

# On a new solution concept for Single-Leader-Multi-Follower under uncertainty

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When considering a set of agents interacting both in a hierarchical manner and in a non cooperative way, a classical model is the so-called Multi-Leader-Follower problem. When only one leader is identified the model reduces to Single-Leader-Multi-Follower and the non cooperative game between the followers is captured through the concept of (generalized) Nash equilibrium, see, e.g. [1]. Finally if some uncertainties occur then stochastic Single-Leader-Multi-Follower game are usually considered.

The aim of this work is to propose an alternative approach intrinsically integrating at the same time uncertain future and time dependent decision processes. It is called Single-Leader-Radner-Equilibrium (SLRE) and is characterized by a hierarchical structure with one leader and several followers competing to reach a Radner equilibrium. Thanks to a variational formulation of this bilevel problem we proved an existence result for such model.

An application to the optimal design of an Eco-Industrial Park is finally presented.

## References

- [1] D. Aussel and A. Svensson, Chapter *A short state of the art on Multi-Leader-Follower Games*, pp. 53-76, In: Dempe S., Zemkoho A. (eds) *Bilevel Optimization. Springer Optimization and Its Applications*, vol 161 (2021), Springer, Cham.
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