Lancaster University

PART II   (SECOND AND FINAL YEAR)

ACCOUNTING AND FINANCE

AcF304   BOND MARKETS

(2 hours + 15 minutes reading time)

Sections A and B are compulsory
Answer one question only in section C (i.e. either Question 1 or Question 2)
Closed book
Financial calculators allowed

Section A (30 marks)
This section is compulsory

- You must provide the date, your **full name** and your **library card number** on the MCQ answer sheet.
- Only answers recorded on the MCQ answer sheet will be taken into consideration when marking the examination.
- Choose only one answer A, B, C, D or E, for each question
- Each correct answer gives three marks
- Absence of answer gives 0 marks. There is no penalty for blank answers
- For each incorrect answer **1 mark is deducted**.

1. A 4.25% semiannual coupon payment corporate bond matures on June 18, 2026. The street convention yield to maturity on the corporate bond is 3.88% for settlement on January 21, 2015. Accrued interest is calculated on a 30/360 day-count basis. The full (or dirty) price for the bond is closest to:
   A. 103.382
   B. 103.040
   C. 103.771
   D. 103.985
   E. 103

2. Bank A is buying some securities from Bank B, and simultaneously promising to sell them back to Bank B in 60 days. Bank A has:
   A. Engaged in a Reverse Repo
   B. Bought a Credit Default Swap
   C. Bought commercial paper investment
   D. Engaged in an Interest Rate Swap
   E. Raised funds, through the Federal Funds market

3. During Jan 2014, a trader at Deutsche Bank in Frankfurt buys one unit of a 10-year 2% annual coupon German Bond at 1% yield denominated in Euros, and one unit of a 10-year 2% annual coupon Switzerland Government Bond at 1% yield denominated in Swiss Franc. One year later, the Swiss National Bank abandons the currency cap to the Euro, and the exchange rate goes from 1.20 CHF per EUR to 1.05 CHF per EUR. After the announcement in Jan 2015, the bonds bought during Jan 2014 are trading at a market yield of 1% and -1% for Germany and Switzerland, respectively. After the announcement, the market value in Euros of this position is:
   A. 234.9 Euros
   B. 230.85 Euros
   C. 236.97 Euros
   D. 241.19 Euros
   E. We are not able to measure the market value because Swiss bond cash flows are uncertain and depend on the future exchange rates

Please turn over

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4. Which of the following sets of estimated recovery rates is most plausible for senior secured, senior unsecured, and junior subordinated bonds?
   A. Junior Subordinated 40%, Senior Secured 50%, Senior Unsecured 60%
   B. Junior Subordinated 40%, Senior Secured 70%, Senior Unsecured 50%
   C. Junior Subordinated 60%, Senior Secured 40%, Senior Unsecured 50%
   D. Junior Subordinated 70%, Senior Secured 40%, Senior Unsecured 50%
   E. Junior Subordinated 100%, Senior Secured 40%, Senior Unsecured 50%

5. A 5-year corporate bond with a 6% annual coupon has a duration of 8.88, and a current price of $90. If interest rates increase by 50 bps the price will decrease to 87. If interest rates decrease by 50 bps the price will increase to 95. What is the best estimate of the convexity adjustment to the 'percentage price change based on duration' if interest rates decrease by 200 bps?
   A. 8.88%
   B. -8.88%
   C. 1.11%
   D. 17.78%
   E. -17.78%

6. A corporate bond has an effective duration of 4.5 and a convexity of 25. Which of the following is closest to the change to the bond's price if its yield rises by 2%?
   A. 8.% rise
   B. 8.% fall
   C. 5.5% rise
   D. 10% rise
   E. 3.5% fall

7. At low yields, which of the following best describes the price impact of a further decrease in yields on a callable bond?
   A. The price increases slower than an option free bond due to negative convexity
   B. The price increases faster than an option free bond due to positive convexity
   C. The price increases at a similar rate to an option free bond
   D. The price decreases at a similar rate to an option free bond
   E. The price decreases due to positive convexity

8. James works with PIMCO as an analyst and is currently evaluating the putable bonds trading in the global financial markets. A significant part of James' research report includes the effects of changes in interest rates on bonds with embedded options. James should conclude that as interest rates become more volatile, the putable bond prices tend to:
   A. Remain the same because the put option does not grant the issuer the right to retire the issue from the market before maturity
   B. Remain the same because putable bonds do not depend on interest rate volatility
   C. Increase
   D. Decrease
   E. None of the above

9. On January 2008 two counterparties agreed to obtain/provide protection against General Motors's bonds using a 5-year CDS contract with a $10 million notional amount. The protection buyer (insured) and the protection seller (or insurer) agreed a CDS spread of 1,000 bps. Which of the following is true?
   A. The protection seller pays an annual interest of 1,000bps to be insured against default risk
   B. The protection buyer pays an annual interest of 1,000bps to be insured against default risk
   C. The protection buyer pays $10 million to the protection seller in the event of default
   D. The protection buyer pays $10 million to the protection seller at maturity of the CDS contract
   E. The protection seller pays $10 million to the protection seller at maturity of the CDS contract

10. Which of the following is more *likely* to cause a widening in the 2y-10y spread (steepening in the Treasury yield curve)?
    A. A small investor intends to buy 10-year Treasury Notes
    B. A large fund manager intends to sell large quantities of 2-year notes
    C. The market expects lower future short-term interest rates
    D. The Federal Reserve announces tapering of Quantitative Easing policies
   E. The Federal Reserve announces new Quantitative Easing policies

Total for Section A: 30 marks

Section B (30 marks)

This section is compulsory
Answer both Question 1 and Question 2
Choose 3 items out of the 4 items available

Question 1

A US mutual fund manager is currently looking at the evolution of the 10-year Treasury rates, the 10-year TIPS rates, and the Overnight Effective Federal Funds rate.
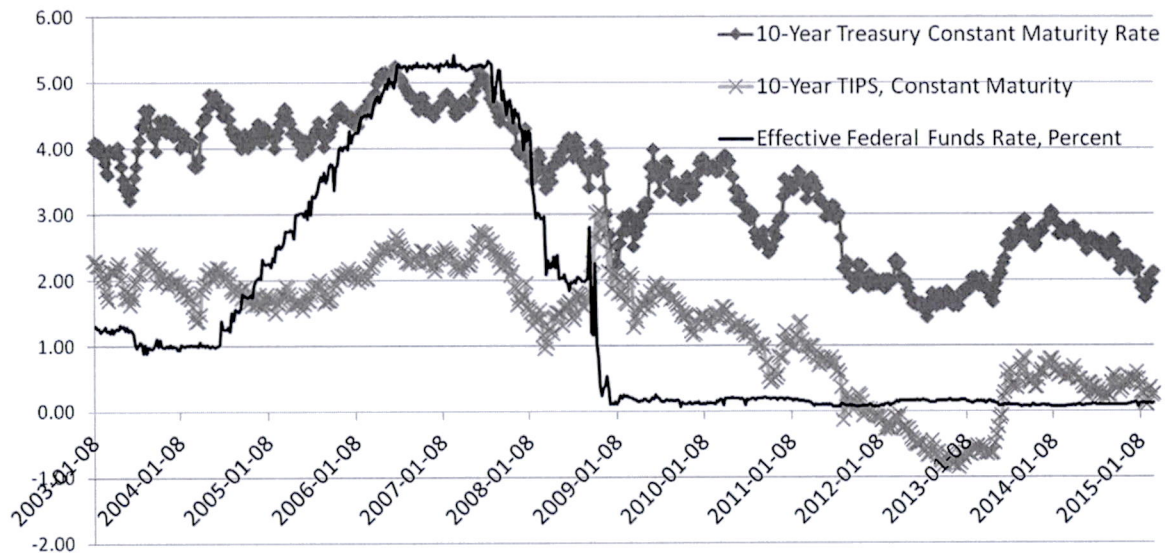
Based on the evolution of interest rates, answer **3 of the 4 items** below:

a) Why is there a difference between the 10-year Treasury rates and the 10-year TIPS rates? Name, explain and interpret this difference.

5 marks

b) Which monetary policy is behind the decrease of the 10-year rates between 2008 and 2013? Explain this policy.

5 marks

c) Which theory of the term structure of interest rates best describes the gap between the 10-year Treasury rates and the overnight Federal Funds Rate between 2008 and 2013?

5 marks

d) If today the fund manager believes that the inflation over the following decade is going to be 4% on average due to the policies undertaken between 2008 and 2013, which of the two Treasury securities would he prefer to buy? Explain your answer.

5 marks

Total for Question 1: 15 marks

Please turn over

Question 2

Give a concise *definition* and *numerical example* for **3 of the 4 items** below.

a) Reinvestment risk

5 marks

b) Reconstitution

5 marks

c) Yield to first par call

5 marks

d) Credit Default Swap spread

5 marks

Total for Question 2: 15 marks

Total for Section B: 30 marks

Please turn over

Section C (40 marks)
Choose either Question 1 or Question 2

Question 1

a) The table below provides quotes for US zero-coupon Strips from the Wall Street Journal. Compute (i) the price and (ii) the yield of a synthetic portfolio that replicates a long position in a 1.5-year 10% coupon Treasury Note based on the Strips available below.

Type of Strip	Maturity (years)	Ask Price (%)	Bid Price (%)
Coupon Strip	0.5	97.4	97.395
Coupon Strip	1	94.2	94.19
Coupon Strip	1.5	92.8	92.786
Principal Strip	0.5	97.34	97.335
Principal Strip	1	94.2	94.19
Principal Strip	1.5	92.85	92.835

10 marks

b) An investor can buy any of the two coupon bonds A and B trading at par value. The table below provides information about the yield/price relationship for the securities A and B. (i) Calculate the sensitivity of these securities to changes in market interest rates (ii) If one of these bonds is option-free, which of these two bonds is most likely to be a callable bond? Explain why.

10 marks

Bond A		Bond B	
Yield	Price	Yield	Price
4.75%	102.5	4.75%	104
5%	100.0	5%	100.0
5.25%	96.5	5.25%	96.5

c) PIMCO is currently looking at potential credit risk coming from one of its investments in corporate bonds issued by General Motors Company. The bond issued by GM is a 4-year annual coupon bond, pays an annual 3% coupon, and it is currently trading at $85. The table below provides the US Government bond spot rates. (i) Discuss the difference between the z-spread and the nominal spread and why they are likely to differ. (ii) Calculate the z-spread.

10 marks

Horizon	Spot rate
1-year	2.50%
2-year	3.20%
3-year	3.90%
4-year	4.20%

d) The following prices and spreads for 5 bonds with embedded options were reported in the financial press. Assume that the option-free bond prices and the Option-Adjusted Spread are correct. Which of these 5 callable/putable bonds are associated with information that is correct/incorrect? For each bond state why the provided information is correct/incorrect.

10 marks

| Bond with embedded option	Equivalent Option-Free Bond Price ($)	Callable/Putable Bond Price ($)	Embedded Option Type	Option-Adjusted Spread, OAS (%)	Option Cost Spread (%)
A	110	115	Put	4.0	-0.5
B	85	81	Put	5.2	-0.3
C	100	103	Call	4.5	-0.2
D	76	70	Call	5.6	-0.6
E	118	109	Call	3.8	1.0

Total for Question 1: 40 marks

Question 2

The ABC Company issues annual coupon securities. The on-the-run issue for the ABC Company is shown below:

Maturity (Years)	Coupon rate (%)	Yield to maturity (%)	Spot rates (by bootstrapping methodology) (%)
1	5.000	3.500	3.500
2	3.000	3.981	3.988
3	5.000	4.607	4.647

Assume the following arbitrage-free binomial interest rate tree for valuing an ABC bond with a maturity of up to three years:
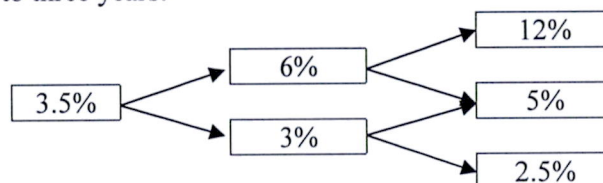
a) Using the spot rates available in the table above, calculate the 1-year forward rate one year from now ($_{1\text{-year}}f_1$) and the 1-year forward rate two years from now ($_{1\text{-year}}f_2$).

8 marks

b) What is the value of a 3-year option-free 5% coupon issue of the ABC Company using the arbitrage-free interest rate tree? Using the spot rates, show that there are not arbitrage opportunities with this 3-year 5% coupon bond.

8 marks

c) Assume that the 3-year 5% coupon issue will become callable at par in one year. Assume that the call rule used is: if the price exceeds par the issue will be called. What is the value of this 3-year 5% coupon callable issue? What is the value of the embedded call option for this 3-year 5% coupon callable issue?

8 marks

d) Assume that the 3-year 5% coupon issue will become putable at par in one year. What is the value of this 3-year 5% coupon putable issue? What is the value of the embedded put option for this 3-year 5% coupon putable issue?

8 marks

e) Assume that the 3-year 5% coupon issue will become putable at par in one year. It has been estimated that this security is trading at an OAS of 1%. What is the value of this 3-year 5% coupon putable issue? Explain the effect of the volatility assumption on the estimated OAS

8 marks

Total for Question 2: 40 marks

END OF EXAM