OPTIMAL STOPPING UNDER PROBABILITY DISTORTION

XUN YU ZHOU

We formulate an optimal stopping problem for a geometric Brownian motion where the probability scale is distorted by a general non-linear function. The problem is inherently time inconsistent due to the Choquet integration involved. We develop a new approach, based on a reformulation of the problem where one optimally chooses the probability distribution or quantile function of the stopped state. An optimal stopping time can then be recovered from the obtained distribution/quantile function, either in a straightforward way for several important cases or in general via the Skorokhod embedding. This approach enables us to solve the problem in a fairly general manner with different shapes of the payoff and probability distortion functions. We also discuss economical interpretations of the results. In particular, we justify several liquidation strategies widely adopted in stock trading, including those of "buy and hold", "cut loss or take profit", "cut loss and let profit run", and "sell on a percentage of historical high".