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Original Articles

Filtration Consistent Nonlinear Expectations and Evaluations of Contingent Claims

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摘要 We will study the following problem. Let $ X_t, \ t\in [0,T]$, be an ${\pmb R}^d$--valued process defined on a time interval $t\in [0,T]$. Let Y be a random value depending on the trajectory of X. Assume that, at each fixed time $t\leq T$, the information available to an agent (an individual, a firm, or even a market) is the trajectory of X before t. Thus at time T , the random value of $Y(\omega)$ will become known to this agent. The question is: how will this agent evaluate Y at the time t?\\ We will introduce an evaluation operator ${\mathcal{E}}_t[Y]$ to define the value of Y given by this agent at time t. This operator ${\mathcal{E}}_t[\cdot]$ assigns an $(X_s)_{0\leq s\leq T}$--dependent random variable Y to an $(X_s)_{0\leq s\leq t}$--dependent random variable ${\mathcal{E}}_t[Y]$. We will mainly treat the situation in which the process X is a solution of a SDE (see equation (3.1)) with the drift coefficient b and diffusion coefficient $\sigma $ containing an unknown parameter $\theta =\theta _t $. We then consider the so called super evaluation when the agent is a seller of the asset Y. We will prove that such super evaluation is a filtration consistent nonlinear expectation. In some typical situations, we will prove that a filtration consistent nonlinear evaluation dominated by this super evaluation is a g--evaluation. We also consider the corresponding nonlinear Markovian situation.

关键词 option pricing, measure of risk, backward stochastic differential equation, nonlinear potential theory, nonlinear Markov property, dynamic programming principle

分类号

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Abstract

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