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Research on Marginal Consumption Tendency of Urban Residents in Yangtze River Delta Region

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Abstract: One of the important research matters is the marginal consumption propensity of urban residents. A great many Chinese scholars have investigated the marginal consumption propensity of residents in a single province and city, but there is still a certain gap in the comparative study of marginal consumption tendency among different provinces and cities nationwide. The research theme of this paper is to explore the marginal consumption tendency of urban residents in the Yangtze River Delta region and compare the differences among them. We select the per capita disposable income and per capita consumption expenditure of urban residents in the Yangtze River Delta region from 2004 to 2022, dividing the Yangtze River Delta region into four cities, and calculate the marginal consumption tendency of urban residents in each city by establishing the ELES model. The study found that the marginal consumption tendency of food and housing has become the highest value of urban residents in each region, reflecting people's attention to food and continuous pursuit of improving living experience. And in the case of different cities in the Yangtze River Delta region, there is a relatively distinct difference in the marginal consumption propensity of residents.

Keywords: marginal consumption tendency, ELES model, urban residents, Yangtze River Delta region.

1. Introduction

The Yangtze River Delta (YRD) in China, which includes Zhejiang, Anhui, Shanghai, and Jiangsu provinces, lies in the lower portions of the river. This region is now among China's most economically vibrant areas because of its plans for economic growth and easy access to shipping. With the rapid economic progress, people in this area got more income, leading to changes in their consumption tendencies. Chinese residents' consuming structure may be better understood by analyzing the marginal propensity to consume (MPC), which is measured among people living in the YRD.

The research on residents' marginal consumption tendency started earlier in foreign countries. Many scholars carried out relevant research summarized the empirical model, and then continued to optimize the model, providing a solid theoretical foundation for other related studies. The linear expenditure system sometimes was developed in 1954 by British econometrician Stone. During the application procedure that followed, Lluch suggested the Extended Linear Expenditure System

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(ELES) demand function model. Since then, the ELES model has found widespread use in the study of the consumption pattern of residents.

Chinese domestic scholars' research on consumption structure mainly focused on a single city, and some scholars also divided China's 31 provinces (municipalities and autonomous regions) into four major economic zones: east, central, northeast, and west for comparative study. Based on the ELES model, Zhu conducted a study on the spending habits of rural inhabitants in Wuxi from 2005 to 2019, suggesting that the rural residents have a significant potential for consumption and that their consumption patterns will continue to improve as their income rises [1]. Some respectively analyzed the consumption patterns of residents in Henan, Xizang, and Yangzhou using ELES models and provided specific suggestions for local economic development [2-4]. With the help of an ELES model, Tan examined 11 provinces in the Yangtze River Economic Belt and discovered that while living standards are high, there is a low tendency toward marginal consumption, with service-oriented consumption emerging as a new consumption hotspot [5]. Fu divided China into four economic regions using the division method of regional economic theory and adopted the ELES model to conduct a quantitative analysis of residents' consumption structure, concluded that although the consumption level and structural characteristics of residents in the four regions had something in common, it is more important to pay attention to the spatial differences between them [6]. Yang used the ELES model to focus on the consumption frame analysis of six provinces in the central region and put forward targeted suggestions to promote the rise of the central region [7]. Cheng and Zang made a comparison of the data from 2015 and 2022 through the utilization of the ELES model and concluded that there is an overall improvement in people’s living standards, an increase in the willingness to consume in the service-oriented aspect, as well as the negative impact of the novel coronavirus epidemic on consumption expenditure [8].

Some research also used the ELES model to analyze the frame of consumer spending at the national level. Fan analyzed the factors that affect the structure of China's consumption expenditure by constructing the ELES model [9]. He discovered that for the past few years, China’s household consumption has presented a situation where the MPC food has tended to decrease while the MPC medical care and housing has shown an increasing trend [9]. Lu adopted the ELES model to analyze how China's rural people's income affects their consumption structure and found that Food, drink, and cigarette purchases will drastically decline, with a growing share of spending going toward housing, healthcare, and transportation [10].

In many other studies on the MPC, the MPC of households has been surveyed by computing MPC from hypothetical gains. For example, the International Monetary Fund estimated MPC in 2022 using a fictitious £500 transfer and found that there are different marginal propensities to consume (MPCs) in British households with varying income levels during the period of income changes [11]. Drescher analyzed data from European countries, and it was concluded that the MPCs vary considerably between countries, and the MPCs are negatively correlated with income [12]. Some scholars analyzed the MPC from the perspective of the wealth effect. By analyzing data on Spanish households, Trivin examined how the increase in wealth has brought about changes in household consumption [13].

Based on the current situation of China's domestic consumption, insufficient consumer demand has always been an urgent problem to be solved. The state has repeatedly introduced corresponding policies to stimulate consumption growth, but it is still difficult to fundamentally promote consumption. The continuous contraction of consumption will lead to a series of problems such as the imbalance of economic structure. One of China's areas with comparatively favorable economic growth conditions is the YRD region. The conclusion of this paper makes some suggestions for improving local consumption. While other studies are conducted at the national or international level, we start from the more specific YRD region, have a more detailed understanding of the current

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situation of the specific region, and extend to the whole country to provide reference for policy formulation.

This study used the ELES model to examine the MPC in the YRD area, using consumption data from urban residents from 2004 to 2022. Through further discussion of the results, it is expected to understand the current development status and offer sane suggestions for improving the consumer spending structure.

2. Method

2.1. Data Source

Research data is taken from the official website of the National Bureau of Statistics of China and the statistical yearbooks of provinces and cities in the YRD region. In this paper, the data from 19 years ranging from 2004 to 2022 is selected for analysis. Nevertheless, in 2012, the National Bureau of Statistics of China carried out the integrated reform of urban and rural household surveys, which led to alterations in the statistical scope. Therefore, the model estimation of each province and city in this paper is divided into two stages: 2004-2012,2013-2022.

2.2. Indicator Selection and Explanation

In this paper, the goods consumed by residents in the YRD are divided into 8 categories, including food, clothing, living, daily necessities and services, transportation and communication, education and entertainment services, medical care and other supplies and services, which are expressed by $X_i(i = 1, \ldots, 8)$. The data is divided into four regions by city, which are indicated by $X_j(j = 1,2,3,4)$, in which $j = 1,2,3,4$ represents Anhui, Jiangsu, Shanghai and Zhejiang respectively. For example, X_{12} represents the consumer spending of Jiangsu urban inhabitants on food and X_{73} represents the consumption expenditure of Shanghai urban residents on medical care. Similarly, per capita disposable income is divided into four regions by city, which are indicated by $l_j(j = 1,2,3,4)$, in which $j = 1,2,3,4$ represents Anhui, Jiangsu, Shanghai and Zhejiang respectively.This paper takes the data of Anhui Province from 2013 to 2021 as an example, as displayed in Table 1.

Table 1: Statistical description

Variable	Logogram	Min	Median	Max	Mean	Standard Deviation
Per capita disposable income	l_1	22789	33016.5	45133	33487.7	7302.925
Food, Tobacco and Liquor	X_{11}	5360.33	6668.685	8924.9	6946.701	1062.710
Clothing	X_{21}	1333.74	1604.99	1794.9	1599.032	151.539
Residence	X_{31}	1663.55	4572.25	6078.8	4425.46	1268.649
Household Facilities, Articles and Service	X_{41}	898.55	1268.155	1671.2	1252.923	271.993
Traffic and Communications	X_{51}	869.89	2711.26	3039.9	2484.798	625.952
Education, Cultural & Recreation Service	X_{61}	1650.87	2372.325	3170.2	2408.68	427.068
Mediciine and Medical Service	X_{71}	976.54	1528.46	1933.6	1503.776	333.891
Miscellaneous Commodities and Services	X_{81}	389.45	500.14	713.9	507.286	99.894

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2.3. Introduction of the Method

ELES model is the bare front expenditure system model. The model divides the consumption expenditure of certain goods into supplementary demand and basic demand, and the basic formula is as follows:

$$D_i = p_i q_i = p_i x_i + \beta_i (l - \sum_{i=1}^{n} p_i x_i) = (p_i x_i - \beta_i \sum_{i=1}^{n} p_i x_i) + \beta_i l \quad (1)$$

Where D_i is the total consumer expenditure on a commodity, p_i is the price of certain goods, q_i is the consumption quantity of a certain type of commodity, l represents per capita disposable income, β_i is the MPC a certain commodity, $p_i x_i$ is the basic demand for a commodity. In formula (1), $p_i x_i$ and $\sum_{i=1}^{n} p_i x_i$ of the cross-section data can be regarded as constants.

$$\alpha_i = p_i x_i - \beta_i \sum_{i=1}^{n} p_i x_i \quad (2)$$

$$X_i = \alpha_i + \beta_i l + u_i \quad (3)$$

where u_i is a random interference item, α_i and β_i indicates the parameter to be estimated. The estimates, $\widehat{\alpha_i}$ and $\widehat{\beta_i}$ are obtained after least squares estimation. We can find the income elasticity of demand by the formula:

$$\varepsilon_i = \frac{\partial x_i}{\partial l} \times \frac{l}{x_i} = \beta_i \times \frac{l}{x_i} \quad (4)$$

Since the price elasticity formula is:

$$\varepsilon_{ii} = (1 - \beta_i) \frac{p_i x_i}{x_i} - 1 \quad (5)$$

3. Results and discussion

According to the statistical yearbooks of Shanghai, Zhejiang, Anhui, and Jiangsu, the consumption expenditure data of urban residents from 2004 to 2022 in the YRD region are summarized. Table 2 presents the data for the 2013–2022 portion of the overall data.

Table 2: Data on the YRD region's consumption between 2013 and 2022.

Index	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Consumption Expenditure	89959	97345	107807	115964	122694	131598	140891	134601	156541	157241
Food, Tobacco and Liquor	30533	30438	30589	32253	33643	34834	36837	37122	42220	43879
Clothing	7669	7123	6936	7040	7135	7958	8116	7116	8460	8013
Residence	11522	18576	28473	30673	34170	37544	40279	41867	44821	47251
Household Facilities, Articles and Service	5311	5371	5376	6023	6469	7279	7467	7418	8593	8726
Traffic and Communications	9904	11372	15096	16248	16095	16568	17917	16334	19793	19594

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Table 2: (continued).

Education, Cultural & Recreation Service	12727	12018	11980	13383	14430	14676	16716	12424	16361	13714
Medicine and Medical Service	8719	9052	6568	7425	7456	9201	9710	9163	11621	11357
Miscellaneous Commodities and Services	3575	3396	2787	2917	3296	3537	3849	3160	4673	4717

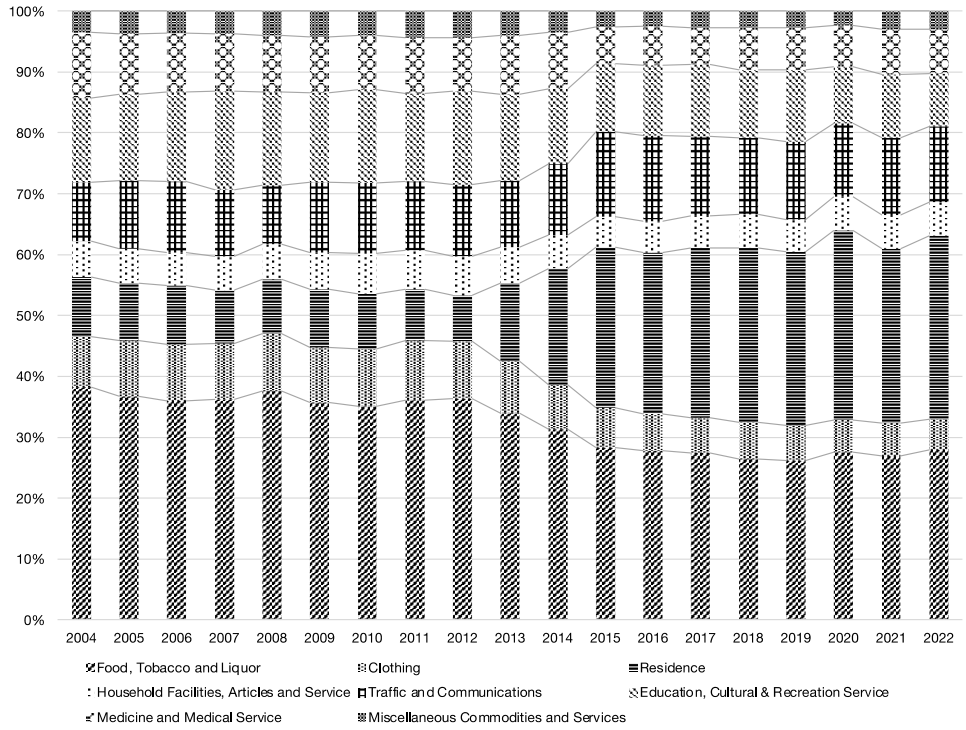

Figure 1: The consumer spending structure in the YRD region.

Figure 1 shows the percentage of each category of spending in the consumption statistics for the YRD region. Due to the change in statistical scope in 2012, the percentage of residence has changed significantly. Before 2012, the YRD region's food expenses made up the greatest portion of the consumption structure or almost 40%. After 2012, food and residence accounted for the largest share of about 30%.

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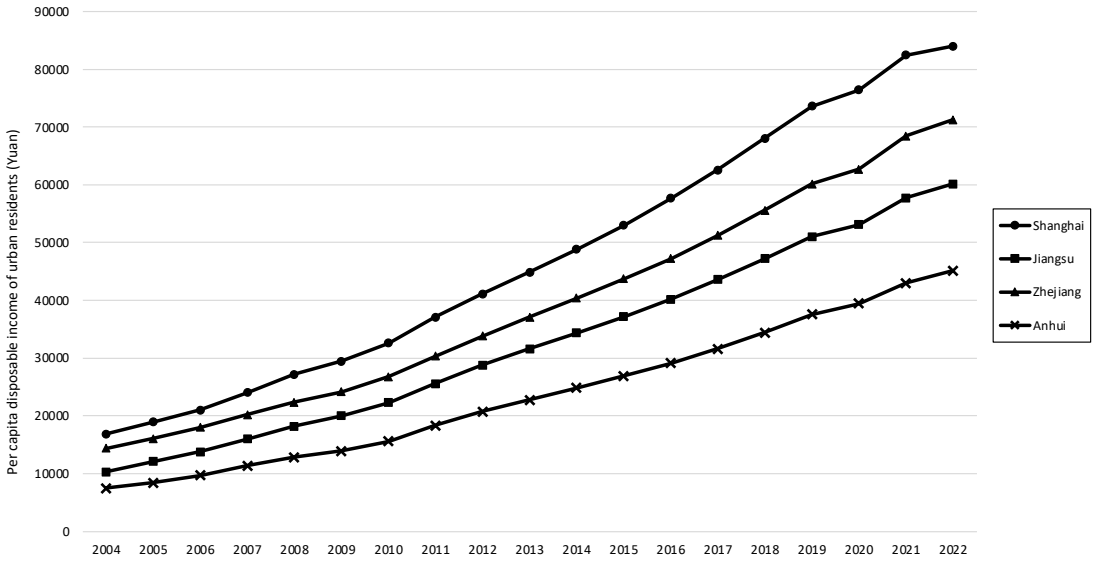

Figure 2: Trends in the YRD region's per capita disposable income.

As seen in Figure 2, the disposable income of the urban population likewise exhibits a similar upward tendency. In the last 19 years from 2004 to 2022, per capita income increases from 12263 yuan to 65153 yuan. Figure 2 shows that by comparing the incomes of urban residents across provinces, the economic gap between Shanghai, Zhejiang, Anhui, and Jiangsu widened as the overall economy of the YRD region developed rapidly. Shanghai's per capita disposable income in 2004 was 9435 yuan more than that in Anhui Province, and in 2022 Shanghai had 38901 more than that in Anhui Province.

The regression analysis of X_1、X_2、X_3、X_4、X_5、X_6、X_7、X_8 and l is accomplished in this paper. Through regression analysis, it is found that the parameter values and the whole are significant, the model has a high degree of fit, and basically no bad values, so the model setting is reasonable. The results in Table 3 and Table 4 show that most of the various commodities are above 0.75, and the values are large, indicating that the model fits well.

Table 3: Model regression result from 2004 to 2012.

index	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
				Jiangsu				
R^2	0.996	0.993	0.916	0.994	0.953	0.981	0.974	0.983
F	2125.117	1104.266	76.864	1194.957	144.105	378.25	272.704	407.519
β_i	0.206	0.070	0.032	0.044	0.110	0.104	0.029	0.024
				Shanghai				
R^2	0.992	0.978	0.654	0.938	0.722	0.912	0.977	0.980
F	891.451	318.036	13.252	106.610	18.214	73.022	299.079	359.597
β_i	0.213	0.057	0.033	0.054	0.014	0.112	0.071	0.043
				Anhui				
R^2	0.995	0.990	0.923	0.946	0.950	0.976	0.975	0.973
F	1709.436	765.059	84.357	124.965	135.272	288.007	274.237	256.704

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Table 3: (continued).

β_i	0.246	0.064	0.076	0.042	0.086	0.096	0.055	0.028
				Zhejiang				
R^2	0.992	0.947	0.869	0.950	0.925	0.990	0.915	0.922
F	977.386	126.932	46.550	133.586	86.361	724.170	75.838	83.699
β_i	0.195	0.058	0.029	0.032	0.127	0.067	0.023	0.024

It can be seen from the empirical results that Since the fourth quarter of 2012, the state has unified the statistical standards, classifications and names of income indicators, and implemented household surveys in cities and towns. Between 2004 and 2012, Anhui Province had the greatest MPC for food and housing in the YRD region, Jiangsu Province had the lowest MPC for apparel, and Zhejiang Province had the highest MPC for transportation. The MPC value of food from 2004 to 2012 is the highest among the 8 categories of consumer goods. By comparing the two periods from 2004 to 2012 and 2013 to 2022, after the change of statistical standards in Jiangsu Province, the significance of clothing and education, culture and recreation services decreased, but still showed a positive correlation. The model fit of apparel, education, healthcare, culture, and leisure, as well as other supplies and services, declined in Shanghai, and the variables' relative importance also declined.

Table 4: Model regression result from 2013 to 2022.

index	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
				Jiangsu				
R^2	0.925	0.699	0.987	0.916	0.813	0.298	0.879	0.714
F	98.738	18.598	632.784	87.586	34.802	3.411	58.127	20.037
β_i	0.114	0.010	0.220	0.029	0.058	0.017	0.050	0.016
				Shanghai				
R^2	0.815	0.002	0.784	0.840	0.614	0.011	0.005	0.000035
F	35.433	0.022	29.118	42.240	12.765	0.089	0.043	0.000279
β_i	0.074	0.0006	0.355	0.017	0.086	-0.005	-0.004	-0.00011
				Anhui				
R^2	0.767	0.000221	0.674	0.788	0.334	0.344	0.268	0.239
F	26.359	0.001766	16.594	29.824	4.025	4.205	2.934	2.519
β_i	0.084	-0.00027	0.118	0.024	0.045	0.024	0.021	0.003
				Zhejiang				
R^2	0.971	0.695	0.984	0.955	0.800	0.823	0.942	0.824
F	271.898	18.292	506.485	172.783	32.132	37.372	131.471	37.630
β_i	0.131	0.015	0.162	0.040	0.062	0.053	0.044	0.021

Among them, education, medical care and other supplies and services showed a negative correlation, indicating that with the growth of average disposable income, inhabitants' expenses on other services and supplies, medical treatment and education decreased; In Anhui province, the fit degree of clothing model decreased significantly, which was negatively correlated with per capita disposable income, indicating that When average disposable income increases, inhabitants' expenses

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on clothing decreased; In Zhejiang Province, the variables of education, communication and transportation, clothing, other services and goods decreased significantly. Zhejiang Province had the greatest MPC for food, daily needs, and services from 2013 to 2022, whereas Shanghai had the highest MPC for housing and transportation.

The MPC value of residence from 2013 to 2022 is the highest among the 8 categories of consumer goods, indicating that urban residents have improved their demand for living environment, and people pursue a more comfortable urban living environment to improve their happiness of life. Moreover, there is a relatively large MPC in food and consumer expenditure on domestic goods and services. It can be seen that people have a better pursuit of diet.

The YRD area has a distinct income distribution, and the regional consumption differences are more significant, and the focus of consumption tendency has shifted from food to residence.

Residents' purchasing patterns have shifted from fundamental requirements to a greater degree of quality of life enhancement as a result of their income increases.

The Huaihai Economic Zone's urban population has a consumption pattern that is more oriented toward residential and other consumption, and their demand for consumption is lower than the national average. At the same time, the consumption of health care, education and culture in the region is relatively stable, and there is a huge consumption potential. In addition, food and convenient travel methods will become the pursuit of residents in the Huaihai Economic Zone[14].

Northern Jiangsu and northern Anhui are still late-developing areas, coupled with the relative location, the distance is relatively far away and the existing transportation network is not perfect and fast and other unfavorable factors, resulting in the current economic and social ties with the centre area of the YRD are not close enough. Especially the demand to make up for the shortcomings of major infrastructure construction such as transportation and water conservancy as soon as possible. From 1994 to 2013 in the YRD region, the reasonable Engel's coefficient means that economic growth will result in a decrease in the ratio of food expenditure, and China's current situation conforms to this law. In terms of housing, the MPC is small and stable, elasticity is less than 1, which proves that it is a necessity for daily life. This proves that compared to high housing prices, small changes in people's income are not enough to affect people's decisions to buy or rent a house. However, there is a need for housing, so the government should promote housing reform, introduce affordable housing, affordable housing, and so on[15].

The YRD region has an abundant labor force and obvious population advantages. In recent years, the provincial investment direction of the YRD urban agglomeration has gradually changed from traditional manufacturing to strategic emerging industries as well as contemporary service sectors. The upscale manufacturing, the contemporary service sector, and strategic emerging industries of the YRD urban agglomeration are clustered and developed in clusters, accelerating urban integration. The YRD's merging with the Huaihai Economic Zone's superior development will be further studied through cooperative integration in the follow-up.

4. Conclusion

This research examined the consumption patterns of residents in the YRD region between 2004 and 2022, drawing conclusions about how their marginal propensity to consume changed during that period of time. Because of recent economic growth, the general level of consumption among people living in this region has increased. The marginal inclination to eat food has been declining, as is the share of consumption expenditures spent on food. In contrast, there has been an increase in the marginal propensity to spend housing and healthcare. Within the provinces of the Yangtze River Delta area, there are also notable variations in the marginal tendency to consume. Residents in Anhui prioritize improved housing conditions over increased spending on clothing as their incomes grow. Residents in Jiangsu earned higher incomes and more stable spending habits. Residents with

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increased income may invest more in housing and improve the convenience of life in Shanghai. Residents in Zhejiang had a developed economy, with higher income levels and diversified consumption. As income increases, the consumption structure may become more complex. That showed the differences in consumption levels across different provinces due to the differences in income levels.

Based on the analysis, this study provides recommendations for maximizing the consumption of locals in the Yangtze River Delta area. Firstly, enterprises should raise their employees' wages so that residents will have more disposable income to spend on consumption. Secondly, urban residents could diversify their consumption and enrich their household expenditures. Third, the government can formulate distinct economic policies based on the state of the economy and the existing spending patterns in various areas. Regions with slower economic development can expand basic consumption by promoting the construction of infrastructure and improving residents' housing conditions. The government can support the growth of new industries and local brand marketing in areas with quicker economic development.

Authors Contribution

Each author made an equal contribution, and their names were listed alphabetically.

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