

Reworking of the Anomalies in the Discounted Utility Model as a Combination of Cognitive Bias and Decrease in Impatience: Decision Making in Relation to Bounded Rationality and Emotional Factors in Intertemporal Choices

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Abstract : Every day we face choices whose consequences are deferred in time. These types of choices are the intertemporal choices and play an important role in the social, economic, and financial world. The Discounted Utility Model is the mathematical model of reference to calculate the utility of intertemporal prospects. The discount rate is the main element of the model as it describes how the individual perceives the indeterminacy of subsequent periods. Empirical evidence has shown a discrepancy between the behavior expected from the predictions of the model and the effective choices made from the decision makers. In particular, the term temporal inconsistency indicates those choices that do not remain optimal with the passage of time. This phenomenon has been described with hyperbolic models of the discount rate which, unlike the linear or exponential nature assumed by the discounted utility model, is not constant over time. This paper explores the problem of inconsistency by tracing the decision-making process through the concept of impatience. The degree of impatience and the degree of decrease of impatience are two parameters that allow to quantify the weight of emotional factors and cognitive limitations during the evaluation and selection of alternatives. In fact, although the theory assumes perfectly rational decision makers, behavioral finance and cognitive psychology have made it possible to understand that distortions in the decision-making process and emotional influence have an inevitable impact on the decision-making process. The degree to which impatience is diminished is the focus of the first part of the study. By comparing consistent and inconsistent preferences over time, it was possible to verify that some anomalies in the discounted utility model are a result of the combination of cognitive bias and emotional factors. In particular: the delay effect and the interval effect are compared through the concept of misperception of time; starting from psychological considerations, a criterion is proposed to identify the causes of the magnitude effect that considers the differences in outcomes rather than their ratio; the sign effect is analyzed by integrating in the evaluation of prospects with negative outcomes the psychological aspects of loss aversion provided by Prospect Theory. An experiment implemented confirms three findings: the greatest variation in the degree of decrease in impatience corresponds to shorter intervals close to the present; the greatest variation in the degree of impatience occurs for outcomes of lower magnitude; the variation in the degree of impatience is greatest for negative outcomes. The experimental phase was implemented with the construction of the hyperbolic factor through the administration of questionnaires constructed for each anomaly. This work formalizes the underlying causes of the discrepancy between the discounted utility model and the empirical evidence of preference reversal.

Keywords : decreasing impatience, discount utility model, hyperbolic discount, hyperbolic factor, impatience

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