Behavior Economics and Prospect Theory: A Review

ZHAOYANG SUN

ABSTRACT

Behavior economics combines psychological research and economic research properly, reveals the decision-making mechanism under uncertainty, and opens up a whole new field of research. As a basic theory of behavior economics, prospect theory is a good descriptive model of risk decision making in recent decades. Its emergence is a challenge to the theory of expected utility, and even an alternative to the theory of expected utility. This paper gives an overview of behavior economics and prospect theory, including their development history and basic content. Besides, this paper summarizes the development trend of behavior economics in the future.

KEYWORDS

Behavior economics; prospect theory; economic history.

INTRODUCTION

Modern economics is distinguished from other social sciences by its rigorous logic and mathematical reasoning, which is known as the crown of social sciences. Modern microeconomics begins with a series of strict axiomatic assumptions of individuals, and uses logic and mathematical tools to study the maximization of individual utility theory, and thus establishes a magnificent economy theoretical mansion of macroscopic, finance, and measurement. The mainstream economists have come up with such a set of rational research paradigm: which is from the point of view of simplifying assumptions and abstract, aiming at the objective economic variables, using the unified theory of logical deduction and quantitative analysis of the core, at the same time by the difference between the basic variables and the relationship between them, so as to explain and predict the economic phenomenon [1,2].

However, due to the excessive esteem and adherence to the paradigm of rational research, traditional economics is confronted with a series of challenges and dilemmas. For example, traditional economic theory assumes that people are perfectly rational, patient, and they would make choices that can maximize their happiness. However, in reality, people usually are impatient, are not always good decision-makers when the situations are tricky. Behavior economics is the combination of psychology and economics, it investigates what happens in markets in which some of the agents display human limitations and complications.
Behavioral economics doesn't imply the criticisms of neoclassical economics, but combines psychology with economics to provide a better analysis and prediction for the economy that based on a certain psychological basis. People can use behavioral economics to solve some shortcomings in Western Economics, such as using the prospect theory to solve some paradox in the risk decision theory. Therefore, we can use some relevant modern psychological knowledge and behavioral economics to explain some extreme phenomena during the market economy or how people make their decisions, to amend and supplement the traditional economic theory.

This study gives an overview of behavior economics and prospect theory, including their development history and basic content. In addition, the development trend of behavioral economics in the future is also summarized.

THE HISTORY OF BEHAVIORAL ECONOMICS

As an important branch of economic research, behavioral economics is often thought to have started with the work of Daniel Kahneman and Amos Tversky in 1979. In 1979, Kahneman and Tversky wrote an important paper that used cognitive psychology to explain various divergences of economic decision making from neoclassical theory [3]. In this classical thesis, they completely refuted the structural basis of the neoclassical prospective utility theory, and had the idea that the theory of neoclassical economics has two fatal weaknesses: First, it assumes that the procedure is the same, that is, the different expected preferences are independent of the methods and procedures for judging and evaluating preferences; Second, it is assumed that the description is constant, that is, the different expected preferences are purely the function of the probability distribution of the corresponding expected consequences, and do not depend on the description of these given distributions. Kahneman and Tversky's research laid the theoretical framework for the decision-making of behavioral economics.

After the 1980s, people began to recognize the irrationality of human beings, the complexity of human sexual behavior. Modern economics officially recognized that people are also living on the other side, that is, human nature also has emotional, irrational concept to guide the composition. From the 1980s, a group of economists led by Richard Thaler began to study along the direction of Kahneman and Tversky's research and achieved many gratifying results, which showed that behavioral economics had entered the stage of prosperity and development. In 1986, at the University of Chicago's Economic Research Conference, most of the papers utilized psychological methods and theories to solve the economic problems. The convening of the meeting was a milestone in the development of behavioral economics.

In 1997, the Quarterly Journal of Economics also published a special project topic for the behavioral economics. In 2002, the psychologist Daniel Kahneman and an economist Vernon L. Smith shared the Nobel Prize in Economic Science. At this point, behavioral economics has drawn unprecedented attention in the economic community, the importance of behavioral economics has been established and entered a new period of development, behavioral economics has stepped into the ranks of Western mainstream economics, and represents the new direction of development of Western economics.
Prospect theory

The Prospect Theory proposed by Kahneman and Tversky (1979) was the first cornerstone of behavioral economics. This theory indicates people are not entirely rational in the form of experiments. The theoretical basis of prospect theory contains three effects: 1) Reflection effect. It refers to the opposite of the people's preference when faced with profit and loss. In the positive range of profit, the performance is risk aversion; in the negative range of loss, the performance is risk pursuit. Reflection effect and the deterministic effect is the corresponding. Kahneman and Tversky added the experiment above into here, but changed the income for the loss. The $A$ represents 100 percent probability of the loss of 1,000 Yuan and the $B$ represents 80 percent probability of loss of 1,500 Yuan. At last, ninety-two percent of the participants opted for $B$. This shows when decision-makers are dealing with loss and profit, the attitudes to risks are completely different. 2) Certainty effect. People will pay too much attention to confirmed results, giving them higher weights. In other words, in the face of profit, people will show a risk aversion, giving certainty results higher weights, which leads to underestimating the non-deterministic results. The expected utility at this time is not a simple linear expected value. The expecting functions are different on both sides of the reference point, which directly violates the axiom of substitution. Kahneman and Tversky designed a simple experiment to detect the discussion above. Assume that $A$ means 1000 Yuan can be obtained 100 percent of the probability, $B$ means it can obtain 1,500 Yuan 80 percent of the probability. According to expected utility theory, if the utility of $B$ is 1200, which is higher than $A$, the rational decision maker should choose $B$, but 82 percent of the people chose $A$. This shows that decision-makers will give the confirmed income a higher weight and neglect the non-deterministic income. 3) People's preferences will be affected by external factors, and most people always make their judgments about the loss and income based on the reference point decision.

The value function is the value of subjective feeling of the decision-maker, which is related to the reference point. It is the gain or loss relative to the reference point chosen by the decision-maker, so the measurement of value is the degree of change to wealth rather than the amount of wealth. There is a very important inflection point in the value function called the reference point, which is subjectively determined by the individual as an evaluation criterion. The reference point will change because of the assessment subjects, the environment, and time and so on. In general, the criterion for decision-makers to choose a reference point is the total amount of wealth they now have, but not exactly. After investigating 25 graduate students at Berkeley and Stanford, Kahneman and Tversky used the nonlinear regression method to give the following form of the value function [4]:

$$v(x) = \begin{cases} 
  x^\alpha, & \text{if } x \geq 0 \\
  -\lambda(-x)^\beta, & \text{if } x < 0 
\end{cases}$$

(1)

Among the function, $\alpha, \beta < 1$, $\lambda > 1$ $\alpha, \beta$ are the risk attitude coefficients, and $\lambda$ is the loss aversion coefficient. As can be seen from the equation (1), the profile of value function curve transforms to "S" shape. The curve is concave above the reference point and convex below the reference point. The decision-maker has different attitudes towards risk on both sides of the reference point. The left side of reference point
represents the loss, and the right side represents profit. At the time of profit, the decision-maker will increase the risk-averse behavior, performing the early sale of profitable stocks in the investment behavior. On the contrary, the investor will prefer the risk when the loss occurs and is unwilling to sell the losing stock. The criterion for determining profit or loss is the reference point at the origin of the value function.

Prospect theory describes the decision processes in two stages: editing stage and evaluation stage. In the editing phase, people collect information, abstract and generalize the information to determine the appropriate decision reference point. The main role of the editing phase is determining the appropriate decision reference point by collecting and arranging the decision-making information, and describing the various options according to certain standards, and then abstracting the decision problem by the standards of reference point. If the result of the decision is better than the reference point, the gain is encoded, otherwise the loss. The editing phase mainly consists of coding, combination, segregation, cancellation, simplification, and dominant checking. The evaluation stage is based on the weighted average of expectations and decision weights. In the evaluation stage, people may use decision-making, non-linear probability weighting and other psychological principles to make decisions. After the editing phase, the decision maker evaluates the expectations and chooses the best one. In the evaluating phase, the size of expected value is decided by the value function and the decision weight function together. People will speculate the probability of occurrence of various outcomes when making decisions, and make the right choice through probability reasoning. According to the prospect theory, the risk decision process is shown in Figure 1.

DEVELOPMENT TREND OF BEHAVIOR ECONOMICS

The future development trends of behavioral economics mainly include the following several points.

Macroeconomic and savings.

In macroeconomics, some of the concepts can be explained by psychology, such as the ideas presented in behavioral economics can explain the rigidity of prices and wages. In macroeconomics, the life cycle model of savings is an extremely important model which assumes that people guess their lifelong income and make decisions their savings and consumption. Shefrin and Thaler put forward the “life cycle” of the savings theory [5], which shows people will put their incomes into different mental accounts, such as the current income and the future income. Mental accounts can reflect natural perceptual or cognitive divisions, can predict the deviation of the theory of life cycle model, and consider the uncertainty of future income and future wealth more carefully.

![Fig. 1. Risk decision framework based on prospect theory.](image)
Labor economics.

In macroeconomics, involuntary unemployment is a central puzzle, one of the reasons is the high wages lead to excess labor, resulting in unemployment. "Efficient wage theory", that is, people pay higher wages for workers, so that workers work harder, leading to a balance and the reciprocal preference. The theory of strong reciprocity in behavioral economics can explain it in some way. Second, the "behavioral life cycle" theory explains that workers make decisions based on different wage rates and wage fluctuations, balancing their leisure and labor time. Third, when people's actions have some kind of moral factors, the impact of changes in wages and prices may not like the traditional labor economics predicted, for example, the increased wage do not necessarily cause the increase of labor supply, but have a very different result.

Therefore, the knowledge of behavioral economics can help us to better understand some economic phenomena in labor market.

Finance

In finance, the effective market assumptions make some accurate predictions of financial phenomena, but there are still some shortcomings. Therefore, with the knowledge of behavioral economics, people put forward the "behavioral finance" theory, to explore some assumptions when the investors' rationality is limited. In finance, the "equity premium problem" is a critical issue, the average return on stocks is much higher than the bond returns. Benartzi and Thaler claim that they can solve the problems using the prospect theory, and they assume a combination of decision isolation [6]. Second, investors sometimes tend to be over confident, as well as the market will appear the lack of information. Behavioral finance introduces the technical analysis and the theoretical basis of the relevant behavioral economics to explain the anomaly. Now, more and more scholars use psychology methods to analyze some financial problems happened in financial markets.

Analysis of social cooperative behavior

Based on the knowledge of behavioral economics, economists conducted a series of experiments of strong reciprocity theory and altruistic punishments. Also, combining with evidence of brain science, the simulation analysis showed that through long-term life, people have formed a certain preference, and hope every individual can obey the rules consciously. Otherwise, people may do some punishments on those who break the rules. This kind of strong reciprocity is conducive to social stability and progress.

Therefore, we combined the knowledge of behavioral economics with the evidence of brain science and help us to study further on people's social co-operation.

CONCLUSION

This paper reviews the basic theory, history and prospect theory of behavioral economics, and briefly summarizes the development trend of behavioral economics in the future. We can use the theory of behavioral economics, on the basis of the revision and supplementation of the traditional Western economic theory, to effectively study some abnormal economic phenomena to make better predictions.
Behavioral economics, as a scientific theory of economics, is also an immutable rigid theory. It is not the final form of economics, and still a stage in the long history of economics development, which will continue to develop and is decided by the continuous development of human society and complex. In short, with the deepening of behavioral economics research, behavioral economics research has changed from capital, price and other non-emotional areas to the value of human self and its impact on the economic field. The non-economic trend in this field of research is becoming a significant phenomenon in the evolution of western economics in the 21st century.

REFERENCES