

Fiscal Expenditure Incentives, Spatial Correlation and Quality of Economic Growth: Evidence from a Chinese Province

Jiangyi Qi¹

¹ Room 1102, Building No. 26, Changsha, Hunan, China

Correspondence: Jiangyi Qi, Room 1102, Building No. 26, Yun Xi Gu Community, 88 Yunxi Road, Yuelu District, Changsha, Hunan, China. E-mail: qjyfuture@163.com

Received: April 21, 2016

Accepted: May 18, 2016

Online Published: June 18, 2016

doi:10.5539/ijbm.v11n7p191

URL: <http://dx.doi.org/10.5539/ijbm.v11n7p191>

Abstract

This paper constructs an index system to evaluate economic growth quality. After taking into account the spatial correlation, the impact of public expenditure on economic growth quality is investigated by using panel data from a Chinese province during 2007 and 2014. In this analysis, different levels of economic growth quality and fiscal expenditure are considered. The results reveal that (1) Economic growth quality should be measured not only from scale but also from structure, performance and coordination. (2) There is agglomeration effect because local government fiscal expenditure greatly promotes local region economic growth, and this rule not only embodies in scale, but also in performance and coordination. (3) The spatial spillover effect of neighbouring government fiscal expenditure on local economic growth quality cannot be ignored, and different fiscal expenditure represents different results. There is complex spatial correlation among governments and corporation relationship among regions is very important. Finally, some policies about fiscal expenditure and economic development are proposed.

Keywords: economic growth quality, fiscal expenditure, spillover effects, agglomeration effect

1. Introduction

For more than 30 years of Chinese economic reform, great achievements have been made in economic growth. Though “it’s hard to imagine a development world without growth”, but too much attention has been given to economic scale, and GDP is the usually indicator to measure this for a long time. Many problems have been brought from this growth pattern, such as economic growth quantity and efficiency are not coordinated. But the unity of quality and efficiency is the intrinsic request of economic development (Wei, 2009). Therefore, the 8th National Congress of the Communist Party of China reported “we should take accelerating the change of the growth model as a major task and ensure that development is based on improved quality and performance”. Sustainable and healthy economy, not only depends on quantity, but also structure and content, especially when economic growth has made great achievements in China. Li and Zhang (2011) pointed out that the connotation of economic development needs to be expanded. The author constructed an index system for growth model change with endogenous and sustainability from economic growth, development force, resources and environment support, development fruits. Ren and Li (2013) also suggested that the optimal goal of economic growth is the unity of quantity, quality and efficiency.

Public Finance is the important pillar of national governance. The global financial crisis of 2008 made business and economic scholars began to re-examine the importance of fiscal policy (Feldstein, 2009). Fiscal policy, as a basic macroeconomic regulation tool, has become an important force to promote regional economic growth (Deng, 2013). The Chinese Government Work Report in 2015 proposed “Proactive fiscal policy should be strength”. Fiscal expenditure, by guiding distribution and flow of economic resources, plays a function of stabilizing economy. Taking fiscal spending as an investment, Arrow and Kurz (1970) analyzed the effect of fiscal expenditure on economic growth. According the traditional theory, the function of fiscal expenditure was summarized as inter-temporal investment behavior theory, aggregate demand effect of fiscal expenditure, positive externality of public investment by Ndikumana (2008). Using Threshold Vector autoregressive, Choi and Devereux (2006) argued that economic growth effect of fiscal expenditure is nonmonotonic. About local government expenditure, some scholars believed that macroeconomic stability policy is essentially a national policy (Musgrave, 1959), but the local fiscal expenditure in China has quickly improved public infrastructure,

inspired enterprise investment and technological innovation, laid a series of important driving force for rapid economic growth (Blanchard & Shleifer, 2001; Li & Zhou, 2005). Some other researches are more specific. Tang (2012) supported that people's livelihood fiscal expenditure is the main power in the long-term growth and consumer spending. Jia (2013) argued that county-level public finance plays an important role for economic growth. Although local government competition is one of the reason to explain economic growth in China (Qian & Roland, 1998), vicious fiscal competition among regions also lead to a variety of local protectionism, damage the efficiency of market and widen economic development gap (Young, 2000; Bai, Du, Tao, & Tong, 2004). Lu and Yin (2010) suggested only joint supply of public products by more governments will be Pareto improvement.

For the measurement of fiscal expenditure, Fiorito and Kollintzas (2004) divided government consumption into public goods and merit goods (services supplied by private sector). Forni, Monteforte, and Sessa (2009) suggested that government expenditure includes purchasing goods and services, public employment subsidy, transfer payments. Ganelli (2010) distinguished government employment expenditure and non-employment expenditure. Jia (2011) measured fiscal expenditure from agricultural expenditure, education and health expenditure, social security expenditure and administrative expenses. He also approximate classified fiscal expenditure as economic, social and maintenance expenditure (Jia, Guo, & Zhao, 2012). Wang and Zhang (2011) focused on consumer and investment expenditure. Mao (2012) classified government expenditure into administrative expenditure, productive expenditure, service public expenditure. Some other researches are more specific. Li (2009) investigated fiscal expenditure from economic construction expenditure, administrative expenditure, social culture and education expenditure, defense expenditure, and other expenditure. The research of Luo (2014) was about the level of public service supply from basic construction, education, administration, social security and health care. For some specific expenditure, e.g. education and national defense expenditure, Grier & Tullock (1989) classified them as consumer expenditure, but Barro (1990) regarded them as investment expenditure. In recently years, government fiscal expenditure in China has turned to public finance and people's livelihood finance (Wang, 2012).

As the adjustment of economic structure and the deepening of economic reform, the quality of economic growth has become the main target of economic policy. But most studies, especially empirical researches, still focused on economic scale, this will lead to estimation errors and is unfavorable to explore the inner essence of regional economic growth. Furthermore, studies exploring the effect mechanism of fiscal expenditure on economic growth, still based on the independence assumption that each region never interfere. But we couldn't ignore the spatial correlation and the spillover effect between fiscal expenditure and economic development with liquidity across regions of all kinds of resources. It is a necessary requirement to study the influence mechanism of local government fiscal expenditure on regional economic development and estimate its size using spatial method. And different fiscal expenditure should be adjusted by different prices indexes, because different fiscal expenditure influences economic life through different market. To be more specific, the contribution of this paper may be as follows: (1) Choosing an index system to measure economic growth quality from scale, structural performance and coordination; (2) Studying the aggregation and spillover effects of local government expenditure on economic growth quality with spatial method; (3) Adjusting fiscal expenditure to actual expenditure by price index respectively.

2. Measurement of Economic Growth Quality

To realize the transformation of economic development patterns, we need pay attention from scale to performance, from speed to structure, from economic growth to coordinative development of economic and social. According to existing references, the index system of economic growth quality should follow the principles of systematic, validity and availability. That means the selected indicators can reflect the specific situation of economic development, can fully measure the quality and performance of economic development, and can be calculated. Finally the first grade assessment indicators for economic growth quality in this paper include scale, performance, structure and coordination. And the second grade assessment indicators respectively summarized as: (1) Scale: gross scale, per capita scale and growth rate scale; (2) Performance: investment performance, labor performance and technology performance; (3) Structure: driving force structure, urban-rural structure and industry structure; (4) Coordination: urban and rural income coordination, economic and social coordination, internal and external economic coordination.

To get the final value of economic growth quality, we need carry out normalization processing to convert all original data to [0, 1] firstly. Positive indicator means the bigger the better. On the contrary, it is negative indicators. The formula for positive indicator is $A'_{ij} = (A_{ij} - \min(A_j)) / (\max(A_j) - \min(A_j))$. Where A_{ij} = the original value of indicator j at time i , and A'_{ij} = the standard value after normalization. The formula for negative indicator

is $A'_{ij} = (\max(A_j) - A_{ij}) / (\max(A_j) - \min(A_j))$.

Then we need get weights of all levels. The most commonly methods to get weight are subjective method and objective method. The former is relatively simple and practical, but also too subjective, because it gets weights according to the subjective judgment of decision makers. The latter is more objective because this method is based on the information provided by the indicator itself to get weight. In this paper, we use entropy method which is one of the objective methods to calculate weights. The information entropy in the social system can reflect the balance of system, the greater entropy value means a more balanced system and smaller variation, and vice versa. So we can get weights according to the degree of variation. Firstly, we calculate the proportion of each indicators using equation:

$$Y_{ij} = A'_{ij} / \sum_{i=1}^m A'_{ij}$$

Then the formula for redundancy of information entropy is:

$$e_j = 1 - d_j = 1 + \frac{1}{\ln m} \sum_{i=1}^m (Y_{ij} \times \ln Y_{ij})$$

Finally, we get the weight of each indicator by equation:

$$w_i = e_i / \sum_{j=1}^n (e_j)$$

Table 1. Evaluation index system of economic growth quality

first grade	second grade	measuring indicator	weight
Scale	gross scale	GDP	0.0825
	per capital scale	per capital GDP	0.0800
	growth rate scale	GDP growth rate	0.0964
Performance	investment performance	GDP/fixed assets investment	0.0758
	labor performance	labor remuneration	0.0711
	technology performance	total profit of high-tech industries	0.0847
Structure	driving force structure	consumption rate	0.1893
	urban-rural structure	urbanization rate	0.0711
	industrial structure	added value of tertiary industry/GDP	0.0635
Coordination	urban and rural coordination	rural per capita net income/ urban per capita disposable income	0.0892
	economic and social coordination	energy consumption per unit scale industrial added value	0.0532
	internal and external economic coordination	retail sales growth rate of consumer goods/growth rate of export and import	0.0398

The trend of economic growth quality is shown in Figure 1 by using related data of Hunan province in 2007-2014. All data come from the statistical yearbook of this province. This figure shows that economic growth quality was getting better all the time except in 2009 due to the global financial crisis of 2008. We had paid more and more attention to economic growth transformation, not only focus on economic growth scale, but also performance, structure and coordination. Especially the coordination increased steadily in this period. After decades of rapid economic growth, the coordination of urban and rural, economy and society, internal and external economy, had increasingly become the focus of current economy. Although we can't ignore the reality of dual economy, environment pollution, weak domestic demand, the central and local governments in China had shown a positive attitude and made many efforts towards the sustainable economic development model. We also should notice that economic structure did not get obvious improvement after many years economic structure

reform. The economic structure had been stuck, and even backwards for a long time. From the specific indicator of economic structure, low consumption rate may be the key reason. This rate of Hunan province was fallen from 55.9% in 2007 to 46.1% in 2014, and was continuous decreasing in the sample period. Consumption, exports and investment are three carriages for economic growth according to the theory of the modern market economy, but the promotive function of consumption had not been fully demonstrated, and insufficient consumer demand had restricted economic growth.

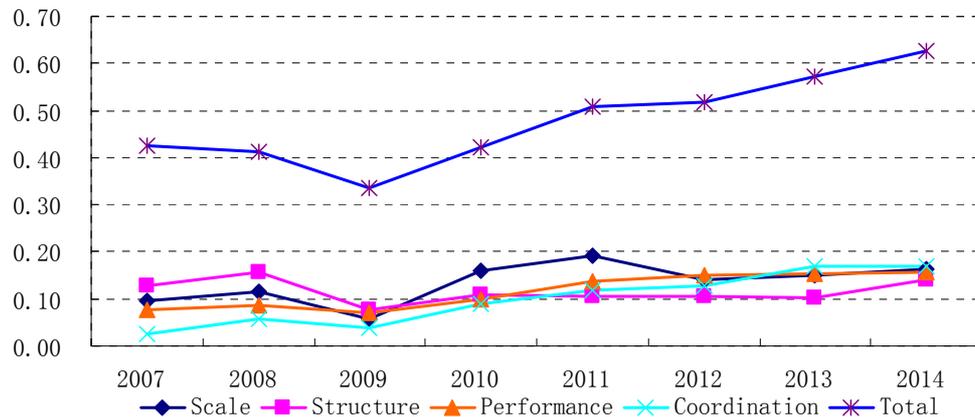


Figure 1. Trends of economic growth quality

3. Theoretical Analysis of Fiscal Expenditure on Economic Growth Quality

3.1 Directing Resource Flow by the Guidance Function of Fiscal Expenditure

In the final analysis, the economic development is about how to make full use of and optimize all kinds of resources, improve the efficiency of resource utilization. Although market mechanism is the basic way of resource distribution, government reasonable intervention is needed because of market failure in some cases. Fiscal expenditure has influenced the structure and performance of economic growth by guiding the direction and efficiency of high quality resources. So under the new normal state of economic development, fiscal expenditure is not only the basic supportive force of stable growth, but also the important means to promote economic structural adjustment and sustainable development. The directing function of fiscal expenditure works mainly through the following ways: (1) Direct support for resource that is important to improve economic growth quality, e.g. aggregate high quality human resources by increasing education expenditure, improving wages or benefits of innovators. (2) Government purchase for emerging industries or products, which will optimize industrial structure by promoting more financial and social capital to these promising industries. (3) Focus fiscal special funds on key areas, guide credit capital, social capital and land resources to specific regions, industries and areas. (4) Lead the whole society to increase capital after residents' welfare has been improved because of adding service fiscal expenditure.

3.2 Affecting the Relationship among Different Groups by Coordinating Role of Fiscal Expenditure

In order to maintain sustainable economic development, we should coordinate interests among regions, industries and departments. Fiscal expenditure, as an important part of the fiscal resources distribution, can ensure the coordination of national economy through distribution and use of fiscal income. On the one hand, fiscal expenditure can reduce imbalances of initial distribution through transfer payment and fiscal expenditure arrangement to vulnerable group. Residents can not fairly enjoy the benefits of economic growth because there are large resource price difference among regions and industries during the initial distribution of wealth. Although resource market price depends on efficiency, sometimes the market price is not fair, especially in a transformation economy. To a certain extent, government can correct the unfair through secondary distribution of social wealth, maintain the equalization of public service among urban and rural, region, residents, and promote the whole society to enjoy the achievement of economic growth. On the other hand, fiscal expenditure can promote coordination of economy, society and environment through "green fiscal expenditure" to support the development of resource-saving industries. The growth model at the cost of sharply increasing raw materials and energy consumption is unsustainable. The evaluation index system including green GDP can change government

behavior, shift public resources to industries of low input, low consumption, low emissions and high efficiency. The change of fiscal expenditure structure will reverse the relationship between economy and environment, and realize the intergenerational transfer and fair of the society and the environment.

3.3 Stabling Economic Development by “Stabilizer” and “Discretion” Mechanism of Fiscal Expenditure

The stability and development of economy are mutually unified, stability is the premise and development is the fundamental. High-speed growth will not prevent the fluctuation, and fiscal policy is an important tool of anti-fluctuation. On the one hand, fiscal expenditure has a “stabilizer” function. Fiscal expenditure can promote the stability of the social resources, keep reasonable growth of economic scale and maintain reasonable benefits of economic activities. For example, fiscal subsidies, fiscal discount and social assistance can effectively adjust gross demand. The coordination between fiscal expenditure and other policies benefits to promote the basic balance of gross demand and supply, and promote the stable development of economy. On the other hand, “discretion” mechanism of fiscal expenditure is helpful to promote the adjustment of economic structure and economic sustainable development. According to economic development level and stage, leading fiscal capital to the public domain such as education, health care and environment protection, can eliminate market bottleneck and effectively adjust the gross supply. Expenditure changes in construction and agriculture based on the cycle of economic development can effectively stimulate the economic development and slow the recession.

4. Empirical Models and Properties

4.1 Establishment of Empirical Models

On the basis of above theoretical analysis, the role of local government fiscal policy on regional economic growth quality can not be ignored. We also should consider the spatial interaction. Guo and Jia (2009) found there were significant fiscal expenditure policy interactions among governments due to the fiscal competition mechanism. Li (2014) thought there was obvious and stable spatial correlation among regions. Neighbouring government fiscal expenditure has impact on local economic growth quality because of resource flow across regions. First of all, neighbour government fiscal expenditure has direct attraction to resources in these areas, then influences resource aggregation and economic growth quality in local government. Secondly, with economic transformation and development, resource flow across regions enhance as “offside”, “dislocation” and “omission” phenomena of governmental management is decreasing. The effect of neighbour government fiscal expenditure on local economic growth quality is likely to grow.

With researches of Guo and Jia (2009), Chen and Wang (2014), this paper assumes that region's economic output (Y) depends on labor (L), capital (K) and local fiscal expenditure (G). Based on spatial geographic methods, considering the spillover effect of neighbour government fiscal expenditure on local economic growth, the spatial correlation model of fiscal expenditure and economic growth quality is specified as:

$$\ln Y_{dt} = \gamma W \ln G_{-dt} + \alpha_1 \ln L_{dt} + \alpha_2 \ln K_{dt} + \alpha_3 \ln G_{dt} + \lambda_t + \beta_d + \pi_{dt} \quad (1)$$

Where $\pi_{dt} = \nu w \pi_{dt} + \varepsilon_{dt}$, $|\nu| \leq 1$. β and λ represent region fix effect and time fix effect. ε is random disturbance term, $\varepsilon \sim iid(0, \sigma^2)$. In different models, the economic growth quality (Y_{dt}) is represented by total level (YT), scale (YQ), structure (YS), performance (YB) and coordination (YC) in region d at time t . Government fiscal expenditure (G) is represented by total level (GT), service expenditure (GS), investment expenditure (GI) and non-productive expenditure (GC). The spatial lag item $W \ln G_{-d,t}$, which is obtained by spatial weight matrix multiples logs of fiscal expenditure, captures the spatial effect of fiscal expenditure in neighbouring governments on local economic growth. Spatial coefficients γ represent the direction and degree of this spatial effect.

The spatial weight matrix W , which combines characteristics of cross section and time, is a $NT \times NT$ matrix, and $N=14$, $T=8$ in this paper. Elements on the diagonal line of W are notated by W_n (14×14), with their elements demonstrating the spatial connection pattern of two regions in geography, and all other elements equal zero. If two regions are not geographical neighbors, the value of W_{ij} will be zero, otherwise will be one. $-it$ means that spatial lag item doesn't include $\ln G_{dt}$ (Yang, 2010).

4.2 Data, Indicator and Method

In order to disregard differences of different regions and time due to fiscal policy and macro economy, we use mainly secondary cross-city data in Hunan province. Since the classification reform of fiscal expenditures in 2007 for the reason of establishing public finance system in China, this study covers a period of 2007 to 2014.

Fiscal expenditure (G) is divided into service expenditure, non-productive expenditure and investment expenditure. Service expenditure includes education, social security and employment, medical care. They are closely associated with people's livelihood and directly meet citizen demands. We get non-productive

expenditure according to general public services because they don't produce economic benefits and just to maintain social stability and social affairs management. Other expenditure that include agriculture, forestry and water affairs are classified into investment expenditure. Using the research of Imbeau, Pétry, Crête, Tellier, & Clavet (2001) for reference, we adjust nominal expenditure to real expenditure by GDP index, CPI and the price indices of investment in fixed assets respectively. Then we can get the total real fiscal expenditure. K = capital stock per capita. Capital stock is estimated by Perpetual Inventory Method (PIM) and $K_t = (1-\varphi) K_{t-1} + I_t$ (Zhang, 2004). K_t and K_{t-1} denote current and previous real capital stock, I_t represents current gross fixed capital formation which has been adjusted by the price indices of investment in fixed assets. $\varphi=9.6\%$, calculated by the formula $\omega_t = (1-\varphi)^t$, where $\omega=4\%$. L refers to real labor force and L =workers / total population.

Considering spatial correlation among economic growth quality and fiscal expenditure, we use Moran index ($-1 < \text{Moran} < 1$) of cross-section data to make a preliminary judgment. Moran index is the correlation coefficient of observed variable and its spatial lag item (that is a weighted average of the same variable in neighbouring regions), can reflect the direction and degree of spatial correlation of the variable. At 10% significance level, we can conclude from Table 2 that total fiscal expenditure, service expenditure and investment expenditure have significant spatial correlation. A regional service and investment expenditure may be affected by neighbouring regions, and tend to adopt similar policy. But non-productive expenditure doesn't present spatial correlation because it is mainly controlled by macro economy policy and regional competition is weak. Economic growth quality also presents spatial correlation in most cases. Resource flow among regions is enhanced by market mechanism and government, especially neighbouring regions. Therefore, adopting spatial empirical method to estimate the relationship between fiscal expenditure and economic growth quality is reasonable. General OLS estimation has some shortcomings when the spatial factors are included, so we use two stage FGLS method to estimate spatial panel data model (Yang, 2010). Main steps include: Firstly, use fixed effects (or random effects) to get consistent estimator of coefficient. Secondly, use residual to get parameters of disturbance term. Then use FGLS method to estimate coefficient again to get consistent and effective estimator. Stata 10.0 is used as the necessary software.

Table 2. Moran index of fiscal expenditure and economic growth quality

Moran	YT	YQ	YP	YS	YC	GT	GS	GC	GI
2008	0.214** (0.042)	0.304*** (0.002)	0.200** (0.040)	0.136* (0.081)	0.093 (0.127)	0.103* (0.070)	0.127* (0.072)	0.167 (0.408)	0.232** (0.039)
2010	0.211** (0.028)	0.420** (0.031)	0.309* (0.081)	0.193* (0.098)	0.109 (0.142)	0.093* (0.061)	0.109 (0.187)	0.147 (0.331)	0.119* (0.062)
2012	0.255** (0.031)	0.397** (0.047)	0.287** (0.048)	0.204* (0.071)	0.084 (0.210)	0.108* (0.058)	0.236* (0.061)	0.142 (0.211)	0.187** (0.024)
2014	0.267** (0.043)	0.443** (0.049)	0.302** (0.034)	0.145* (0.066)	0.112* (0.071)	0.123** (0.064)	0.182** (0.028)	0.157 (0.456)	0.202** (0.035)

Note. ***, **, * denote 1%, 5% and 10% significance levels respectively. P-value is in ().

5. Model Estimation and Discussion

5.1 Influence of Fiscal Expenditure on Different Levels of Economic Growth Quality

As traditional economic growth theory, our results in Table 3 show labor and capital in China have important and persistent effect on economic growth. Although knowledge and technology make a lot of contributions to economic growth, labor and capital are still basic forces of economic growth. We should notice that labor has significant contribution to economic growth scale, but has no significant impact on economic growth structure and coordination. Furthermore the impact of capital on economic growth structure is also not obvious. Many labor and capital in China are still focus on manufacturing industry, so the development of tertiary industry lags behind. Though there are a large number of rent-seeking labor and capital flowing into big cities, the contribution of population and labor in promoting urbanization rate and consumption rate is small. The reason may be identity conversion mechanism between urban and rural is poor, and safeguard mechanism of peasants is imperfect.

In addition, the existing fiscal system stimulates the enthusiasm of developing local economy. The resource aggregation effect of fiscal expenditure in this region is an important factor to improve economic growth quality. Incomplete information and externality will lead to market failure, and governments can improve efficiency of market operation through direct or indirect intervention. Along with growing function of local government in

vertical government structure, fiscal expenditure effectively promotes economic growth quality in this region by improving public infrastructure and technology innovation activities, etc. This positive impact can be reflected from scale, performance and coordination of economic growth. Increasing local government fiscal expenditure benefits to accumulate resources in this region, and can guide and change the direction and efficiency of high quality resources. The increase of local government public service supply effectively promoted performance of economic growth by accelerating high quality human capital accumulation, raising production efficiency, and promoting the development of high technology industry. Moreover, through secondary distribution of national income, fiscal expenditure play an active role in coordinating different social groups, economy and society,, economy and environment. We also admit fiscal expenditure on social security will reduce residents' precautionary savings, enhance residents' consumer confidence. However, the impact of fiscal expenditure on consumption rate is insignificant. This shows that we still need to improve social security expenditure, or eliminate obstacles between social security expenditure and residents consumption.

The coefficient γ of spatial lag item suggests that economic growth quality in a region is connected with fiscal expenditure of this region and neighbouring regions. There is spatial correlation between fiscal expenditure and economic growth. We can conclude some reasons for this phenomenon. On the one hand, neighbouring government fiscal expenditure may exert negative effects on local economic growth. If neighbouring governments increase fiscal expenditure while local government fiscal expenditure remains unchanged, neighbouring regions will present competitive advantage. By improving public facilities, stimulating business investment and innovation, neighbouring regions become more attractive to resources than local region. This effect will weak aggregation ability of resources in local region, then restrain economic growth. On the other hand, neighbouring government fiscal expenditure may also exert positive effect on local economic growth. When neighbouring governments attract more resources from other regions, local government can also get more resources from other regions. Moreover, due to geographical proximity, local region is easier to get resources from neighbouring regions when resources in neighbouring regions become crowded. The final influence of fiscal expenditure on economic growth quality depends on comprehensive results of these two effects. As a whole positive impacts offset negative impacts. This spatial spillover effect of fiscal expenditure on economic growth quality is significant in economic growth scale and performance, but not in economic growth structure and coordination. We should pay more attention to local government fiscal expenditure to transfer economic growth structure and improve economic growth coordination.

Table 3. Influence of fiscal expenditure on different levels of economic growth quality

	<i>total</i>	<i>Scale</i>	<i>Structure</i>	<i>Performance</i>	<i>Coordination</i>
<i>LnL</i>	0.3021** (0.1407)	0.3314** (0.1486)	0.2388 (0.2171)	0.2026* (0.1116)	0.1189 (0.1081)
<i>LnK</i>	0.2014* (0.1104)	0.2209** (0.1028)	0.1211 (0.1514)	0.1413** (0.0673)	0.1008* (0.0549)
<i>LnG</i>	0.0653** (0.0328)	0.2892* (0.1575)	0.0942 (0.0725)	0.0816** (0.0366)	0.0177* (0.0097)
<i>WLnG</i>	0.0186** (0.0089)	0.0214** (0.0102)	0.0153 (0.0139)	0.0178* (0.0096)	0.0185 (0.0231)
<i>adjusted R²</i>	0.3456	0.3043	0.2477	0.2135	0.2795
<i>Hausman</i>	37.6191	35.9284	36.0935	37.2189	36.4678
<i>Joint test (F)</i>	15.675 (0.00)	18.495 (0.00)	16.028 (0.00)	16.439 (0.00)	15.216 (0.00)

Note. ***, **, *denote 1%, 5% and 10% significance levels respectively; Before () are estimated parameters of independents; Stationary standard errors with heteroscedasticity adjusted are in () under parameters; Hausman test is for the choice of model (Fixed effects or random effect); The null hypothesis of Joint test (F) is $\gamma = 0$, and P-value is shown in ().

5.2 Influence of Different Fiscal Expenditure on Economic Growth Quality

Results in Table 4 show that estimators of main variables have no fundamental changes after dividing fiscal expenditure into three specific categories. In most models, the impact of labor, capital, local government fiscal expenditure and neighbouring government fiscal expenditure on local region economic growth quality is important and significant. That is to say, in the process of improving economic growth quality, there are aggregation and spillover effects of fiscal expenditure. And different types of fiscal expenditure have different

effects on economic growth quality.

We first analyze aggregation effect. Investment expenditure of local government makes largest contribution to economic growth quality. Investment expenditure can directly generate economic benefits and strong political rent-seeking behavior which can stimulate economic growth. The positive role of service expenditure on economic growth quality begins to emerge but still need to be improved. Fiscal expenditures on education, social security and employment, medical care are the basis of stabilization and development. But they also bear higher upfront costs, a long return cycle and difficult evaluation, so the incentive generating from these expenditures may be not so strong. And there may be lag effect when fiscal expenditure influences economic growth. All these reasons cause a relative smaller impact of service expenditure on economic growth. At the level of 10%, the impact of non-productive expenditure on economic growth quality is insignificant. The internal reason may be the purpose of this expenditure is to maintain social stability and has nothing to economy.

Then we analyze spillover effect. We conclude two reasons for the impact of neighbouring government fiscal expenditure on local economic growth quality—fiscal competition and directing resources. Firstly, local government fiscal expenditure which will be affected by neighbouring government fiscal expenditure can exert influence on local economic growth quality. Secondly, resources in local region which will be affected by neighbouring government fiscal expenditure can also influence local economic growth quality. We agree that there is fiscal competition not only in the total of fiscal expenditure but also different categories. We also can't refuse that the impact of different fiscal expenditure on resource flow is different. All these result in different spillover effect of different fiscal expenditure. Service and investment expenditure show a significant spillover effect, but non-productive expenditure doesn't. Keen and March (1997) pointed out that local governments continue to compete in fiscal expenditure scale and structure in order to promote economic development. Gordon (1983) and Lenka (2009) suggested that fiscal expenditure on education and environmental protection has obvious regional spillover effect. This kind of competition between different fiscal expenditure, directly affect region economic growth quality. For example, "green fiscal expenditure" will change industrial structure, fiscal subsidies and unemployment benefits can effectively promote residents consumption, etc.

Table 4. Influence of different fiscal expenditure on economic growth quality

	<i>Total expenditure</i>	<i>Service</i>	<i>Investment</i>	<i>Nonproductive</i>
<i>LnL</i>	0.3021**(0.1518)	0.3410* (0.1857)	0.3573* (0.1946)	0.3318* (0.1831)
<i>LnK</i>	0.2014*(0.1101)	0.2817* (0.1550)	0.2685* (0.1482)	0.2412*(0.1297)
<i>LnG</i>	0.0653**(0.0293)	0.0596**(0.0284)	0.0892**(0.0415)	0.0151 (0.0116)
<i>WLnG</i>	0.0186**(0.0089)	0.0104* (0.0057)	0.0217 (0.0197)	0.0209 (0.0261)
<i>adjusted R²</i>	0.3456	0.2103	0.2652	0.2033
<i>Hausman</i>	37.6191	20.3422	21.8329	20.8576
<i>Joint test (F)</i>	15.675 (0.00)	13.945 (0.00)	14.198 (0.00)	14.905 (0.00)

Note. The same as the above table.

6. Conclusion and Recommendation

To realize the transformation of economic development patterns, we need pay attention from scale to quality of economic growth. There are aggregation and spillover effect of fiscal expenditure on economic growth quality. This paper firstly constructs an evaluation index system of economic growth quality from scale, performance, structure and coordination. After that we calculate and compare economic growth quality by using data of Hunan province in China in the period of 2007-2014. Secondly we divide fiscal expenditure into service, investment and non-productive expenditure, and adjust nominal expenditure into real expenditure by different price index respectively. Thirdly we make general theoretical analysis of fiscal expenditure on economic growth quality. Finally spatial econometric model including fiscal expenditure of local and neighbouring governments is made to test aggregation and spillover effect of fiscal expenditure on economic growth quality. We also analyze these influences from different aspects. Eventually, we may get some conclusions and relevant policy implications.

(1) We should measure economic growth quality not only from scale but also from structure, performance and coordination. Systematic, validity and availability are principles of choosing an evaluation index system of economic growth quality. With normalization processing and entropy method, we got the final value of economic growth quality. Results based on data of Hunan province in China showed that economic growth quality was getting better all the time except in 2009. We are pursuing a sustainable economic development pattern. But

economic structure did not get obvious improvement and the key reason may be the lower consumption rate. To promote the transformation of economic growth patterns we firstly need to seek development by maintaining economic growth. Then improving economic growth performance is also needed. We can achieve this goal by raising investment performance and labour remuneration, and supporting high technology industry. At the same time, we should seek coordination of urban and rural, economy and society, economy and environment. Of particular importance would be economic growth structure. Attempts of increasing consumption rate and reducing external risks will be helpful to improving economic growth structure, such as increasing fiscal expenditure on social security and raising residents' income.

(2) Local government fiscal expenditure greatly promotes local region economic growth, this rule not only embodies in scale, but also in performance and coordination. Appropriate government intervention is an important tool of macroeconomic regulation although market mechanism plays a vital role in resource distribution. Public services provided by local government have an effectively positive effect on economic growth scale, performance and coordination. But it is worth noting that the effect of fiscal expenditure on economic growth structure is not significant. We can get some policy implications from above conclusions. Combining fiscal expenditure and tax policy to make full use of the guidance and “stabilizer” function of fiscal expenditure helps to resource aggregation, industrial structure adjustment, economic development, and therefore economic growth performance is on the rise. For example, we expand the scope of the tax preference and carry out the policy of structural tax cuts with strong growth of fiscal expenditure on medical treatment, education, transportation, science and technology. Improving fiscal expenditure efficiency is also beneficial to economic growth quality. We should perfect fiscal rules, strengthen government budget management and increase the transparency of fiscal expenditure. Moreover, according to the secondary distribution function, optimizing fiscal expenditure structure to improve environment and increase peasants' income will be helpful to economic growth coordination. Finally, we can achieve the goal of economic growth transformation by enhancing social security fiscal expenditure to raise resident consumption rate.

(3) The spatial spillover effect of neighbouring government fiscal expenditure on local economic growth quality cannot be ignored, and different fiscal expenditure represents different results. Because neighbouring government fiscal expenditure has positive spillover effect, fiscal expenditure of local government and neighbouring government mix together and influence local economic growth. In an open economy and with perfecting market mechanism, government can't cope on its own only and there is complex spatial correlation among them. Service and investment expenditure have a relatively significant spillover effect and local economic growth quality is not significantly affected by neighbouring government non-productive expenditure. We should make use of this spillover effect to promote economic growth quality. Firstly, local government officials should be highly sensitive to policy and have governing concept of openness. Local government cannot be “closed”, and should always focus on neighbouring government fiscal expenditure policy to obtain its location advantage, because there is obvious fiscal expenditure strategy interaction and this competition is an important stimulus to region economic growth quality. Secondly, local government should also improve local government fiscal expenditure system to reduce the negative effect of expenditure competition on economic growth quality by maximizing fiscal expenditure stock and expanding fiscal expenditure. Finally, Local government should set up the idea of regional cooperation and strengthen inter-regional collaboration on public service. This governance way will be beneficial to economic growth quality.

Acknowledgments

This research is supported by Education Science Planning Program of Hunan Province “Spatial spillover of government education expenditure and optimal distribution” (Grant: XJK013BJG007), Scientific Research Fund of Hunan Provincial Education Department “Spatial and time relationship between government expenditure and quality of economic growth” (Grant: 13B007), Program of Hunan University of Finance and Economics “Targeting effect of governments' fiscal on FDI” (Grant: K201503), and Provincial Key Programs on Fiscal.

References

- Arrow, H. J., & Kurz, M. (1970). *Public investment, the rate of return, and optimal fiscal policy*. The Johns Hopkins Press. Baltimore and London
- Bai, C. E., Du, Y. J., Tao, Z. G., & Tong, S. Y. (2004). Local protectionism and industrial concentration in China: Overall trend and important factors. *Economic Research Journal*, 4, 29-40. Retrieved from <http://www.cqvip.com/QK/95645X/200404/9639829.html>
- Barro, R. J. (1990). Government spending in a simple model of endogenous growth. *Journal of Political Economy*, 98(5), 103-126. <http://dx.doi.org/10.1086/261726>

- Cheng, G., & Wang, Z. C. (2014). Study on the relationship of regional fiscal expenditure and economic growth in China- Based on the provincial data of 1990-2012. *Public Finance Research*, (8), 42-45. Retrieved from <http://www.cnki.com.cn/Article/CJFDTotal-CZYJ201408006.htm>
- Choi, W. G., & Decereux, M. B. (2006). Asymmetric effects of government spending: Does the level of real interest rates matter? *IMF Staff Papers*, 53, 147-181. Retrieved from <http://www.jstor.org/stable/30036027>
- Deng, M. (2013). Fiscal expenditure, expenditure competition and China's regional economic growth efficiency. *Finance & Trade Economics*, 10, 27-37. Retrieved from <http://www.cqvip.com/QK/96197X/201310/47299414.html>
- Feldstein, M. (2009). Rethinking the role of fiscal policy. *American Economic Review*, 99(2), 556-559. <http://dx.doi.org/10.1257/aer.99.2.556>
- Fiorito, R., & Kollintzas, T. (2004). Public goods, merit goods, and the relation between private and government consumption. *European Economic Review*, 48(6), 1367-1398. <http://dx.doi.org/10.1016/j.euroecorev.2004.01.004>
- Forni, L., Monteforte, L., & Sessa, L. (2009). The general equilibrium effects of fiscal policy: Estimates for the Euro area. *Journal of Public Economics*, 93(3-4), 559-585. <http://dx.doi.org/10.1016/j.jpubeco.2008.09.010>
- Ganelli, G. (2010). The international effects of government spending composition. *Economic Modelling*, 27(3), 631-640. <http://dx.doi.org/10.1016/j.econmod.2010.01.002>
- Gordon, R.H. (1983). An optimal taxation approach to fiscal federalism. *Quarterly Journal of Economics*, 98(4), 567-586. <http://dx.doi.org/10.2307/1881778>
- Grier, K. B., & Tullock, G. (1989). An empirical analysis of cross-national economic growth, 1951-80. *Journal of Monetary Economics*, 24(89), 259-276. [http://dx.doi.org/10.1016/0304-3932\(89\)90006-8](http://dx.doi.org/10.1016/0304-3932(89)90006-8)
- Guo, Q. W., & Jia, J. X. (2009). The tactical interaction among local government, their competition in fiscal expenditure, and regional economic growth. *Management World*, 10, 17-27. Retrieved from <http://www.cqvip.com/QK/95499X/200910/31783403.html>
- Imbeau, L. M., Pétry, F., Crête, J., Tellier, G., & Clavet, M. (2001). Measuring Government growth in the Canadian provinces: Decomposing real growth and deflator effects. *Canadian Public Policy*, 27(1), 39-52. <http://dx.doi.org/10.2307/3552372>
- Jia, J. X., Zhang, Y. J., & Guo, J. (2013). The fiscal system reform on direct province control of counties, counties' economic growth and the overcome of fiscal difficulties. *China Soft Science*, 6, 22-29. <http://dx.doi.org/10.3969/j.issn.1002-9753.2013.06.003>
- Jia, J. X., Guo, Q. W., & Zhao, X. J. (2012). The periodic characteristics of local government spending and its system root. *Management World*, 2, 7-18. Retrieved from http://www.cnki.com.cn/Article/CJFDTotal-GLSJ2012_02003.htm
- Jian, J. X., Guo, Q. W., & Lin, J. (2011). Fiscal decentralization, government governance structure and the overcome of county fiscal difficulties. *Management World*, 1, 30-39. Retrieved from <http://www.cnki.com.cn/Article/CJFDTOTAL-GLSJ201101006.htm>
- Keen, M., & Marchand, M. (1997). Fiscal competition and the pattern of public spending. *Journal of Public Economics*, 66(1), 33-53. [http://dx.doi.org/10.1016/S0047-2727\(97\)00035-2](http://dx.doi.org/10.1016/S0047-2727(97)00035-2)
- Lenka, S. (2009). Spatial interdependence of local public expenditures: Selected evidence from the Czech Republic. *AUCO Czech Economic Review*, 3(1), 7-25. Retrieved from http://dlib.lib.cas.cz/4328/1/2009_01_007.pdf
- Li, L. L., & Zhang, Y. H. (2011). The construction of evaluation index system and primary assessment of the transformation of China's economic development pattern. *China Industrial Economics*, 4, 54-63. Retrieved from <http://ies.fsv.cuni.cz/default/file/download/id/10250>
- Li, H., & Zhou, L. A. (2005). Political turnover and economic performance: The incentive role of personnel control in China. *Journal of Public Economics*, 89(9-10), 1743-1762. <http://dx.doi.org/10.1016/j.jpubeco.2004.06.009>
- Li, J., Cheng, S., Wan, G. H., & Fu, C. M. (2014). Study on the spatial correlation and explanation of regional economic growth in China- Based on analytic network process. *Economic Research Journal*, 11, 4-16. Retrieved from <http://www.cqvip.com/QK/95645X/201411/662784775.html>

- Li, Y. Y. (2009). Structural changes and efficiency of China's fiscal expenditure. *China Economic Quarterly*, 9, 307-332. <http://dx.doi.org/10.13821/j.cnki.ceq.2010.01.013>
- Lu, J., & Yin, H. (2010). Analysis of the choice of regional public goods' location among city cluster. *China Soft Science*, 8, 99-105. <http://dx.doi.org/10.3969/j.issn.1002-9753.2010.08.011>
- Luo, Z. (2014). The congestion of local public service and the optimization of financial structure in China. *Finance & Economics*, 5, 113-122. <http://dx.doi.org/10.3969/j.issn.1000-8306.2014.05.012>
- Mao, J., Wang, D. H., & Bai, C. E. (2012). Poverty reduction policies and local government public spending: An empirical study based on the 8-7 Plan. *China Economic Quarterly*, 4, 1365-1388. <http://dx.doi.org/10.13821/j.cnki.ceq.2012.04.009>
- Musgrave, R. A. (1959). *The theory of public finance: A study of public economy*. Kogakusha: McGraw-Hill.
- Ndikumana, L. (2008). Can macroeconomic policy stimulate private investment in South Africa? New insights from aggregate and manufacturing sector-level evidence. *Journal of International Development*, 20(7), 869-887. <http://dx.doi.org/10.1002/jid.1465>
- Qian, Y. Y., & Roland, G. (1998). Federalism and the soft budget constraint. *American Economic Review*, 88(5), 1143-1162. <http://dx.doi.org/10.2139/ssrn.149988>
- Reng, B. P., & Li, J. W. (2013). To realize the unity of the quantity, quality and efficiency of economic growth. *Journal of Northwest University (Philosophy and Social Sciences Edition)*, 1, 110-115. <http://dx.doi.org/10.3969/j.issn.1000-2731.2013.01.019>
- Tang, Y. Y., & Zhang, Y. X. (2012). How much does public spending on peoples' livelihood contribute to household consumption? Empirical test based on the empirical data from 1978 to 2010. *Economist*, 9, 37-42. <http://dx.doi.org/10.16158/j.cnki.51-1312/f.2012.09.004>
- Wang, D. X., & Zhang, Q. (2011). Relationship between FDI and local government fiscal expenditure structure: Based on 29 provinces' panel data in China. *Finance and Trade Research*, 1, 66-72. <http://dx.doi.org/10.3969/j.issn.1001-6260.2011.01.010>
- Wang, X. Q. (2012). On the innovation of the people's livelihood finance for public finance: Exploration on fiscal transaction during the period of China's full completion of building a well-off society. *Finance and Economics*, 12, 96-103. Retrieved from <http://www.cqvip.com/QK/96436X/201212/43990564.html>
- Wei, L. Q. (2009). The emphasis is the unity of quantity, quality and efficiency of economic growth. *Qiushi Journal*, 8, 22-25. Retrieved from <http://www.doc88.com/p-5456824731462.html>
- Yang, H. S., Nie, H. F., & Xu, X. X. (2010). The third-province effects in the selection of FDI region. *Journal of Quantitative & Technical Economics*, 4, 122-136. <http://dx.doi.org/10.13653/j.cnki.jqte.2010.04.010>
- Young, A. (2000). The razor's edge: Distortions and incremental reform in the Peoples Republic of China. *Quarterly Journal of Economics*, 115(4), 1091-1135. <http://dx.doi.org/10.1162/003355300555024>
- Zhang, J., Wu, G. Y., & Zhang, J. P. (2004). The estimation of China's provincial capital stock: 1952-2000. *Economic Research*, 4, 35-44. <http://dx.doi.org/10.3969/j.issn.1002-6487.2006.08.037>

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).