

# **“Principal-agent problems with hidden savings in continuous time: Validity of the first-order approach”**

## **Abstract**

In this paper, I establish the validity of the first-order approach to the continuous-time principal-agent problem with hidden savings. The agent's problem, which is non-Markovian, is formulated using a stochastic HJB equation. Without loss of generality, the payment process is designed so that it is optimal for the agent to choose zero savings. Then, the principal's problem can be expressed as maximizing her expected profit subject to two SDEs: one equation describing the agent's continuation utility process, and the other being the Euler equation concerning the agent's marginal utility process.