Economic Analysis on the Purchasing of Sports Lottery

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Abstract — This paper elaborates the social and economic effect of sports lottery from the macroscopic and microscopic perspectives, with research methods including literature, interview, survey, and mathematical statistics. Based on the utility theory and risk theory of traditional microeconomics, this paper carried an indepth analysis on the motivation of buying sports lottery with combined consideration of decision utility theory, psychological effect, investment coefficient, tax effect, and external effect, hoping to provide reference for government with better financing function of sports lottery.

Keywords - sports lottery; utility; consumer; risk appetite

I. INTRODUCTION

Approved by the people's bank of China in 1998, sports lottery is defined as follows in the Interim Measures for Issuance, Sale, and Management of Sports Lottery promulgated by state general administration of sports: Sports lottery is "the credential with numbers, graphics or texts on it, that is issued to raise sports enterprise development funds by voluntarily purchasing by consumers and obtaining winning rights in accordance with specific rules." In 2006, the sales of sports lottery in China reaches 32.3 billion yuan, contributing significantly to the development of our sports cause. However, the winning probability is quite low for lottery buyers. According to the traditional economic theory, rational consumers should be risk-averse investors. Then what drives them to buy sports lottery tickets of this large quantity? Given the fact that gambling is a social reflection of personal economic state, this paper elaborates the utility of sports lottery and consumer risk attitude with the traditional microeconomic theory, researches and explains the phenomenon with decision utility theory, to explore the real motivation of consumers to buy sports tickets. Clearly, lottery industry has become the sixth largest industry in China, which makes it significant to study the influence of consumer behavior to the lottery industry and reasonable income adjustment [1].

II. SOCIAL AND ECONOMIC EFFECT OF SPORTS LOTTERY

As "lottery economy" becoming a hot spot of current Chinese economy, the social and economic effect of lottery has drawn more and more attention [2].

While understanding the positive social and economic effects of lottery, we should also see clearly its inevitable negative effects on the society and economy. For example, the excessive development of gambling encourages the speculative psychology, which in turn inhibits the development of the real economy. Under such speculative psychology, consumers are more willing to make such unearned risk rather than getting rich through hard work. Gambling leads toextrusion effect. As a financing method of the government, lottery industry gathers the "idle money" of lottery buyers to the government for public spending, which inevitably leads toextrusion effect on private investment. The negative social and economic impact of lottery, of course, is limited, compared with its positive influence, which is why we should not hinder its healthy development.

First of all, the issuance of lottery effectively expands the financing channels. For issuers, lottery is a special financing tool which do not require payment of the capital and interest; for buyers, lottery is a kind of investment tool with its expected returns greater than zero, meeting the psychological needs of thrill. Clearly, lottery industry has become the sixth largest industry in China, which makes it significant to study the influence of consumer behavior to the lottery industry and reasonable income adjustment [1].

Furthermore, the issuance of lottery can enlarge consumption demand. On the one hand, according to the provisions, the lottery bonus should not be less than 50%.
which means that there will be a considerable number of bonus funds directly turning into individual consumption funds; on the other hand, lottery sales capital and parts of lottery bonus will become bank deposits, which may lead to indirect credit expansion. The settled lottery funds will become credit funds, which are used for enterprise production and personal consumption of the residents, with encouraging the expanding of domestic demand [5-7].

Last but not least, the issuance of lottery helps provide employment opportunities. As a labor-intensive industry, it can create a lot of employment opportunities. As seen from the current situation of China's lottery industry, with the popularity of lottery, and the increasing number of lottery stations, the lottery industry is showing its broad development space in creating job opportunities.

III. TRADITIONAL ECONOMICS ANALYSIS OF SPORTS LOTTERY

A. Utility of Lottery

Lottery buyers get to lose more because the probability to win the lottery prize is normally one in a million. Although most lottery buyers are willing to try with their luck, but the "good luck" is rare. Classical economic theory holds that individuals are completely rational. They are generally risk averse, with pursuing the maximization of utility. There is a positive relationship between risk and expected return, which means that only when the expected return is high will people accept the high risk. So now that people know their investment rate is basically zero, why are they enjoying the investment? And why do people buy insurance to avoid risks and buy lottery to take risks at the same time?

Classical economic theory assumes that the preference of the decision maker is fixed. On the basis of a given preference, decision makers will estimate the probability distribution first, then forecast the repercussions of their decisions, and make a final decision following the basic principles of statistical analysis on all the available information. In 1944, Van Newman and Morgan Stanley proposed the expected utility maximization principle, assuming that each decision makers has a real value of utility function which takes the probable results of the behaviors as independent variables.

People buy lottery tickets out of risk preference, that means, the expected utility of buying lottery is much bigger than the utility brought by the existing wealth. The expected utility of buying lottery can be represented as follows:

\[ U(E) = U1(W - m + M)P + U2(W - m)(1 - P) \]

Where, \( W \) refers to the initial wealth of the buyer, \( m \) refers to the lottery denomination, \( M \) refers to the winning amount, \( P \) refers to winning probability, \( U1 \) and \( U2 \) refer to the utility level of winning and not winning. Only when \( U(E) > U(W) \), i.e. the expected utility of buying lottery is larger than the utility of the initial wealth, people will buy lottery. As the lottery denomination \( m \) is often small, while the winning amount \( M \) is large, people are aware of the tiny winning probability \( P \). However, there are still a lot of people who meet the conditions of buying lottery. The lotteries issued in our country are selling well [8].

The winning probability is very small, but the winning amount is large. Lottery buyers are facing the following two choices:

1. Spend a few money to buy lottery tickets. If they win, the utility if high. But with the winning probability is nearly zero, even if they miss it, their loss utility is not high. The tiny winning probability makes the expectation value to win become small, which is close to zero. The expectation value of losing utility is negative. So the total expectation value of buying lottery is negative.

2. Do not buy lottery. In this condition, the expectation value is zero.

According to the theory of utility maximization, nobody would buy lottery tickets, which does not accord with the reality. So is the behavior of lottery buyers irrational?

B. Risk Attitudes of Consumers

Economics divides consumers into three categories based on different risk preferences: Risk averse consumer (C curve in figure 1) refers to the consumer who is willing to chose a plan with determined payment in various plans with the same expected payment; neutral risk consumer (B curve in figure 1) refers to the consumer who do not differentiate the uncertain plan and the certain plan with the same expected payment; risk appetite consumer (A curve in figure 1) refers to the consumer who is willing to choose the uncertain plan rather the certain plan with the same expected payment.

Through the analysis of consumer behavior based on the traditional economics, it seems that we can draw the conclusion that the lottery buyers are all risk appetite consumers, because the risk reverse consumers won't buy lottery. However, there are some people who are gamblers who put most of his life savings on lottery, putting all his eggs in one basket. Actually, we can see that every time the welfare lottery is issued, some people are enthusiastic while some are not interested at all. Based on rough observation, most consumers who buy lottery are ordinary people. The money they invest is limited, such as a dozen or several dozens yuan, up to hundreds yuan. The investment does not affect their basic life. It doesn't really matter, even if they are gone. These consumers have limited bear ability for risks. It cannot be real that they are all risk appetite consumers.
IV. ANALYSIS OF MOTIVATION OF SPORTS LOTTERY CONSUMERS

It seems the traditional risk theory cannot explain the reasons why consumers buy lottery. So what's the real reason?

First of all, for the vast majority of consumers, the appetite degree for risks is related to the percentage of the investment in the total wealth. Within the acceptable amount scale, they are risk appetite consumers. But when the investment amount reaches a certain degree that affect their normal life, they will become risk averse consumers who do not want to risk. This is why the vast majority of lottery buyers also buy home insurance and car insurance. Therefore, we can see that the attitude of consumers towards risk is related with the percentage of money they spend in the total wealth. When the investment is small and irrelevant, they are willing to take a risk. But when the investment is large enough to affect the basic life, they hate to risk. That is to say, normal consumers features part risk appetite and part risk aversion.

Here we can introduce the concept of survival risk degree u in the decision utility theory. Survival risk degree refers to the maximum threat degree that a decision can bring to the decision system. When the decision plan has no threat to the decision system, $M_i = 0$, $u_i = 0$; When the decision plan brings fatal loss to the decision system, $M_i = B$, $u_i = 1$.

$$u_i = \frac{M_i \times (\text{Probable maximum loss of the i plan})}{B \times (\text{total value of the decision system})}$$

By introducing the survival risk degree, we can clearly measure the internal relationship between risk appetite and the total wealth. It shows that the same amount of money has different value to the same person in different risk conditions; in the same risk condition, the same amount of money has different values to different person. With the application of this concept, we can clearly find out why consumers buy risky lottery, and buy insurance for valuable assets like house and cars to avoid risks. For example, there is a housing fire insurance. The property of this consumer worth 1 million yuan and the insurance fee is 700 yuan. If there is a fire, the loss will be all compensated. In this case, if there is no fire after the consumer buy the insurance, $u_i=700/1000000=0.07\%$; if there is a fire but the consumer did not buy the insurance, $u_i=1000000/1000000=1$

Since the traditional economics of utility theory cannot explain the motives of consumers to buy lottery tickets, what kind of behavior that buying lottery is? Experience tells us that the fundamental purpose of lottery is to raise funds to meet the needs of public utilities such as social welfare; from the perspective of consumers, the purpose to buying lottery is to win the big prize, which is a speculative behavior. The two aspects interacted with each other, which forms the nature of lottery in China (especially the welfare lottery). Therefore, we should take these two factors into consideration and improve the utility function when analyzing the motives. First, we should consider the motive of the government to issue the lottery and add a tax utility variable F. There should be speculation and flooding effect, which is represented with speculation coefficient S.

Why consumers are eager to buy lottery? The traditional consumer utility theory only considers the relationship between utility and payment. In fact, consumers buy lottery to meet the satisfaction degree when their needs are met. This satisfaction is not only related to payment, but also the mental experience, which is main utility. For example, the cheerful mood with the expectation of being rich. For any person who buy lottery, their behavior is a investment behavior. Only this kind of investment is essentially different from the ordinary investment. As an investment, people buy lottery to meet the risk consumption desire and expect payment. In a sense, lottery consumption means the spirit of adventure. Due to its low risk (2 yuan for each note) and high expectation (millions of yuan for each note), this kind of investment features low entry and high expectation. Therefore, lottery is a kind of spirit consumption in essence. Of course, this utility decreases along with the increase of the number of lottery. The more the spending, the lower the bear ability of risks, which will lead to stopping at certain point. Besides, many people buy welfare lottery out of love. This behavior brings great satisfaction to the buyer. From this perspective, the spirit utility is much more than the payment utility.

Therefore, psychological factors accounts for a large part when buying lottery. The pursuit of large wealth and the expectation of winning large prize lead to great mental utility M.

From the above factors that affect the buying behavior of consumers, we can get a function to explain why lottery is popular among consumers. As shown below:

$$U(E) = S \times P \times U1(W - m + M) + (1 - P) \times U2(W - m) + F + M$$

Where, W refers to the initial wealth of the buyer, m refers to the lottery denomination, M refers to the winning amount, P refers to winning probability, U1 and U2 refer to the utility level of winning and not winning. U1 and U2 are the utility levels for losing and winning the lottery. Only when $U(E) > U(W)$, i.e. the expected utility of buying lottery is larger than the utility of the initial wealth, people
will buy lottery. In this way, we can explain why people buy lottery.

What’s more, what attracts the consumers is that there are some external factors in buying lottery. When we apply the traditional consumer behavior theory, we assume that the demands to the lottery are independent and that whether a person buy lottery is up to his appetite. A person’s buying behavior for lottery also depends on the buying behavior of others. Especially those who have been buying lottery tickets and have won awards of consumer can influence other consumers’ buying behavior. For example, a lottery buyer in Jiayuguan city won 113.8 million awards, "created the multiple records in the history of China welfare lottery" of hundred million yuan. At that time, news are spreading all over China through media reports. Many people are encouraged to buy lottery.

The external effect of lottery, namely the lottery sales increase with the increase of consumers who buy lottery. Increasing number of lottery buyers leads to the increasing attention of the public medias. At the same time, more people are winning the large prize, which is a temptation to the consumers who have not yet bought lottery. External effect, propaganda, and media report have greatly stimulated the buying preference of consumers.

Above is my analysis of lottery consumers' behavior motivation. Through the analysis on lottery consumers' behavior, we found that, in order to better play the financing function of lottery, some local lottery stations can adjust the prices based on local conditions to attract more consumers. At the same time, in order to smoothly issuance, we can promote the social significance of lottery and improve the buyers' spiritual enjoyment. Besides, the propaganda of the media can improve the external effect and attract more consumers to buy lottery. For example, when issuing the football lottery, we can increase the external utility among football fans by means of football lottery salon.

REFERENCES