Proceedings of the 7th International Conference on Economic Management and Green Development
DOI: 10.54254/2754-1169/28/20231306

A Game Theory Explanation of the High Ticket Price in Scenic Spots

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Abstract: Recently, the ticket price of domestic tourist attractions has continued to rise, which causes a hot debate in society. Compared with the international average, the ticket prices of some tourist attractions in China have reached or exceeded some developed countries. This paper points out that in different scenic spots their products are different. On this basis, it gives a monopoly competition model based on game theory, which can be used to explain the high ticket prices of scenic spots and other high prices, and can provide references for relevant departments to formulate countermeasures. The purpose of this paper is to point out that scenic spot products are differential monopoly products. By introducing the idea of game theory, it is demonstrated that the characteristics of differential monopoly may automatically lead to a complete monopoly price in scenic spots, resulting in social welfare losses. This model can explain the high ticket prices in China and the fact that some scenic spots are still planning to raise prices.

Keywords: differentiated products, monopoly competition, game theory, ticket price of the scenic spot

1. Introduction

In recent years, the ticket price of domestic tourist attractions has continued to rise, which has aroused extensive discussion from all walks of life. The ticket price of tourist attractions in China is on the high side. Compared with the international average, some scenic spots have reached or exceeded some developed countries. At the same time, however, some scenic spots are planning to raise prices.

Although the main function of scenic spot products is to meet the entertainment needs of consumers, scenic spot products are not homogeneous, but different. First, the uniqueness of landscape products. Almost no two scenic spots are the same, especially those based on natural and cultural heritage. Uniqueness is an important feature of scenic spot products [1]. The second is the regional nature of the scenic spot products. An important difference between landscape products and general products is that they cannot be moved. The products of the scenic spot must be connected with the specific area. Regionality includes the distance and accessibility to the source market, which greatly affects the choice of consumers. Because the products of scenic spots are different types of products, for example, different scenic spots display different products to consumers. For example, some scenic spots want to display special culture, beautiful scenery and architectural style. There is only a certain degree of substitutability between the products of scenic

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spots, and there is no complete substitution relationship. The degree of substitution increases with the reduction of product differences in scenic spots.

This paper explains the high ticket price of scenic spots in China based on differential products and monopolistic competition with the game theory, so as to offer some references for relevant departments to formulate countermeasures.

2. Analysis of Monopoly Competition

In the general analysis of monopoly competition, it is usually assumed that the products are homogeneous. There is a complete substitution relationship between products of different manufacturers. In this case, all products must have only one price, otherwise the higher the price, the manufacturer will not sell any products. Following the above concept, Bo Tran provides a monopoly competition mode of competitive bidding. Because one manufacturer can attract customers and gain profits from another manufacturer by lowering the price, any price higher than the marginal cost cannot become an equilibrium price, and the only equilibrium can only be competitive equilibrium. In the monopoly competition model, the Bertrand equilibrium has the highest output and the lowest price among all homogeneous products [2]. The opposite is the collusion model. The collusion has the lowest output, the highest price and the highest profit. However, researchers pointed out that under the assumption that other manufacturers will not respond, a manufacturer can earn higher profits by selling more production than the production agreement, so collusion is generally unstable.

The above model is analyzed under the assumption of product homogeneity, and the situation is different under different product assumptions. For example, in Bertrand model, by reducing the price, one manufacturer can attract customers from another manufacturer [3]. In the case of different products, even if the price is reduced to 0, I'm afraid it will not attract all customers. Compared with the collusion model, in the case of different products, the manufacturer may automatically tend to completely monopolize the price and have no motivation to deviate from the price and the corresponding output. We take scenic spots as an example to establish a monopoly competition model for different products. Suppose there are two scenic spots. Because their products are designed to meet the entertainment needs of consumers, there is a certain degree of substitutability between products. However, as mentioned above, since the scenic spot products are different products, there is no complete substitutability between products. In order to simplify the analysis, we assume that there is a linear relationship between the demand of tourist attractions and their own price and the price of another tourist attraction. The demand function of the two scenic spots can be expressed as:

$$q1 = a1 - b1p1 + c1p2 \tag{1}$$

$$q2 = a2 - b2p2 + c2p1 \tag{2}$$

Obviously, the above function shows that the demand of scenic spots is inversely related to their own prices. The higher their own prices are, the lower the demand is; It is positively related to the price of another scenic spot. The higher the price of the other scenic spot, the higher the demand of the scenic spot [3]. We further assume that there is no cost in the scenic area, and the profit of the scenic area is equal to the revenue of the scenic area. The income of the scenic spot can be expressed as:

$$r1 = p1q1 = a1p1 - b1p21 + c1p1p2 \tag{3}$$

$$r2 = p2q2 = a2p2 - b2p22 + c2p1p2 \tag{4}$$

The first-order conditions for maximizing the income of scenic spots are:

$$\partial r1 / \partial p1 = a1 - 2b1p1 + c1p2 = 0 \tag{5}$$

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$$\partial r2 / \partial p2 = a2 - 2b2p2 + c2p2 = 0 \quad (6)$$

It is easy to get the expression of the optimal price selection behavior:

$$p1 = (a1 + c1p2) / 2b1 \quad (7)$$

$$p2 = (a2 + c2p2) / 2b2 \quad (8)$$

The above two equations describing the optimal price behavior are very interesting, because the price of one scenic spot depends on the price of another scenic spot. Especially if the price of another scenic spot increases, the optimal price of that scenic spot will also increase. By combining the above equation, we can get the optimal price as follows:

$$p1 = (a2c1 + 2a1b2) / (4b1b2 - c1c2) \quad (9)$$

$$p2 = (a1c2 + 2a2b1) / (4b1b2 - c1c2) \quad (10)$$

The so-called optimal price is obtained on the premise that both scenic spots reach the optimal price behavior. If the price of one scenic spot remains unchanged, the price of another scenic spot should also remain unchanged. This study now considers the impact of monopolistic competition of different products on social welfare, in order to keep the both maximum profit for the both producers. Since we assume that the scenic spot has no cost, it is obvious that when the price is 0, the social welfare will be maximized and the output will be higher [4]. Therefore, monopoly competition leads to the loss of social welfare. Another situation can also be considered, that is, when two scenic spots are owned by the same manufacturer, the price, output and social welfare of the scenic spots may change. For manufacturers with two scenic spots, what he believes is the maximization of overall profits. It is assumed that there is no cost, that is, revenue maximization. The information of game theory, so the language is correct, so that there is reason to guess that manufacturers will increase the price of each scenic spot, reduce reception, increase profits and reduce social welfare [5]. For the above conjecture, a simple proof can be given. For manufacturers with two attractions, the revenue function is:

$$r = a1p1 - b1p21 + c1p1p2 + a2p2 - b2p22 + c2p1p2 \quad (11)$$

The first order condition for revenue maximization is:

$$\partial r1 \ \partial p1 = a1 - 2b1p1 + c1p2 + c1p2 = 0 \quad (12)$$

Another first-order condition can be similarly analyzed. This means that the manufacturer's income will increase by increasing the price of the scenic spot. That is to say, the manufacturer with two scenic spots will set a higher price than the monopoly competition. In fact, the best price can be calculated for two scenic spot manufacturers:

$$p1 = (a2(c1 + c2) + 2a2b2) /(4b1b2 - (c1 + c2)2) \quad (13)$$

$$p2 = (a1(c1 + c2) + 2a2b2) /(4b1b2 - (c1 + c2)2) \quad (14)$$

Comparing the above optimal price expression with the optimal price expression of monopoly competition, we can see that the denominator of the former is smaller than the latter, and the numerator is larger than the latter. Therefore, the former must be greater than the latter.

Since the cost is assumed to be 0, it can be inferred that two scenic spots owned by a manufacturer will further reduce social welfare. The optimal price derived in the previous section enables the two scenic spots to achieve their own optimal price choice behavior, but the later analysis points out that because the complete monopoly makes the product in the whole market only

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available to one manufacturer, thus limiting the choice of consumers in the market, the manufacturer has no competition, so the complete monopoly can increase profits by raising the price, so the so-called "optimal price" is not optimal. In order to further analyze the monopolistic competition behavior of different products [6], this paper introduces the idea of game theory.

3. Game Model

The previous article analyzed the optimal price of monopoly competition of different products, and pointed out that the price will be between the competitive price and the monopoly price, and the impact on social welfare will also be the same. However, the problem is that the optimal price in the above analysis is based on the assumption that the price of another scenic spot is fixed, that is, when the scenic spot makes its own optimal price choice, it believes that the price of the other scenic spot will not change, that is, the other scenic spot will not react to its own behavior. In this case, the scenic spot will operate according to the best price exported above and execute the best price exported above [7]. However, when considering the reaction of competitors, the price choice of scenic spots will change greatly.

When the price of the scenic spot is at the best price, assuming that the price of another scenic spot remains unchanged, the price of that scenic spot will also remain unchanged. This is actually the specific expression of Nash equilibrium (no price increase, no price increase). However, because the scenic spot knows that when its price rises, the price of another scenic spot will also rise, so the above equilibrium is not stable. This study pointed out earlier that when two scenic spots are owned by the same manufacturer, it often sets a price higher than the optimal price of monopoly competition to obtain higher profits. This shows that if the prices of the two scenic spots continue to rise at the same time, it will bring higher profits for each scenic spot. Since the scenic spot knows that the price of another scenic spot will rise when the price rises, and if the two scenic spots continue to rise at the same time, it will bring higher profits to each scenic spot, then the scenic spot will obviously choose to increase the price. That is to say, to achieve the perfect Nash equilibrium of the sub-game [8]. People can see that this price rise will continue until the price equals the price of a complete monopoly. At this time, the profit of the scenic spot will be maximized, and the profit of further price increase will not increase, but will decrease. Therefore, the prices of these two attractions will remain unchanged (no price increase, no price increase) and will become the perfect Nash equilibrium of the sub-game (however, the dilemma of the participants will be the main difficulty in this point, because the more the game is played, the more effective your choice will be), which is our expected final result. Note that at this time, these two scenic spots do not choose actions according to their best prices. Assuming that the reaction of competitors is not taken into account, the scenic spot should, of course, continue to adjust the price. However, considering that competitors will inevitably react to their own price adjustment, it is better to maintain the price. This is the result of introducing game theory.

4. Price Analysis of Scenic Spots

The foregoing analysis and simulation of the competitive process of the ticket prices of scenic spots in China. The market competition has made the ticket prices of scenic spots in China have been rising and close to the monopoly pricing, causing significant damage to social welfare. However, we have noticed that many scenic spots in China are priced by the government. In theory, the government should aim at maximizing social welfare rather than pursuing profit maximization [9].

Three conclusions are drawn after the analysis. First, the actual government is not necessarily the faithful representative of the public. The government also has its own interests. If the interests of the government are related to the profits of the scenic spot, there is obviously a motivation to set higher

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ticket prices; second, to a large extent, the income of scenic spots in China comes from ticket revenue, so scenic spots may take lobbying or bribery actions to urge the government to set higher prices; Third, the pricing of enterprise scenic spots as reference is high. These reasons make the price decision of scenic spots close to the behavior of profit maximization.

After consulting a survey material organized by the Beijing Municipal Price Bureau on the expert argumentation of ticket prices [10], it is found that the reasons for asking for price increases in various scenic spots are similar, mainly three: the first is that the quality and price are not consistent. Indeed, some scenic spots with lower grades have higher prices than those with higher grades. But it cannot be the necessary reason to raise the price.

The second is to control capacity. The price increase of scenic spots with lower grades not only results in the discrepancy between quality and price, but also increases the reception pressure of scenic spots with higher grades. The third is to increase income to cover maintenance and construction costs. According to the analysis of this paper, at present, the price of scenic spots in China has been higher than the socially optimal price or even the monopolistic competitive price. Continuing to raise the price may increase income, but it will inevitably cause further loss of social welfare. Therefore, whether to raise the price must be measured between the loss of social welfare and the cost of financial constraints.

5. Conclusion

After above analysis, it can be found that, many scenic spots in China are priced by the government, the actual government is not necessarily the faithful representative of the public; the income of scenic spots in China largely comes from ticket revenue. The government should control the capacity of scenic spots, increase income to cover maintenance and construction costs. This paper makes a game theory explanation for the high ticket price of scenic spots in China based on differential products and monopolistic competition, and believes that the current ticket price of scenic spots in China has deviated from the social optimal pricing, even close to monopolistic pricing, and the social welfare has been seriously damaged. In this case, it is not appropriate to further increase the price of scenic spots with lower prices, but consider reducing the price of some scenic spots with higher prices.

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