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Effect of Fiscal Expenditure Structure in China on Total Factor Productivity: Empirical Analysis Based on Provincial Panel Data

ZHU Mingliang[a],*; HAN Qiong[b]

[a]Central University of Finance and Economics, College of Finance, Beijing, China.
[b]Yunnan University of Business Management, Kunming, China.
*Corresponding author.

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Abstract
The paper used the data from 1998 to 2012 of 30 provinces in China to observe the influence of scale and structure of fiscal expenditure in China on total factor productivity through the panel data model. The study shows that the scale of fiscal expenditure has conductive promotion to total factor productivity. The influences are different in diverse years. Finally, the paper studies the endogenous effect of total factor productivity with GMM model.

Key words: Scale of fiscal expenditure; Structure of fiscal expenditure; Total factor productivity

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INTRODUCTION
It is an issue focused on how government promotes total factor productivity to have sustained economic growth with fiscal expenditure. The studies of the relationship between government fiscal expenditure and total factor productivity as well as the economic growth at home and abroad include all aspects. Musgrave (1964) was the oldest one to suggest the structure of fiscal expenditure of country in the mature period. He thought the fiscal expenditure should not be based on infrastructure in this period, but transferring to the expenditure of human resource and transforming expenditure. Grier and Tullock (1989) found that investment expenditure of government provides the necessary environment of economic growth and it would have real effect on economic increase. Zou (1993) found that some productive expenditure was not obvious to the effect of economic increase while such recurrent expenditure has obvious positive effect on economic increase. Lou (2004) also studied the public investment part of productive expenditure. Different from the conclusion of Zou Hengpu, he found that the public investment on infrastructures could improve the total factor productivity and make the endogenous growth effect to hinder the decline of long-term economic growth rate; only public investment provides sufficient public infrastructures could provide the labor productivity, so the economic growth rate is improved ceaselessly. Xiao and Gong (2003) put the key point in the fiscal expenditure efficiency under the situation of fiscal decentralization. They thought the transfer payment of central government and local government could be positive or negative to the effect of economic increase. The result depended on the volume of marginal productivity of public expenditure of the central government and local government. The above scholars started on the relationship between fiscal expenditure and economic growth and some scholars started from the mechanism of fiscal expenditure on economic growth and put their eyesight in the total factor productivity. For example, Cai (2013) thought Chinese economy entered into the transition period from dual economic development stage to neo classical growth stage gradually and it was in need to form domestic flying geese model and creative destruction policy environment through policy adjustment to gain the resource reconfiguration efficiency, so the transformation of China's economic growth to total factor productivity was achieved. Cheng and Chen (2013) studied the driving effect of total factor productivity on economic

growth of regional aspects. Their study results showed that the increase rate of total factor productivity of High-tech zone was higher than the average level of the province. Meanwhile, the improvement of total factor productivity in High-tech zone has convergence effect within the region. The western high-tech zone technical efficiency improvement was more obvious than that in eastern. Dai (2009) suggested the concept of innovation oriented fiscal expenditure and they thought that government should increase the input of infrastructure, educational and medical investment and basic research in the process of construction of an innovative city. Since there is spillover effect of total factor productivity, some scholars would not only study the influence of fiscal expenditure on total factor productivity and they also analyze the spatial spillover benefits of total factor productivity. Guo and Jia (2005) studied and found positive fiscal policy was an important promoter of the spatial spillover benefits to the improvement of Chinese total factor productivity. However, there would be unreasonable expenditure structure and the insufficient expenditure focusing on quantity and ignoring efficiency in the process of specific policy implementation. Zhou and Li (2014) used Durbin model to find that there was a positive spillover of fiscal expenditure within budget and there was a negative spillover of fiscal expenditure out of budget.

Conclude the studies of the relationship between current fiscal expenditure and total factor productivity and economic growth at home and abroad are mainly from the following aspects. Firstly, the influence of scale and structure of fiscal expenditure on economy increase; secondly, compare the fiscal expenditure efficiency of central and local from the aspect of fiscal decentralization; thirdly, study the relationship between fiscal expenditure and total factor to explore the influence of spatial spillover effects on total factor productivity. In the study of the total factor productivity, the influence of fiscal expenditure on total factor productivity is proved with three aspects. First is the direct public investment of government, especially the construction of infrastructures. These public investments would not only increase the input of public investment and it also attracts the private capital to fasten the spatial flow of capital elements and affect the scale of capital and the distribution of this element. Consequently, the regional total factor productivity is improved. Second is government's expenditure of education, culture, medical, entertainment and social insurance such aspects could increase the attraction to surplus labor, so the labor force supply is sufficient and the increase of technology input could also promote the improvement of labor productivity. The increase of labor force supply and the improvement of labor productivity have positive effect to the improvement of total factor productivity. Third is the government's expenditure of public service and management skill could be beneficial to the flow of knowledge and technology among enterprises, departments and regions, which is good for the sharing of innovation to speed up the improvement of regional total factor productivity.

In the study of the influence of governing fiscal expenditure on total factor productivity, we should study the influence of the total scale of fiscal expenditure and structure on total factor productivity. It has been a long time that Chinese economy increase relied on government investment pull, but the direct fiscal expenditure would squeeze out the private capital. Such non-competitive capital investment environment would lead to the decrease of the capital running efficiency. It would restrain the decrease of total factor productivity for a long time. Wagner's Law pointed out that enlarging the scale of government's direct fiscal expenditure could make up the market failure and lack of public goods in the beginning of industrialization; but the continuous enlarging the scale of government's direct fiscal expenditure could affect the economy operation efficiency when industrialization developed to certain level, which is bad for the transformation of economy increase method. Hence, we guess the enlargement of fiscal expenditure could promote the increase of economy but it may restrain the improvement of total factor productivity of the fiscal expenditure structure is not optimized.

In the situation of weakened Chinese demand side stimulus, it could be solved from the supply terminal; but the solution of supply terminal is not only adding quantity purely. Just based on the reality, the paper tries to explore whether Chinese fiscal expenditure promotes the improvement of total factor productivity or not. The paper also studies the relationship between several fiscal expenditure projects related with domestic people and the total factor productivity to give some suggestions to the optimization of structure of Chinese fiscal expenditure. The innovation of the paper is not only studying the influence of scale of fiscal expenditure to Chinese total factor productivity and it also studies the influence of fiscal expenditure breakdown entry on total factor productivity. The fiscal expenditure policy is divided into two passages to explore.

The rest of the structures are following: The second part is the statistical description of data; third part is static model analysis and result interpretation; the fourth part is GMM model analysis; fifth part is conclusion and suggestion.

1. STATISTICAL DESCRIPTION OF DATA

1.1 Sample Selection and Data Sources

The paper chooses the data of Chinese 30 provinces and municipals (not including Tibetan) from 1998 to 2012 to build up the panel data model. The logarithm of total factor productivity is explained variable to observe the effect of fiscal expenditure structure and the structure

of total factor productivity. Core explanatory variables chosen by the paper are the scale of public expenditure, the expenditure of public services, the expenditure of sports and broadcasting, the expenditure of education, science and technology expenditure, medical expenditure, social security expenditure. Other non-core control variables are added. The data in the paper are mainly from China Statistical Yearbook and the ministry of commerce website. As to the data which would not be gained directly, the paper would count out.

1.2 Definition of Variable

The explained variable of the paper is total factor productivity (TFP). Since the calculation of TFP is Solow residual method, stochastic frontier production function method and data envelopment analysis. Each of method calculates different value of TFP and each of method has disputes, so China would not release the data of TFP. The paper chooses the method of Duan and Yin (2009), Guo and Jia (2005), Zhang (2003), Zhang (1991), which is the Solow residual method to calculate the TFP. Meanwhile, the paper will get the pair value of the TFP in the paper.

Explanatory variables are level of financial development, the level of openness, the proportion of FDI, government financial expenditure, the proportion of public service expenditure, the proportion of culture media expenditure, the proportion of education expenditure, the proportion of science and technology expenditure, the proportion of health expenditure and the proportion of social security spending. The level of financial development (JRFZ) = total loans of financial institutions/GDP*100%, the level of openness (KFSP) = (total import+total export) /GDP*100%, the proportion of FDI (FDI) = foreign direct investment/GDP*100%, government financial expenditure (ZFGM) = Total government expenditure/GDP*100%, the proportion of public service expenditure = total expenditure on public infrastructure/total government expenditure*100%, ,the proportion of culture media expenditure(EDU) = total expenditure on education/total government expenditure*100%, the proportion of science and technology expenditure(TEC) = total expenditure on science and technology/total government expenditure, the proportion of health expenditure(HEAL) = total health expenditure/ total government expenditure*100%, the proportion of social security spending (SEC) = total social security expenditure/ total government expenditure*100%. Seen from the definition of explanatory variables, the explanatory variables are proportional value, which will eliminate the influence of price level, so the accuracy of statistical results is ensured.

It should be explained that although the paper will have a uniform explanation for defining variables. There is a huge change in the statistics of fiscal expenditure projects observed by the paper within the years. The public service expenditure has been changed into infrastructure program in 2007; meanwhile, the sports broadcasting expenses of 1998-2006 had been changed into the culture, sports and media and the social security expenditure had been changed into social security and employment expenditure in 2007; there were science and technology expenditure items in 2007 and there were science and technology from 1998-2006. Hence, the paper combines two expenditures as the science and technology expenditure items in 1998-2006. Although financial statistics items are different, the paper still employs the uniform definition, but the statistics of model estimation would be divided into two period, 1998-2006 and 2007-2017. The reasons to use the statistics are the following. On one hand, the time passages are different and the diverse fiscal expenditure programs need to have statistics respectively; on the other hand, the Chinese fiscal expenditure structure in different time range are unique, time interval statistics could study whether Chinese fiscal expenditure structure is optimized or not.

1.3 Descriptive Statistics of Core Data

Table 1
Descriptive Statistics of Gross Index

	1998-2006				2007-2012			
Var	Min	Max	Mean	Std	Min	Max	Mean	Std
JRFZ	55.69	225.22	104.54	28.37	53.29	241.56	103.96	33.71
KFSP	3.16	184.29	32.16	43.93	3.57	176.46	33.42	41.11
FDI	0.09	15.60	3.16	3.17	0.07	8.19	2.62	2.03
ZFGM	5.75	34.81	14.72	5.85	8.71	61.21	20.96	8.97
INF	4.16	29.51	11.24	4.64	6.01	20.53	12.86	3.30
CUL	1.44	3.97	2.61	0.44	1.09	3.84	1.95	0.47
EDU	9.70	21.14	15.31	2.27	11.09	22.22	16.92	2.43
TEC	0.68	3.69	1.60	0.65	0.39	7.20	1.87	1.34
HEAL	2.74	7.42	4.40	0.91	3.77	9.15	6.21	1.17
SEC	0.64	17.29	6.06	3.70	5.77	25.49	12.77	3.36
TFP	0.46	1.38	0.82	0.19	0.61	1.51	0.93	0.23

From Table 1, we could find that the fiscal expenditure proportion of Chinese government is increased ceaselessly. In 1998-2006, the average value of the proportion of government fiscal expenditure in GDP was 14.72% while the value was up to 20.96% in 2007-2012, which was 42.4% increased. All items of fiscal expenditure which was closely related to people's livelihood were increased in the proportion of the expenditure. Except for the average value of sports media expenditure which was decreased, other proportions of expenditures were increased to some extent. In the inspection period, the smallest fiscal expenditure proportion was Zhejiang in 1998 and the fiscal expenditure was only 5.75% of GDP; the largest proportion was Qinghai in 2012, which was up to 61.21%. However, if we only see the total factor productivity, we could find that the total factor productivity of Zhejiang in 1998 was 0.82, which was far more than that of Qinghai in 2012, 0.62. In another word, the huge fiscal expenditure proportion of Qinghai did not have a huge improvement in total factor productivity. It seems to mean that the scale of fiscal expenditure may not promote the improvement of total factor productivity. The structure of fiscal expenditure has been changed in recent years. The relationship between specific fiscal structure and the total factor productivity would be discussed in the following. Next is to have a primary understanding of the change of scale and structure of fiscal expenditure and the basic situation of total factor productivity with a series of intuitive data graph, which provides basic support of the study of the relationship between these in the following paper.

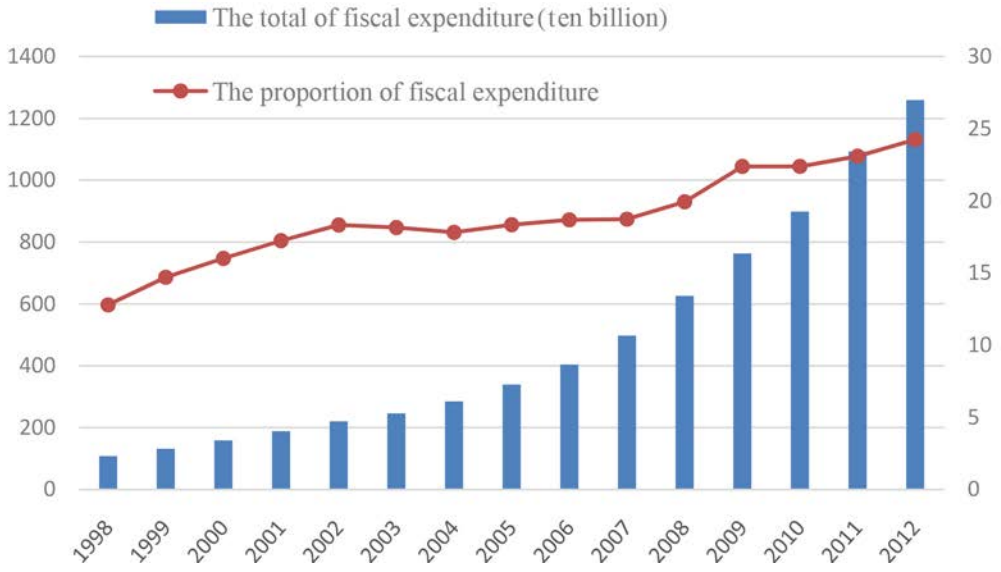

Figure 1
The Scale of Chinese Fisscal Expenditure in 1998-2012

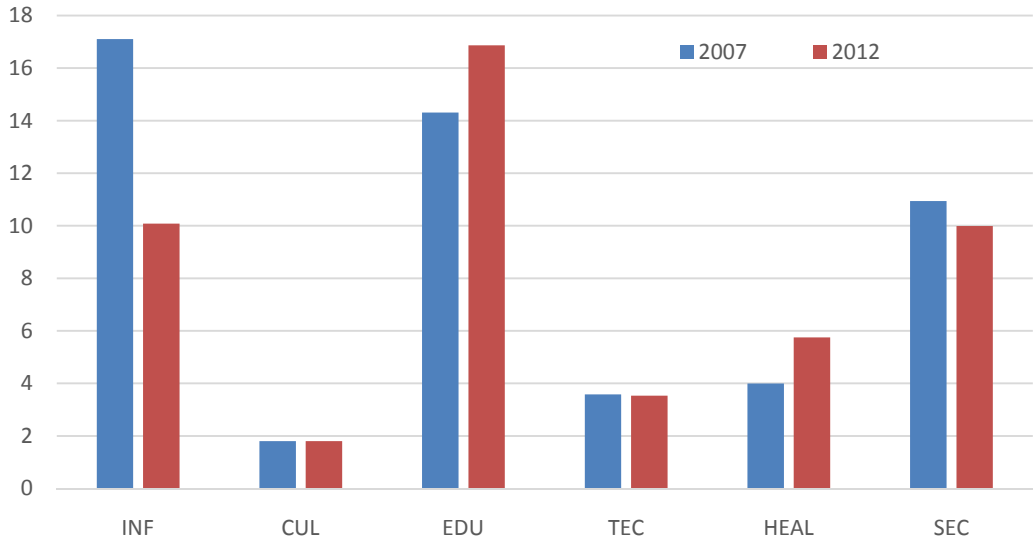

Figure 2
The Compare of Fiscal Expenditure Proportion of the Main Project

In 1998-2012, scale and proportion of Chinese fiscal expenditure were increased. Public service expenditure of 1998 was 1 trillion and 79 billion 818 million yuan and the proportion of GDP was 12.8%; the public service expenditure of 2012 was 12 trillion and 595 billion 297 million yuan and proportion in GDP was 24.2%. The total fiscal expenditure has a rapid increase in Figure 1. It was increased by 10 times from 1998 to 2012 and the proportion was increased but the range was not that fast of the increase of the total. How did the structural change could not be seen with the addition of the total. For the convenience of explanation, the paper chooses the proportion of government fiscal expenditure and the government in close proximity to residents in the year of 2007 and 2012 to compare.

Figure 2 compares the proportion of 2007 and 2012 chosen by the paper. Seen from the picture, compared with 2007, government mainly increased the proportion of education and medical and health these two aspects in 2012, but the proportion in public service construction and social insurance were decreased.

The above has a statistical description of the structure and scale of fiscal expenditure from supply terminal and we also focus on the effect of such supply. Hence, we should have a description on the situation of total factor productivity. Seen from Figure 3, we could see that the TFP of 1998-2007 was in a trend of increase with very slow speed; after the economic crisis of 2008, the TFP was in a trend of decrease. It means that China increasing the scale of fiscal expenditure ceaselessly would not make the TFP improved rapidly but we know nothing whether the structure is reasonable or not. The following will study the relationship between the scale and structure of fiscal expenditure and TFP and then there are solutions to improve the policy of fiscal expenditure.

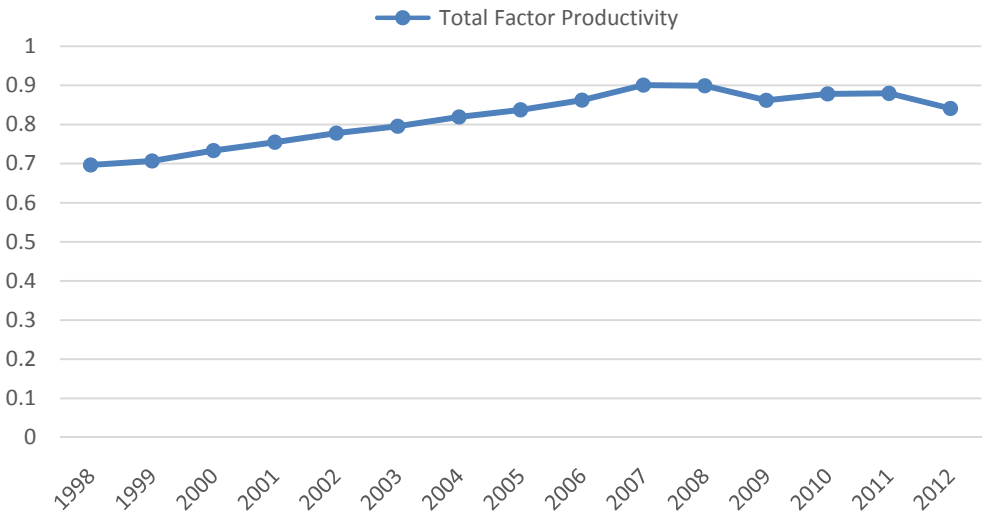

Figure 3
Total Factor Productivity of China in 1998-2012

2. STATIC MODEL ANALYSIS AND RESULTS INTERPRETATION

2.1 Setting and Variable Selection of Model

The paper will observe the influence of scale and structure of fiscal expenditure on TFP with linear regression equation and the specific is following.

$$\ln TFP_{it}=\beta_0+\beta_1 JRFZ_{it}+\beta_2 KFSP_{it}+\beta_3 FDI_{it}+\beta_4 ZFGM_{it}+u_{it}, \quad (1)$$

$$\ln TFP_{it}=\beta_0+\beta_1 JRFZ_{it}+\beta_2 KFSP_{it}+\beta_3 FDI_{it}+\beta_4 X_{it}+u_{it}. \quad (2)$$

The formula (1) studies the influence of scale of fiscal expenditure on TFP and formula (2) studies the influence of structure of fiscal expenditure on TFP. refers to the paper selected six projects of structure of fiscal expenditure, refers to random error term, and the attributes represented by other letters have been pointed in the above.

2.2 Stationary Test and Co-integration Test of Sequences

(a) Stationary Test of Sequences

Since the sequence statistical aperture used by 1998-2006 was different from that of 2007-2012, there should be respectively inspected when doing the unit root test. The paper studies the influence of scale and structure of fiscal expenditure on TFP respectively, so there should be inspected of the scale and the structure independently. There is unit root in the core variable original sequence. Hence the original sequences are not stable. Consequently, there is first order difference processing of the original sequences and inspected the unit root.

Table 2
Unit Root Test for First Order Difference of Fiscal Expenditure Scale in 1998-2006

Method	Statistic	Prob.**
ADF - Fisher Chi-square	85.8721	0.0000
ADF - Choi *Z*-stat	-3.49075	0.0000

Table 3
Unit Root Test for First Order Difference of Fiscal Expenditure Scale in 2007-2012

Method	Statistic	Prob.**
ADF - Fisher Chi-square	138.688	0.0000
ADF - Choi *Z*-stat	-6.21251	0.0000

Table 2 and Table 3 shows the result of a unit root test for first order difference of fiscal expenditure scale. The scale of 1998-2006 and that 2007-2012 is first order sequences.

Table 4
Unit Root Test for First Order Difference of Fiscal Expenditure Structure in 1998-2006

Method	Statistic	Prob.**
ADF - Fisher Chi-square	916.867	0.0000
ADF - Choi *Z*-stat	-15.7929	0.0000

Table 5
Unit Root Test for First Order Difference of Fiscal Expenditure Structure in 2007-2012

Method	Statistic	Prob.**
ADF - Fisher Chi-square	493.060	0.0000
ADF - Choi *Z*-stat	-4.28279	0.0000

Table 6
Unit Root Test for First Order Difference of TFP

Method	Statistic	Prob.**
ADF - Fisher Chi-square	115.819	0.0000
ADF - Choi *Z*-stat	-4.70701	0.0000

Table 4 and Table 5 are the result of a unit root test for first order difference of fiscal expenditure structure and Table 6 is the result of a unit root test for first order difference of TFP. The structure and TFP are one order sequence. The rest of variables are inspected as one order sequence with the same method and there is no repeat.

(b) Co-integration test between variables

The paper studies the relationship between scale and structure of fiscal expenditure and TFP. We suppose the scale and the structure would affect TFP. Before the inspection of their relationship, there should be co-integration inspection among variables to prove whether there is co-integration relationship or not.

Table 7
Co-Integration Inspection of Scale of Fiscal Expenditure and TFP in 1998-2006

Hypothesized	Fisher stat.*		Fisher Stat.*	
No. of CE(s)	(from trace test)	Prob.	(from max-eigen test)	Prob.
None	422.6	0.0000	396.0	0.0000
At most 1	148.6	0.0000	148.6	0.0000

Table 8
Co-Integration Inspection of Scale of Fiscal Expenditure and TFP in 207-2012

Hypothesized	Fisher Stat.*		Fisher stat.*	
No. of CE(s)	(from trace test)	Prob.	(from max-eigen test)	Prob.
None	413.8	0.0000	389.0	0.0000
At most 1	132.0	0.0000	132.0	0.0000

Seen from the inspection result of Table 7 and Table 8, there is significant co-integration relationship with the scale of fiscal expenditure and TFP, which mean there is long-term and stable correlation between the scale of fiscal expenditure and TFP.

Table 9
Co-Integration Inspection of Structure of Fiscal Expenditure and TFP in 1998-2006

Hypothesized	Fisher stat.*		Fisher stat.*	
No. of CE(s)	(from trace test)	Prob.	(from max-eigen test)	Prob.
None	455.2	0.0000	422.1	0.0000
At most 1	152.6	0.0000	152.6	0.0000

Table 10
Co-Integration Inspection of Structure of Fiscal Expenditure and TFP in 2007-2012

Hypothesized	Fisher stat.*		Fisher stat.*	
No. of CE(s)	(from trace test)	Prob.	(from max-eigen test)	Prob.
None	461.6	0.0000	436.0	0.0000
At most 1	161.0	0.0000	161.0	0.0000

Seen from the inspection result of Table 9 and Table 10, there is significant co-integration relationship with the structure of fiscal expenditure and TFP, which mean there is also long-term and stable correlation between the structure of fiscal expenditure and TFP.

There is correlation between scale and structure of fiscal expenditure and TFP. The effect and volume of relationship would be predicted by the model in the following paper.

3.3 Empirical Analysis of Static Model

This part inspects the relationship between scale and structure of fiscal expenditure and the TFP through panel data and there is an explanation for the result.

Empirical analysis of the influence of scale of fiscal expenditure on TFP

Table 11
Empirical Result of Influence of Scale of Fiscal Expenditure on TFP

Yreas / Variables	1998-2006		2007-2012	
	Fixed effect	Random effect	Fixed effect	Random effect
JRFZ	-0.1204***	--0.1490***	-0.0904**	0.1076***
	（-4.77）	（-6.25）	（-0.25）	（4.03）
KFSP	0.4340***	0.4503***	0.0188***	0.2184***
	（14.03）	（18.44）	（0.43）	（7.35）
FDI	-1.4667***	-1.2572***	-0.1763***	0.2116***
	（-5.67）	（-5.45）	（-0.34）	（0.46）
ZFGM	0.8283***	0.5641***	0.2103***	0.5555***
	（5.97）	（4.51）	（1.71）	（5.34）
Constant	0.7293***	0.7861***	0.9835***	0.8577***
	（22.69）	（22.66）	（24.57）	（25.37）
R-squared	0.9398	0.6136	0.9777	0.3335

Note. The regression results of fixed effect model and random effect model are shown in the table; the regression coefficient of each variable is t value in parentheses; ***, ** and * represented the significance of 1%, 5% and 10% level.

Table 11 studies the influence of scale of fiscal expenditure to TFP under the fixed effect and random effect and the study is divided into two time passages. It could be known from the result that the general trend of two effects are the same, so the empirical results are stable. The Hausman of Table 12 further proves that the fixed effect model would be more reliable.

Table 12
Inspection Result of Hansman

Test summary	Chi-Sq. statistic	Chi-Sq. *df*	Prob.
Cross-section random	35.566400	4	0.0000

Empirical analysis of the influence of structure of fiscal expenditure on TFP

Table 13a
Empirical Result of Influence of Structure of Fiscal Expenditure on TFP

Explanatory variables	Fixed effect					
JRFZ	-0.1344***	-0.1231***	-0.1261***	-0.1168***	-0.1294***	-0.1083***
	（-5.04）	（-4.59）	（-4.58）	（-4.42）	（-4.98）	（-4.15）
KFSP	0.4950***	0.4644***	0.4675***	0.4959**	0.4233**	0.4486***
	（16.02）	（14.30）	（13.14）	（16.45）	（12.29）	（14.50）
FDI	-1.3371***	-1.3396***	-1.4334***	-1.5321***	-1.4133**	-1.2970***
	（-4.89）	（-4.94）	（-5.08）	（-5.64）	（-5.2966）	（-4.95）
INF	-0.2852**					
	（-2.26）					
CUL		-4.0610***				
		（-2.99）				
EDU			0.6733***			
			（1.6626）			
TEC				-5.6166***		
				（-4.16）		
HEAL					-2.9892***	
					（-4.3362）	
SEC						0.7498***
						（5.23）
Constant	0.8741***	0.9462***	0.9483***	0.9192***	0.9940***	0.7830***
	（28.64）	（21.62）	（13.80）	（28.44）	（22.73）	（27.32）
R-squared	0.9322	0.9333	0.9315	0.9354	0.9358	0.9379

Note. All regression coefficient of each variable is *t* value in parentheses; ***, ** and * represented the significance of 1%, 5% and 10% level. The fixed effect model of Hausman inspection result is more precise, so there is only the result of fixed effect model.

Table 13b
Empirical Result of Influence of Structure of Fiscal Expenditure on TFP

Explanatory variables	Fixed effect					
JRFZ	0.0261** （0.08）	0.0478*** （0.72）	0.0484** （0.76）	0.0432** （0.55）	0.0379*** （0.35）	0.0306*** （0.31）
KFSP	0.0114*** （0.27）	0.0140 （0.12）	0.0153*** （0.30）	0.0157** （0.35）	0.0208** （0.45）	0.0129** （0.11）
FDI	-0.3133*** （-0.60）	-0.1012*** （-0.19）	-0.1242*** （-0.24）	-0.0822*** （-0.16）	-0.1354** （-0.27）	-0.0970** （-0.10）
INF	0.3433** （2.36）					
CUL		0.3121*** （0.30）				
EDU			0.1310*** （0.59）			
TEC				1.1648*** （0.99）		
HEAL					-1.4144*** （-4.3362）	
SEC						0.3911** （1.96）
Constant	0.8892*** （15.90）	0.9822*** （20.99）	1.0048*** （18.11）	0.9517*** （18.79）	1.0325*** （25.29）	0.9107*** （16.84）
R-squared	0.9781	0.9333	0.9315	0.9774	0.9793	0.9778

Note. All regression coefficient of each variable is *t* value in parentheses; ***, ** and * represented the significance of 1%, 5% and 10% level.The fixed effect model of Hausman inspection result is more precise, so there is only the result of fixed effect model.

(c) Explanation to empirical inspection results

Government scale. Seen from the regression results of fixed effects of chart 11, the scale in 1998-2006 and 2007-2012 has significant positive effect on TFP, which means that our country would optimized the fiscal expenditure structure ceaselessly when increasing the scale of it to restrain the decrease of TFP brought by diminishing marginal return on capital.

Expenditure of infrastructure construction. The expenditure of infrastructure construction is the main part of fiscal expenditure. It plays a role of production function to improve the efficiency of capital and labor force. In Table 13a, the expenditure of infrastructure construction has a significant negative effect in 1998-2006; in Table 13b, the expenditure of infrastructure construction has a significant positive effect in 2007-2012. The input of infrastructure construction would have certain lagging. The improvement of TFP is promoted by the increase of efficiency of production factors, hence there would be a process of TFP from restraint to promotion.

Expenditure of culture and broadcast. Table 13a and Table 13b shows the expenditure of culture and broadcast had a significant negative effect in 1998-2006 and the significant positive effect in 207-2012. Role of expenditure of culture and broadcast is an indirect profit. In 1998-2006, Chinese culture and broadcast may be unreasonable to have restraint on TFP. With the improvement of the industrial chain of culture and broadcast, on one hand, the international technology and capital with cultural soft power appealing promote the improvement of Chinese TFP; on the other hand, efficiency of TFP is improved.

Expenditure of the education business. The expenditure of education business has a significant positive effect on the TFP. The aim of education is to cultivate talents and the increase of education business could promote the accumulation of human resource capital and bring the progress of technology, so the expenditure has promoted effect to TFP.

Expenditure of science and technology business. Science and technology have a significant negative effect on TFP in Table 13a while it has a significant positive effect on the TFP in Table 13b. Although the Chinese technology level of 1998-2006 had rapid development, the core technology was still imported from the foreign technology. This situation was bad for the improvement of Chinese independent science and technology level and damaged the TFP; with the country encouraging the independent study, the technology level is improved gradually and master the core technology, hence, the promoting effect of the expenditure starts to be obvious.

Expenditure of medical and health. Seen from Table 13a and Table 13b, the expenditure of medical and health has significant restraint effect on the TFP, which means the TFP would not increase with the increase of the expenditure, but decreased. The expenditure was used to have stronger effect of human resource, but the medical and health policies were extremely unreasonable and the resource distribution was unfair, such situation would not only not promote the accumulation of human resource and it also exacerbate the contradiction of human resources in

different regions, hence it is bad for the improvement of TFP.

Expenditure of social insurance. Seen from Table 13a and Table 13b, the expenditure of medical and health has significant positive effect on the TFP, which means the important position of Chinese social insurance. Social insurance is a basic welfare system in the country and it is an important role in the modernization process. Social insurance system could not only maintain society stable and it will ensure the stability of labor force as a re-distribution of social welfare. Meanwhile, under the social insurance system of the old will be looked after with reliance, the production enthusiasm of labor is improved and the labor productivity is improved, so the TFP is increased.

3. INSPECTION RESULT OF DYNAMIC MODEL

There is typically endogenous of TFP and the improvement of productive factors must affect the improvement of TFP in the future. Static model could not reflect the accumulation effect and the lagging influence of TFP. This part studies the endogenous with GMM model and lead the lagging one order item of TFP and core explanatory variables:

Table 14
Endogeneity Stuyd on TFP

Year variables	1998-2006		2007-2012	
TFP（-1）	0.7445***	0.8778***	0.1102**	0.2019**
	（43.10）	（18.55）	（1.38）	（2.37）
JRFZ	-0.1142***	-0.0646***	0.0472	0.4996
	（-8.92）	（-2.26）	（1.13）	（0.48）
KFSP	0.1163***	0.1897***	0.4359***	0.7742*
	（8.55）	（5.38）	（6.89）	（1.30）
FDI	-0.2250	0.6932	1.7254	-0.1137
	（-1.07）	（1.60）	（1.53）	（-0.31）
ZFGM（-1）	0.6785***		0.9332***	
	（13.19）		（4.84）	
INF（-1）		0.2157***		0.5402**
		（2.87）		（1.92）
CUL（-1）		-0.5625		0.3927
		（-0.37）		（0.42）
EDU（-1）		0.2158		0.5730*
		（0.79）		（0.47）
TEC（-1）		0.5966**		0.3301***
		（1.49）		（0.91）
HEAL（-1）		0.8796**		-0.2824*
		（1.86）		（-0.54）
SEC（-1）		0.2996**		-0.2460*
		（2.07）		（-1.59）
AR（2）	0.231	0.357	0.219	0.362
Sargan	1.000	1.000	1.000	1.000

Note. All regression coefficient of each variable is *t* value in parentheses; ***,** and * represented the significance of 1%, 5% and 10% level.

We could see the obvious endogenous of TFP in Table 14, which means the TFP of the last period has a significant positive effect of the TFP at this term. Seen from the increase of the Solow growth model, the influence of TFP on the economic increase is a residual value effect. Except the influence of element input factor on economic growth, the rest will be the effect of TFP on economic growth. The improvement of TFP pushes the technology accumulation, so this could provide motivation to sustainable economic growth.

CONCLUSION AND SUGGESTION

Seen from the empirical result of the paper, the scale of fiscal expenditure has a positive effect on TFP, which means China increases the scale of fiscal expenditure and improves the structure of fiscal expenditure, so the TFP is increased continuously. But there is still unreasonable place in the structure in the specific detailed catalog of expenditure.

Expenditure of education business could be improved since the expenditure could promote the accumulation of human capital and the progress of technology, so the TFP will be improved. Under the situation, the proportion of the expenditure would be improved property. Expenditure of medical and health should be improved, too. Since the policy and resource distribution of medical and health is unreasonable and unfair, it would do harm to the increase of labor productivity and also aggravate the dispute of human capital in different regions, so it is bad

for the growth of TFP. With the increasing proportion of expenditure of science and technology, the spillover effect of technology is more and more significant to drive the growth of TFP, but the input of this aspect should be increased.

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