This diploma thesis deals with the problem of portfolio optimization in relation to the mean vector and the variance matrix of yields. The emphasis is put on Markowitz model. In the thesis there are explored some possibilities of robustification based on the used parametric set. Beside the classic formulation of the task our focus is also devoted to the cases in which short sales are not allowed. The core of the thesis constitutes of a simulation study that models the impact of errors in the estimation of the input parameters of Markowitz model. It takes into account different types of risk aversions and different approaches to modelling parameter perturbations . Therefore it specifies the hypothesis of the dominating influence of the mean vector estimate which is valid only for a risk lover.