OPTIMISATION OF BORROWER'S RISK ON MORTGAGE LOAN [1]

S.A. Malakh, V.V. Servakh

Sobolev Institute of Mathematics SB RAS, Omsk
e-mail: malahsveta@mail.ru, svv_usa@rambler.ru

When arranging a mortgage loan the borrower should think of his/her financial possibilities, as the delay of current payment leads to reconsidering bank agreement or its involuntary termination. Numerous publications about risks of mortgage loans are mostly devoted to problems the banks face at.However, the information provided for the borrowers is not enough to optimize risk on mortgage loan.

This paper investigates a model of risk minimization by a borrower when using an annuity loan scheme. A borrower having M rubles on him wants to buy a flat which costs S. Of this money a reserve Z is formed, the difference between M and Z is deposited as the first payment and the loan is received in the amount of $D = S - M + Z$ for T months.By the annuity loans monthly payments are $R = Dr\frac{(1+r)^T}{(1+r)^T-1}$, where r is a monthly loan rate. The borrower's profit at the moment T is a random quantity $\xi(t)$ with known distribution. The values of S and M are fixed and the quantities of T and Z are defined by the borrower. And D and R are dependable variables.

Let us call a borrower's risk $P(Z,T)$ as probability of shortage of money for repayment of current payment at a certain moment of time $t = 1, 2, ..., T$. Let $z(t)$ be distribution reserve at the moment t. Basically, the risk $P(Z,T)$ consider equal to zero, and $z(0) = Z$. Then we organize a cycle on t from 1 to T calculating current reserve distribution using a recurrent formula $z(t) = z(t-1) - R + \xi(t)$. Negative values of this random quantity exclude from further consideration, and $P(Z,T)$ increases by summary value of relevant probabilities. The outcome of the algorithm is the risk value depending on the loan term T and the quantity reserve Z.

There has been a program written for calculating risks and an experiment held, based on the real data as well. The calculations present that by the fixed time T the risk function has a single minimum on Z. And the risk function decreases monotonously on parameter T. But overpayment on the loan increases significantly with T rising. At the present time two-criteria model is being investigated, which takes into account both the risks and the total financial borrower's expenses.