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Investment/consumption problem in illiquid markets with regime-switching

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We consider an illiquid financial market with different regimes modeled by a continuous-time finite-state Markov chain. The investor can trade a stock only at the discrete arrival times of a Cox process with intensity depending on the market regime. Moreover, the risky asset price is subject to liquidity shocks, which change its rate of return and volatility, and induce jumps on its dynamics. In this setting, we study the problem of an economic agent optimizing her expected utility from consumption under a non-bankruptcy constraint. By using the dynamic programming method, we provide the characterization of the value function of this stochastic control problem in terms of the unique viscosity solution to a system of integro-partial differential equations. We next focus on the popular case of CRRA utility functions, for which we can prove smoothness C^2 results for the value function. As an important byproduct, this allows us to get the existence of optimal investment/consumption strategies characterized in feedback forms. We analyze a convergent numerical scheme for the resolution to our stochastic control problem, and we illustrate finally with some numerical experiments the effects of liquidity regimes in the investor's optimal decision.

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