

Notes for Thursday, October 19.

There is one concept: The time value of money. Furthermore, at this point we are only considering "lump sums." Examples include Treasury bills, Treasury STRIPS, zero-coupon bonds, and bank deposits. This means that cash flows occur only at 2 points on our timeline.

One thing I would like to clarify: With bills and zero-coupon bonds there is no explicit "compounding" of interest as there is with a bank account, or certificate of deposit (CD). When you buy one of these securities the only values you know are the price you pay and the par amount you will receive when the security matures.

All questions will involve using one or both of our 2 valuation equations:

1.  $PV \cdot (1 + r/p)^{pT} = FV$
2.  $PV \cdot \exp(rT) = FV$

Our notation:

- PV is the present value
- r is the interest rate
- p is the compounding frequency – number of compounding periods in a year
- T is the number of years
- FV is the future value.

Additional examples:

1. Find the yield to maturity on a zero-coupon bond:
  1. Consider a 5-year zero-coupon Treasury STRIPS that sells for 82.0348.
    - i. What is this security's bond-equivalent yield?
    - ii. What is the continuously-compounded yield on this security?

Features of this problem:

1. There is an institutional feature that bond prices are quoted in percentage of par terms. Which, in this example, means that \$82.0348 buys a promise to receive \$100 in five years.
  2. Bond-equivalent yield means semi-annual compounding.
2. A US Treasury zero-coupon STRIPS matures in 7 years. It has a bond-equivalent yield-to-maturity of 6.25%. What is this STRIPS' price?
  3. A US Treasury STRIPS that matures in 13 years has a continuously-compounded yield-to-maturity of 7.5%. What is this STRIPS' price?
  4. Your bank offers you an 18-month CD that pays 4.25% compounded semi-annually or alternatively, 4.1% compounded continuously. Which do you prefer?

5. How long will it take a deposit into a bank account to double if the account earns:
  - i. 5% interest compounded annually?
  - ii. 5% interest compounded continuously?
  - iii. 7% interest compounded semi-annually?
  
6. You purchase a 6-year CD earning 3.25% with monthly compounding for \$15,000. What will this CD be worth when it matures?