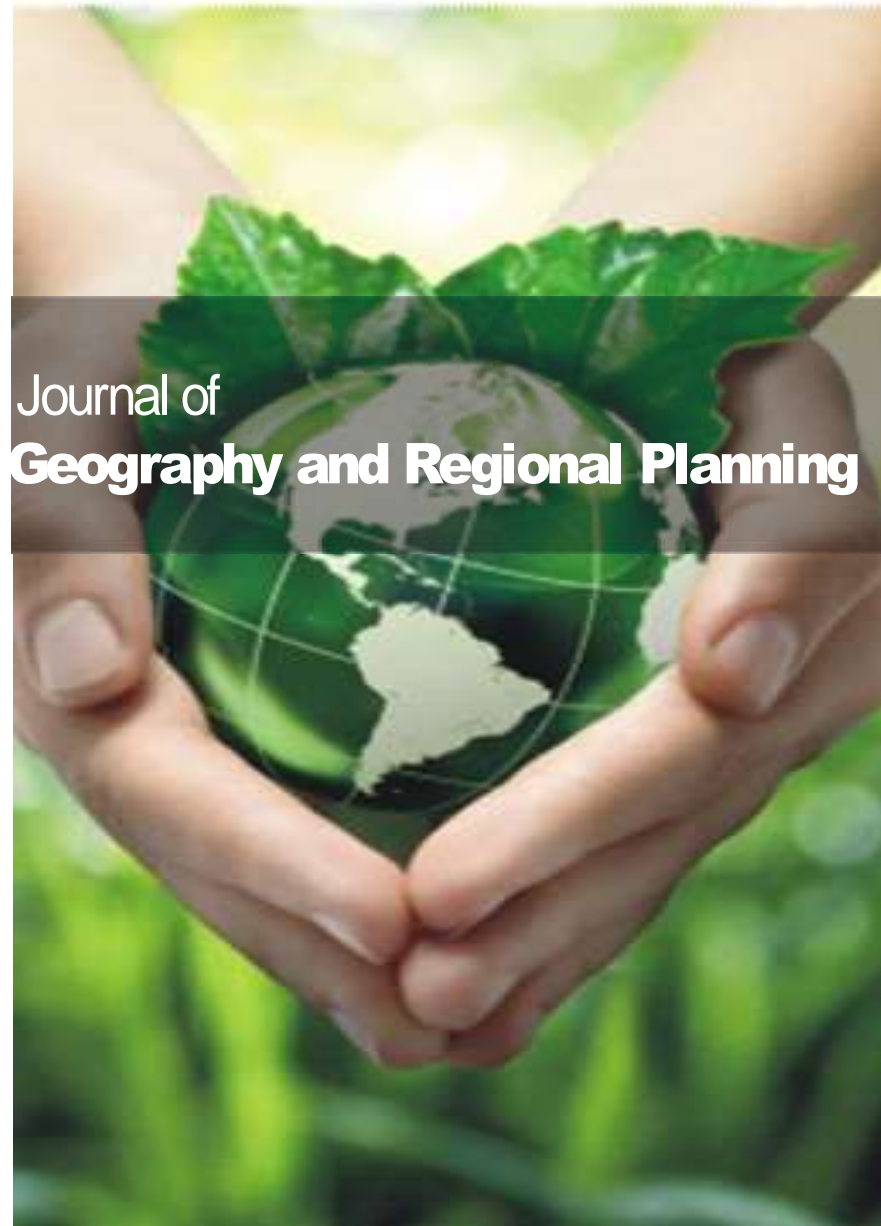


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# Journal of Geography and Regional Planning

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## ARTICLE

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Li Jiulin, Chu Jinlong, Chen Xiaohua, Gu Kangkang, and  
Wang Yongzheng,

*Full Length Research Paper*

# Spatial pattern and influencing factors of county consumption level

Li Jiulin<sup>1,2\*</sup>, Chu Jinlong<sup>1,2</sup>, Chen Xiaohua<sup>1,2</sup>, Gu Kangkang<sup>1,2</sup> and Wang Yongzheng<sup>1,2</sup>

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The aim of this paper is to improve the level of consumption in the region and achieve sustained and steady regional economic growth. According to global autocorrelation calculation, the difference in county consumption level of the Wanjiang City Cluster since 2004 generally takes on an increasing trend, while the consumption level presents unbalanced development. Evolution of spatial distribution pattern indicates that high level consumption areas are mainly distributed along Yangtze River and these areas are constantly expanding, while low level consumption areas are situated in central Anhui and southwest mountain areas of Anhui. The differentiation pattern of consumption level gets constantly increasing and tends to remain stable. Quantile regression approach was used in different quantiles to depict effects of influencing factors on consumption level. In all quantiles, per capita GDP, per capita financial revenue, and average wage exert a positive effect on county consumption level, while the per capita industrial added value and net income of farmers produce a negative effect on county consumption level. Based on the overall grasp of the influencing factors of the regional consumption level and the quantile regression analysis, in order to improve the consumption level in the region and reduce the difference in regional consumption, policy makers should make every effort to improve the basic conditions for regional economic development and implement it in a targeted manner when formulating the regional consumption policy Countermeasures to Improve Regional Consumption Level.

**Key words:** County consumption level, evolution of spatial pattern, exploratory spatial data analysis (ESDA), quantile regression, Wanjiang City Cluster.

## INTRODUCTION

With development of social economy, economic contacts between regions become increasingly close and resources flow more frequently. Regional economic connection not only intensifies or abates spatial difference, but also promotes dynamic changes to regional spatial pattern; as leading force of economic

growth, resident consumption is an essential factor keeping regional economic development and bringing about regional differences, and regional difference in consumption level is also a concentrated expression and miniature of imbalance in regional economic development (Haider et al, 2016; Zhang and University, 2017; Ma et

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al., 2016; Wei et al, 2016; Liu et al, 2015; Zhang and Tian, 2005; Mei-Juan et al, 2014).

Currently, studies about the consumption level mainly focus on economics and geography, including consumption characteristics, spatial difference of consumption, and influencing factors. Wang and Zhang (2012) and Li and Huang (2007) studied rural consumption structure and characteristics of undergraduate consumption. Lin (2003) explored the relation between changes in consumption demands and regional economic development and the relation between consumption and industrial structure. Jiang and Luo (2008) compared differences in resident consumption structure between Jiangsu, Shanxi and Sichuan provinces, and gave pertinent recommendations for raising the consumption level. Jiao (2013) analyzed distribution and spatial correlation of urban consumption space in China, and found that urban spatial consumption market structure is mainly manifested as separation effect rather than agglomeration effect. Guan et al. (2012) explored changes to regional pattern of China's social consumption level, and concluded that the consumption level is mainly under the influence of per capita GDP, traffic accessibility, percentage of output value of tertiary industry, and per capita income of urban and rural residents. The above studies were related to the low level of consumption in the region involving small-scale county-level units, and less involved in the spatial analysis of the interaction and interaction between regional consumption levels and the detection of genetic mechanism.

The level of regional consumption not only has the historical evolution of time, but also shows the remarkable regional differentiation in space. As one of the indicators of macroeconomic analysis, the spatial pattern and evolution pattern of regional consumption level can be used to study the development direction and equilibrium of national or regional consumption levels. This study can reflect not only the general characteristics of economic spatial differentiation but also the significance of understanding the spatial pattern of regional economic differences.

Wanjiang City Cluster refers to the City Belt along the Yangtze River in Anhui Province. On the basis of the study on mutual spatial influence and interaction of the county consumption level of the Wanjiang City Cluster in 2004-2016, this study used quantile regression approach to explain the effect of influencing factors of regional consumption level, in the hope of raising the consumption level of backward areas and realizing stable and sustainable growth of regional economy.

**MATERIALS AND METHODS**

**Study area**

The Wanjiang city belt is an important development area for the implementation of the strategy of promoting the rise of the central

province of China (Figure 1). It is an important part of the Pan-Delta Economic Area Cooperation and has an important strategic position in the transfer of industries in the central and western regions. Wanjiang City to undertake industrial transfer demonstration area is located in Anhui Province, China, including Hefei, Wuhu, Ma On Shan, Tongling, Anqing, Chizhou, Chaohu, Chuzhou, Xuancheng 9 throughout the city, And Jin'an District and Shucheng County of Lu'an City, a total of 59 counties (cities, districts), the land area of 76,000 km<sup>2</sup> and a population 30.58 million people.

**Global spatial correlation**

**Spatial autocorrelation**

Generally, there exists certain degree of spatial interaction in behavior between regions. In order to analyze potential spatial interaction in urbanization development of counties from the perspective of public goods, this paper employed exploratory spatial data analysis (ESDA) technique to calculate and evaluate whether the county consumption level of the Wanjiang City Cluster shows spatial autocorrelation (dependence) in geographical space.

(i) Firstly, this study tested the global spatial correlation using the Moran's I.

$$\text{Moran's } I = \left[ \frac{\sum_{i=1}^n \sum_{j=1}^m W_{ij} (Y_i - \bar{Y})(Y_j - \bar{Y})}{S^2 \sum_{i=1}^n \sum_{j=1}^n W_{ij}} \right] \quad (1)$$

where,

$$S^2 = \left[ \frac{\sum_{i=1}^n (X_i - \bar{Y})}{n} \right]^2, \quad \bar{Y} = \frac{1}{n} \sum_{i=1}^n (Y_i) \quad (2)$$

$Y_i$  denotes the observed value of  $i$ -th region,  $Y_j$  signifies the observed value of the  $j$ -th region,  $n$  is the number of regions, and  $W_{ij}$  refers to binary contiguous spatial weight matrix (Teng and Shi, 2013).

Based on the above method, with the aid of GeoDa1.4.0 software, the paper calculated the global Moran's I for different period of county consumption level of the Wanjiang City Cluster, as shown in Figure 2.

(ii) After global autocorrelation analysis, it was necessary to use local spatial correlation indicators to analyze possible spatial correlation with local significance. Generally, Moran scatter plot is employed to make estimation (Wang et al, 2011). In Moran scatter plots, counties in the Wanjiang City Cluster are located separately in four quadrants which correspond to different types of spatial correlation: in the first quadrant, high consumption level counties are surrounded by other high consumption level counties (high-high, HH); in the second quadrant, low consumption level counties are surrounded by high consumption level counties (low-high, LH); in the third quadrant, low consumption level counties are surrounded by other low consumption level counties (low-low, LL); in the fourth quadrant, high consumption level counties are surrounded by low consumption level counties (high-low, HL). The first and third quadrants show positive spatial autocorrelation, while the second and fourth quadrants reflect negative spatial autocorrelation. If the county consumption level indices are uniformly distributed in four quadrants, there exists no spatial autocorrelation between counties.

The calculation formula:

$$Z_d = \left[ I - E_n(I) \right] / \sqrt{\text{VAR}_n(I)} \quad (3)$$



Figure 1. Map of study area.

where

$$E_n(I) = -1/(n-1),$$

$$VAR_n(I) = (n^2 w_1 + n w_2 + 3 w_0^2) / [w_0^2 (n-1)(n-2)(n-3)] - E_n^2(I) \quad (4)$$

**Quantile regression method**

The quantile regression method, introduced by Koenker and Bassett (1978), is used to estimate linear relationship between regression variable X and explained variable Y in different quantiles in the interval (0, 1). Compared with ordinary least squares (OLS) method that offers only one regression curve, is subject to interference of abnormal value, and limited in effective information of mined data, the quantile regression is based on minimization of the sum of the absolute values of the residuals, is subject to little influence of outliers, has strong estimation robustness, and low requirements for assumption of error term, thus using quantile regression, it is able to obtain large volume of data information in looser conditions, so as to understand relationships of economic phenomena in detail, and reveal intrinsic mechanism of variable distribution and spatio-temporal distribution (Gu and Pang, 2008; Peng, 2015; Cao et al., 2017).

The quantile regression model can be expressed as:

$$Q(\theta|x) = \inf \{y : F_Y(y|x) \geq \theta\}, \theta \in (0,1) \quad (5)$$

This study can estimate the quantile regression coefficient using the weighted least absolute deviation (WLAD):

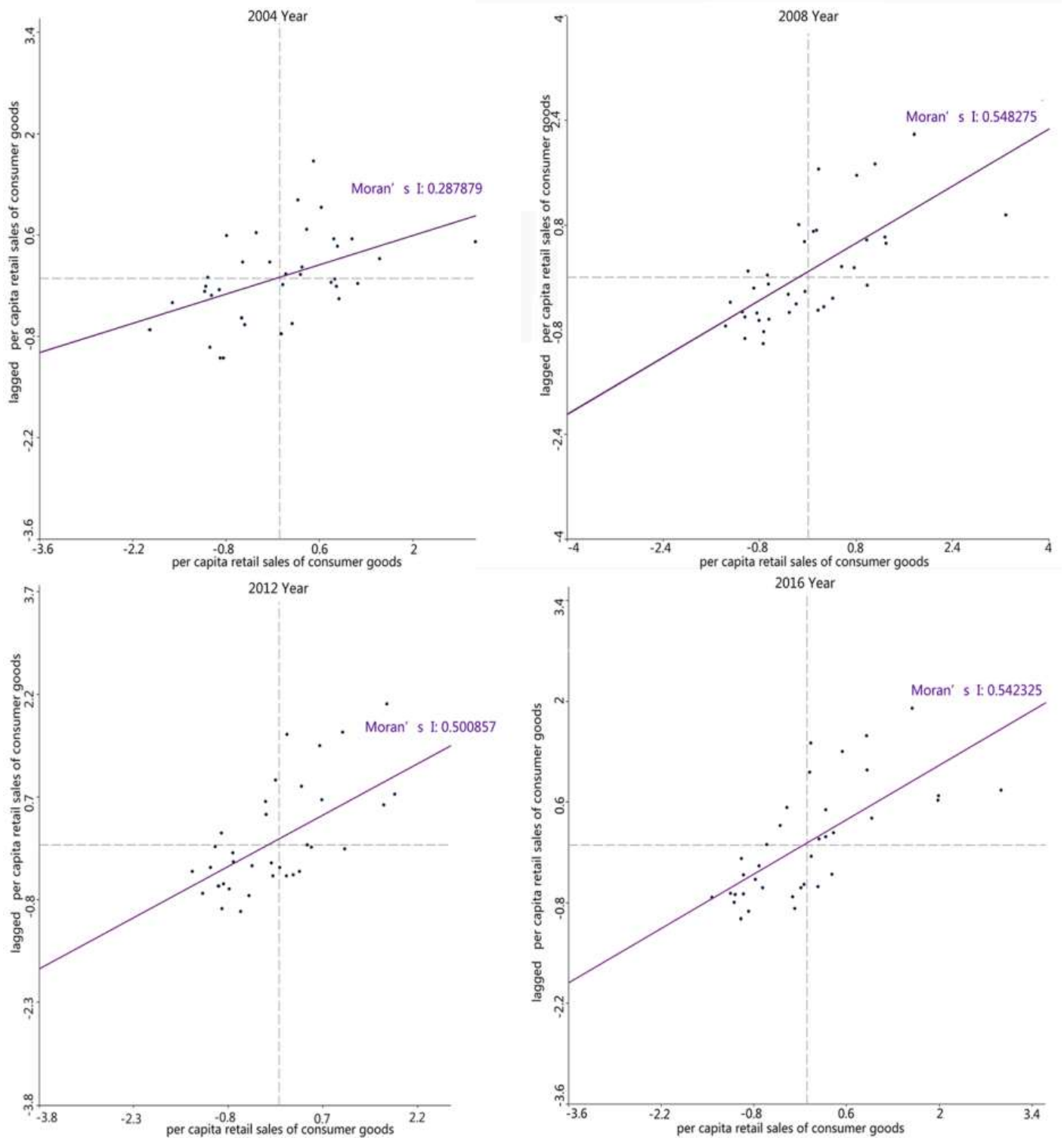
$$\beta(\theta) = \underset{\beta \in R^p}{\operatorname{argmin}} \sum_{y_i \geq x_i \beta} \theta |Y_i - X_i \beta| + \sum_{y_i < x_i \beta} (1-\theta) |Y_i - X_i \beta| \quad (6)$$

where  $Y_i$  signifies vector of explained variable,  $X_i$  denotes vector of explanatory variable,  $\theta$  refers to estimated quantile,  $\beta(\theta)$  is the regression coefficient estimator with changes of quantiles in the interval (0, 1). Quantile regression equations can be obtained through regression coefficient estimation.

**Factor selection**

On the basis of current county consumption level of the Wanjiang City Cluster, this study selected (i) per capita industrial added value, (ii) per capita GDP, (iii) per capita financial revenue, (iv) average wage level, and (v) net income of farmers as dynamic factors





**Figure 2.** Moran scatter plots for county consumption level of the Wanjiang City Cluster

influencing the development of county consumption level. Data in this study were selected from Statistical Yearbook of Anhui Province (2005-2015) and Construction Statistical Yearbook of Anhui Province (2004-2016).

**Data source and explanation**

The total retail sales of consumer goods refer to the sum of retail sales of commodities sold by wholesale, retail, catering, and other

service industries to urban and rural residents and to social institutions, are data directly manifesting domestic consumption level, and reflect people's material and cultural living standards, purchasing power for social commodities, and scale of consumer market in a certain period. Thus, the per capita total retail sales of consumer goods can reflect the consumption level of the whole society in a most truly and evenly way (Liu et al., 2012; Xu et al., 2013). In this study, the author selected the per capita retail sales of consumer goods of counties (including county-level cities) in the Wanjiang City Cluster in 2004-2016 as the indicator for measuring the regional consumption level. The paper divided them into 36 evaluation units. The data were selected from Statistical Yearbook of Anhui Province (2005-2015) and Construction Statistical Yearbook of Anhui Province (2004-2016).

## RESULTS

### Moran scatter plot for county consumption level of the Wanjiang City Cluster

Firstly, using GeoDa1.4.0 software, this study calculated the global Moran's I for county consumption level of the Wanjiang City Cluster in 2004-2016. In the study period, the global Moran's I value is positive, indicating that the spatial regional differentiation correlation is significant for county consumption level of the Wanjiang City Cluster. The Moran's I value rose from 0.287 in 2008 to 0.548 in 2016. Except slight decline in 2008 and 2012, the fluctuation of county spatial correlation became more violent, and it took on a concentrated development trend in space.

The global Moran's I only reflects the overall autocorrelation of county consumption level of the Wanjiang City Cluster, but it fails to reflect dynamic characteristics of the internal spatial agglomeration. In Moran scatter plots of 2004, 2008, 2012 and 2016, 4 types of the local spatial autocorrelation between a county and its adjacent counties are distributed separately in 4 quadrants. Specifically, the first quadrant (high-high, HH) indicates the county and adjacent counties have high benefit level, the spatial difference between them is little, and they have high spatial positive correlation, namely they are hot spot areas. In the second quadrant (low-high, LH), the county itself has low benefit level, while surrounding counties have high benefit level, and the spatial difference between them is high, showing high spatial negative correlation, in other words, showing prominent heterogeneity. In the third quadrant (low-low, LL), the county and surrounding counties have low benefit level, the spatial difference between them is low, and there is high spatial positive correlation between them, namely, they are blind spot areas. In the fourth quadrant (high-low, HL), the county itself has high benefit level, while surrounding counties have low benefit level, and the spatial difference between them is high, showing high spatial negative correlation, in other words, showing prominent heterogeneity.

In 2004, most counties of the Wanjiang City Cluster fall in the first and third quadrants (12 counties in the first

quadrant and 11 in the third quadrant), jointly accounting for 63.8% of the entire city belt, indicating high spatial correlation between counties; in 2008, the number of counties in the first quadrant shows no change, while the number of counties in the third quadrant increases by 5 compared with the year 2004, indicating increase in spatial agglomeration effect of low consumption level of counties in the Wanjiang City Cluster; in 2009, the number of counties in the first quadrant drops to 9, the percentage of HH type counties declines, reflecting mitigation of driving action of developed counties to surrounding counties; in 2016, 14 counties fall in the first quadrant and 16 counties lie in the third quadrant, jointly accounting for 83.3% of the entire city belt, showing constantly increase in spatial agglomeration of the consumption level of all counties from 2004 to 2016.

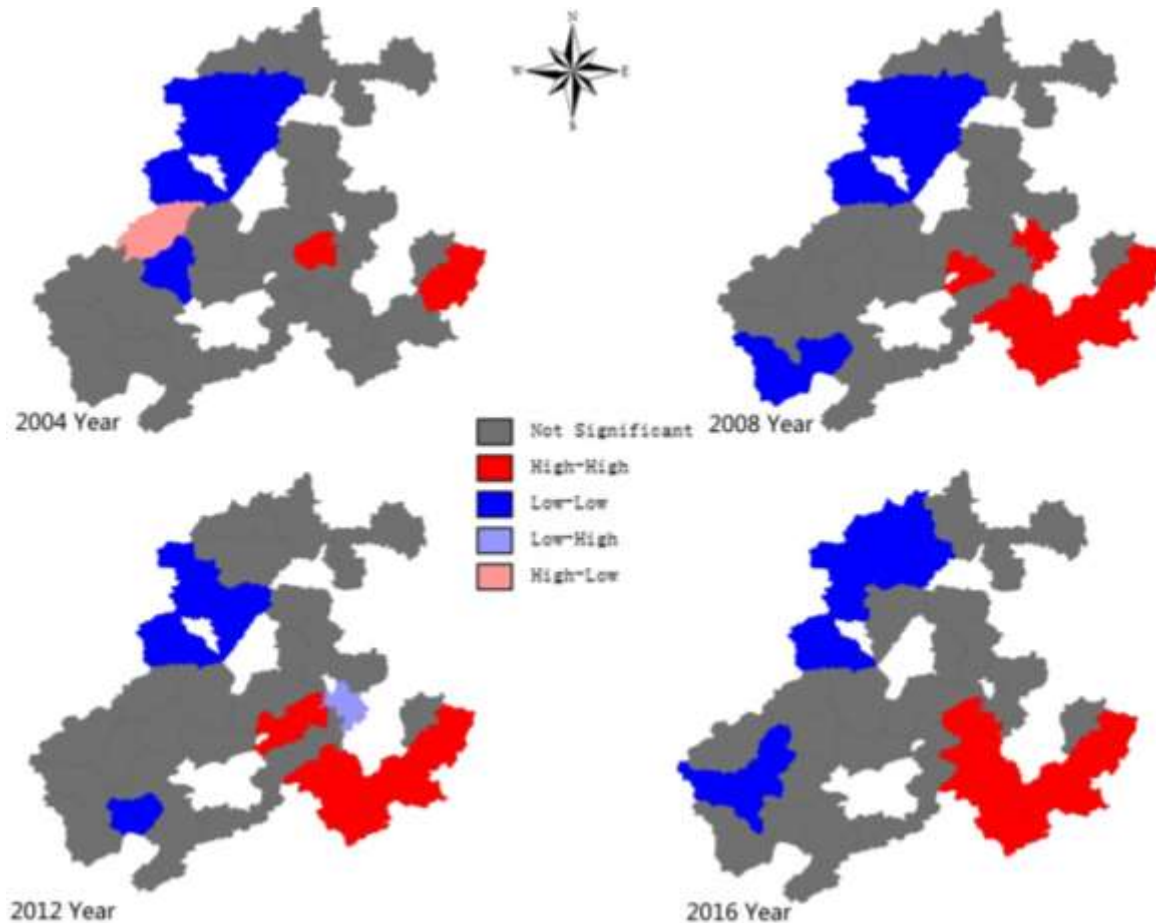
### LISA cluster map for the county consumption level of the Wanjiang City Cluster

Moran scatter plot does not show significance level, while LISA (local indicators of spatial association) cluster map can measure the attribute of spatial unit and correlation with surrounding units, as well as essential significance indicators. Therefore, it was necessary to make further study on spatial analysis results (Zhou and Xiao-Wen, 2017; Yang and Ning, 2015). According to Equation (2) and with the aid of OpenGeoDa software, the paper calculated LISA values of different years of county consumption level of the City Belt along the Yangtze River Belt in Anhui Province. On the basis of z test ( $p < 0.05$ ), the paper plotted LISA cluster maps for the years 2004, 2008, 2012 and 2016, to clearly reflect the spatial autocorrelation of county consumption level of the City Belt along the Yangtze River Belt in Anhui Province in geographical space (Figure 3).

Big changes to the differentiation pattern are mainly manifested in the following aspects:

(1) There are big changes in spatial distribution of HH type counties. In 2004, HH type was mainly distributed in Fanchang County and Guangde County; in 2008, it was mainly distributed in Tongling County and Wuhu County and counties around Xuancheng City (including Jing County, Jingde County, Jixi County, Ningguo City, and Guangde County); in 2012 and 2008, changes in spatial distribution of counties are little; in 2016, the consumption level of counties (Fanchang County and Nanling County) around Wuhu City has brought about spatial diffusion effect; on the whole, HH type counties (hot spot areas) are mainly distributed in counties around Wuhu City and Xuancheng City.

(2) LL type counties were mainly distributed in counties (Changfeng County, Feixi County, and Feidong County) surrounding Hefei City in 2004, and spreading to Dingyuan County and Tongcheng City; in 2008, blind spot areas spread to Susong County and Wangjiang County;



**Figure 3.** LISA cluster maps for the county consumption level of the Wanjiang City Cluster.

in 2012, there was basically no change to spatial distribution of this type counties; in 2016, the consumption level of counties surrounding Hefei City was still low and the scope expanded to some northwestern counties (Dingyuan County and Fengyang County) and southwest mountainous counties in Anhui Province (Taihu County and Qianshan County); on the whole, LL type counties (blind spot areas) are mainly distributed in counties around Hefei City and southwestern mountainous counties in Anhui Province.

(3) For LH type counties (low-lying land of consumption level), only Wuhu County showed characteristics of LH type in 2012. Due to policy reasons, much consumption flows to counties around Wuhu County, leading to its relatively low consumption level and showing enormous difference from surrounding counties.

(4) HL type counties were distributed in Shucheng County in 2004. Shucheng County had high consumption level, but its radiation function was weak and took on obvious spatial polarization. Since 2004, such type county has not appeared in spatial distribution of county consumption level.

Through analysis of LISA cluster maps, the paper

obtained the spatial pattern evolution of county consumption level of the City Belt along the Yangtze River Belt in Anhui Province: the association between counties in Heifei City, Wuhu City and Xuancheng City is increasing; core city (Hefei City) in central Anhui Province exerts the suction effect on surrounding counties, while core cities (Wuhu City and Xuancheng City) along the Yangtze River produce an increasingly prominent spatial spillover effect on improvement of consumption level of surrounding areas.

## DISCUSSION

Related theoretical researches show the county consumption level is subject to influence of various factors, including economic and social development, political system, national policy, allocation of government revenue, infrastructure construction, interest rate of bank deposit, fluctuation in price, income level, consumption idea, educational level of residents, and population structure (Jin et al., 2011; Xu and Peng, 2008). In order to make a quantitative evaluation of the effect of various

factors on regional consumption level, based on data availability, combined with current county consumption development level of the Wanjiang City Cluster and factors of consumption level selected by scholars, this paper took the per capita retail sales of consumer goods as dependent variable ( $Y$ ), per capita industrial added value ( $X1$ ), per capita GDP ( $X2$ ), per capita financial revenue ( $X3$ ), average wage level ( $X4$ ), and net income of farmers ( $X5$ ) as independent variable, and built the following quantile regression model:

$$\log(Q_y(\beta_i^\theta(u_i, v_i) | x_j)) = \beta_i^\theta(u_i, v_i) + \sum_{i=1}^n \beta_i^\theta(u_i, v_i) \cdot \log(x_j) \quad (5)$$

where  $Q_y$  denotes per capita consumption level of the respective county,  $x_j$  is related factor influencing consumption level,  $\theta$  signifies 0.1 - 0.9 quantiles,  $(u_i, v_i)$  signifies 36 county units of the Wanjiang City Cluster, and  $\beta_i^\theta$  denotes estimated value of variables in different quantiles.

On the basis of Equation 5, the paper obtained quantile regression coefficient of 2004 - 2016 (Table 1). From Table 1, it can be seen that due to influence of error term of different quantiles, with changes in quantile, the effect of independent variables on the consumption level takes on different variation trends. The variable coefficient of quantile regression is not positive completely. For example, in the table, per capita industrial added value, per capita GDP, and net income of farmers have negative values in different quantiles, showing the quantile regression is more meticulous in depicting variable coefficient.

Specifically, the quantile regression coefficient for per capita industrial added value takes on the decline trend and it becomes negative after 0.5 quantile. These indicate that with economic development, industrial structure evolves constantly, county consumption level is gradually improved, and the effect of the secondary industry on consumption level gets gradually mitigated and it even exerts a negative effect. The quantile regression coefficient of per capita GDP takes on a rising trend, and its effect on regional consumption level is apparent. In high quantile, it is positive, indicating that with growth of per capita GDP, the effect on county consumption level is increasing. Financial revenue reflects fund allocation of government. When the investment is increased, the effect of per capita financial revenue on the consumption level in each quantile rises with fluctuation, and the effect is enormous, which proves that investment of government in public facilities will stimulate more regional consumption. The average wage level rises along with increase in quantile, showing that increase in income can boost the consumption ability of residents. Net income of farmers has high low quantile coefficient value, and it generally takes on a decline trend

and becomes negative after 0.7 quantile, reflecting that when farmers' income increases to certain level, it exerts little effect on driving the consumption level.

Using per capita retail sales of consumer goods of counties in the Wanjiang City Cluster to characterize the regional consumption level, the article analyzed spatial pattern of the consumption level in 2004 - 2016. Besides selecting related factors influencing county consumption level, the article elaborated the effect on quantiles by the quantile regression method, in the hope of lifting overall consumption level of the Wanjiang City Cluster and promoting regional economic growth. The study thus revealed the following:

(1) Since 2004, regional consumption level of the Wanjiang City Cluster shows significant spatial correlation. Changes in global Moran's  $I$  and local Moran scatter plots indicate that the difference in regional consumption level of the Wanjiang City Cluster is expanding, counties with high per capita consumption level tend to adjoin, and counties with low per capita consumption level also tend to adjoin, showing that the spatial dependence is increasing and the consumption level takes on high and low agglomeration trend.

(2) Since 2004, the differentiation pattern for agglomeration of county consumption level of the Wanjiang City Cluster is constantly deteriorating, and overall distribution of spatial pattern tends to become stable. High level consumption areas are expanding and mainly distributed in counties around Wuhu City and Xuancheng City, indicating that in the economic integration within the Wanjiang City Cluster, central cities along the Yangtze River are producing spatial diffusion effect on surrounding counties, and the radiation and driving actions are growing. Low level consumption areas are mainly distributed in central Anhui and southwest mountain areas of Anhui, largely because of the following reasons. In southwest mountain areas of Anhui, agriculture is still traditional agriculture, infrastructure is backward and subject to limitation of landform and terrain conditions, economic foundation is weak and lacks internal driver to boost regional economic development, and it is difficult to accept economic driving action from high consumption level areas. Due to influence of core city Hefei in the City Belt, counties in central Anhui exert an air suction effect on consumption of surrounding counties.

Based on the spatial pattern of county consumption level, it is recommended to bring into play location advantages of counties along the Yangtze River, intensify development effort, accept the consumption radiation of the Yangtze River Delta, expand the county economic scale, and strengthen the positive spillover effect. Counties around Hefei City should increase investment of fixed assets, improve infrastructure condition, undertake the transfer of some industries in central city, cultivate leading industries, drive economic development of surrounding counties, and raise regional consumption

**Table 1.** Quantile regression results of variables in 2004 to 2016.

Factor	Quantile	Coefficient	Std. Error	t-Statistic	Prob.
Per capita industrial added value	0.1	0.12	0.037	3.24	0.001
	0.2	0.10	0.036	2.74	0.006
	0.3	0.07	0.039	1.77	0.076
	0.4	0.05	0.040	1.19	0.233
	0.5	0.01	0.044	0.17	0.857
	0.6	-0.01	0.064	-0.16	0.868
	0.7	-0.05	0.061	-0.91	0.361
	0.8	-0.06	0.114	-0.58	0.558
	0.9	-0.17	0.146	-1.18	0.237
Per capita GDP	0.1	-0.18	0.043	-4.17	0.000
	0.2	-0.11	0.028	-4.01	0.000
	0.3	-0.10	0.029	-3.41	0.000
	0.4	-0.04	0.093	-0.53	0.592
	0.5	-0.02	0.076	-0.31	0.756
	0.6	-0.01	0.062	-0.20	0.837
	0.7	-0.00	0.057	-0.02	0.978
	0.8	0.03	0.062	0.49	0.620
	0.9	0.07	0.072	1.04	0.2991
Per capita financial revenue	0.1	1.76	0.438	4.02	0.000
	0.2	1.22	0.409	2.98	0.003
	0.3	1.40	0.447	3.12	0.002
	0.4	0.99	0.823	1.20	0.230
	0.5	1.42	0.642	2.22	0.026
	0.6	1.92	0.419	4.58	0.000
	0.7	2.02	0.374	5.39	0.000
	0.8	1.75	0.495	3.53	0.000
	0.9	2.51	0.883	2.84	0.004
Average wage level	0.1	0.01	0.039	0.30	0.761
	0.2	0.04	0.021	1.97	0.048
	0.3	0.05	0.018	2.94	0.003
	0.4	0.05	0.021	2.51	0.012
	0.5	0.05	0.019	2.72	0.007
	0.6	0.04	0.015	3.04	0.002
	0.7	0.06	0.017	3.79	0.000
	0.8	0.09	0.021	4.49	0.000
	0.9	0.10	0.021	4.79	0.000
Net income of farmers	0.1	0.54	0.224	2.42	0.016
	0.2	0.33	0.111	2.96	0.003
	0.3	0.27	0.100	2.74	0.006
	0.4	0.30	0.085	3.57	0.000
	0.5	0.25	0.091	2.77	0.005
	0.6	0.16	0.085	1.94	0.052
	0.7	0.08	0.094	0.87	0.384
	0.8	-0.04	0.096	-0.47	0.638
	0.9	-0.13	0.079	-1.66	0.097

level. By contrast, southwest mountainous areas in Anhui with backward consumption, such as Yuexi County, should develop ecological agriculture with local characteristics and little investment, and take full advantage of rich tourist resources to develop the tourism industry.

(3) Quantile regression approach depicts pulling degree of dynamic factors of consumption level in different quantiles, so it is able to provide effective reference for different consumption levels. Generally, in the study period, the per capita GDP exerts an increasingly great effect on the consumption level with increase in quantile; per capita financial revenue and average wage level exerts a positive effect on county consumption level in all quantiles; the per capita industrial added value and net income of farmers exert negative restrictive effect on county consumption level in high quantiles.

On the basis of quantile regression explanation, in order to raise county consumption level, and reduce regional difference, managers can make improvements from the following aspects. Firstly, the per capita GDP is an essential indicator for measuring urbanization, so it is recommended to promote rapid economic growth and raise the urbanization level. Secondly, government should increase infrastructure construction, and guarantee housing, medical care and endowment of residents, to enhance consumption confidence and willingness of residents. Thirdly, per capita income is the basis of consumption, thus effectively increasing per capita resident income can raise the consumption level, and narrow the regional consumption difference. Fourthly, the paper propose optimizing county industrial structure, reduce excessive input in secondary industry, coordinate the relationship between the tertiary industry and resident consumption level, and promote development of finance, tourism, and information service industries, to stimulate consumption of high income residents. Fifthly, it is recommended to improve educational level of farmers, transform conservative consumption ideas, and boost county consumption level through promoting domestic demands.

## Conclusions

Accompanied by the acceleration of the process of regional economic integration, the improvement of transport conditions, the inter-regional consumption levels interacting with each other, the interaction between the two regions has been continuously strengthened, and the level of consumption space shows a significant level of convergence. In order to break the pattern of widening and differentiating regional consumption levels and achieve the improvement of the overall consumption level in the region, the formulation of regional consumption policies should take into account the mutual influence and interaction of consumption levels in different regions, pay close attention to the close ties between the regional

and overseas trade in commodities, promote the unification of the environment and the factor market of the inter-regional economic system, ensure a fair and reasonable regional consumption environment, encourage the continuous opening up of the regional consumer market, share the consumption market, actively promote cross-border consumption and stimulate consumption imitation.

It should be noted that there are some defects in this study, for example, few dynamic factors influencing county consumption level. Besides, quantile regression is the study of entire period of 2004 - 2016, instead of concrete analysis of a specific year. However, study of long period and many indicators is particularly important for spatial evolution of county consumption level of the Wanjiang City Cluster. This is a direction of our further study.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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