# Prospect Dynamics and Loss Dominance

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**Abstract**

This paper investigates the role of loss-aversion in affecting the long run equilibria of stochastic evolutionary dynamics. We consider a finite population of loss-averse agents who are repeatedly and randomly matched to play a $2 \times 2$ coordination game. When an agent revises his strategy, he compares the payoff from each strategy to his reference point which is endogenously formed. Based on the comparison, he makes a (possibly stochastic) choice. We call the resulting evolutionary dynamics *prospect dynamics*. Three types of endogenous reference points are examined: the social average, status-quos and expectations. We find that risk-dominance is no longer sufficient to guarantee stochastic stability under prospect dynamics with any type of reference points. Therefore, we propose a stronger concept, *loss-dominance*: a strategy is loss-dominant if it is both risk-dominant strategy and the maximin strategy. This concept captures people's psychological needs to avoid not only risks but losses. We show that it serves as a natural selection refinement for games with loss-averse agents. The state in which all agents play the loss-dominant strategy (if exists) is uniquely stochastically stable under prospect dynamics for any degree of loss-aversion and all types of reference points. We also characterize the precise conditions for stochastic stability in games with no loss-dominant strategy.

**Keywords:** Evolutionary game theory, Behavioral game theory, Equilibrium selection, Loss-aversion, Prospect dynamic, Loss-dominance, Risk-dominance, Maximin.

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