M329F Theory of Interest
Spril 2020
University of Texas at Austin
Homework #7
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Note: You **must** show all your work. Numerical answers without a proper explanation or a clearly written down path to the solution will be assigned zero points.

Problem 6.1. (5 points) Consider the following bond which is supposed to account for inflation.

The bond's term is 8 years and the face value is \$1000. The redemption amount is $1000 \cdot (1.025)^8$, the first annual coupon is \$80 and each subsequent one is by 2.5% greater than the one preceeding it.

Roger wishes to earn a non-inflation adjusted rate of 8% on this bond. How much should he be willing to pay?

Problem 6.2. (8 points) A corporation decides to issue an inflation-adjusted bond with a par value of \$1,000 and with annual coupons at the end of each year for 10 years. The initial coupon rate is 7% and each subesquent coupon is 3% greater than the preceding coupon.

The bond is redeemed for \$1,200 at the end of 10 years. Find the price the investor should pay to produce a yield rate of 9% effective.

Problem 6.3. (7 points) Find the price of the bond with par value \$1,000 and 10 years to maturity with coupons at 8.4% convertible semiannually, if the investor's yield rate is to be 10% convertible semiannually for the first five years and 9% convertible semiannually for the next five years. The redemption amount of this bond is \$1,050.

Problem 6.4. (10 points) Roger purchased a 30-year, 7%−annual-coupon bond with a face value of 1000 to yield 8% effective per year. The bond is a callable bond, with a redemption amount of \$1,050 for any call date. It can be called by the issuer on any coupon date staring with the one five years after its purchase.

(i) (5 points) What is the price P that Roger paid for this bond?
(ii) (5 points) Due to external reasons, the issuer decides to call the bond right after the 14^{th} coupon payment. What is the yield that Roger realized on this investment?

Problem 6.5. (10 pts) A 100 par value 4% bond with semiannual coupons can be called just after any coupon payment starting from 5 years after issue. The redemption amount at the time the bond is called depends on the call date as follows:

- If the call date is between 5 and 9.5 years after issue, the redemption amount is 110.
- If the call date is between 10 and 14.5 years after issue, the redemption amount is 105.
- If the call date is 15 years after issue, the redemption amount is equal to the face amount.

Assume that an investor can realize a yield rate of 5% convertible semiannually with the above bond. Find the price of the above bond for this investor.

Please, provide your *final answer only* to the following questions:

Problem 6.6. (2 points) You are given the following table of spot rates:

Length of Investment	Spot rate
1 year	0.04
2 years	0.045
3 years	0.05

Suppose you are guaranteed an interest rate of 5% for a two-year loan or investment made one year from today. This guarantee creates an arbitrage opportunity. *True or false?*

Problem 6.7. (2 points) A call provision means that the owner of the bond can redeem the bond before the maturity date. *True or false?*

Problem 6.8. (2 points) The book value of the bond is supposed to tako into account market forces. *True or false?*

Problem 6.9. (2 points) An \$800-par value, 10% 10-year bond with semiannual coupons is redeemable for \$1,020. It is purchased for \$880.
Then, this bond is sold at a discount. *True or false?*

Problem 6.10. (2 points) If there are higher yield rates for shorter term investments, one obtains a normal yield curve. *True or false?*