Research on the Growth Point of Sports Consumption Based on Extended Linear Expenditure System -- Taking Jiangxi Province as an Example

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Abstract. Sports activities play an important role in strengthening physique and improving the quality of life, which makes the proportion of sports consumption in China's national consumption increase year by year, but the current supply of sports service products in China has not increased with the demand of mass consumption, some sports consumers' needs are not met, and personalized sports service resources are especially short, which is not conducive to the healthy development of sports economy. Therefore, by analyzing the current sports consumption of mass fitness in Jiangxi Province, this paper introduces an extended linear expenditure system to analyze the new sports consumption growth points in Jiangxi Province from the perspective of consumer demand, and puts forward relevant sports consumption development suggestions in a targeted manner to increase the options for the public to carry out sports consumption and provide reference for promoting the diversification of sports consumption in Jiangxi Province.

1. Introduction
As China's economy enters a new normal and the material living standard of residents continues to improve, residents' sports culture is also showing a vigorous development. The proportion of residents' sports consumption in consumption is becoming larger and larger, and sports consumption is gradually becoming a new consumption growth point in China's economy. The current concept of sports consumption is gradually gaining popularity, which has greatly stimulated people's awareness of sports consumption. The public has begun to pay attention to their own physical exercise and their own health, and their awareness and enthusiasm for sports consumption has reached a new height, making the sports industry an impressive new economic growth point. It is of great theoretical and practical significance to promote the development of sports industry, improve people's living standards and stimulate economic growth by vigorously tapping the potential new growth point of residents' sports consumption [1-3].

However, the existing relevant studies show that there is an imbalance in the distribution of public sports facilities in China, and the problems of low utilization rate and low social benefits are becoming increasingly prominent [4-5]. Therefore, this paper addresses the problems of mass sports consumption in Jiangxi Province, analyses the existing mass sports consumption structure in depth, explores the growth points of sports consumption, promotes the development of new sports service industry, and provides some theoretical basis for the development of sports economy in Jiangxi Province.
2. The meaning and classification of sports consumption
As a combination of material and spiritual consumption, sports consumption is a product of a certain stage of social development, a type of consumption that arises on the premise that people's material needs are satisfied, a new type of consumption that emerges when sports reach a certain degree of socialization and popularization, and it is closely related to other social phenomena.

At present, domestic sports economists in China have basically defined the concept and classification of sports consumption in terms of consumer demand, consumption behaviour and consumption of sports-related substances. When analysing the types of sports consumption, scholars in China have two main views. The first one is to divide sports consumption into two categories, namely physical consumption of sports (consumption of sports products) and consumption of sports labour services. The second viewpoint is to divide the types of sports consumption into three categories, namely, physical sports consumption, sports labour consumption, and sports information consumption.

In this paper, personal consumption expenditure in terms of people directly engaging in sports activities is defined as sports consumption in a narrow sense, while consumption that includes all consumption directly or indirectly connected and related to sports activities as well as the loss of sports clothing and sports equipment is defined as sports consumption in a broad sense. According to the research needs, sports consumption is divided into the following six categories based on the research of other scholars: sports venues fitness consumption, sports clothing and footwear consumption, sports newspapers and magazines consumption, sports competition tickets consumption, sports equipment supplies consumption and sports lottery consumption. Sports stadium fitness consumption refers to the residents' expenses for sports and fitness exercise at sports venues; sports clothing and footwear consumption refers to the residents' expenses for sports apparel and footwear; sports newspapers and magazines refer to the residents' expenses for sports newspapers and magazines; sports match tickets refer to the residents' expenses for tickets to watch sports matches; Sports equipment and supplies refers to the cost of purchasing sports equipment and sports supplies; finally, sports lottery is the cost of purchasing sports lottery tickets.

3. Extended linear expenditure system model
The traditional consumption analysis is mainly realized by using the linear expenditure system model, but the model has certain defects, all the total budget expenditure of residents in the model will be spent on consumption, that is, there will not be a certain amount of residents' savings and investment, which is contrary to the consumption behaviour of residents in real life. Therefore, the linear expenditure system model has certain limitations.

To address the shortcomings of the traditional linear expenditure system, economist Lunch proposed the theory of extended linear expenditure system, which replaces the personal budget expenditure in the linear expenditure system with income and replaces the weights with the marginal propensity to consume. Then the traditional linear expenditure system becomes the form of the following, which becomes the extended linear expenditure system model.

\[ P_i Q_i = P_i R_i + B_i (I - \sum_{i=1}^{n} P_i R_i) \]  

From equation (1), it can be seen that at a certain income and price level, consumers will not only spend a part of their income to satisfy their basic needs, including basic goods or labor, but when a part of their income is spent after satisfying their basic needs, consumers will spend the rest of their income in other goods according to their determined marginal propensity to consume, and attach a part of their savings, thus corresponding to the actual.

To further elaborate the model principle, the transformation of equation (1) and the separation of the effect of income on the basis of the original function leads to equation (2).

\[ P_i Q_i = (P_i R_i - B_i \sum_{i=1}^{n} P_i R_i) + B_i I \]
From the above equation, it can be seen that the extended linear expenditure system model mainly contains the income-related part of the population and the basic needs consumption part, which is independent of income, therefore, in this process, the income-independent part is regarded as a constant, denoted by $A_i$, and the consumption $K_i$, to denote the actual consumption amount, thus an econometric model can be obtained:

$$K_i = A_i + B_i I + \varphi$$ (3)

The cumulative calculation of the econometric model leads to equation (4):

$$\sum_{i=1}^{n} A_i = \sum_{i=1}^{n} (PR_i - B_i \sum_{i=1}^{n} PR_i)$$ (4)

$$\sum_{i=1}^{n} A_i = (1 - \sum_{i=1}^{n} B_i) \sum_{i=1}^{n} PR_i$$ (5)

In turn, it is possible to find the basic needs expenditure of the population:

$$PR_i = A_i + B_i \left( \frac{\sum_{i=1}^{n} A_i}{1 - \sum_{i=1}^{n} B_i} \right)$$ (6)

Based on the traditional linear expenditure system model, the extended linear expenditure system model takes into full consideration the actual situation of residents' consumption, and saves part of the income after meeting the basic needs, which is in line with the actual consumption situation of the residents nowadays, and at the same time, the residents' marginal propensity to consume is added into it, so that the analysis of the weight of the residents' marginal propensity to consume can be carried out. It is a more practical analysis model.

Sports consumption will be divided into the following six categories. The first category is the consumption of residents to participate in fitness and recreation and sports activities at sports venues (referred to as sports venues fitness consumption), expressed in $K_1$. The second category is the consumption of residents to purchase sports clothing and footwear (referred to as sports clothing and footwear consumption), expressed in $K_2$. The third category is the consumption of residents to purchase equipment and supplies needed for sports exercise (referred to as sports equipment and supplies consumption), expressed in $K_3$. The fourth category is residents to buy sports newspapers and sports books and magazines consumption (referred to as sports newspapers and magazines consumption), expressed in $K_4$. The fifth category is the residents to watch sports games for the purchase of tickets consumption (referred to as sports tickets consumption), expressed in $K_5$. The sixth category is the residents to buy sports tickets consumption (referred to as sports lottery consumption), expressed in $K_6$.

In order to quantitatively analyze the mass consumption structure of Jiangxi Province, an extended linear expenditure system model of mass sports consumption structure under cross-sectional data is constructed as follows:

$$K_i = A_i + B_i I + \varphi$$ (7)

4. Empirical Analysis
The model was estimated using disposable income and six categories of sports consumption expenditure data of urban residents in upper Jiangxi. The income of the six classes is the explanatory variable and $K_1 \sim K_6$ are the explanatory variables, and the results of the estimated parameters are shown in the table below.

| Sports   | $A_i$ | $B_i$ | $t_a$ | $t_b$ | F   | $R^2$ |
|----------|-------|-------|-------|-------|-----|-------|

Table 1. Estimates of an extended linear expenditure system model for the sports consumption structure of urban residents in Jiangxi Province
Table 1 shows the estimation results of the extended expenditure system model for urban residents' sports consumption in Jiangxi Province. Where $B_i$ is the marginal propensity to consume sports consumption items of category $i$. The values of $t_A$ and $t_B$ are the results of testing the constant term $A_i$ and coefficient $B_i$ in the model, respectively. As can be seen from Table 1, the $t$-test results for the constant terms of sports stadium fitness, sports newspapers and magazines, and sports competition tickets are not significant at the significance level of $\alpha = 0.05$, while the $t$-test values for the constant terms of sports clothing and footwear and sports equipment supplies are significant, indicating that urban residents in Jiangxi Province are interested in sports clothing and footwear, sports equipment supplies, sports newspapers and magazines. In addition, it can be seen from Table 1 that the regression equation of the model developed in this paper fits the city sample data of the Jiangxi Province very well.

From the results of the estimated parameters of the extended linear expenditure system model of the sports consumption structure of urban residents in Jiangxi Province, the basic sports consumption demand expenditure and its proportion of each sports consumption can be calculated, as shown in Table 2.

Table 2. Basic sports consumption expenditure and its proportion of urban residents in Jiangxi Province

| Sports consumption category | Basic consumer needs | Ranking |
|-----------------------------|----------------------|---------|
| $K_1$                       | 285.36 (22.52%)      | 3       |
| $K_2$                       | 543.54 (42.89%)      | 1       |
| $K_3$                       | 312.45 (24.66%)      | 2       |
| $K_4$                       | 21.87 (1.73%)        | 5       |
| $K_5$                       | 78.52 (6.19%)        | 4       |
| $K_6$                       | 25.26 (1.99%)        | 6       |

As can be seen from Table 2, the sports consumption of urban residents in Jiangxi Province is dominated by sports clothing and footwear, sports equipment supplies, and sports stadium fitness, of which sports clothing and footwear account for a much larger proportion than other sports consumption items. The function is not only to serve sports, but also to beautify oneself. Sports clothing and footwear can show people's personality and follow the trend of the times through the diversity of styles, which is a greater use of resources. Therefore, there is no doubt that resident give priority to meeting the consumption demand for sports clothing and footwear.

The basic demand for sports lottery consumption among urban residents in Jiangxi Province is the lowest among the six major categories of sports consumption items. As a kind of gaming sports consumption, sports lottery is to a greater extent an entertainment consumption to satisfy the residents' gaming psychology, and its low basic consumption demand is reasonable.

The basic consumption demand for sports equipment is second only to sports clothing, shoes and hats, both of which, as typical physical types of consumption, occupy a large part of sports consumption, and their sum exceeds the sum of other four major categories of sports consumption, indicating that the basic demand for physical types of sports consumption occupies a larger proportion among urban residents in Jiangxi Province.

The marginal budget share $B_i^*$ can be calculated based on the estimated parameter $B_i$ of the extended linear expenditure system model for urban residents in Jiangxi Province.
Table 3. Marginal propensity to consume and marginal budget share of urban residents in Jiangxi Province

| Sports consumption category | $B_i$ | $B'_i$ | Ranking |
|-----------------------------|------|-------|---------|
| $K_1$                       | 0.01825 | 27.24% | 2       |
| $K_2$                       | 0.00765 | 11.42% | 5       |
| $K_3$                       | 0.00896 | 13.37% | 3       |
| $K_4$                       | 0.00063 | 9.40%  | 6       |
| $K_5$                       | 0.02256 | 33.67% | 1       |
| $K_6$                       | 0.00895 | 13.35% | 4       |
| **Total**                   | 0.067 | 1     |         |

Analysed from the perspective of marginal consumption tendency, it can be seen from Table 3 that the marginal consumption tendency of urban residents in Jiangxi province for sports consumption is ranked from largest to smallest as sports competition tickets, sports stadium fitness, sports equipment supplies, sports lottery tickets, sports clothing and footwear, and sports newspapers and magazines. As the disposable income of urban residents in Jiangxi province increases, they spend more of their income on sports competition tickets, stadium fitness, etc. This indicates that with the improvement of social and economic level and the guidance of national macro policy, the consumption demand of Jiangxi urban residents for sports tickets has increased greatly, and residents are not only satisfied with their own sports exercise, but also increase their expenditure on sports consumption of viewing and enjoyment type.

The marginal consumption tendency of sports equipment and sports clothing and footwear is lower than that of sports tickets and stadium fitness, which further indicates that the sports consumption awareness of urban residents in Jiangxi Province has changed from the traditional physical sports consumption to the participatory and spectator sports consumption.

The marginal consumption tendency of sports newspapers and magazines is the lowest, probably due to the development of the Internet, which makes the dissemination of sports information more convenient, while sports newspapers and magazines slowly lose their competitive advantage as the traditional information carrying medium.

All in all, for the sports consumption of the general public in Jiangxi Province, the share of marginal budget for various types of sports consumption is highest for sports competition tickets, followed by stadium fitness, sports equipment supplies, sports lottery tickets, sports clothing and footwear in that order. Obviously, after meeting the basic needs of sports consumption, urban residents in Jiangxi Province have the highest demand for sports competition tickets, followed by stadium fitness, then sports equipment supplies, sports lottery tickets and sports clothing and footwear, and finally sports newspapers and magazines.

5. Development suggestions

The current sports consumption has passed the "survival stage" of consumption requirements, requirements, such requirements in general is the diversification of demand, personalized customization, precision in turn will force the optimization of the supply-side structure of sports and personalized customization, precision consumption needs. Optimize the structure of the sports industry, and gradually shift to the new precision of the "development stage" of sports consumption, the diversification of sports consumption demand, industrial upgrading, and ultimately meet the diversified, personalized, and precise consumer demand. To optimize the structure of the sports industry is to work on the supply side of sports, improve the precision of supply according to market demand, expand the scale of supply according to the scale of consumption, and effectively integrate resources to realize the efficiency of supply. The size of the proportion of residents' household sports consumption investment marks the activity of the sports consumption market. At this stage, the residents' view of sports consumption should be led to the concept of healthy investment under the modern market economy system. Encourage residents to participate in sports activities, improve their physical quality, gradually increase the time spent on sports activities and the total amount of sports
consumption, prompt residents to enhance their awareness of health investment through the public opinion media from all walks of life, guide them out of leisure misconceptions and blind spots, switch from entertainment pastimes that are not conducive to physical and mental health to sports, and vigorously promote sports and fitness methods, etc., so as to activate sports consumption. Improve the market mechanism, cultivate residents' awareness of sports consumption, change the traditional concept of sports consumption, and create a good atmosphere for social sports consumption. Government policy guidance and public opinion propaganda can help to create sports consumption hotspots and cultivate a group of sports interest enthusiasts, which in turn can promote the development of sports consumption.

6. Conclusion
This paper analyses the current situation of sports consumption in Jiangxi Province, constructs an extended linear expenditure system model of the sports consumption structure of urban residents in Jiangxi Province. Then we conduct an empirical study of the sports consumption structure of urban residents in Jiangxi Province, analyses the new growth points of the existing demand for sports consumption in Jiangxi Province through the basic demand for sports consumption and the marginal consumption propensity index. Finally we put forward corresponding suggestions to promote the growth of sports consumption in Jiangxi Province in order to promote the economic growth of sports consumption in Jiangxi Province.

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