The Research on the Efficiency of Financial Support for the Development of Real Economy-A Case Study Based on the Data of the Silk Road Belt

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Abstract

With the intensifying trend of financialisation of the economy, the efficiency of financial support is associated with the smooth and sustainable development of the real economy. However, Mismatches between financial resources and real economic development emerged in recent years, and the decreased efficiency of financial services has greatly affected harmonisation and balance of financial and real economic growth, meanwhile there are also large differences between different provinces. Based on the data of 10 provinces along the Silk Road Belt from 2012-2018, the efficiency of financial support for the real economy development will be analyzed using DEA-BBC model and DEA-Malmquist index, and the validity of financial support for the real economy development will also be discussed in the article. The results showed that the overall comprehensive efficiency is effective, meanwhile there are significant differences among the provinces, and the productivity of financial support for economic development is on a declining trend, which is meanly caused by the declining efficiency of financial scale.

Keywords*: Financial support; Efficiency; DEA; Malmquist Index*

I. Introduction

Finance is the engine and driving force of modern economic development. However, the rapid development of the financial industry has brought about a series of problems such as financial bubble, the de-realization of financial assets to the deficit, the hollowing out of the real industry, which have once again aroused the great concern on the relationship between finance and economy, especially the issue of how finance can support the growth of the real economy, and the enhancement of the efficiency of financial services for the development of the real economy. Since 2010, with changes in the domestic and foreign economic and financial environment, the efficiency of financial support for the real economy development has gradually decreased, and the effect has been weakening. In 2012, it was put out that "deepen the reform of the financial system and improve the modern financial system that promotes macroeconomic stability and supports the development of the real economy." In 2015 it was put out that "accelerate the reform of the financial system and improve the efficiency of financial services for the real economy". In 2017, it was pointed out that the financial system should be reformed to enhance the efficiency of financial services for the real economy. Under New normal of economy, improving the efficiency of financial services for the development of the real economy has become one of the key concerns of the highest decision-making level of the State.

In 2020, it was pointed out that with the joint construction of the "the Belt and Road" as a guide, the development of the western region should be intensified, actively participate and integrate into the construction of the "the Belt and Road". Finance is the driving force to support and promote the economic development of the provinces and regions along the Silk Road belt, and the key guarantee for the implementation of the "the Silk Road Belt" and "Western Development" strategy, which promotes the implementation of the national strategy by serving the growth of the real economy. However, the financial development along the Silk Road Belt is extremely unbalanced among the provinces and regions, and the difference in the efficiency of financial services for the real economy is very significant, especially in the northwest of the country, where the financial development along the Silk Road Belt lags behind, and the role of financial support for the development of the real economy is difficult to play effectively. Therefore, taking the 10 provinces and regions in the Silk Road Belt as an example, this article explores and researches the differences in the efficiency of financial services for the real economy among the

provinces and regions n the Silk Road Belt, using the regional financial development theory and financial efficiency theory as the guidance, and the differences in the efficiency of financial services for the real economy in the 10 provinces and regions in the Silk Road Belt.

II. Literature Review

2.1 Theoretical foundations between finance and economic growth

The main theoretical perspectives are "financial deepening theory", "financial repression theory" and "financial constraint theory". McKinnon and Shaw (1973) put forward the financial deepening theory, figured out that developing countries should pay attention to the impact of finance on the national economy if they want to develop their economies, and McKinnon and Shaw (1974) put forward the financial repression theory based on the actual situation of developing countries, arguing that excessive government intervention in financial activities and the financial system inhibited the development of the financial system, and that the lagging development of the financial system hindered economic development.[1,2] Hellmann et al. (1997) put forward the financial constraint theory, which argues that governments can achieve more efficient financial deepening and credit allocation by formulating financial constraint policies, including controlling deposit and lending rates and restricting market access, and thus promote accelerated economic growth.[3]

2.2 Measures of efficiency of financial services to the real economy

Liu Xiaoling and Luo Ronghua[4] (2016) studied the effect of financial development on promoting the real economy, using VAR model with economic growth as the explanatory variable, financial development as the explanatory variable, and government expenditure, fixed asset investment, import and export, and human capital as the control variables, and the results showed that there is a long-term balanced and stable relationship between financial development and economic growth, and the factors that inhibit economic growth are the scale of financial development and the development of the stock market; and conversely, those that promote economic growth are the efficiency of financial development and the development of the bond market. Cai Zexiang and Wu Xueqiang [5](2017) conducted a study on the efficiency of financial services for the development of the real economy under the new normal, selecting data of 31 provinces from 2008 to 2015, using the analysis method of SBM directional distance function and Luenberger index method, selecting the scale of social financing, the number of financial institutions, the number of financial employees as input indicators; selecting GDP value deducted financial sector value added, non-performing loan balances in the banking sector as output indicators, measuring and decomposing the efficiency value of financial services for real economic development in each province. The results show that efficiency of financial services for real economic development is on a declining trend, the influencing factors are large in different areas. Sun Aijun et al.[6] (2011) studied the efficiency of financial support to provincial economic development and subdivided it into three major industries, based on the data from 1998-2010, using the DEA-Malmquist index method, selecting GDP and output value of three industries in each province as output indicators, and three major industries employment, bank loan balance, total market value of listed companies, and premium income as input indicators; the results show that there are differences in the role and efficiency played by finance in each province, and efficiency as a guideline to direct the flow of financial resources between provinces. Yang Xinshun et al. [7](2017) selected the data of 30 provinces and cities in China from 2006-2015, applied spatial autocorrelation Moran's index and established a spatial Durbin model to study the impact of insurance development on the growth of China's real economy, and selected the gross national product minus the output value of the financial and real estate industries as explained variables, the premium income as key explanatory variables. The study showed that there is a significant positive influence between insurance development and real economic growth. Song Zhixiu[8](2019)used the DEA model and Malmquist index method to conduct dynamic analysis of the efficiency of the real economy of financial services in 31 provinces and cities in China from 2008 to 2017, and conducted a comparative static analysis of the measured results in 2012 and 2017. The analysis found that the efficiency of China's regional financial services real economy was not high, with only 5 provinces in the frontier of efficiency in both 2012 and 2017, and 26 provinces and cities in the state of inefficiency. 2008-2017 total factor productivity of financial services real economy varies greatly among provinces and cities, with the east

significantly higher than the west and the central fluctuating. The study found that technological progress was the main reason for the changes in total factor productivity in each province and city, while purely technical efficiency changes and scale efficiency changes had a weaker impact, while external crises and internal policy shocks were obvious. Liu Limin et al. [9](2015)measured the efficiency of financial support for economic development based on the panel data of the five provinces of Northwest China involved in the Silk Road Economic Belt for the past five years from 2010 to 2014, and decomposed the efficiency index by using the Malmquist index method to study the changing characteristics of the efficiency of financial support for real economic development. The results showed that the overall comprehensive efficiency of financial support for economic development in Northwest China was effective, and there were significant differences among provinces, but the productive efficiency of financial support for economic development was on a declining trend, and the main reason for the decline was the decline in the efficiency of financial scale.

III. Research design: methods, indicators and data

This article proposed to use the DEA-based Malmquist index to measure the efficiency of financial services to the real economy in Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Chongqing, Sichuan, Yunnan, Guangxi, and Henan provinces.

3.1 Introduction to the model

3.1.1 DEA model

Data Envelopment Analysis is a parametric method created by Charnes, Coopor and Rhodes in 1978, It is a quantitative analysis method for evaluating the relative effectiveness of comparable units of the same type based on multiple input indicators and multiple output indicators using a linear programming approach, which has a unique advantage in dealing with multiple indicator inputs and multiple indicator outputs. It uses the weight coefficients of each input and output as decision variables and evaluates them in an optimal sense, avoiding the need to determine the weights of indicators in a preferred sense; It is not necessary to give an expression reflecting the correlation between each input and output.

3.1.2 Malmquist index model

Malmquist index is the most commonly used DEA method to calculate and analyze the production efficiency in different periods. The calculation of Malmquist index requires data to be panel data, and this article takes each province as a decision unit and calculates the efficiency of provincial financial support for economic development using DEA-Malmquist index. [8] [10-11]

From period t to period t+1, the Malmquist index formula is.

$$M\left(x_{t,}y_{t,}x_{t+1,}y_{t+1,}\right)=\left[d_t\left(x_{t+1,}y_{t+1}\right)/d_t\left(x_{t,}y_t\right)*d_{t+1}\left(x_{t+1,}y_{t+1}\right)/d_{t+1}\left(x_{t,}y_t\right)\right]^{1/2} \tag{1}$$

In equation (1), $\left(x_{t+1},y_{t+1}\right)$ and $\left(x_{t,}y_t\right)$ are the input and output quantities in periods $t+1$

$$effch=\left\{\left[\frac{d_t^v\left(x_{t+1,}y_{t+1}\right)*d_t^c\left(x_{t,}y_t\right)}{d_t^c\left(x_{t+1,}y_{t+1}\right)*d_t^v\left(x_{t,}y_t\right)}\right]*\left[\frac{d_{t+1}^v\left(x_{t+1,}y_{t+1}\right)*d_{t+1}^c\left(x_{t,}y_t\right)}{d_{t+1}^c\left(x_{t+1,}y_{t+1}\right)*d_{t+1}^v\left(x_{t,}y_t\right)}\right]\right\}^{1/2}=pech*\sec h \text{ and } t, \text{ respectively;}$$

d_t and d_{t+1} are expressed as a function of periods t and $t+1$ with reference to technology T in period t. In

terms of output, the Malmquist index, with technology level T in period t as the reference, can be expressed as

$$M_t\left(x_{t,}y_{t,}x_{t+1,}y_{t+1,}\right)=\frac{d_t\left(x_{t+1,}y_{t+1}\right)}{d_t\left(x_{t,}y_t\right)}$$

(2)

Similarly, the Malmquist index at period t+1 for the technology level reference is

$$M_{t+1}\left(x_{t,}y_{t,}x_{t+1,}y_{t+1,}\right)=\frac{d_{t+1}\left(x_{t+1,}y_{t+1}\right)}{d_{t+1}\left(x_{t,}y_t\right)}$$

(3)

Then, the Malmquist index can be decomposed as

$$M\left(x_{t,}y_{t,}x_{t+1,}y_{t+1,}\right)=\left[\frac{d_t\left(x_{t+1,}y_{t+1}\right)}{d_t\left(x_{t,}y_t\right)}*\frac{d_{t+1}\left(x_{t+1,}y_{t+1}\right)}{d_{t+1}\left(x_{t,}y_t\right)}\right]^{1/2}=techch*effch$$

(4)

That is, decomposed into the product of technical progress (TECHCH) and technical efficiency change (EFFCH), the Malmquist index is the geometric mean of the efficiency generated from period t to period t+1, expressed by TFPCH, reflecting the change in production efficiency, the technical progress index TECHCH describes the change in production structure (technical level) in period t+1 relative to period t. If the TECHCH If the value of TECHCH is greater than 1 (less than 1), it indicates that the technical level of the decision unit is higher (lower) than the previous period; the technical efficiency change index EFFCH reflects the relative efficiency change and describes the change of technical efficiency between period t+1 and period t. If the value of EFFCH is greater (less than 1), it indicates that the technical efficiency of the decision unit is higher (lower) than the previous period, and the technical efficiency can be decomposed into pure technical efficiency index (PECH) and scale efficiency index (SECH), i.e.

$$effch=\left\{\left[\frac{d_t^v\left(x_{t+1,}y_{t+1}\right)*d_t^c\left(x_{t,}y_t\right)}{d_t^c\left(x_{t+1,}y_{t+1}\right)*d_t^v\left(x_{t,}y_t\right)}\right]*\left[\frac{d_{t+1}^v\left(x_{t+1,}y_{t+1}\right)*d_{t+1}^c\left(x_{t,}y_t\right)}{d_{t+1}^c\left(x_{t+1,}y_{t+1}\right)*d_{t+1}^v\left(x_{t,}y_t\right)}\right]\right\}^{1/2}=pech*\sec h$$

(5)

The superscript V in equation (5) denotes variable scale payoff and the superscript C denotes fixed scale payoff.

3.2 Selection of indicators and data sources

3.2.1 Input and output indicators
Scientific and rational selection of input and output indicators is the basis of establishing the efficiency evaluation model, and is also the key to establishing a proper evaluation model. The input and output indicators selected in this article are shown in Table 1.

Input indicators design. According to the production function theory, capital and labour are input variables, and specifically for finance, the input variables are financial capital input and financial labour input, using the amount of social financing and the amount of investment in fixed assets in the financial sector as a measure of capital input in the financial sector and the number of people employed in the financial sector as a measure of human input in the financial sector. [12-13]

Output indicators design. The output of the real economy is used as the output variable. The GDP of each region is deducted from the value added of the financial sector and the value added of the real estate sector to measure the output of the real economy. [12-13]

Table 1 Indicators of efficiency measurement

	Primary indicators	Secondary indicators	Indicator measurement
Efficiency of financial services to the real economy (TE)	input	Capital investment	Size of social financing (X1 or SF) Amount of fixed asset investment in the financial sector (X2 or FFI)
		Labour input	Number of people working in the financial sector (X3 or NFFP)
	output	Real economy output	(Y) obtained by deducting the value added of the financial sector and the real estate sector from the GDP of each province

Data processing. In this article we selected a total of 280 data from year 2012 to 2018. Considering the availability of data, the number of employees in the financial sector is replaced by the number of urban units employed in the financial sector, and the data are obtained from the official website of the National Bureau of Statistics. 2012-2018 data on the amount of social financing are obtained from the Financial Operation Report, and 2013-2019 data on the scale of social financing in each province are obtained from the China Financial Yearbook in each year. 2012-2019 data on the amount of fixed asset investment in the financial sector, the number of urban units employed in the financial The data on the number of urban units employed, provincial GDP, value added in the financial sector and value added in real estate are from the official website of the National Bureau of Statistics. 2012 data on the amount of social fixed asset investment in the financial sector are missing and replaced by 2013, 2018 partially missing data are replaced by 2017.

3.2.2 Sample selection and data sources

The Silk Road Belt contains five northwestern provinces and regions such as Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang, four southwestern provinces and regions such as Chongqing, Sichuan, Yunnan, Guangxi. The Silk Road Belt, with the Asia-Pacific Economic Circle to the east and the developed European Economic Circle to the west, is considered "the longest and most promising economic corridor in the world". In addition, historically, Henan is an important strategic point of the Silk Road, and from the existing transportation and geographical location, Henan is also an important node of the Silk Road Belt, which plays the role of bearing the east and enlightening the west. Therefore, this article also includes Henan in addition to original nine provinces and regions, totally ten provinces:Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Chongqing, Sichuan, Yunnan, Guangxi, and Henan. The time span of the sample data selected in this article is 2012-2018, and Table 2 presents the descriptive statistics of the input and output indicator data of the ten provinces from 2012-2018.

Table 2 Descriptive statistical analysis of the data (2012-2018)

2012					
indicators	average value	(statistics) standard deviation	maximum value	minimum value	median
Size of social financing	3654.6	1902.04	7137	664	3554
Investment in fixed assets in the financial sector	13.62	14.31	46.4	0.7	7.95
Number of people employed in the financial sector	115919	68969	233242	21912	107549
Real economy output	11059	7886	27755	1769	9724
2013					
indicators	average value	(statistics)	maximum	minimum	median

		standard deviation	value	value	
Size of social financing	3654.6	1902 04	7137	644	3554
Investment in fixed assets in the financial sector	18.44	19.57	62.45	1.73	7.92
Number of people employed in the financial sector	94750	74735	253500	16749	69322
Real economy output	12019	8391	29385	1909	10788

2014

indicators	average value	(statistics) standard deviation	maximum value	minimum value	median
Size of social financing	3858.3	2021.20	7092	842	3124
Investment in fixed assets in the financial sector	16.74	14.99	45.43	0.77	12.1
Number of people employed in the financial sector	95753	72808	240000	17230	72194
Real economy output	12986	8885	30959	2076	11950

2015

indicators	average value	(statistics) standard deviation	maximum value	minimum value	median
Size of social financing	3154	1705.24	5812	503	2901.5
Investment in fixed assets in the financial sector	15.95	10.03	39	1.64	13.86
Number of people employed in the financial sector	97492	73056	244000	18009	73766
Real economy output	13657	9524	33362	2142	12957

2016

indicators	average value	(statistics) standard deviation	maximum value	minimum value	median
Size of social financing	3038.7	2086.34	6824	530	2668.5
Investment in fixed assets in the financial sector	20.70	19.25	72.07	0.97	16.73
Number of people employed in the financial sector	104435	85420	300000	19345	74898
Real economy output	14686	10283	36013	2270	14231

2017

indicators	average value	(statistics) standard deviation	maximum value	minimum value	median
Size of social	3841.6	2090.79	7391	865	3286

financing					
Investment in fixed assets in the financial sector	17.94	15.35	54.3	1	14.2
Number of people employed in the financial sector	104700	84813	297000	18658	74669
Real economy output	16483	11550	40256	2307	16489
2018					
indicators	average value	(statistics) standard deviation	maximum value	minimum value	median
Size of social financing	3592.3	2659.83	8087	126	3516
Investment in fixed assets in the financial sector	16.97	17.08	54.3	1	9.95
Number of people employed in the financial sector	146000	95079	324000	23000	123000
Real economy output	17490	12143	41566	2529	16831

From table 2, we can see that the average value of the total real economic output of the ten provinces and regions has increased year by year, and the direct gap between the real economic output of the provinces is large, such as the maximum value of 41566 in 2018, and the minimum value of 2529. the gap between the output of the provinces is large, the development of the real economy is unbalanced, and the difference between the economic growth of the provinces is gradually expanding. The scale of social financing has seen a significant rise every year, the gap between the scale of social financing in each of the ten provinces is quite large, such as the maximum value of social financing in 2018 can reach 8087, the minimum value of 126. the amount of investment in fixed assets in the financial sector is relatively good, the average value of 2012-2018 is not a big difference in general, but also in growth, indicating that financial assets are expanding. The number of employees in the financial sector, 2012-2018 is not much different, relatively stable, descriptive statistical analysis of the data of input and output indicators of the ten provinces, in general, the financialization of the economy is getting higher and higher, and financial support for the development of the real economy is getting better and better.

IV. Measurement of the efficiency of financial support for real economic development

4.1 Static analysis of regional financial services efficiency in the real economy from the perspective of DEA-BCC model

This article selects 2012 and 2017 as representative samples for analysis. Year 2012 and year 2017 both are major turning point of economic policies. They both are the period of the effectiveness of the previous policy and the transition period of planning the future to carry on the top and bottom, and the characteristics of economic and social operation are quite different from those of the ordinary years.

4.1.1 Overall analysis
In this article, DEAP2.1 software is used to calculate, using GDP and real economy output as outputs, and social financing scale SF, financial sector fixed asset investment FFI, and financial sector employees NFFP as inputs. The efficiency values of the real financial combination of ten provinces in China in 2011-2012 and 2016-2017 are obtained as shown in Table 3 and Table 4.

When applying DEA for validity measurement, Valid if the decision unit value is one, otherwise it is invalid. As can be seen from Table 3, the CRSTE integrated efficiency values of six of the ten provinces, Ningxia, Xinjiang, Chongqing, Yunnan, Guangxi and Henan, are all one in 2011-2012, indicating that the integrated efficiency of financial support for economic development is effective. As can be seen from Table 4, the CRSTE integrated efficiency values of seven of the ten provinces, Shaanxi, Qinghai, Chongqing, Sichuan, Yunnan, Guangxi, and Henan, are all 1 in 2016-2017, indicating that the integrated efficiency of financial support for economic development is effective.

4.1.2 Specific analysis

As can be seen from Table 3, the comprehensive efficiency values of Shaanxi, Gansu, Qinghai and Sichuan among the ten provinces in 2011-2012 are 0.773, 0.646, 0.830 and 0.886 respectively, indicating that Shaanxi, Gansu, Qinghai and Sichuan financial support for economic development are in a non-effective state, decomposing CRSTE comprehensive efficiency, SACLE scale efficiency of Shaanxi and Qinghai financial support for economic development is effective , VRSTE pure technical efficiency belongs to the non-effective state,i.e. the scale of financial inputs plays a full role in promoting economic development.

Table 3 Efficiency decomposition results of the BCC model for financial support to economic development by province, 2011-2012

2012	CRSTE Integrated Efficiency	VRESTE Technical Efficiency	SACLE scale efficiency
Shaanxi	0.773	0.738	1.000
Gansu	0.646	0.555	0.985
Qinghai	0.830	0.691	1.000
Ningxia	1.000	1.221	1.000
Xinjiang	1.000	0.935	1.000
Chongqing	1.000	1.366	1.000
Sichuan	0.886	0.873	0.994
Yunnan	1.000	0.913	1.000
Guangxi	1.000	1.011	1.000
Henan	1.000	1.283	1.000

As can be seen from the following Table 4, among the ten provinces in 2016-2017, excluding Gansu, the remaining nine provinces Shaanxi, Qinghai, Ningxia, Xinjiang, Chongqing, Sichuan, Yunnan, Guangxi, and Henan SACLE scale efficiency are all 1, indicating that the SACLE scale efficiency of financial support for economic development is effective. And Gansu SACLE scale efficiency is 0.927, indicating that SACLE scale efficiency is non-effective.

Table 4 Efficiency decomposition results of the BCC model of financial support to economic development by province, 2016-2017

2017	CRSTE Integrated Efficiency	VRESTE Technical Efficiency	SACLE scale efficiency
Shaanxi	1.000	1.346	1.000
Gansu	0.556	0.618	0.927
Qinghai	1.000	1.026	1.000
Ningxia	0.707	0.908	1.000
Xinjiang	0.759	1.021	1.000
Chongqing	1.000	1.659	1.000
Sichuan	1.000	1.218	1.000
Yunnan	1.000	1.344	1.000
Guangxi	1.000	1.470	1.000

| Henan | 1.000 | 1.261 | 1.000 |

In a comprehensive comparison (shown in Figure1.), there are four provinces that are efficient on the frontier side both in 2012 and 2017, namely Chongqing, Yunnan, Guangxi, and Henan. Combined technical efficiency rose from 2012 to 2017 in three provinces, namely Shaanxi, Qinghai, and Sichuan, where Shaanxi, Qinghai, and Sichuan changed from being inefficient in 2012 to being efficient in 2017, which is related to the economic development of Shaanxi and Sichuan. There are three declining provinces, namely Gansu, Ningxia and Xinjiang, of which Ningxia and Xinjiang were in the frontier surface efficient in 2012 and fell out of the frontier surface efficient in 2017 to become an inefficient province, which is related to the weak natural environment, more backward economic base, more closed market environment and poor economic structure transformation in Ningxia and Xinjiang.
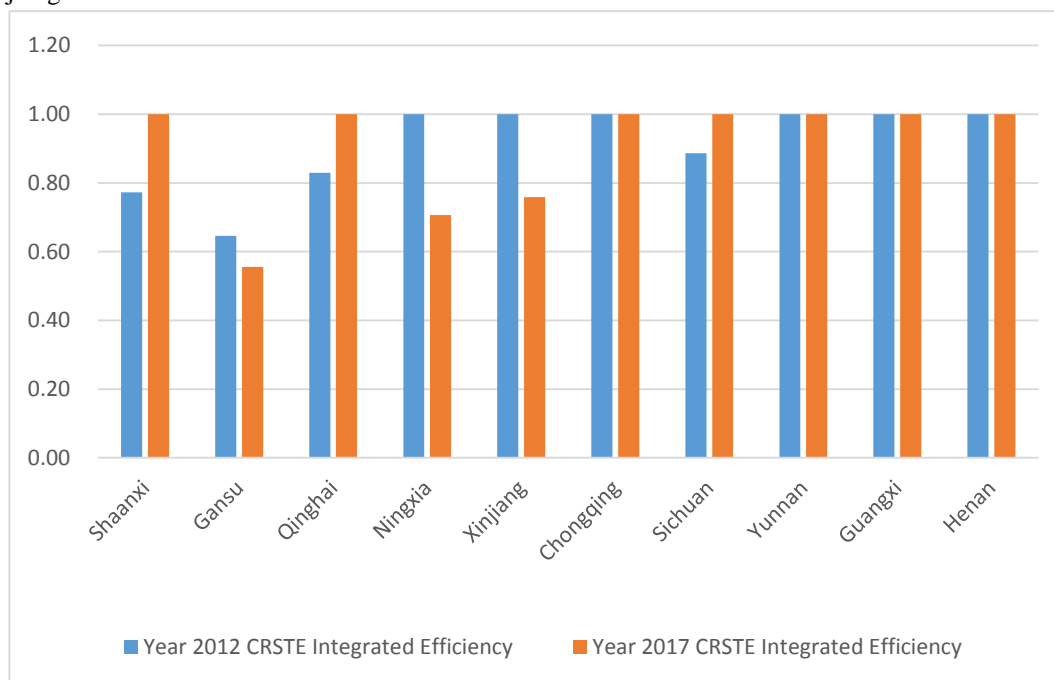
Figure 1 Comparison of the combined technical efficiency of regional financial services to the real economy, 2012 and 2017

4.2 Dynamic analysis of the efficiency of the financial services real economy from the perspective of the DEA-Malmquist index

In order to reflect more specifically the changes in the efficiency, this article uses the Malmquist productivity index method for further analysis. the Malmquist productivity index and its decomposition are shown in Table 5 and Figure 2. From Table 5, it can be seen that during 2012-2018, the average value of the dynamic change of total factor productivity (TFPCH) in ten provinces is 1.047, indicating that comparing to 2012, the TFP of financial service real economy improved by 4.7% in 2018. From the decomposition results, It can be seen that the sources of TFP improvement came from technical efficiency change and technical progress change. the index of technical efficiency change improved by 0.3%, the index of technical progress change change improved by 4.4%, the index of scale efficiency change improved by 0.4%, while the index of pure technical efficiency change decreased by 0.1% during the period 2012-2018. This suggests that the increase in TFP in the real economy of financial services is mainly the result of the combined effect of technical progress and scale efficiency.

In terms of annual changes, from 2012 to 2013 he Malmquist productivity index was 1.135, indicating that comparing to 2012 the TFP of financial services entities in the ten provinces rose by 13.5 per cent in 2013, mainly due to the large improvements in technical progress and scale efficiency of financial services entities that occurred in 2013 - Both improved by 12.1% and 1.1%, respectively, while pure technical efficiency rose by 0.2%. Form

2013 to 2014 the Malmquist productivity index was 1.037, with the rise in TFP in 2014 largely due to improvements in technological progress. Form 2014 to 2015 the Malmquist productivity index was 0.946 and the decline in TFP in 2015 was mainly due to technological progress and purely technical efficiency that had a reverse hindering effect on it. Form 2015 to 2016 Malmquist Productivity Index was 1.062 and the rise in TFP in 2016 was mainly due to technological progress. From 2016 to 2017 the Malmquist productivity index was 1.014, and the rise in TFP in 2017 was mainly driven by a combination of technological progress and technical efficiency. From 2017 to 2018 Malmquist productivity index was 1.047, and the rise in TFP in 2018 was mainly driven by technological progress. In terms of the structure of efficiency growth of financial services entities, the growth of efficiency of financial services entities was mainly from technological progress.

Table 5 Average annual Malmquist index for the ten provinces and districts during 2012-2018

Year	effch	techch	pech	sech	tfpch
2012-2013	1.013	1.121	1.002	1.011	1.135
2013-2014	0.991	1.047	1.000	0.991	1.037
2014-2015	1.007	0.940	0.998	1.009	0.946
2015-2016	0.999	1.063	0.991	1.009	1.062
2016-2017	0.970	1.045	1.004	0.967	1.014
2017-2018	1.038	1.055	1.000	1.038	1.095
average value	1.003	1.044	0.999	1.004	1.047

Note: effch denotes index of change in technical efficiency; techch denotes index of change in technical progress; pech denotes index of change in pure technical efficiency; sech denotes index of change in scale efficiency; tfpch denotes total factor productivity index. Where effch = pech $\times$ sech.
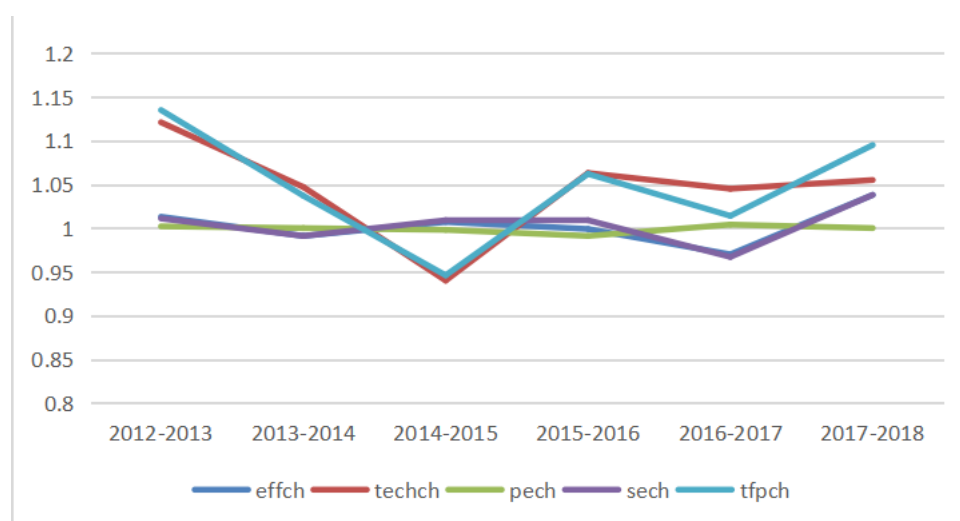

Figure 2 Trends in the efficiency of financial support to the real economy based on DEA-Malmquist measures

This article examines the efficiency of financial support to the real economy by region, based on regional divisionsnamely.i.e.Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Chongqing, Sichuan, Yunnan, Guangxi, Henan, the trend of Malmquist index changes in the economies of ten provinces and regions is shown in Figure 3.
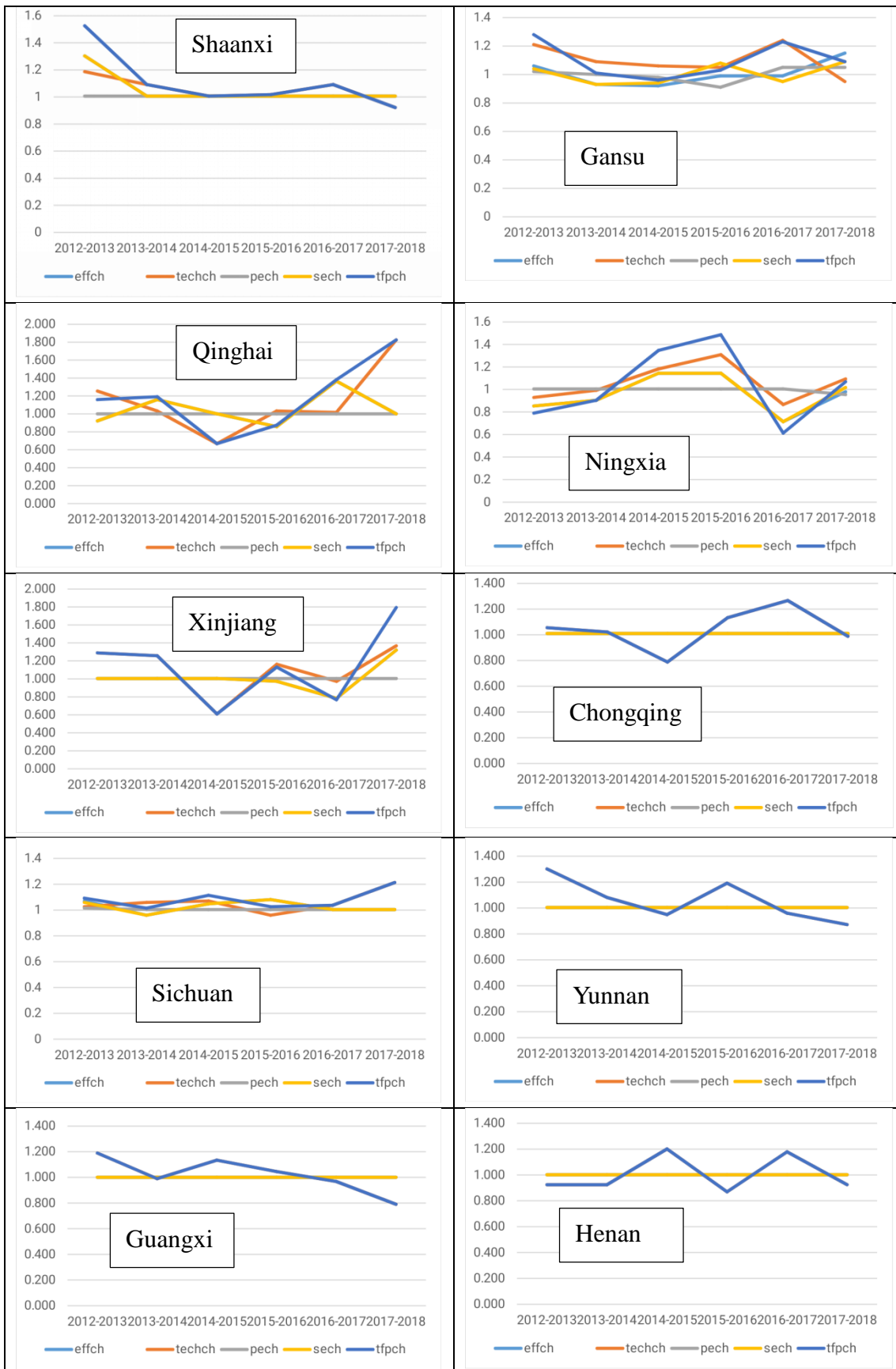
Figure 3 Trends in the Malmquist Index for the economies of the ten provinces and districts

4.3 Conclusion

In this article, we use DEA model and Malmquist index method to measure the efficiency of financial service for real economy in ten provinces from 2012-2018, From the perspective of static and dynamic,respectively, and he conclusions are as follows:

1.Te integrated efficiency of financial support for economic development in all regions is effective, but the productive efficiency of financial support for economic development is on a downward trend, and the main reason is the decline in the efficiency of financial scale. The efficiency of our regional financial services to the real economy has fluctuated considerably, from a macroscopic point of view, mainly due to the fact that our financial markets and economic development have been more exposed to external crisis shocks and domestic policy shocks.

2.In terms of decomposition values, changes in total factor productivity and changes in the rate of technological progress are highly positively correlated, indicating that technical progress plays its leading role in improving efficiency. The efficiency of financial support for economic development varies among provinces, with the fastest growth in financial productivity in Gansu Province, the fastest increase in the efficiency of the use of financial resources in the Gansu economy, and the fastest decline in financial productivity in Ningxia, especially in the tertiary sector, which is mainly caused by the mismatch in the scale of financial resource inputs.

3.The correlation coefficient between the financial technical level efficiency index THCHCH and the financial productivity index TFPCH in each province is the best, which indicates that the financial environment has the largest contribution to the economic growth of the ten provinces, and the one-sided pursuit of financial scale expansion does not promote sustainable economic growth, and the same is true for the three major industries, and the financial technical level efficiency is the main factor affecting the financial support for economic development in the five northwestern provinces.

V. Suggestions on improving the efficiency of financial services for the real economy

5.1 Focus on the financial reform

The report of the 19th National Congress states that the reform of the financial system should be deepened to promote a virtuous cycle between the economy and finance. Financial reform should adhere to the direction of marketization and promote the development of enterprises upstream and downstream of the industrial chain with specialized financial services supply.

(1)Improving the structure of credit allocation.
(2)Improving the financial organization system. The province should accelerate the improvement of the financial organization system and promote the transformation of the financial sector to match the transformation of the real economy in order to provide systematic financial support.
(3)Innovating the way and path of financial development, improving the functions of financial institutions, improving the efficiency and level of management. Optimizing the layout of outlets and broaden financing channels to accelerate financial product innovation.
(4)Deepening reform and opening up, improving the market mechanism and government functions, and give play to the leading role of the market in the allocation of resources.
(5)Promoting structural reform on the supply side.
(6)Promoting the structural reform of the financial supply side, achieve high-quality financial development, improving the capacity and efficiency of financial services for the real economy.

5.2 Deepening innovation-driven development and stimulate the vitality of economy

Technological innovation is an endogenous force for sustainable development of real enterprises. Entity enterprises

should be innovation-driven in their development and enhance their technological innovation capabilities.

Firstly, Relying on technological progress to innovate real enterprises' development; it is the strengthening of an enterprise-centered mechanism for cooperation between industry, academia and research; and it is the creation of regional well-known brands. Financial support for infrastructure construction is the main line. Infrastructure construction can strongly stimulate economic growth, while alleviating the current domestic manufacturing overcapacity problem. The current infrastructure construction in the Silk Road Belt region is relatively backward, in a state of relative lack and imbalance, which is difficult to meet the needs of future economic and social development. The actual situation of local economic development, to make a more systematic industrial development planning, to promote the financial industry to lay a good foundation for the agglomeration.

Secondly, we should implement a branding strategy and focus on supporting innovative and internationally competitive financial institutions, for which the Government should provide more tax incentives. We should guide enterprises to improve their financial systems, standardize their financial information, and increase the monitoring of their internal controls, so as to create the basic conditions for financial institutions to issue loans, thus enabling them to invest credit funds with confidence. In due course, it should promote the development of financial guarantee companies, introduce a large number of financial consulting institutions, financial technology and information service institutions, accounting firms and other types of financial service institutions with good creditworthiness, expand the financial resources in the Silk Road Belt region and guide their standardized development, while increasing supervision.

Thirdly, proper layout of the financial institutions, promoting financial industry clustering. On the basis of continuously improving the system of financial institutions, various financial institutions, such as fund companies, trust companies, securities companies and other financial institutions, should be actively laid out in the economic belt region in a targeted manner, and the layout of special, development, trade and industrial financial institutions should be more inclined to the Silk Road Belt, especially to places that have the conditions to become financial centres in the west in the future. Specifically, on the basis of continuously improving the financial market system, the efficiency of resource allocation of finance should be gradually improved and the proportion of finance in the whole industry should be increased.

Fourthly, robust the regional financial cooperation mechanism. The construction of the Silk Road Belt is a long-term development strategy, and regional financial cooperation and exchanges are also very urgent, in addition to through the development of public diplomacy. It is also necessary to continuously strengthen the links between financial institutions in the economic belt, actively encourage all kinds of financial institutions to carry out cross-regional cooperation in equity investment, especially in areas with good financial development bases, encourage local commercial banks to carry out cooperation with foreign financial institutions in financing agents, syndicated loans and other businesses, support the strong alliance of all kinds of financial institutions for business and product innovation, and should establish as soon as possible a local development with policy tendencies The local development and innovation should be established as soon as possible with a policy orientation, playing a role of financial radiation. On the one hand, regional financial institutions should actively carry out external exchange activities, such as cooperation and exchange between banks, banks and non-bank financial institutions, and banks and enterprises, so as to publicize and promote financial products and services through the provision of quality services, and provide convenience for enterprises and individuals in the region to conduct business across borders. On the other hand, communication and cooperation through relevant platforms, the China - Kazakhstan Horgos International Border Cooperation Center is a good example, as a platform for external communication and cooperation, can give full play to financial institutions to carry out external communication and exhibition activities, while building a platform for financial research and information communication, which is conducive to enhancing financial cross-administrative services and providing convenient financial services, thus achieving a greater scope of Resource allocation.

5.3 Integrated regional development

For economically backward regions, the efficiency of resource allocation is not the key to the problem, the key is to have "quantity", to have funds available for allocation. Therefore, the most urgent task for the regions represented by Xinjiang and Gansu is to improve the level of financial development and expand the scale of finance. Do not blindly follow the policy to guide the limited funds into high-risk, low-return areas, affecting returns, but also affect their own development. When the financial sector grows, it will absorb more financial resources in order to better serve society and play an allocative role. The policy support for the development of the financial sector should be increased, and the scale of the financial sector should be expanded rapidly, so that the region can have "quantity" to match.

For leading economic regions, it is the correct and effective allocation of financial capital that is key. Although this article does not examine how to allocate funds specifically, it makes a claim about the social benefits that result from the allocation of funds. Funds should tend to be allocated to sectors with high social benefits. However, the willing sectors for the financial sector to allocate funds are not necessarily socially efficient sectors; they prefer sectors with stable returns and less risk, which makes the financial sector and the social production sector . Improving the ability of Governments to steer the financial sector has become particularly important. Proper government steering allows financial resources to be invested in more efficient markets for good social benefits, without excessive risks and losses to the financial sector, resulting in more revenue for better development. Misguided government will have a serious negative impact on the economy. This is why it is particularly important to improve the capacity of government guidance.

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