

Opportunity Hunters: A Model of Competitive Sequential Inspections

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There are many economic situations in which players compete to identify an uncertain event, or an “opportunity.” Once an opportunity appears, seizing it quickly is critical. For example, two firms may consider the introduction of a new technology into a market, which may either be ripe for the technology or not. The first firm to identify that the market is ripe and act benefits greatly. However, acting if the market is not ripe generates large losses, and checking market conditions is costly. Other natural contexts in which competition for opportunities occurs include innovation, patenting, launching new products, selling assets, head hunting, and dating. What is common to all these examples is that the right moment to act depends on identifying an unobservable event, while taking the other player’s strategy into account.

We propose a novel framework for analyzing competition for opportunities. We introduce a new type of games called “opportunity-hunting games.” In these games, an event (an “opportunity”) occurs at some unobserved and random point in time. There are two players who wish to discover the event (“seize the opportunity”) once it occurs. At each point in time, each player can inspect whether the event has already occurred at a cost. If a player discovers that the event has already occurred, she obtains the payoff v_1 , the other player obtains the payoff v_2 , and the game ends. Otherwise, the players can inspect again, and again, later in time. This possibility distinguishes opportunity-hunting games from the stopping or timing games that are usually analyzed in the literature.

Through varying the parameters of the model, it is possible to span the range from games in which the competition between players to be the first to identify the opportunity is the dominant force, to games in which free-riding on the other player’s effort is the dominant force. We show that the game has a unique Markov Perfect Equilibrium, which takes one of two forms depending on the parameters of the game: the first involves frequent synchronized inspections, and the second exhibits slow diffusion in which the players inspect randomly at different times. In the second type of equilibrium, changing the value of v_2 has no effect on the players’ equilibrium payoffs. This implies that from a designer’s perspective, it is better to concentrate efforts on decreasing the cost of inspection rather than increasing the reward v_2 .

The analysis of opportunity-hunting games necessitates the incorporation of new analytical techniques. It also contributes to the understanding of stochastic games with a partially observable state, which is known to be a challenging area of study.

A full version of this paper can be found at <https://eilatr.github.io/OpportunityHunters/OppHunters.pdf>.

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