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Optimal Control in the Classical Risk Model: Maximization of the Survival Probability by Franchise and Deductible Amounts

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We deal with the problem of survival probability maximization in the classical risk model when an insurance company has the opportunity to choose franchise and deductible amounts continuously. As a rule, these provisions are applied when the insured's losses are relatively small to deter the large number of trivial claims. Moreover, a deductible stimulates the insured to take more care of the insured property. Normally, a franchise and a deductible imply also reduction of insurance premiums. Thus, the changes in claim and premium sizes have an influence on the survival probability of the insurance company. Our problems are to maximize the survival probability adjusting franchise or deductible amounts. We apply stochastic control theory to solve these problems. In particular, we concentrate on the case of exponentially distributed claim sizes. Moreover, we find the analytical expression for the ruin probability when the franchise is established at constant level, and we investigate how it changes the survival probability when the initial surplus of the insurance company is small or large enough.