Pricing Insurance and Setting a Security Loading

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# Load necessary libraries  
rm(list=ls())  
library(tidyverse)  
library(lubridate)  
library(MASS)  
library(astsa)  
library(tsdl)  
library(xts)  
library(tibble)  
library(ggplot2)  
library(readxl)

# 1. Compute the net single premium for the policy.

# 2. Compute the net annual premium for the policy.

# 3. Determine the single premium for the policy for a group of 2,500 identical insureds so that the probability of a loss is less than or equal to 0.025.

# 4. Determine the annual premium for the policy for a group of 2,500 identical insureds so that the probability of a loss is less than or equal to 0.025.

# 5. What happens to the single and annual premiums as the number of identical insureds increases under the premium calculations in 3 and 4?

# 6. Produce a chart of the single and annual premiums as a function of the number of insureds under the requirements of items 3 and 4 respectively.

# 7. Now assume that 10 years have passed and there are 2,050 lives remaining from the original pool of insureds. How much reserve should the insurer have per policy in order to have a 98% probability of not losing money? Do this calculation for the annual premium case.

# 8. Discuss the benefit and drawbacks of charging a portfolio level premium versus a net premium based on the equivalence principle.