Stochastic Impulse Games for Retail Energy Markets

Coordinators: René Aïd & Matteo Basei
Université Paris Dauphine & Université Paris Diderot

Stochastic impulse control games allow to model strategic interaction between economic agents who are making decisions at random times. In the recent work [1], this framework has been used to model the competition between two retailers in the energy market. Retailers objective is to maximise their total discounted profit made of the product of their evolving market share times the difference of their retail price minus the same sourcing cost. Each price change induce an affine cost of their market share. Market shares are split between them according to their price difference. This problem gives rise to a system of variational inequalities for which even in the simplest case of a linear dependence of market shares to price difference, no analytical solution is available.

The purpose of the project is to solve numerically the system of variational inequalities appearing in [1]. The solution consists in exercices frontiers in separating a continuation region (no action is taken) and an intervention zone (one of the player is changing her price). Their already exists numerical methods known as iteration policy or Howard algorithm for a single one-dimensional variational inequality [2, 3, 4]. During this project, the interns will develop and test extension of the available numerical schemes that can provide an approximation of the optimal frontiers.

References

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