ROBUST OPTIMAL STOPPING UNDER VOLATILITY UNCERTAINTY

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We analyze a robust optimal stopping problem in a financial market with volatility uncertainty. This is a zero-sum controller-stopper game in which the stopper is trying to maximize its pay-off against an adverse player which tries to minimize this payoff by choosing the probability measure from a set $\mathcal{P}_t$ of measures who are not necessarily equivalent. In particular, we analyze the *upper Snell envelope* $\overline{Z}$ of the reward process Y and by comparing it with the Snell envelope of Y under each individual probability $\mathbb{P}$, we show that $\overline{Z}$ is an $\underline{\mathscr{E}_t} \stackrel{\triangle}{=} \inf\limits_{\mathbb{P}\in\mathcal{P}_t} \mathbb{E}_{\mathbb{P}}[\cdot]-$supermartingale, and a $\underline{\mathscr{E}}_t-$*martingale* up to the first time τ^* when $\overline{Z}$ meets Y. Consequently, τ^* is the optimal stopping time for the robust optimal stopping problem.