

**Present Value, Yield to Maturity, and Bond Prices
Exercises**

Present value, internal rate of return, yield to maturity and related concepts are the backbone of financial economics. This exercise provides opportunities for students to apply those concepts in a variety of contexts. The final exam will, in part, test student understanding of these concepts.

1. Suppose the rate of interest at which you can borrow and lend is 8% per annum. What is the present value of a discount bond which pays \$3000.00 at the end of three years (and, by definition, nothing until then)? Explain why it makes sense that the present value is less than \$3000.00? What happens to the present value of this bond if the interest rate falls to 7.5% per annum? Explain why your answer makes sense.
2. Suppose that you are considering subscribing to *The Economist*. The cost of a one-year subscription is \$90.00 payable in advance. The cost of a two-year subscription is \$170.00 also payable in advance. In either case, you don't have the cash now so you plan to pay for your subscription by charging it to your credit card. Are you better off subscribing for two years or subscribing for one with the intention of renewing your one-year subscription next year? Explain. How would your answer change if you are paying for the subscription with money you currently hold in a saving account?
3. You have received a gift of \$1000 from Uncle Buck and wish to save it to use as the down payment on a car that you intend to buy in three years. Which of the following financial strategies is the best.
 - a. Buy for \$1000 a U.S. Saving Bond (discount bond) that matures in three years and pays \$1200 at maturity.
 - b. Buy a three-year U.S. Treasury Bond with a face value of \$1000, a coupon rate of 6.5% and a current market price of \$1000.
 - c. Buy a five-year U.S. Treasury Bond with a face value of \$1000, a coupon rate of 6.7% and a current market price of \$1000.
4. While in Cherokee for a hiking trip you buy a ticket for what a lottery with an advertised first prize of a million dollars. YOU WIN!!! But you find out that the prize is actually \$50,000 per year for the next 20 years. What is your prize really worth?
5. The British government sells perpetuities that are called consols. Perpetuities are illegal in the U.S..
 - a. What will be the market price of a consol that pays 100 pounds per year if the market interest rate is 5.00%?
 - b. What will happen to the market price of the consol if the interest rate suddenly and unexpectedly rises to 6.00%?
 - c. The current interest rate is 5.00% but the price of the consol is lower than the amount you computed in part a? Provide a plausible explanation.
6. You begin the current planning period with no tangible wealth. You will work for three periods and then be retired for two periods before you die. You plan to leave nothing for your heirs. You expect your working income to be \$20,000, \$60,000, and 80,000 in years one, two, and three. You can borrow and lend at 6% per period. You prefer to consume the same amount in every year. You will be paid and will consume at the end of each period. Show your work and explain your answer.
 - a. What is the largest, constant consumption stream that you can afford?
 - b. What borrowing and lending strategy will you use to realize your part-a consumption plan?
 - c. What is the expected time path of your wealth? Recall that wealth is a stock rather than a flow..

7. Will a degree from UNC raise your income enough to justify the opportunity cost of attending? Imagine you are again a high school senior deciding whether or not to attend college. While attending college confers many non-monetary benefits, in this exercise we will focus on the monetary benefits alone. Also, for the sake of simplicity, assume that you are paying the direct costs of attending UNC yourself. Or, if you prefer, assume that your parents were willing to give you the money they would have spent sending you to UNC in order to set you up in the alternative activity of your choice.
- Again from the perspective of a high school senior, forecast your income net of educational expenses in two cases: (i) attending UNC and (ii) not attending college. In each case forecast your income in a thoughtful way for a period up until your 40th birthday. When forecasting your income in case ii, think carefully about what sort of job you might have had. In both cases, do some research to make your income forecasts consistent with incomes typically earned by individuals in jobs you expect to have or to have had.
 - Most or all of the income you forecast in part a lies in the future. For some careers, such as a doctor, the income stream starts later and is higher. If you don't attend college, the income stream starts immediately after high school but, typically, is smaller. Therefore, to compare the income streams requires that you discount future earnings. Think carefully and choose a discount rate that is appropriate for your situation. Explain why the rate you chose is appropriate.
 - Compute the present value of the UNC and non-college income streams. Which is larger? Do your income forecasts imply that attending UNC was a good financial decision?
 - How sensitive do you think your answer is to the fact that your forecasts stop at age 40? Explain.
8. It is January, 2007, and you have decided to plan your life. You plan to have one child who will enroll at UNC in January, 2032. You estimate that you will need \$100,000.00 in January, 2032, to finance the expense of your child's college education package. You expect to earn, on average, 8 percent on any funds that you save during the next 25 years.
- UNC offers you the following prepayment option. Pay \$20,000.00 now and UNC will cover the cost of your child's education package in 2032 provided (s)he is admitted. If (s)he is not admitted, UNC will refund your money including compound interest computed at 8 percent? You do not have \$20,000 but your parents will lend it to you. Should you take advantage of the prepayment option? Explain your answer completely and show any calculations in complete detail. There will be a substantial penalty for an incomplete answer.
 - Suppose that you decide to turn down the prepayment option for some reason. You decide instead to save a constant amount at the end of each year to finance your child's college education package. How much must you save each year? Explain your answer completely and show any calculations in complete detail. There will be a substantial penalty for an incomplete answer.