King Saud University ACTU 262: Corporate Finance

Department of Mathematics Final Exam

First Trimester 1444 H Duration: 3 Hours

21/11/2022 – 27/4/1444H

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Name:
Sequence Number:
Section:

Note: *The exam consists of 8 pages*

Exercise	Mark
Exercise 1 (MCQ)	10 (1 mark for each question)
Exercise 2	5
Exercise 3	5
Exercise 4	5
Exercise 5	5
Exercise 6	5
Total	40

Exercise 1 (MCQ)

1. If the nominal rate of interest is 10% per annum and there is quarterly compounding, the annual effective rate of interest will be:
   a) 10%
   b) 10.10%
   c) 10.25%
   d) 10.38%

2. Which of the following investment alternatives would provide the greatest ending wealth for your investment?
   a) 10% compounded daily
   b) 10.5% compounded annually.
   c) 10.25% compounded quarterly.
   d) 10.75% compounded monthly.

3. With continuous compounding at 10 percent for 30 years, the future value of an initial investment of $2,000 is closest to:
   a) 34,898.
   b) 40,171.
   c) 164,500
   d) 328,282

4. You are considering borrowing $100,000 for 30 years at a compound annual interest rate of 9%. The loan agreement calls for 30 equal annual payments, to be paid at the end of each of the next 30 years (payments include both principal and interest). What is the annual payment that will fully amortize the loan.
   a) 3,333.33
   b) 6,400.30
   c) 9,733.33
   d) 12,333.33

5. Addison Company will issue a zero-coupon bond this coming month. The projected yield for the bond is 7%. If the par value of the bond is $1,000, what is the price of the bond using a semiannual convention and a maturity of 20 years?
   a) 252.57
   b) 250.50
   c) 225.45
   d) 230

6. What is the present value of a $1,000 ordinary annuity that earns 8% annually for an infinite number of periods
   a) 80
   b) 800
   c) 1000
   d) 12,500

7. What is the market value of a $1,000 face-value bond with a 10% coupon rate when the market's rate of return is 9%?
   a) More than its face value.
   b) Less than its face value.
   c) $1,000.

8. What is the approximate yield to maturity (YTM) of a bond that is currently selling for $1,150 in the market place? The annual bond has 20 years remaining until maturity and pays a 14% coupon (assume annual interest payments and discounting).
   a) 14%
   b) 12%
   c) 7%
   d) 6%

9. A company X will pay $2 dividend next year on its common stock, which is currently selling at $50 per share. What is the market's required return on this investment if the dividend is expected to grow at 5% for ever.
   a) 4%
   b) 5%
   c) 7%
   d) 9%

10. Singing Fish Fine Foods has a current annual cash dividend policy of $2.25. The price of the stock is set to yield a 12% return. What is the price of this stock if the dividend will be paid for 10 years?
    a) $14.70
    b) $12.56
    c) $14.68
    d) $12.71

Exercise 2:

An insurance company is offering a new policy to its customers. Typically, the policy is bought by a parent or grandparent for a child at the child's birth. The details of the policy are as follows: The purchaser (say, the parent) makes the following six payments to the insurance company:

First birthday	$ 900
Second birthday	$ 900
Third birthday	$1,000
Fourth birthday	$1,000
Fifth birthday	$1,100
Sixth birthday	$1,100

After the child's sixth birthday, no more payments are made. When the child reaches age 65, he or she receives $500,000. If the relevant interest rate is 12 percent for the first six years and 8 percent for all subsequent years, is the policy worth buying?

Answer:

I will calculate the FV of six payments

Firstly :

For 3,999.144907 the first six year non-level payments

$FV=900(1.12)^5 +900(1.12)^4 +1000(1.12)^3 +1000(1.12)^2 +1,100(1.12)+ 1,100=$ $7,993.6   3 marks

For the $500,000 we find PV at sixth birthday

$PV=500,000/(1.08)^{59} =$ $ 5332.9   2 marks

Since the Fv for sixth payment is greater than the Pv of $500,000   1 mark

So, policy does not worth buying

Exercise 3:

  1) What is the Fisher effect?

Fisher effect The relationship between nominal returns, real returns, and inflation.
Fisher effect The relationship between nominal returns, real returns, and inflation.

$1 + R = (1 + r) \times (1 + h)$ 1mark

2 marks

  2) If investors require a 10 percent real rate of return, and the inflation rate is 8 percent, what must be the approximate nominal rate? The exact nominal rate? The nominal rate is approximately equal to the sum of the real rate and the inflation rate: 10% + 8% = **18%**

om the Fisher effect, we have: $1 + R = (1 + r) \times (1 + h) = 1.10 \times 1.08 = 1.1880$
 Therefore, the nominal rate will actually be closer to 19 percent.

3 marks

  3) suppose you want to withdraw money each year for the next three years, and you want each withdrawal to have $35,000 worth of purchasing power as measured in current dollars. If the inflation rate is 4 percent per year, what is the present value of these cash flows if the appropriate nominal discount rate is 10 percent?

The withdrawals each year will thus be:

$C_1 = \$35,000 \,(1.04) = \$36,400$

$C_2 = \$35,000 \,(1.04)^2 = \$37,856$

$C_3 = \$35,000 \,(1.04)^3 = \$39,370.24$

The present value of these cash flows if the appropriate nominal discount rate is 10 percent

$Pv = \$36,400/1.10 + \$37,856/1.10^2 + \$39,370.24/1.10^3 = \$93,902.69$

To calculate the present value using real cash flows, we need the real discount rate. Using the Fisher equation, the real discount rate is

1 + R = (1 + r) X (1 + h)

1+0.10=(1+r)X(1+0.4) , then r= .0577, The real cash flows are an annuity of $25,000 per year. So, the present value in real terms is:

PV = $35,000[1 - (1/1.0577³)]/.0577 = $93,902.69

Exercise 4:

Prepare an amortization schedule for a five-year loan of $42,000. The interest rate is 8 percent per year, and the loan calls for equal annual payments.

a) How much interest is paid in the third year ? 2,168.71   0.5
b) How much total interest is paid over the life of the loan? $10,595.85   0.5
c) Suppose that the loan agreement calls for a principal reduction of $8,400 every year instead of equal annual payments. Rework questions a) and b). for a=2016, for b=$10,080 0.5   0.5

year	Beginning balance	Total payment	Interest paid	Principal paid	Ending balance	2 marks
1	$42,000	$10,519.17	3,360	7159.17	34,840.83	
2	$34,840.83	$10,519.17	2,787.27	7,7319.90	27,108.93	
3	$27,108.93	$10,519.17	2,168.71	8,350.46	18,758.47	
4	$18,758.47	$10,519.17	1,500.68	9,018.49	9,739.98	
5	$9739.98	$10,519.17	779.19	9,739.98	00	
total		$52,595.85	$10,595.85	$42,000		

c)

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year	Beginning balance	Total payment	Interest paid	Principal paid	Ending balance
1	$42,000	$11,760	3360	8,400	33,600
2	$33600	$11,088	2688	8,400	22,512
3	$22,512	$10.416	2016	8,400	16,800
4	$14,112	$9,944	1344	8,400	8,400
5	$5712	$9,072	672	8,400	00
total			$10,080	42,000	

2 marks

Exercise 5:

Bond J is a 4 percent coupon bond. Bond K is a 12 percent coupon bond. Both bonds have nine years to maturity, make semiannual payments, and have a YTM of 8 percent. If interest rates suddenly rise by 2 percent, what is the percentage price change of these bonds? What if rates suddenly fall by 2 percent instead? What does this problem tell you about the interest rate risk of lower-coupon bonds?

Answer:

J:
FV=1000, N=18, PMT=20, I/Y=4, PV=746.81   1 marks

Rise by 2%,
 and it is convertible semiannually so 1/Y=5%
FV=1000, N=18, PMT=20, I/Y=5, PV=649.31   1 mark
746.81- 649.31= 97.5/746.81= -13..05% change

Fall by 2%
FV=1000, N=18, PMT=20, I/Y=3, PV=862.46
862.46- 746.81= 115.65/746.81= 15.49% change   1 mark

Bond K: FV=1000, N=18, PMT=60, I/Y=4, PV=1,253.19   1 mark

Rise by 2%
FV=1000, N=18, PMT=60, I/Y=5, PV=1,116.90
1,253.19- 1,116.90 = 136.29/1,253.19= -10.88% change   1 mark

Fall by 2%
FV=1000, N=18, PMT = 60, I/Y= 3, PV=1,412.61
1,412.61- 1,253.19= 159.42/1,253.19= 12.72 Change   1 mark
lower-coupon bonds more sensitive to the change in interest rate. Therefore, interest rate risk is higher in lower-coupon bounds than in higher-coupon bonds.

Exercise 6:

You have been asked to determine the intrinsic value of a share of Quick Quilters, Inc. (QQ) common stock. The stock most recently paid a $2.00 annual dividend. You expect dividends to grow at a supernormal rate of 15% for the next three years. You then expect that dividends will grow at a normal 5% rate thereafter (indefinitely). As a potential investor, you would expect to earn 10% on this investment. What is the intrinsic value of a share of QQ?

$D_0 = 2$, $g_1 = 15\%$, $g_2 = 5\%$, $r = 10\%$, $t = 3$

Start by calculating D_1 through D_4 which are $2.30, $2.65, $3.04, and $3.19, respectively. Next, calculate the value of the stock at the end of year 3 using the constant growth model , $P_3 = \$63.88$. Find the PV of cash flows , $P_0 = \$54.56$.   1 mark   1 mark

Where :

$P_0 = D_1/(r-g_1) \ (1-(1+g_1 / 1+r)^3 + P_3/(1+r)^3$ 2 marks

$P_3 = D_4/r-g_2$ 2 marks

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