An Empirical Study on the Impact of Urban and Rural Distribution Industries on Regional Economic Growth in Zhejiang Province--Based on Panel Data from 1978-2019

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Abstract—The distribution industry connects production and consumption, plays the role of bridge and link between them, is a pioneering and basic industry of national economy, and can strongly promote the growth and high-quality development of regional economy. Based on the panel data from 1978-2019, the article explores the causal relationship between the urban and rural distribution industries and the regional economy in Zhejiang Province by using Granger causality analysis and constructing a Cobb Douglas model through unit root test and cointegration test. The study found that the development of urban and rural distribution industries and regional economic growth in Zhejiang Province are causally related to each other, and the development of urban distribution industry and rural distribution industry are also causally related to each other, and the urban distribution industry has a higher significance on regional economic growth than the rural distribution industry. Therefore, it is necessary to further develop the power of the circulation industry, especially to actively promote the development of the rural circulation industry, and actively guide the urban circulation industry to radiate and drive the rural circulation industry, so that the coordinated development of urban and rural circulation industry can promote the regional economic growth and high-quality development.

Keywords-Circulation industry; Granger causality test; Circulation industry; Urban and rural differences;

1 INTRODUCTION

As a component of the service industry in China's economic industry, the circulation industry is a bridge and link between production and consumption, a pioneering and basic industry of the national economy, and has an important role in economic growth as well as improving employment.[1] General Secretary Xi Jinping has stressed in several conferences that the Circulation industry plays a fundamental role in the national economy, building a new development pattern, the construction of a modern circulation system as an important strategic task to grasp. This is enough to illustrate the important position of the circulation industry. Zhejiang Province is located in the southeast coast of China and the south wing of the Yangtze

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River Delta. According to the National Statistical Yearbook 2020, the total retail sales of consumer goods in Zhejiang Province in 2019 was 2,717.641 billion yuan, an increase of 8.7% over the previous year, while the national growth rate was 8%, and the growth rate of Zhejiang Province was higher than the national growth rate. By place of business, retail sales of consumer goods in urban areas were 224.32 billion yuan, up 8.5%, higher than the national rate of 7.9%; retail sales of consumer goods in rural areas were 474.4 billion yuan, up 9.7%, also higher than the national rate of 9.0%. The ratio of total retail sales of consumer goods in urban areas to total retail sales of consumer goods in rural areas was 4.73:1, whose ratio was lower than the national 5.82:1; however, the growth rate of rural areas was 1.2 percentage points higher than the growth rate of urban. Nationwide, Zhejiang Province ranked fourth in total retail sales of consumer goods in 2019, after Guangdong Province, Jiangsu Province and Shandong Province. In terms of total GDP, Zhejiang Province still ranked fourth nationwide. However, the proportion of final consumption to GDP in Zhejiang Province in 2018 is 50% lower than the national indicator, and there is still a need to further expand consumption in Zhejiang Province, and better development of the distribution industry as a bridge between production and consumption is a basic prerequisite for expanding consumption. To this end, based on panel data from 1978-2019, this paper explores in depth the intrinsic relationship between the distribution industry and urban and rural regional economic growth in Zhejiang Province, and comparatively analyzes the differences in the impact of urban distribution industry and rural distribution industry on regional economic growth. Policy suggestions are put forward to accelerate the development of the rural distribution industry in Zhejiang Province in order to promote the coordinated development of urban and rural areas and make efforts to narrow the development gap between urban and rural areas.

2 LITERATURE REVIEW

From domestic studies, Yang Longzhi (2013) [2] used the economic growth rate data from 1953-2010 and employed time difference correlation, Granger causality test, impulse response and variance decomposition to empirically test the precedence of the distribution industry in the national economy, Wang Qiuying and Li Ang (2017) [3] used gray correlation analysis to study the relationship between the distribution industry and the three industries affecting the national economic growth The correlation between the distribution industry and the three industries affecting national economic growth was studied by Wang Qiuying and Li Ang (2017). Li Wei (2019) [4] used generalized least squares to analyze the relationship between the structural transformation of the distribution industry in the east, middle and west regions of China on its economic growth value, total factor productivity and regional employment growth during 2016-2017. Using 285 city-level panel data, Huang Yuting and Wen Ting (2019) [5] empirically analyzed the impact of distribution industry development on local economic growth and the spatial spillover effect of distribution industry development using a spatial econometric model. Based on the panel book from 1978-2018, Yuan-Yuan Yin and Xia Luo (2020) [6] used Granger causality test and explored the causal relationship between urban and rural distribution industries and regional economic growth in Hunan Province by constructing a Cobb Douglas model, and measured the contribution of urban and rural distribution industries to regional economic growth in Hunan Province, and found that the development of urban and rural distribution industries and economic growth in Hunan Province are mutually Granger . It is found that the development of urban and rural distribution industry and economic growth in Hunan Province are related to each

other as Granger causality, and the urban distribution industry and rural distribution industry are also related to each other as causality, and the contribution of urban distribution industry to regional economic growth is greater than that of rural distribution industry.

The relationship between the distribution industry and economic growth has been studied in depth in the literature, and the research results show that the distribution industry has a catalytic effect on economic growth. This paper will adopt Granger causality analysis and Cobb Douglas function to examine the relationship between urban and rural distribution industry and economic growth in Zhejiang Province, and analyze the difference between urban and rural distribution industry development and economic growth in Zhejiang Province.

3 ZHEJIANG PROVINCE CIRCULATION INDUSTRY OVERALL DEVELOPMENT STATUS

3.1 The size of the regional distribution industry is expanding

Since the reform and opening up in 1978, the scale of the consumer goods market in Zhejiang Province has been expanding. The total retail sales of consumer goods in Zhejiang Province grew from 4.686 billion yuan in 1978 to 2.7343.81 billion yuan in 2019, an increase of as much as 583.52 times, higher than the national growth of 313.4 times.

3.2 Diversification of the organization of distribution enterprises

According to a comparative analysis of the data in the Zhejiang Statistical Yearbook for 2018 and 2019, it can be seen that: the number of wholesale and retail legal persons above the limit decreased from 50 legal persons in 2108 to 48 in 2019, and the number of private enterprise legal persons decreased from 39 in 2018 to 37 in 2019, both showing a downward trend; however, the number of private enterprises increased from 15,112 in 2018 to 18,964 in 2019, the number of Hong Kong, Macao and Taiwan-invested enterprises rose from 247 in 2018 to 264 in 2019, and the number of foreign-invested enterprises also rose from 259 to 428 in 2018, all three showing an upward trend.

3.3 Circulation infrastructure continues to improve

Using the fixed investment in transportation, storage and postal industry to describe the investment in circulation infrastructure, the growth rate of fixed investment in transportation, storage and postal industry was 21.8% in 2018, and this growth rate was 15.2% in 2019, although the growth rate was reduced in 2019, but in general in a growth trend, circulation facilities are becoming more and more perfect, for faster and better development of the circulation industry .The foundation is laid.

4 EMPIRICAL ANALYSIS OF URBAN AND RURAL DISTRIBUTION INDUSTRIES IN ZHEJIANG PROVINCE AFFECTING REGIONAL ECONOMIC GROWTH

4.1 Causality test

4.1.1 Variable selection and model setting

In this paper, we use the gross regional product of Zhejiang Province to represent the level of economic growth, which is expressed by GDP. According to the latest statistical caliber standard of Zhejiang, the internal breakdown of urban and rural distribution industries is not carried out for the time being, and then according to the availability of data, the development of urban and rural distribution industries are replaced by the total retail sales of urban and rural social consumer goods respectively, which are expressed by UTRS and UTRS and RTRS, respectively. In this paper, the Granger causality test will be used for causality testing. In order to avoid the problem of spurious regression, the data will first be tested for smoothness. In this paper, we will use unit root test to test the data for stationarity, and then test the data for cointegration on the basis of Stationary data, because cointegration theory points out that it is only practical to use linear regression methods to analyze time series variables when there is a cointegration relationship between smooth series. The cointegration test can compensate for the possible lack of long-term information caused by the unit root test.

4.1.2 Stability test

In order to ensure the white noise characteristics of the random disturbances in the DF test, the ADF test with the expansion process is chosen. The ADF test is completed by the following three models:

$$\Delta X_t = \delta X_{t-1} + \sum_{i=1}^{m} \beta_i \Delta X_{t-i} + \varepsilon_t \quad (1)$$

$$\Delta X_t = \alpha + \delta X_{t-1} + \sum_{i=1}^{m} \beta_i \Delta X_{t-i} + \varepsilon_t \quad (2)$$

$$\Delta X_t = \alpha + \beta T + \delta X_{t-1} + \sum_{i=1}^{m} \beta_i \Delta X_{t-i} + \varepsilon_t \quad (3)$$

The difference between model 1 and model 2 is whether they contain constant terms, while the difference between model 2 and model 3 is whether they contain trend terms. Here we need to choose the appropriate form according to the trend of each indicator and then test it separately.

4.1.3 Co-integration test

If all the variables satisfy the same order single integer, we can perform the cointegration test. In this paper, we choose Johanson test for cointegration test.

4.1.4 Granger causality tes

The Granger causality test requires estimating the following regression model:

$$Y_t = \beta_0 + \sum_{i=1}^{m} \beta_i Y_{t-i} + \sum_{i=1}^{m} \alpha_i X_{t-i} + \mu_i \quad (4)$$

$$X_t = \delta_0 + \sum_{i=1}^{m} \delta_i X_{t-i} + \sum_{i=1}^{m} \gamma_i Y_{t-i} + v_i \quad (5)$$

There are four possible outcomes:

- X has a unidirectional effect on Y,
- Y has a unidirectional effect on X,
- Y has a two-way influence on X,
- Y and X are independent.

For the hypothesis that X is not the Granger cause of Y, i.e., the hypothesis that the parameter before the X-lagged term in Eq. (4) is zero overall, regressions with and without the X-lagged term are done separately, and in calculating the F-statistic:

$$F = \frac{(RSS_R - RSS_U)/m}{RSS_U/(n-k)} \quad (6)$$

Where RSS_U denotes the sum of squared residuals containing X lagged terms, and RSS_R denotes the sum of squared residuals without X lagged terms. m is the number of lagged terms, n is the sample size, and k is the number of parameters to be estimated in the unconstrained regression model including the possible constant terms and other variables.

The calculated F value is compared with the critical value of F to determine whether the original hypothesis is accepted, and thus the relationship between the two variables, i.e., whether one variable is the Granger cause of the other variable or granger causality of each other.

4.2 Data selection and Granger causality test

4.2.1 Data Selection

In this paper, the data of gross regional product and total retail sales of consumer goods in urban and rural areas are selected to measure the economic growth and the development of urban and rural distribution industries. The data are obtained from "Zhejiang Statistical Yearbook" from 1978 to 2020. Since 2010, the total retail sales of consumer goods has only been changed to "urban" and "rural", whereas before that, the original caliber was "city", "county" and "county". In this paper, the two parts of "city" and "county" are combined and considered as "city" and "county". In this paper, the "city" and "county" components are combined and considered as "urban" and "sub-county" as "rural".

4.2.2 Stability test

The results below are obtained from the software Eviews.10 .Since GDP, UTRS and RTRS not only have a high correlation among them, but also all of them show a significant deterministic trend. Therefore, in this paper, the unit root test equation (i.e., model 3) containing the constant term and trend term is selected for the ADF test. From the table below, we can see that the series of GDP, UTRS and RTRS are all non-stationary series, but at 10% confidence level, all three are able to be single in the second order, and the second order difference series are smooth, denoted as I (2), which can satisfy the condition of cointegration test.

Table 1 Table Type Styles

Variables	ADF test	10% critical value	Conclusion
GDP	4.655990	-3.192902	Unstable
ΔGDP	-3.505363	-3.194611	Stable
Δ2GDP	-8.325640	-3.198312	Stable
UTRS	2.047963	-3.194611	Unstable
ΔUTRS	-2.069774	-3.196411	Unstable
Δ2UTRS	-10.60596	-3.194611	Stable
RTRS	1.958877	-3.194611	Unstable
ΔRTRS	-7.826018	-3.194611	Stable
Δ2RTR	-8.341996	-3.198312	Stable

4.2.3 Co-integration relationship test

The AIC criterion is used as a criterion to test and select the optimal lag order, and the test finds that the AIC indicator is the smallest at three lags. Therefore, the optimal lag order chosen for the VAR model constructed by GDP, UTRS, and RTRS is 3, and the corresponding lag order chosen for the cointegration relationship test is 2. As can be seen from the table below, there are at least two cointegration relationships for GDP, UTRS, and RTRS.

Table 2 Co-integration relationship test.

Hypothesized		Trace	0.05	
No.of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None*	0.469407	43.42667	29.79707	0.0008
At most 1*	0.244224	18.07627	15.494	0.0200
At most 2*	0.157933	6.8758584	3.84146	0.0087

4.2.4 Granger causality test

In practical application, the results of Granger causality test are sensitive to the choice of lag lengths, and different lags may yield different test results. Therefore, here in this paper, five different lag lengths are selected to be tested separately to observe their sensitivity. The results of the item-by-item tests for lag orders 1-5 at the 5% significance level are shown in the table

below. By analyzing the results in the table below, it can be concluded that: the economic growth of Zhejiang Province and the regional urban circulation industry are causally related to each other; the economic growth of Zhejiang Province and the regional rural circulation industry are Granger causally related to each other; the urban circulation industry of Zhejiang Province and the rural circulation industry of Zhejiang Province are also Granger causally related to each other.

Table 3 Granger's causality test table.

Original hypothesis	LG=1	LG=2	LG=3
GDP is not the Granger reason for UTRS	3.E-06	4.E-06	3.E-05
Granger reasons why UTRS is not GDP	0.0047	0.0248	0.0058
Granger Reasons GDP is not RTRS	0.0006	0.0024	0.0008
UTRS is not a Granger cause of GDP	0.7102	0.0247	0.1188
UTRS is not the Granger cause of RTRS	0.0004	0.0059	0.0014
RTRS is not the Granger cause of UTRS	0.0835	0.0029	0.0039
Original hypothesis	**LG=4**	**LG=5**	
GDP is not the Granger reason for UTRS	4E-05	2.E-07	
Granger reasons why UTRS is not GDP	0.1401	7E-05	
Granger Reasons GDP is not RTRS	0.0003	3E-05	
UTRS is not a Granger cause of GDP	0.1161	0.0344	
UTRS is not the Granger cause of RTRS	6.E-05	0.0004	
RTRS is not the Granger cause of UTRS	0.0005	0.0019	

4.3 Regression analysis of the impact of urban and rural distribution industries on economic growth

4.3.1 Indicator Selection

The regression model of the distribution industry on regional economic growth is constructed by logarithmically processing the Cobb Douglas function [6], in which the gross national product (GDP) is used to measure the growth of the total regional economy, and the total retail sales of

consumer goods in urban and rural areas are used to measure the development of the distribution industry in urban and rural areas, respectively.

4.3.2 Model setup analysis

The regressions of the results of the impact of urban and rural distribution industries on economic growth are as follows：

$$LN(GDP) = C + \beta_1 LN(URTS) + \beta_2 LN(RTRS) + \mu \qquad (7)$$

Multiple regression of the data by EVIEWS10 software yielded the following regression model outputs：

$$LN(GDP) = 1.860700 + 0.847590LN(URTS) + 0.088341LN(RTRS) \qquad (8)$$

$$(0.072821) \qquad (0.041101) \qquad (0.056337)$$

$$R^2 = 0.998947 \quad \bar{R}^2 = 0.998893$$

$$F = 18499.24 \quad \text{DW} = 0.389953$$

From the test results we can conclude the following: where R^2 and $\bar{R}^2$ are 0.998947 and 0.998893, respectively, which indicates that this model we built fits very well, but the regression results of parameter β_2 do not pass the significance test at the 5% significance level, which makes us unable to reject the original hypothesis of β_2=0, that is, here, the independent variable LNRTRS is not strong enough to explain the dependent variable LNGDP, so we first remove the variable LNRTRS and do a separate one-variable linear regression with the dependent variable LNGDP on the independent variable LNUTRS.

The regression results after removing the variable LNRTRS are as follows：

$$LN(GDP) = C + \beta LN(URTS) + \mu \qquad (9)$$

Multiple regression of the data by EVIEWS10 software yielded the following regression model outputs：

$$LN(GDP) = 1.961323 + 0.911611LN(URTS) \qquad (10)$$

$$（0.035049） \quad （0.004825）$$

$$R^2 = 0.998881 \quad \text{DW} = 0.426922$$

Removing the variable LNRTRS, the fit of the model is still high, with a fit R^2 of 0.998881, which is very close to 1. In addition, all parameters pass the 5% significance test, and the p-values of both C and LNUTRS are 0. However, DW = 0.426922, which according to the DW test method

Theory shows that the model has positive autocorrelation. After the test, the model was found to have first-order autocorrelation, which needs to be corrected for autocorrelation.

Adding AR (1) for autocorrelation correction, after the first-order autocorrelation correction, DW=2.075713, according to the DW test method, it can be determined that the autocorrelation has been eliminated, i.e., the model no longer has autocorrelation problem. And the goodness-of-fit R^2=0.999571, which is also improved compared with the pre-correction.

The results show that for every 1% increase in total urban retail sales of consumer goods, total GDP increases by as much as nearly 90.57%. Although the regression results of LNRTYRS did not pass the significance test when conducting the multivariate regressions and could not reject the original hypothesis of β_2=0, this does not directly say that the development of the rural distribution industry does not contribute to the regional GDP in total. From the Granger causality test done before, it shows that the development of rural distribution industry and regional GDP are mutually Granger causal, so, combined with the regression results, it shows that the development of rural distribution industry does not contribute enough to regional economic growth, much less than the contribution of urban distribution industry to regional economic growth.

5 RESEARCH CONCLUSIONS AND SUGGESTIONS FOR COUNTERMEASURES

5.1 Research findings

The results of the above study show that economic growth in Zhejiang has a two-way Granger causality relationship with both urban and rural distribution industries, and that urban and rural distribution industries are also causal to each other. In terms of urban-rural differences, the development of Zhejiang's urban distribution industry is more likely to drive economic growth than the rural distribution industry. On the one hand, since the reform and opening up, with the continuous development of Zhejiang's social economy, it has strongly promoted the development of the province's urban and rural distribution industry. On the other hand, the development of Zhejiang's urban and rural distribution industry plays a role in promoting the province's economic growth, such as the distribution industry through the promotion of industrial structure upgrading, technological innovation, reducing transaction costs and other paths to adjust aggregate supply and demand, and then optimize economic growth and growth momentum, providing the basis for the province's economic quality development. In addition, the distribution industry can also provide a variety of services to promote the development of the economy.

5.2 Suggestions for countermeasures

5.2.1 Further play the role of the distribution industry to promote economic growth, so that the pioneering industries play a full role

Zhejiang Province should further expand the development scale of the circulation industry, improve the competitiveness of the circulation industry, so as to give full play to the power of

the circulation industry, and strongly promote the province's regional economic growth. First of all, we should actively guide all kinds of funds to the circulation infrastructure investment, perfect circulation infrastructure is the basic guarantee of further development of the circulation industry. Secondly, continuously improve the circulation industry market environment, a good market environment is to promote the development of circulation industry in the economic growth of the virtuous cycle between the economic environment to ensure. As a basic and pioneering industry, its development is not only related to the vitality of the industry, but also to promote the development of other related industries and the basic conditions of economic growth.

5.2.2 Coordinated development of urban and rural circulation industry to promote urban and rural integration as the goal

The government should actively guide the urban circulation industry to radiate and drive the rural circulation industry, especially to play the role of Zhejiang's urban traffic hub, large commodity distribution centers and professional markets to drive the role. In addition, it is recommended to actively cultivate new circulation industry in rural areas, enrich and improve various commercial outlets, and gradually build a two-way circulation channel and docking mechanism to form a city industrial products to the countryside and rural fresh and special agricultural products to the city. [7] [8]

5.2.3 Focus on supporting the transformation and upgrading of the rural circulation industry, and strive to minimize the gap between urban and rural areas

The development of rural circulation industry is far less than the development of urban circulation industry, which is also a major factor causing the difference between urban and rural areas. To narrow the gap between urban and rural areas, the circulation industry should also make corresponding efforts to increase policy support for rural circulation industry, increase investment in rural circulation infrastructure construction, and accelerate the improvement of rural water and electricity supply and road infrastructure construction, so as to ensure a higher level of development Rural circulation industry. Moreover, in the era of Internet development, the construction of rural logistics system should be accelerated to solve the "last mile" problem can greatly promote the development of rural circulation industry, and the construction of financial and other supporting facilities for circulation industry should be improved. In addition, to promote the construction of the rural information platform, farmers access to information channels, usually insufficient information or lagging information, which will make the rural circulation enterprises, farmers can not be timely according to market conditions for production adjustment, the rural circulation industry to "Internet +" the upgrading and transformation of the circulation industry to create an online platform To provide multiple channels for the circulation of agricultural products. [9]

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