

“Exploration and Exhaustibility in Dynamic Cournot Games”

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We study the stochastic effect of resource exploration in dynamic Cournot models. Our work is motivated by consideration of oligopolies in oil markets. We first treat the case of a monopolist who may undertake costly exploration to replenish his exhaustible reserves. We then consider a stochastic game between such an exhaustible producer and a green manager that has access to an inexhaustible but expensive source, such as solar power. The effort control variable is taken to be either continuous or discrete (switching control). In both settings we assume that new discoveries occur according to a Poisson process with intensity given by the exploration effort.

This leads to a study of systems of nonlinear first order delay ODE's. We derive asymptotic expansions for the case of a small exploration success rate and present some numerical investigations.