The goal of this thesis is to characterize payoffs that maximize expected utility function in different market setups. One can solve this problem in its generality in terms of a function of a likelihood ratio between the subjective measure of an agent P and a risk neutral measure Q. Such payoffs should be transformed to the function of the terminal stock price. The question is what measure P should be chosen, the natural candidates would correspond to either the frequentist or the Bayesian choice of the parameters. The thesis should provide a link to the Kelly Criterion in the binomial evolution of the stock price and to the Merton's Portfolio Problem in the geometric Brownian motion example showing the possible extensions of these well known problems in the novel Bayesian setup. The thesis should discuss pricing and hedging of these contracts together with their asymptotic behavior.