

# Optimal Timing with Poisson Clock

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**Abstract.** We discuss optimal timing of an irreversible decision. The considered optimal timing problems are formulated as maximization problems of the expected present value of the exercise payoff, where the underlying dynamics follow a regular diffusion process. We formulate four variants of problem, one of which being the classical perpetual problem. Into the other three we incorporate an independent Poisson process  $N$  in different ways. In the first problem, the decision maker is allowed to exercise only at the jump times of  $N$ . In the second problem, the decision maker can stop at any time, but the payoff is not settled immediately but after an exponentially distributed random time. In the third problem, the first jump of  $N$  expires the opportunity, turning the perpetual problem into a problem with random, exponentially distributed time horizon. We propose a mild set of assumptions on the underlying and the payoff structure under which all four problems prove to be solvable. We discuss also the interrelations of the problems and their interpretations.

**Keywords** Optimal stopping, linear diffusion, resolvent operator, Poisson process here