

Simulation Example Problem: Insurance Reserve Capital

The automobile insurance division of the *Great Benefit* insurance company expects an average of 1,000 claims in the forthcoming year, with the actual number of claims being random and well described by a Poisson distribution. The value of each claim is a random variable, independent of all other claims, with a mean of \$5,000 and a standard deviation of \$1,500.

The division has \$6 million of capital, which is split into two parts. The first part is the *reserve capital* needed to pay claims over the next year. The remainder is invested in short-term bonds, which provide a random return, equally likely to be any value between 5% and 8%. If the reserve capital turns out to be less than the total value of claims for the year, the division has to borrow enough money, at a cost of 10% of the amount borrowed, to make up the difference.

The firm would like to find a capital allocation that maximizes the expected amount of cash they have left at the end of the year. Suppose they have narrowed down their choice to the following possible amounts of reserve capital: \$4.7 million, \$4.8 million, \$4.9 million, \$5.0 million and \$5.1 million. Based on 1,000 simulation trials each, which option is the best?