# Description for the general public

Optimization in economics is one of the basic terms and it is a core of investments, managing and risk analysis. Typically optimization problems concern minimization or maximization of some value function related with a costs, gains and randomness of the market. Within this project we plan to develop the stochastic approach to this problems based on martingale arguments. Martingales appear naturally in financial mathematics since discounted price processes are martingales. We will focus on five main optimization problems: maximization of dividend payments, minimization of the ruin probability, pricing equity-linked products based on drawdowns, pricing cap american options and identifying the quickest detection of abrupt changes in the actuarial and financial markets.