

# Stochastic Perron's method for Hamilton-Jacobi-Bellman equations

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We show that the value function of a stochastic control problem is the unique solution of the associated Hamilton-Jacobi-Bellman (HJB) equation, completely avoiding the proof of the so-called dynamic programming principle (DPP). Using Stochastic Perron's method we construct a super-solution lying below the value function and a sub-solution dominating it. A comparison argument easily closes the proof. The program has the precise meaning of verification for viscosity-solutions, obtaining the DPP as a conclusion. It also immediately follows that the weak and strong formulations of the stochastic control problem have the same value. Using this method we also capture the possible face-lifting phenomenon in a straightforward manner. This is a joint work with Mihai Sirbu.