

Introduction to Finance – I  
Problem set on Cat Bonds

**Concept Questions and short answers. Answer precisely and concisely.**

1. A local money manager who manages the savings of retirees feels that the yields on traditional Treasury and corporate bonds are unattractively low, but that some Catastrophe bonds proposed by a friend at Morgan Stanley offer an attractive yield. In particular the State of Florida hurricane bonds are 5-year bonds that offer a yield that is 275 basis points higher than the yield on the 5-year Treasury note. He is considering two alternative strategies. The first strategy would shift 25% of the portfolios of each of his wealthy clients (whose portfolios exceed \$15 million) into Cat Bonds. Under the second strategy he would buy \$20 million of the cat bonds and place 1% of every investor portfolio's in these instruments.
  - (a) He is fixated on the 275 basis point spread that this security offers over Treasuries. How would you explain why the spread is 275 basis points? (For example, is it a “free lunch?”)
  - (b) Which of the two strategies is preferred and why?

**Problems. Show all work. Clearly indicate your answer to each question.**

1. Suppose that Farmers has issued 4-year Cat bonds linked to hail damage for car dealerships in eastern Nebraska. Your experts tell you that the hazard rate for such events is 2% per year, (on a continuous basis). The coupon on these bonds is 6%, paid annually, and the bonds become worthless if a hail storm occurs in eastern Nebraska. Suppose that the (Treasury) yield curve is flat at 6% on a continuously-compounded basis.
  - (a) What is the probability that after 4 years the cat bond holders receive the full interest and principal?
  - (b) Find the value of this cat bond by discounting its expected cash flows at the spot rates, and use Solver to find its (continuously-compounded) yield to maturity.
2. You see that a newly issued cat bond linked to named storm damage along the Gulf coast with a 5-year term and  $5\frac{1}{2}\%$  coupon sells for 98% of par. The on-the-run 5-year Treasury note currently has a yield to maturity of 1.65%.
  - (a) Assuming a constant hazard rate, what is the hazard rate that you can infer from the market price on this cat bond?
  - (b) What does this “hazard rate” mean in “layman’s terms?”