

Solution Book

FN 201 Business Finance

Final Exercise 1-2557

Question 1 (25 Points)

HENGHENG Company has two bond issues outstanding. Both bonds pay \$100 annual interest plus \$1,000 at maturity. Bond M has a maturity of 15 years, and Bond N has a maturity of 5 year.

1.1 Draw an investment time line and find that if both bond M and bond N are sold at par, what are yields to maturity (YTM) of each bond? (5 Points)

Answer: YTM = Coupon rate = 10%

1.2 What will be the value of these bonds when the going YTM or rate of interest is at 5%, 8%, and 12%? Show the derivation and put the final answers into below table. (10 Points)

Answer:

	Bond M's Value (Price)	Bond N's Value (Price)
5%	1,518.98	1,216.47
8%	1,171.19	1,079.85
12%	863.78	927.90

1.3 Show percent changes in bond value when the interest rate is going up (compared with the values when interest rate is 5%). Then, explain why the value of longer-term bond fluctuate more when interest rates change than does the shorter-term bond? (10 Points)

Answer:

	Bond M's Value (Price)	Bond N's Value (Price)
5%	-	-
8%	-22.90%	-11.23%
12%	-43.13%	-23.72%

Longer maturity bonds have greater price fluctuation than the shorter ones due to lower degree of interest rate risk. For example, for holding longer maturity bonds, there might be the case that market return is really high, but investors have to bear fixed coupon rate for longer period. This implies higher risk from interest rate change, and thus results in higher bond price fluctuation.

Question 2 (25 Points)

Winnie Corp. is a leading company in automobile industry. According to market research, the company's beta is 1.4 when the risk-free rate is 5.6% and the market risk premium is 6%. Winnie has current return on equity (ROE) at 17.5% and pays out 60% of its earnings as dividends. Its dividend paid last year (D_0) was \$2. One investor is considering to invest in this company, but has no background in common stock valuation. Please help this investor by answering the following questions.

2.1 According to above information, what are the investor's require rate of return and the expected dividend growth rate? (5 Points)

Answer: From CAPM, we have investor's require rate of return $= R_e = 14\%$.
Expected dividend growth rate $= g = \text{ROE} \times \text{Retention Ratio}$
 $= 17.5\% \times (1-60\%) = 7\%$.

2.2 An investor intends to hold Winnie's stock for **only 3 years** and expects to sell at price \$26.22 at the end of year 3. Assume that expected dividend growth rate follows (2.1), what would be a proper stock price for the investor? Should the investor buy if Winnie's current market stock price is \$25? Why? (10 Points)

Answer:

Year	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>
Div		2.14	2.2898	2.450086
Price3				26.22
Common Stock Price =				<u>22.99061</u>

2.3 As a leading company in the industry, Winnie has decided to invest R&D project to improve the operating performance. If the project is successfully completed, this will let Winnie to have earnings and dividends growing at a rate of 50% [$D_1 = D_0(1 + g) = D_0(1.50)$] this year and 25% the following two years, after which growth would return to 9%. If it is believed that the project would be successful, what is the value per share of Winnie's common stock? (10 Points)

Answer:

Year	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Div		3.000	3.750	4.688	5.109375
Price3				102.1875	
Common Stock Price =				<u>77.6550</u>	

Question 3 (25 Points)

Mr. Benny has a portfolio investment with current expected return at 8.5% and variance at 110 (or 10.4881 standard deviation). He was suggested by two trading companies to include one more stock into his portfolio - Company A introduced stock X, while Company B suggested stock Y. Below table provides additional information on stock X and Y, and the correlation with Benny's current portfolio.

	Company A: Stock X	Company B: Stock Y
Expected Return	10%	15%
Variance	140	180
Standard Deviation	11.8322	13.4164

Correlation between Benny's current portfolio return and stock X is 0.75, while the correlation with stock Y is 0.50.

Due to budget constraint, Benny can afford either stock X or stock Y. His new portfolio would have 40% weighting on new stock and the other 60% is allocated for the combination of old stocks. As a financial planner, please help Benny to decide which stock to be chosen into his current portfolio investment by answering the following.

3.1 Calculate expected return and measure risk (i.e. from variance and standard deviation) that associated with the new portfolio if Benny decides to pick **stock X** into his current portfolio. (10 Points)

Answer: Expected Return = 9.10%

Variance = 106.675

3.2 Calculate expected return and measure risk (i.e. from variance and standard deviation) that associated with the new portfolio if Benny decides to pick **stock Y** into his current portfolio. (10 Points)

Answer: Expected Return = 11.10%

Variance = 102.171

3.3 With the findings from (3.1) and (3.2), which stock would you recommend Mr. Benny to include into his current portfolio? Why? (Note that only one stock will be selected). (5 Points)

Answer: Choose stock Y, since higher expected return and lower risk.

Question 4 (35 Points)

Win Hom Production has **book value** balance sheet as shown below:

Current assets	\$30,000,000	Long-term debt	30,000,000
Fixed assets	50,000,000	Common stock	50,000,000
		(1 million shares)	
Total Assets	80,000,000	Total Claims	80,000,000

Under this capital structure, the long-term debt consists of 30,000 bonds, each with a par value of \$1,000, an annual coupon interest rate of 12%, and a 20-year maturity with 15% yield to maturity (YTM). The company has a dividend yield of 4%, an expected constant growth rate of 8%, and the market price of common stock at \$60 per share. The company's marginal tax rate is 40%.

4.1 Calculate Win Hom's **market value** capital structure. (10 Points)

Answer: $MV \text{ of Common Stock} = 1 \text{ million} \times 60 = 60 \text{ Million}$
 $MV \text{ of Debt} = 30,000 \times 812.22 = 24,366,600$
Hence, $W_e = 71.12\%$ and $W_d = 28.88\%$.

4.2 Find the component after-tax costs of debt and cost of common stock. Then, calculate weighted average cost of capital (WACC) under the current market capital structure. (10 Points)

Answer: $R_e = 4\% + 8\% = 12\%$
 $R_d \times (1-t) = 15\% \times (1 - 40\%) = 9\%$
Hence, $WACC = 12\% \times (0.7112) + 9\% \times (0.2888) = 11.1336\%$

4.3 If Win Hom Production plans to raise \$40 million capital for new projects, in order to maintain the present market capital structure, how much of the new investment must be financed by common equity? What could be the reason why Win Hom wants to maintain the current capital structure? (5 Points)

4.4 (10 Points) **Qualitatively speaking**, what will happen to the WACC if:

(1) There is not enough internal cash flow and Win Hom must issue new shares of stock with the flotation cost?

Answer: **WACC increases, due to higher cost of equity.**

(2) The new projects of Win Hom are more risky?

Answer: **WACC increases, since R_d and R_e are higher.**

Question 5 (30 Points)

Minnie Ltd. is trying to determine its optimal capital structure, which now consists of only debt and common equity. In order to get information how much debt would cost at different levels, the company consulted with investment bankers and got the following table:

Long-term debt fraction (W_D)	Equity fraction (W_E)	Before-tax cost of debt (R_D)
0	100%	7%
20%	80%	8%
40%	60%	10%
60%	40%	12%
80%	20%	15%

* The company does not currently use preferred stock in its capital structure, and it does not plan to do so in the future.

Minnie uses the CAPM to estimate its cost of common equity, R_s . The company estimates that the risk-free rate is 5%; the market risk premium is 6%, and the company's tax rate is 40%. Elliott estimates that if it had no debt, its "unlevered" beta, b_U , would be 1.20.

5.1 Without numerical calculation, what would be criteria when the company wants to decide its optimal capital structure? (5 Points)

Answer: At level at which (1) firm value is maximized or (2) WACC is minimized.

5.2 Given the above information, what is the weighted average cost of capital (WACC) when company has no debt? (5 Points)

Answer: ($W_D = 0\%$): $WACC = R_e = 12.20\%$

5.3 What would be the weighted average cost of capital (WACC) under different levels of debt (starting from 20%)? Determine at which level debt should be financed? Why? (20 Points)

Answer:

Wd = 20%	new beta =	1.38	Wd = 60%	new beta =	2.28
	new Re =	13.2800%		new Re =	0.1868
	new Rd =	8%		new Rd =	0.12
	WACC =	11.5840%		WACC =	11.7920%
Wd = 40%	new beta =	1.68	Wd = 80%	new beta =	4.08
	new Re =	15.0800%		new Re =	0.2948
	new Rd =	10%		new Rd =	0.15
	WACC =	11.4480%		WACC =	13.0960%

Thus, Wd = 40% is the optimal capital structure of company.

Question 6 (20 Points)

David's broker has shown him two bonds selling at par. Both have the same par value of \$2,000 and pay 10.00% coupon annually. The difference is that bond X has a maturity of 5 years, while bond Y has a maturity of 20 years.

6.1 Draw an investment time line for each bond, find yields to maturity (YTM) of each bond? **(5 Points)**

6.2 The broker expects that yield to maturity of bond X and Y would increase to 12.00% and 13.50%, respectively, at the end of this year. Calculate current yields, expected prices, and percent change in price of the two bonds. **(10 Points)**

Answer: From $YTM = \text{Current Yield} + \text{Capital Gain/Loss Yield}$

For X: $YTM = 12\% = (200/2,000) + \text{Capital Gain/Loss Yield}$

We get $\text{Capital Gain/Loss Yield} = 2\% = \text{percent change in price}$

So, expected price = 2,040.

For Y: $YTM = 13.50\% = (200/2,000) + \text{Capital Gain/Loss Yield}$

We get $\text{Capital Gain/Loss Yield} = 3.50\% = \text{percent change in price}$

So, expected price = 2,070.

6.3 If David wants to minimize interest rate risk, which bond should he purchase? Why?

(5 Points)

Answer: Should buy Bond X, since it has lower fluctuation in price changes.

Question 7 (25 Points)

AROI Inc. is in the agricultural business. The company could maintain its return on equity at 15% and keep paying dividend 40% of its earnings. One investor is considering to invest in this company with required rate of return 15%. Please help this investor by answering the following questions.

7.1 What is the company expected dividend growth rate? **(5 points)**

Answer: $g = \text{ROE} \times \text{Retention Ratio} = 15\% \times (1 - 40\%) = 9\%$

7.2 An investor intends to hold AROI Inc.'s stock for **only 3 years** and expects to sell at price \$26.50 at the end of year 3. Assume that last year AROI paid its dividend \$2 per share ($D_0 = \2) and expected dividend growth rate is from (7.1), what would be a proper stock price for the investor? **(10 points)**

Answer:

<u>Year</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>
Div		2.18	2.3762	2.590058
Price ₃				26.5
Price of Common Stock =		<u>22.8196</u>		

7.3 AROI Inc. has an R&D project which is expected to complete in the next two years. If the project is successful, this will lead earnings and dividends to grow at a rate of 40% at the end of year 3, 20% at the end of year 4, after which growth would return to 10%. Given dividend paid last year at \$2 per share, what is the appropriate value of AROI Inc.'s common stock under this scenario? **(10 points)**

Answer:

<u>Year</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Div		2.18	2.3762	3.32668	3.992016	4.3912176
Price ₄					87.8244	
Price of Common Stock =		<u>58.3761</u>				

Question 8 (25 Points)

Tony has a portfolio investment consisting of stock A and B. Now, he is considering to include stock C into his portfolio. Given the information below, please help Tony decide whether he should include stock C into his current portfolio by answering the following questions.

State of Economy	Probability	Rate of Return if State Occurs		
		Stock A	Stock B	Stock C
Boom	0.20	30.00	45.00	33.00
Good	0.40	12.00	10.00	15.00
Poor	0.30	1.00	-15.00	-5.00
Bust	0.10	-6.00	-3.00	-9.00
Expected Return		10.50	8.20	10.20
Variance		745.00	446	219
Standard Deviation		27.29	21.12	14.81

8.1 Tony's portfolio is invested 30% in stock A and 70% in stock B. Suppose that correlation coefficient of stock A and B returns is equal 0.65, what are the expected return of the portfolio and risk as measured by variance and standard deviation? **(10 points)**

Answer: Expected return = 8.89%
Variance = 442.9376

8.2 In case Tony includes stock C, his new portfolio would have 40% weighting on new stock and the other 60% is allocated for the combination of old stocks. Given the correlation between current portfolio return and stock C is 0.75, what are Tony's new expected return, variance, and standard deviation of new portfolio? **(10 points)**

Answer: Expected return = 9.41%
Variance = 306.7068

8.3 Using appropriate criteria, decide if stock C should be invested? Why? **(5 points)**

Answer: Tony should include stock C into his portfolio, since expected return is higher with lower variance, compared with previous one.

Question 9 (30 Points)

MAMAMIA reported its total market value as January 1 at \$80 million. During the year, the company plans to raise and invest \$30 million in new projects. The firm's present market value capital structure, shown below, is considered to be optimal. There is no short-term debt.

Debt	\$30,000,000
Common equity	50,000,000
Total capital	\$80,000,000

New bonds will have a 9% coupon rate, and they will be sold at par. MAMAMIA's current EPS is \$6.50. It was \$4.42 five years ago. The company pays out 40% of its earnings as dividends, and the stock sells for \$36.

9.1 What are the historical growth rate in earnings of MAMAMIA and next expected dividend per share, assuming the past growth rate will continue? Given this information, what is cost of equity? **(10 points)**

Answer: Solving for g from $4.42 \times (1 + g)^5 = 6.50$, we have $g = 8.0185\%$
Next dividend or $D_1 = 6.50 \times (1 + 8.0185\%) \times 40\% = 2.8085$
Cost of equity = $R_e = 15.8199\%$

9.2 Calculate weighted average cost of capital (WACC) under the current market capital structure **assumed tax is paid at 40%. (5 points)**

Answer: From that $W_e = 62.5\%$ and $W_d = 37.5\%$
 $WACC = 11.9124\%$

9.3 In order to maintain the present capital structure, how much of the new investment must be financed by common equity? What could be the reason why MAMAMIA wants to maintain the current capital structure? **(5 points)**

Answer: New capital is to be financed as equity = $62.5\% \times 30 = 18.75$.
Possible reason to maintain current capital structure is that it is already an optimal level which results in maximum firm value and lowest WACC.

9.4 **(10 points) Qualitatively speaking**, what will happen to the WACC if:

(1) There is not enough internal cash flow and MAMAMIA must issue new shares of stock with the flotation cost?

Answer: WACC will increase, due to higher R_e .

(2) The new projects of MAMAMIA are more risky?

Answer: WACC will increase, because of higher R_d and R_e .

Question 10 (30 Points)

Beckman Company has a total market value of \$100 million, consisting of 50% debt and 50% equity. The company's EBIT is \$13.24 million, and its tax rate is 40%. Beckman can change its capital structure either by increasing its debt to 70% (based on market values) or decreasing it to 30%. If it decides to **increase** its use of leverage, it must call its old bonds and issue new ones with a 12% coupon. If it decides to **decrease** its leverage, it will call its old bonds and replace them with new 8% coupon bonds.

The company will sell or repurchase stock at the new equilibrium price to complete the capital structure change. The firm pays out all earnings as dividends; hence its stock is a zero-growth stock. The beta on its common stock at the current level of debt is 1.5, the risk-free rate is 6%, and the market risk premium is 4%

10.1 Without numerical calculation, what would be criteria when the company wants to decide its optimal capital structure? **(5 points)**

Answer: At level at which (1) firm value is maximized or (2) WACC is minimized.

10.2 What is Beckman Company's unlevered beta? And what will be the new beta and new cost of equity under different debt levels (e.g. 30% and 70%)? **(10 points)**

Answer: Unlevered beta = $1.5 / [1 + (1-40\%) \times (50\%/50\%)] = 0.9375$

Wd 30%	new beta =	1.178571429
	new Re =	10.71%
	new Rd =	8%
	WACC =	8.94%
Wd 70%	new beta =	2.25
	new Re =	15.00%
	new Rd =	12%
	WACC =	9.54%

10.3 What is the firm's WACC and total corporate value under each capital structure – one is to increase debt to 70%, and the other one is to decrease debt to 30%? **(10 points)**

Answer:

Wd 30%	WACC =	8.94%
	Corporate value =	88.8591
Wd 70%	WACC =	9.54%
	Corporate value =	83.2704

10.4 Determine at which level debt should be financed? Why? **(5 points)**

Answer: Beckman Company should increase debt level to be at 30%, since firm value is higher than at 70% and also for WACC.

Question 11 (20 Points)

Rayne, Inc., has a \$1,000 face value convertible bond issue that is currently selling in the market for \$950. Each bond is exchangeable at any time for 25 shares of the company's stock. Stock in Rayne sells for \$36 per share.

11.1 What are the conversion ratio, conversion price, and conversion premium? **(10 points)**

Answer:

Conversion ratio = 25 shares of common stocks

Conversion price = $1,000 / 25 = \$40$

Conversion premium:

From conversion value = $25 \text{ shares} \times 36 = 900$

Bond price = 950

Hence, conversion premium = $950 - 900 = \$50$

Or as percentage = $(950-900)/950 = 5.56\%$

11.2 What could be the company's advantages from issuing convertible bond? **(5 points)**

Answer:

1. To attract market investors to buy corporate bonds of the company.
2. Permit the issuance of debt at a low interest rate.
3. Due to call features, the company has greater control over the timing of the capital structure with convertible bonds.

11.3 Is price of convertible bond normally lower than straight bond? Why? **(5 points)**

Answer:

No. The price of convertible bond should be higher due to convertibility of the bond which can yield benefits to the holders or investors.

Question 12 (20 Points)

Jenny Hem, the pension fund manager, is considering a purchase of put option in anticipation of a price decline in the stock of AYOI Inc. The option gives Jenny the right to sell 100 shares of AYOI Inc., at any time during the next 90 days at a striking price of \$45.

12.1 What profit or loss will **Jenny** make if she buys the option, and the lowest price of **AYOI Inc.** stock during the 90 days is \$50, \$44, \$40, and \$35? (5 Points)

Answer:

At price \$50: Option value = $(45 - 50) \times 100 = -500$ or 0

At price \$44: Option value = $(45 - 44) \times 100 = 100$

At price \$40: Option value = $(45 - 40) \times 100 = 500$

At price \$35: Option value = $(45 - 35) \times 100 = 1,000$

12.2 What is the difference between “option” and “future” contracts? (5 Points)

Answer:

Option = “right” to buy or sell commodities or securities

Future = “obligation” to buy or see commodities or securities

12.3 Without any calculation, explain how investors use option and future contracts for risk management. (10 Points)

Answer:

To manage risk from expected price changes of commodities or securities the company has.