Introduction to Finance

Quiz 5 *November 26, 2019*

1. Oriental Land Company (the owner of Tokyo Disneyland) is selling \$200 million of 5-year Tokyo earthquake cat bonds. The bonds pay an annual coupon of 7%. The yield to maturity on 5-year US Treasury bonds with similar terms is 3% on a continuously-compounded basis. The hazard rate that aggregates all of the market wisdom for earthquake risk in Tokyo is 1.5% on a continuous basis.

   (a) **(10 points)** Write the timeline of promised future cash flows on this bond.

   (b) **(10 points)** Write the timeline of expected future cash flows on this bond.

   (c) **(10 points)** What is the present value of this bond?

   (d) **(10 points)** What can you say about the yield to maturity on this cat bond, without using Solver?

2. FEMA (the Federal Emergency Management Agency) issued \$300 million of 4-year 11.25% flood-damage-linked cat bonds at a price of par. These bonds make annual coupon payments, and will default if there is a major flood along the Mississippi River. US Treasury notes with 4-year terms yield 2% on a continually-compounded basis.

   (a) **(15 points)** What is the implied hazard rate that the market is using to assess the flood risk associated with this cat bond?

   (b) **(10 points)** What is the probability that there will be a devastating flood along the Mississippi at any time over the next four years?

   (c) **(10 points)** What is the expected return on these 11.25% flood-damage-linked cat bonds? (No computations needed.)

3. As we discussed in class, my neighbor Jane has net worth of \$10 billion, and does not insure her \$700,000 house in Tucson. My neighbor Jim also has a \$700,000 house, and his net worth is \$1 million. Jim insures his house against fire loss. The probability of a fire over the next year is 0.5% (half of one-percent, which is the continuous hazard rate), and Jim pays \$4,500 for one year's worth of fire insurance on his house.

   (a) **(10 points)** What is the actuarially fair price of the one-year fire insurance policy on one of these houses?

   (b) **(15 points)** Discuss why Jim pays \$4,500 for one year's worth of fire insurance on his house, but Jane is unwilling to pay this for insuring her house?