Ali, “Performance evaluation of applying fuzzy multiple regression model to TLS in the geodetic coordinate transformation,” *American Scientific Research Journal for Engineering, Technology, and Sciences*, vol. 25, no. 1, pp. 36–50, 2016.