A Proposal to Construct "Behavioral Insurance Theory"

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A Proposal to Construct "Behavioral Insurance Theory"

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Abstract

  Traditional insurance economics derives some definite conclusions using the neoclassical economics method. However, those conclusions are too abstract to explain phenomena in the real insurance market. In other words, a number of anomalies remain that are not explained by traditional insurance economics. In this paper, in order to solve this problem, we propose the development of a "behavioral insurance theory," which is influenced by the establishment of "behavioral finance," which in turn emerged from the field known as "behavioral economics," and in which the analysis is less bound to subjects in the market. This proposal represents a paradigm shift in traditional insurance theory.

Key words: Behavioral economics, Regarding insurance premium as "a waste of money," Anomalies, Paradigm shift

1. Introduction

The ancestors of formal insurance theory may be the work of Ehrlich & Becker ［1972］, in which the subject has 3 attributes in accordance with orthodox microeconomics; "endless rationality," "perfect self-control," and "excessive egoism". Also, in accordance with "marginal analysis," the subject] combines 3 risk management tools: market insurance, self-insurance and self protection. Given these presuppositions, we can compactly present the subjective equilibrium conditions with a series of matrix equations.

However, the assumptions about these attributes are quite unrealistic in this early formal theory, and thus we could not exactly explain the risk management pattern of a real subject. As Simon ［1955］ had already pointed out, in the real world the subject's existence would not be threatened, although he would behave according to a principle of "satisfaction" rather than a principle of "optimization". The approach known as "behavioral economics" can explain why such a situation may emerge. According to Tada ［2003］, it is a developing academic area, which has progressed rapidly over nearly a decade.

We must note that "behavioral finance" was established by the new wave of economic theory in the field of orthodox finance theory, which is closely related to insurance science. We will also rely

upon the fundamental approach of behavioral economics in order to explain anomalies in the area

of orthodox insurance theory that until now have been considered unexplainable.

2. Behavioral Economics

Neoclassical economics assumes that human can be understood as "homo economicus," individuals who rationally make choices to maximize their utility. Homo economicus has 3 attributes endless rationality, perfect self-control, and excessive egoism. However, it is likely that such individuals make up a minority of people in the real world.

First, most humans do not behave with perfect rationality. This is clear in cases in which people face an uncertain event. In such a situation, homo economicus would consider all possible future events and make the best choice to maximize his utility. However, according to Edwards [1968], in the face of new evidence people update their posterior probabilities by too little in magnitude relative to the rational Bayesian benchmark. Humans are essentially conservative beings.

Second, most humans do not exactly exhibit perfect self control. Homo economicus makes choices among unlimited possibilities and attempts to allocate consumption and savings in order to maximize utility. But, according to Loewenstein & Prelec [1992], humans have "time inconsistency," meaning that for many people the discount rate in the short term is higher than that in the long term. Under time inconsistency, there is a possibility that "preference reversal" emerges; a subject who prefers "¥20,000 received after 11 years" to "¥10,000 received after 10 years" might

prefer "¥10,000 received after 1 year" to "¥20,000 received after 2 years". In other words, the problem of self control arises; a subject overrides a plan in which he maximizes his utility in the initial stage.

Third, most humans do not exactly act only for their own benefit. For example, most people involved in a volunteer activity would not be behaving only to get something in return.

In this way, as long as there are such gaps between homo economicus and people in the real world, it is not surprising that anomalies that can not be explained by a neoclassical economics based on rational choice theory arise in the real world.

Tada [2003] defines behavioral economics as an academic area that approaches the analysis of economic activities and phenomena under the assumption that economic players be defined more realistically as people who make mistakes and got swayed by emotion. Such a definition helps to explain various anomalies that neoclassical economics cannot explain and enhances the potential of economic analysis. In what follows, we explain the characteristics of behavioral economics.

One such characteristic is known as "bounded rationality". Simon [1955] pointed out that since humans have limits to their abilities, they would not behave according to the "optimization" principle but rather the "satisfaction" principle. If people behave according to this principle, then

they will make decisions with bounded rather than endless rationality.

Kahneman & Tversky [1974] had found that under bounded rationality people exhibited a behavioral pattern called "heuristics". In heuristics when people make decisions under the condition of uncertainty, they try to achieve approximate solutions without following a systematic procedure. There are three subordinate concepts within heuristics; representativeness (people analogize a whole image with the use of limited cases), availability (people image an event to be what they would prefer it to be), anchoring and adjustment (people start with an implicitly suggested reference point and adjust their judgment).

Under such a behavioral pattern, it is clearly incorrect to assume that people make decisions regarding an uncertain event by means of the traditional expected utility hypotheses (EUH). As an alternative decision-making model, Kahneman & Tversky [1979] suggested what they refer to as "prospect theory," which we discuss in the next chapter.

Another characteristic of behavioral economics is "bounded willpower". The subjects who have this attribute might make decisions on the basis of the pursuit of interactive pleasures, such as the postponement of a problem, blind purchase and easiness.

In another economic model, humans are considered to have only bounded willpower. This model

is known as the hyperbolic discount model (Ainslie ［1992］, Loewenstein & Prelec ［1992］). According to the traditional exponential discount model, utility decreases flatly as time advances. Correspondingly, according to the hyperbolic discount model, discounted utility in the initial stage is large and the discount rate goes down over time. Therefore, by applying this model, it is possible to explain the preference reversal which is already discussed.

A third characteristic of behavioral economics is "bounded self-interest." People do not make decisions based solely on their self-interest. In the real world, "reciprocity" plays an important role. They engage in the mutual interchange of favors or hostilities.

The concept of reciprocity is applied widely in various economic models, as in the constraint of monopolistic prices and the downward rigidity of wages in labor contracts.

As described above, behavioral economics assume bounded rationality, bounded willpower, and bounded self-interest and suggest new economic models. As an applied area of behavioral economics, it is "behavioral finance" that is most closely watched.

Ever since Harry Markowitz published his "portfolio selection" in the 1950s, the finance theory has made enormous progress as manifested by the number of Nobelists in the field, including Harry Markowitz, Merton Miller and William Sharpe in 1990 and Robert Merton, Myron Scholes in

1997. The investment theory evolved from the Modern Portfolio Theory that Markowitz elaborated and became the main stream of finance theory, as evidenced by the predominance of the capital asset pricing model (CAPM) that Sharpe developed and the option pricing mode (OPM) that Black, Scholes, and Merton developed.

The traditional finance theory is based on the expected utility hypothesis (EUH) propounded by von Neumann & Morgenstern ［1944］. EUH assumes that in a situation in which the outcome of the action is uncertain, the subject calculates his expected utility by multiplying the utilities gained from available outcomes by their respective generation probabilities, and makes decisions to maximize this expected utility. In the area of finance studying how people make decisions under uncertain conditions, it has been thought that, based on EUH, people choose rationally and behave to maximize their expected utility. However, in the real world we know that this is not strictly true, and thus one of the main concepts in traditional finance theory, the market efficiency hypothesis (MEH), cannot be accepted.

On the other hand, Friedman [1953] has stated that even if irrational investors (noise traders) exist, market efficiency would still be achieved since their trades are likely to cancel each other out if they trade randomly. Furthermore, even if their trades are biased toward a certain direction, as

long as rational traders exist in the market, the price of a security that temporarily departs from its fundamental value would converge by means of their arbitrage. Then, since noise traders buy expensive securities and sell inexpensive securities, they eventually disappear from the market. According to this argument, market efficiency occurs if either rational traders or arbitrage exists.

However, in the real world arbitrage by rational traders does not function perfectly. Shleifer & Vishny [1997] argue that when the volume of a noise trader's trade is large, even if rational traders arbitrate, it is difficult to drive the price back to its fundamental value.

Since new information is reflected in a security price rapidly and precisely in a world with perfect market efficiency, it is impossible that participants in the market earn superior risk-adjusted returns. However, since the 1980s many researchers have reported various anomalies that contradict the MEH. In terms of behavioral finance, it is believed that trades based on human irrationality skew security prices and lead to anomalies.
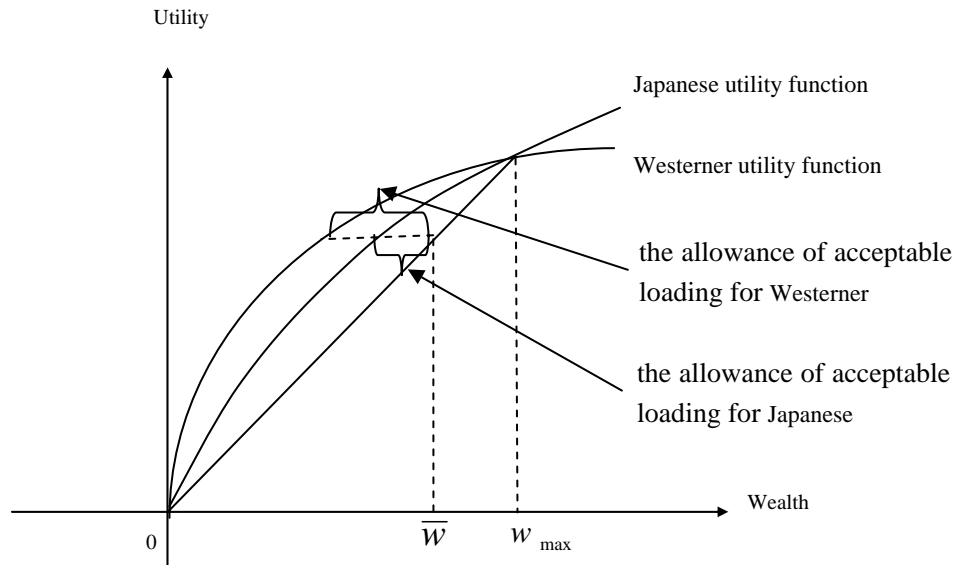
3. "Behavioral Insurance Theory"

- explanation of anomalies in the Japanese insurance area

In this chapter, using the framework of behavioral economics, we will explain several anomalies that could not be accounted for by orthodox insurance theory.

First, we will explain why the Japanese regard insurance premiums as "a waste of money". Until now the asset selection problem of the subject has been explained by Friedman & Savage ［1948］, according to whom the utility function U（W）of a risk-averse subject to asset W has in the 2nd order a differential minus value, i.e. is convex upwards. Additionally the higher the degree of risk aversion is, the larger is the rate of bend of the utility function, and the allowance of acceptable loading also necessarily becomes larger（cf. Fig.1）.

Figure 1

Utility

Japanese utility function

Westerner utility function

the allowance of acceptable
loading for Westerner

the allowance of acceptable
loading for Japanese
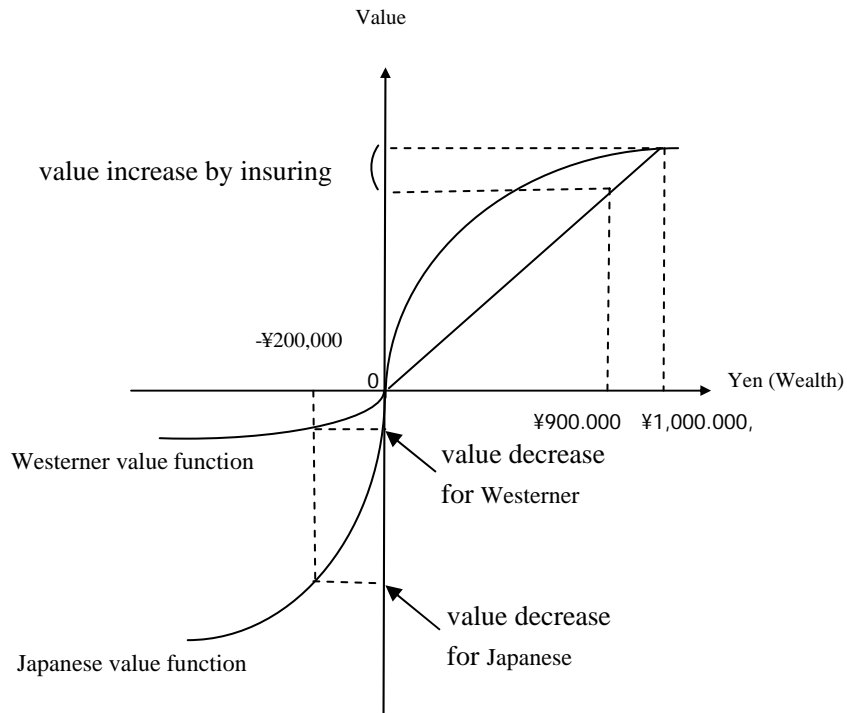
Wealth

0          $\overline{w}$ w_{max}

Source: created from Friedman & Savage [1948] Figure 1 (p.290)

But in explaining the insurance purchase behavior of the typical Japanese, the following

difficulty arises in this framework: the rate of bend of the Japanese utility function becomes nearly

0, because the typical Japanese individual dislikes "pay-out no-return type" insurance and would

prefer to make the total premium（=pure premium + loading）as cheap as possible. This context

leads us to the unrealistic conclusion: The Japanese have a risk-neutral utility function. Kahneman

& Tversky［1979］provide a route out of this problem.

Next, using the Kahneman & Tversky Model with a value function V（W）（cf. Fig. 2），we will analyze "typical Japanese mentality" that regards insurance premiums as "a waste of money." Suppose for example that a typical Japanese individual is endowed with a risky asset that will become ¥1,000,000 with a probability of 0.9 but could become ¥0 with a probability of 0.1. In this case, the value function V(W）in the 1st quadrant is similar to the utility function in the above-mentioned model of Friedman & Savage[1948]. The value of this risky asset in the endowed time is V（¥1,000,000. x 0.9 + ¥0 x 0.1）= V（¥900,000）. But if the subject pays a fixed insurance premium in advance（¥200,000 = ¥1,000,000 x 0.1 + loading（¥100,000）），the value which he maintains is ¥1,000,000 of a safe asset, independent of any event. Thus, "to buy insurance" will surely increase the value V in the 1st quadrant.

Figure 2

Value

value increase by insuring

-¥200,000

0

Yen (Wealth)

¥900.000   ¥1,000.000,

Westerner value function

value decrease
for Westerner

value decrease
for Japanese

Japanese value function

Source: created from Kahneman & Tversky [1979] Figure 3 (p.279)

On the other hand, in the prospect theory we must pay attention to the negative value due to the

premium payment in the 3rd quadrant. The fact that the Japanese avoid "pay-out" type insurance

more than Europeans and Americans means that the negative value of the premium payment is

significantly larger for the Japanese than for Europeans or Americans in the 3rd quadrant. This difference may be caused by cultural or historical factors on one or both sides.

Second, in Japan there is a large problem in the social annuity insurance scheme related to the reluctance of the young generation over 20 years old to make its premium payments. By law young Japanese over 20 must join this scheme, but about a half of them would not pay their premium in this assessment plan. In the survey of Sasaki［2003, 2005a, 2005b］involving a binary logit analysis of 506 samples of students, the main reason for this reluctance is not a calm calculation about advantage or disadvantage. Rather, although it is clear that in the present condition the young generation under 34 years old will receive less from the annuity than the value of the premium they must pay in Japan, the reluctance to pay results from a lack of conception of the so long period 45 years later, when the annuity payment will begin. In other words, it is a result of a "myopic" attribute of the subjects. Sasaki［2005a］has stressed not only the correction of inequality within that generation but also the need for the social security agency to publicly address the effect of "smoothing consumption over one's lifetime" or the effect of "economizing cost in selecting the best menu for elder security". Anyway it is due to "the limit of cognitive capacity" and so "bounded rationality" of the young generation.

Third, we would like to point out that quite a large number of latent "obligatory" or "unreasonable" insurance contracts have been entered into in Japan. Unlike in Europe and the U.S.A., the Meiji Restoration（1868）had not necessarily brought us a complete "civil revolution". It was not until after the 1970s that most of the life insurance system became covered by the insurance market in Japan. In addition, Japan is a small island country; its population density is now very high. Among the Japanese the values of interdependence and humility are stressed above independence and pride. Therefore the pressure for insurance sales by means of wet human relations or pre-modern human networks are latently so dominant that the excessive and unnecessary insurance contract may emerge.

Last, it seems to us that an upper limit（saturation level）has been reached in the diffusion of earthquake insurance in Japan, where earthquakes frequently occur. This is probably because the Japanese have become skeptical of incomplete conditions（e.g. underinsurance, clear-cut adverse selection）.

4. Conclusion

In orthodox insurance theory, the economic subject under pure risk is supposed to be "homo economicus" who behaves according to strict economic rationality. However, there is no guarantee that such a subject would make a calm decision in an abnormal or emergency case. According to Kahneman & Tversky〔1979〕from the standpoint of cognitive psychology, the judgment of humans confronting stochastic phenomena is not necessarily consistent; there are a significant number of anomalies that cannot be explained by the EUH. Thus, a "paradigm shift" is needed in orthodox insurance theory.

In general, human beings had long conceived of the possibility of unexpected disasters〔e.g. solar eclipse, flood etc.〕but hesitated to take action to protect against such an event. The philosophy of enlightenment that first became popular during the Renaissance and Protestant Reformation have released human beings from "Zaubergarten" and "modern insurance" has emerged as a product of thought of western European rationalism.

In other words, many people outside the sway of western European intellectual history have not experienced "Entzauberung," which refers to the confidence that an abnormal incident could be managed by normal methods〔cf. Weber〔1934〕〕. Thus it is difficult for the "economically

rational" incentive to emerge from the insurance system in Japan and to extract the "leverage effect," which means that policyholders can remove uncertain huge damages with a certain and relatively low level of insurance premium.

One typical difference between Japan and the U.S.A. arises in the problem of "Dread Disease Service" in the life insurance market. In the U.S.A., a buyer emerges to buy the insurance policy from a policyholder who has been determined by his doctor to become dead soon. In Japan, by contrast, the established life insurance company exclusively repurchases those policies. Even in the simply structured life insurance business, there appears to be a sharp difference between the two societies. In the analysis of more complicated insurance areas, it is necessary to develop the more rigid "behavioral insurance theory" as well as the theory of "behavioral finance," which explicitly contains the works of Kahneman & Tversky [1974, 1979].

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