



## EN.555.644.81.FA19 Introduction to Financial Derivatives

## Course Modules Module 3: Interest Rates

Review Test Submission: Module 3 Self Check Quiz

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Course	EN.555.644.81.FA19 Introduction to Financial Derivatives
Test	Module 3 Self Check Quiz
Started	9/15/19 9:52 PM
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Time Elapsed	2 hours, 13 minutes
Results Displayed	All Answers, Submitted Answers, Correct Answers, Feedback, Incorrectly Answered Questions

## Question 1

0 out of 0 points



The compounding frequency for an interest rate defines

Selected



b. A unit of measurement for the interest rate

Answer:

Answers:

a. The frequency with which interest is paid



b. A unit of measurement for the interest rate

c.

The relationship between the annual interest rate and the monthly interest rate

d. None of the above

Response The compounding frequency is a unit of measurement. The frequency with which interest is paid may be different from the compounding frequency used for quoting the rate.

## Question 2

0 out of 0 points



An interest rate is 6% per annum with annual compounding. What is the equivalent rate with continuous compounding?

Selected Answer: ☒ c. 5.83%

Answers:

- a. 5.79%
- b. 6.21%
- ☒ c. 5.83%
- d. 6.18%

Response Feedback: The equivalent rate with continuous compounding is  $\ln(1.06) = 0.0583$  or 5.83%.

### Question 3

0 out of 0 points



An interest rate is 5% per annum with continuous compounding. What is the equivalent rate with semiannual compounding?

Selected Answer: ☒ a. 5.06%

Answers:

- ☒ a. 5.06%
- b. 5.03%
- c. 4.97%
- d. 4.94%

Response Feedback: The equivalent rate with semiannual compounding is  $2 \times (e^{0.05/2} - 1) = 0.0506$  or 5.06%.

### Question 4

0 out of 0 points



An interest rate is 12% per annum with semiannual compounding. What is the equivalent rate with quarterly compounding?

Selected Answer: ☒ a. 11.83%

Answers:

- ☒ a. 11.83%
- b. 11.66%
- c. 11.77%
- d. 11.92%

Response Feedback: The equivalent rate per quarter is  $\sqrt[4]{1.06} - 1 = 2.956\%$ . The annualized rate with quarterly compounding is four times this or 11.83%.

### Question 5

0 out of 0 points



The two-year zero rate is 6% and the three year zero rate is 6.5%. What is the forward rate for the third year? All rates are continuously compounded.

Selected Answer: ☒ d. 7.5%

Answers: a. 6.75%

b. 7.0%

c. 7.25%

☒ d. 7.5%

Response Feedback: The forward rate for the third year is  $(3 \times 0.065 - 2 \times 0.06) / (3 - 2) = 0.075$  or 7.5%.

## Question 6

0 out of 0 points



The six-month zero rate is 8% per annum with semiannual compounding. The price of a one- year bond that provides a coupon of 6% per annum semiannually is 97. What is the one-year continuously compounded zero rate?

Selected Answer: ☒ c. 9.02%

Answers: a. 8.02%

b. 8.52%

☒ c. 9.02%

d. 9.52%

Response Feedback: If the rate is R we must have

$$\frac{3}{1.04} + 103 e^{-R \times 1} = 97$$

or

$$e^{-R} = \frac{97 - 3/1.04}{103} = 0.9137$$

so that  $R = \ln(1/0.9137) = 0.0902$  or 9.02%.

## Question 7

0 out of 0 points



The yield curve is flat at 6% per annum. What is the value of an FRA where the holder receives interest at the rate of 8% per annum for a six-month period on a principal of \$1,000 starting in two years? All rates are compounded semiannually.

Selected Answer: ☒ d. \$8.63

- Answers:
- a. \$9.12
  - b. \$9.02
  - c. \$8.88
  - ☒ d. \$8.63

Response Feedback: The value of the FRA is the value of receiving an extra  $0.5 \times (0.08 - 0.06) \times 1000 = \$10$  in 2.5 years. This is  $10 / (1.03^5) = \$8.63$ .

### Question 8

0 out of 0 points



Under liquidity preference theory, which of the following is always true?

- Selected Answer: ☒ d. Forward rates are higher than expected future spot rates.
- Answers:
- a. The forward rate is higher than the spot rate when both have the same maturity.
  - b. Forward rates are unbiased predictors of expected future spot rates.
  - c. The spot rate for a certain maturity is higher than the par yield for that maturity.
  - ☒ d. Forward rates are higher than expected future spot rates.

Response Feedback: Liquidity preference theory argues that individuals like their borrowings to have a long maturity and their deposits to have a short maturity. To induce people to lend for long periods forward rates are raised relative to what expected future short rates would predict.

### Question 9

0 out of 0 points



The zero curve is upward sloping. Define X as the 1-year par yield, Y as the 1-year zero rate and Z as the forward rate for the period between 1 and 1.5 year. Which of the following is true?

- Selected Answer: ☒ a. X is less than Y which is less than Z
- Answers:
- ☒ a. X is less than Y which is less than Z
  - b. Y is less than X which is less than Z
  - c. X is less than Z which is less than Y
  - d. Z is less than Y which is less than X

Response Feedback: When the zero curve is upward sloping, the one-year zero rate is higher than the one-year par yield and the forward rate corresponding to the period

between 1.0 and 1.5 years is higher than the one-year zero rate. The correct answer is therefore A.

### Question 10

0 out of 0 points



Which of the following is true of the fed funds rate

Selected Answer: ☒ b. It is an overnight interbank rate

- Answers:
- ☐ a. It is the same as the Treasury rate
  - ☒ b. It is an overnight interbank rate
  - ☐ c. It is a rate for which collateral is posted
  - ☐ d. It is a type of repo rate

Response At the end of each day some banks have surplus reserves on deposit with the  
Feedback: Federal Reserve others have deficits. They use overnight borrowing and lending at what is termed the fed funds rate to rectify this.

### Question 11

0 out of 0 points



The modified duration of a bond portfolio worth \$1 million is 5 years. By approximately how much does the value of the portfolio change if all yields increase by 5 basis points?

Selected Answer: ☒ b. Decrease of \$2,500

- Answers:
- ☐ a. Increase of \$2,500
  - ☒ b. Decrease of \$2,500
  - ☐ c. Increase of \$25,000
  - ☐ d. Decrease of \$25,000

Response When yields increase bond prices decrease. The proportional decrease is the  
Feedback: modified duration times the yield increase. In this case, it is  $5 \times 0.0005 = 0.0025$ .  
The decrease is therefore  $0.0025 \times 1,000,000$  or \$2,500.

### Question 12

0 out of 0 points



A company invests \$1,000 in a five-year zero-coupon bond and \$4,000 in a ten-year zero-coupon bond. What is the duration of the portfolio?

Selected Answer: ☒ d. 9 years

- Answers:
- ☐ a. 6 years

b. 7 years

c. 8 years

☒ d. 9 years

Response The duration of the first bond is 5 years and the duration of the second bond is 10 years. The duration of the portfolio is a weighted average with weights corresponding to the amounts invested in the bonds. It is  $0.2 \times 5 + 0.8 \times 10 = 9$  years.

**Question 13**

0 out of 0 points



Which of the following is true of LIBOR?

Selected

☒ c.

Answer:

It is a rate used when borrowing and lending takes place between banks.

Answers:

a. The LIBOR rate is free of credit risk.

b.

A LIBOR rate is lower than the Treasury rate when the two have the same maturity.

☒ c.

It is a rate used when borrowing and lending takes place between banks.

d. It is subject to favorable tax treatment in the U.S.

Response Feedback: LIBOR is a rate used for interbank transactions.

**Question 14**

0 out of 0 points



Which of following describes forward rates?

Selected

☒ a.

Interest rates implied by current zero rates for future periods of time.

Answer:

Answers:

☒ a.

Interest rates implied by current zero rates for future periods of time.

b.

Interest rate earned on an investment that starts today and last for n-years in the future without coupons.

c.

The coupon rate that causes a bond price to equal its par (or principal) value.

d.

A single discount rate that gives the value of a bond equal to its market price when applied to all cash flows.

Response The forward rate is the interest rate implied by the current term structure for future periods of time. For example, earning the zero rate for one year and the

forward rate for the period between one and two years gives the same result as earning the zero rate for two years.

**Question 15**

0 out of 0 points



Which of the following is NOT a theory of the term structure

Selected Answer: d. Maturity preference theory

- Answers:
- a. Expectations theory
  - b. Market segmentation theory
  - c. Liquidity preference theory
  - d. Maturity preference theory

Response Feedback: Maturity preference theory is not a theory of the term structure. The other three are.

**Question 16**

0 out of 0 points



A repo rate is

Selected Answer: c.  
The rate implicit in a transaction where securities are sold and bought back later at a higher price.

- Answers:
- a. An uncollateralized rate
  - b. A rate where the credit risk is relative high
  - c.  
The rate implicit in a transaction where securities are sold and bought back later at a higher price.
  - d. None of the above.

Response Feedback: A repo transaction is one where a company agrees to sell securities today and buy them back at a future time. It is a form of collateralized borrowing. The credit risk is very low.

**Question 17**

0 out of 0 points



Bootstrapping involves

Selected Answer: b.  
Working from short maturity instruments to longer maturity instruments determining zero rates at each step.

- Answers:
- a. Calculating the yield on a bond.
  - ☒ b.  
Working from short maturity instruments to longer maturity instruments determining zero rates at each step.
  - c.  
Working from long maturity instruments to shorter maturity instruments determining zero rates at each step.
  - d. The calculation of par yields.

Response Bootstrapping is a way of constructing the zero coupon yield curve from  
Feedback: coupon-bearing bonds. It involves working from the shortest maturity bond to progressively longer maturity bonds making sure that the calculated zero coupon yield curve is consistent with the market prices of the instruments.

### Question 18

0 out of 0 points



The zero curve is downward sloping. Define X as the 1-year par yield, Y as the 1-year zero rate and Z as the forward rate for the period between 1 and 1.5 year. Which of the following is true?

Selected Answer: ☒ d. Z is less than Y which is less than X

- Answers:
- a. X is less than Y which is less than Z
  - b. Y is less than X which is less than Z
  - c. X is less than Z which is less than Y
  - ☒ d. Z is less than Y which is less than X

Response The forward rate accentuates trends in the zero curve. The par yield shows  
Feedback: the same trends but in a less pronounced way.

### Question 19

0 out of 0 points



Which of the following is true?

Selected Answer: ☒ d. None of the above.

- Answers:
- a.  
When interest rates in the economy increase, all bond prices increase.
  - b. As its coupon increases, a bond's price decreases.
  - c.  
Longer maturity bonds are always worth more than shorter maturity bonds when the coupon rates are the same.
  - ☒ d. None of the above.



Response When interest rates increase the impact of discounting is to make future cash  
Feedback: flows worth less. Bond prices therefore decline. A is therefore wrong. As  
coupons increase a bond becomes more valuable because higher cash flows  
will be received. B is therefore wrong. When the coupon is higher than  
prevailing interest rates, longer maturity bonds are worth more than shorter  
maturity bonds. When it is less than prevailing interest rates, longer maturity  
bonds are worth less than shorter maturity bonds. C is therefore not true. The  
correct answer is therefore D.

**Question 20**

0 out of 0 points



The six month and one-year rates are 3% and 4% per annum with semiannual compounding. Which of the following is closest to the one-year par yield expressed with semiannual compounding?

Selected Answer:  c. 3.97%

Answers:  a. 3.99%

b. 3.98%

c. 3.97%

d. 3.96%

Response The six month rate is 1.5% per six months. The one year rate is 2% per six  
Feedback: months. The one year par yield is the coupon that leads to a bond being worth  
par. A is the correct answer because  $(3.99/2)/1.015 + (100 + 3.99/2)/1.022 = 100$ .  
The formula in the text can also be used to give the par yield as  $[(100 - 100/1.022) \times 2] / (1/1.015 + 1/1.022) = 3.99$ .

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← OK