FN 201 Business Finance

Final Exam Exercise 1-2020

(Guided Solutions)

INVESTMENT CRITERIA AND DECISION

Question 1 (30 Points)

Sweetie Icy Company is considering including two pieces of equipment, a machine and an overhead pulley system, in this year's capital budget. The projects are independent. The cash outlay for the machine is $17,100 and that for the pulley system is $22,430. The firm's cost of capital is 14%. After-tax cash flows, including depreciation, are as follows:

Year	Machine	Pulley
1	$5,100	$7,500
2	5,100	7,500
3	5,100	7,500
4	5,100	7,500
5	5,100	7,500

1.1 Calculate the Net Present Value (NPV) and the Internal Rate of Return (IRR) for each project, and indicate whether to accept or reject each project. And why? (20 Points)

Answer:

Cost of capital 14%

	Machine	Pulley
NPV	408.71	3,318.11
IRR	14.99%	20.00%
PI	1.0239	1.1479

Since the projects are independent, the company can invest in both projects. Machine and pulley investment plans are all profitable because NPV is positive, IRR is higher than cost of capital and PI is greater than 1.

1.2 Calculate the Regular Payback Period for each project. Explain the meaning and decide which project is more attractive. (10 Points)

Answer:

	Machine	Pulley
Payback period	3.3529	2.9907

Question 2 (25 Points)

Project A and B, of equal risk, are alternatives (or mutually exclusives projects) for expanding the Winnie Company's capacity. The cash flows for each project are shown in the following table.

	Project A	Project B
Initial Investment	$80,000	$50,000
Year	**Cash Inflow**	
1	$15,000	$15,000
2	15,000	15,000
3	25,000	15,000
4	25,000	15,000
5	30,000	15,000

As a financial analyst of the company, help Winnie make an investment decision on its project by answering the following questions.

2.1 Calculate the internal rate of return (IRR) to the nearest whole percent for each of the projects. Please provide all necessary information used in the calculation procedures. **(5 Points)**

Answer:

	Project A	Project B
IRR	10%	15%

2.2 If the company's cost of capital is 3%, calculate the net present value (NPV) for each project. **(5 Points)**

Answer:

	Project A	Project B
NPV	19,671.03	18,695.61

2.3 According to IRR and NPV values from (1.1) and (1.2), respectively, discuss any conflict in ranking that may exist between NPV and IRR. And which project will you recommend Winnies to invest? Why? **(10 Points)**

Answer: Since the projects are mutually exclusive, company can choose only one project to invest. However, the decision depends on criteria they consider: IRR suggests project B, while NPV suggests project A. In this case, using NPV is more reliable.

2.4 Explain possible reasons that lead to conflict in ranking between NPV and IRR in this case. **(5 Points)**

Answer: 1) Different in initial investment and 2) Timing of cash inflows.

Question 3 (25 Points)

Winnie Inc. is considering two mutually exclusive projects of this year's capital budget. The firm's cost of capital is 4%. The cash outlay and after-tax cash flows received are as follows.

	Project A	Project B
Initial Investment	$79,607.52	$54,071.64
Year	**Cash Inflow**	
1	21,000	15,000
2	21,000	15,000
3	21,000	15,000
4	21,000	15,000
5	21,000	15,000

3.1 Calculate the Net Present Value (NPV) for each project. Which project will you recommend Winnie to invest? **(10 Points)**

Answer:

Cost of capital 4%

	Project A	Project B
NPV	$13,880.75	$12,705.69

Since the two projects are mutually exclusive, company should select the highest NPV project, which is project A.

3.2 Calculate the internal rate of return (IRR) to the nearest whole percent for each of the projects. Please provide all necessary information used for calculation. Which project will you recommend Winnie to invest? **(10 Points)**

Answer:

	Project A	Project B
IRR	10%	12%

The company should choose the highest IRR project, which is project B.

3.3 Does conflict exist from using NPV and IRR when making decision? If so, which project will you choose? Why? **(5 Points)**

Answer: Yes, the conflict exists from using NPV and IRR for making decision. In this case, NPV is more reliable. Thus, project A should be selected.

Question 4 (25 Points)

WinHom Roofing Materials, Inc., is considering two mutually exclusive projects. The cash outflows and inflows are as follows:

	Project A	Project B
Initial Investment	$145,000	$150,000
Year	**Cash Inflow**	
1	$45,000	$75,000
2	45,000	60,000
3	45,000	30,000
4	45,000	30,000
5	45,000	30,000
6	45,000	30,000

As an assistant project manager, help WinHom Roofing Materials make an investment decision on its projects by answering the following questions.

4.1 Calculate the internal rate of return (IRR). Please provide all necessary information used in the calculation procedures. Which project would you recommend to invest? **(5 Points)**

Answer:

	Project A	Project B
IRR =	21.28%	22.71%

4.2 If the company's cost of capital is 4%, calculate the net present value (NPV) and the profitability index (PI) for each project. **(5 Points)**

Answer:

	Project A	Project B
NPV =	90,896.16	78,270.02
PI =	1.63	1.52

4.3 According to IRR and PI from (4.1) and (4.2), respectively, discuss any conflict in ranking that may exist between IRR and PI. And which project will you recommend to invest? Why? **(10 Points)**

Answer:

	Project A	Project B
IRR =	21.28%	22.71%
NPV =	90,896.16	78,270.02
PI =	1.63	1.52

Yes, in this case, we should believe NPV.

So that, the company should invest in Project A.

4.4 Explain possible reasons that lead to conflict in ranking between IRR and PI in this case. **(5 Points)**

Answer:

1. Initial investment difference
2. Timing of cash flows

BOND

Question 5 (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.

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

Answer: YTM = Coupon rate = 10%

5.2 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

5.3 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%

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)**

Answer:

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 = Current Yield + Capital Gain/Loss Yield

For X: YTM = 12% = (200/2,000) + Capital Gain/Loss Yield

We get Capital Gain/Loss Yield = 2% = percent change in price

So, expected price = 2,040.

For Y: YTM = 13.50% = (200/2,000) + Capital Gain/Loss Yield

We get Capital Gain/Loss Yield = 3.50% = 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)

Tony is a risk-averse investor. He plans to invest in fixed income securities. One investment company shows him two bonds – Bond X and Y. Both pay 9% coupon interest rate with $1,000 par value. The difference is that bond X has 25 years to maturity, while bond Y has 7 years to maturity.

7.1 Draw an investment time line for each bond. If Tony's required rate of return is at 12%, how much should he pay for bond X and Y? **(5 points)**

Answer: Price of bond X = 764.7058
Price of bond Y = 863.0873

7.2 From bond prices in **(11.1)**, calculate Current Yield and Capital Gain/Loss Yield of each bond. Explain how these yields are related to each other. **(5 points)**

Answer: **YTM = Current Yield + Capital Gain/Loss Yield**

Bond P:	Current Yield	= 11.7692%
	Capital gain/loss yield	= 0.2308%
Bond D:	Current Yield	= 10.4277%
	Capital gain/loss yield	= 1.5723%

7.3 What will be the value of these two bonds when the going YTM or rate of interest become 15%? Calculate percentage change in price, compared with prices at 12% required rate of return, and fill in below table **(10 points)**

Answer:

YTM	Bond X		Bond Y	
	Price	Change (%)	Price	Change (%)
12%	764.7058		863.0873	
15%	612.1511	-19.9495%	750.3748	-13.0592%

7.4 Which bond should you recommend Tony to purchase? Why? **(5 points)**

Answer: Bond Y

Question 8 (25 Points)

Consider two bonds with 8 percent coupon rate, all selling at face value of $1,000. The short-term bond has a maturity of 8 years, and the long-term bond has maturity 30 years.

8.1 If both bonds have yield to maturity (YTM) at 7%, what will be the price of each bond? From the information obtained, classify the structure of YTM by dividing into Current Yield and Capital Gain/Loss Yield of each bond. **(10 Points)**

Answer:

YTM = 7%

	Price	YTM	Current Yield	CapGain/Loss
8-year	**1059.713**	7%	**7.5492%**	**-0.5492%**
30-year	**1124.09**	7%	**7.1169%**	**-0.1169%**

8.2 If interest rates suddenly rise by 2 percent or suddenly fall by 2 percent, what are the prices and the percentage change in price of these bonds? Please fill you answer in the table below. **(10 Points)**

Answer:

YTM	8-year Bond		30-year Bond	
	Price	Change (%)	Price	Change (%)
9%	**944.652**	**-10.86%**	**897.263**	**-20.18%**
5%	**1193.896**	**12.66%**	**1461.174**	**29.99%**

8.3 What does this problem tell you about the interest rate risk? Why does the percentage price change of a longer-term bond fluctuate more when interest rates change than does the shorter-term bond? **(5 Points)**

Answer:

Longer-maturity bond implies higher interest rate risk as we can observe from the percent change in price corresponding to interest rate change.

COMMON STOCK

Question 9 (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.

9.1 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 = ROE x Retention Ratio

= 17.5% x (1-60%) = 7%.

9.2 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 **(9.1)**, 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	0	1	2	3
Div		2.14	2.2898	2.450086
Price3				26.22
Common Stock Price =			**22.99061**	

9.3 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	0	1	2	3	4
Growth		50%	25%	25%	9%
Div		3.0000	3.7500	4.6875	5.1094
Price3				102.1875	
Common Stock Price =			**\$77.655**		

Question 10 (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.

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

Answer: g = ROE x Retention Ratio = 15% x (1 – 40%) = 9%

10.2 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 (10.1), what would be a proper stock price for the investor? **(10 points)**

Answer:

Year	0	1	2	3
Div		2.18	2.3762	2.590058
Price3				26.5
Price of Common Stock =		**22.8196**		

10.3 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:

Year	0	1	2	3	4	5
Growth		9%	9%	40%	20%	10%
Div		2.1800	2.3762	3.3267	3.9920	4.3912
Price4					87.824	
Price of Common Stock =		**$58.38**				

Question 11 (25 Points)

Storico Co. just paid a dividend of $2.75 per share. The company will increase its dividend by 20 percent next year and will then reduce its dividend growth rate by 5 percentage points per year until it reaches the industry average of 5 percent dividend growth, after which the company will keep a constant growth rate forever. 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%.

11.1 Draw an investment time line presenting dividend payment plan of Storico. **(5 points)**

Answer:

Year	0	1	2	3	4
div	2.75	3.3	3.795	4.1745	4.383225

11.2 If one investor intends to hold Storico's stock for **only 2 years** and expects to sell at $55 at the end of year 2, what will be a proper stock price for the investor? What should be appropriate investment strategy (i.e. to buy, sell, or hold) if Storico's current market stock price is $45? Why? **(10 points)**

Answer:

Year	0	1	2
div	2.75	3.3	3.795
Price			55
PV		2.894736842	45.24084334
Price =	**48.13558018**		

Recommend to BUY!

11.3 An investor has a long-term investment plan in Storico in that he has no plan to sell in a short period of time. According to the above information, what is the value per share of Storico's common stock? And what should be appropriate investment strategy (i.e. to buy, sell, or hold) if Storico's current market stock price is $45? Why? **(10 points)**

Answer:

Year	0	1	2	3	4	5
div	2.75	3.3	3.795	4.1745	4.383225	4.60238625
Price					51.137625	
PV		2.89473684	2.92012927	2.81766859	32.8728002	
Price =	41.5053349					

Recommend to SELL!

Question 12 (25 Points)

Win Hom Hotels, Inc., is entering into a 3-year remodeling and expansion project. The construction will have a limiting effect on earnings during that time, but when it is complete, it should allow the company to enjoy much improved growth in earnings and dividends. Last year, the company paid a dividend of $3.40. It expects zero growth in the next year. In years 2 and 3, 5% growth is expected, and in year 4, 15% growth. In year 5 and thereafter, growth should be a constant 10% per year.

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%.

12.1 Draw an investment time line presenting expected dividend payment of Win Hom Hotels. What are the investor's require rate of return? **(5 points)**

Answer:

year	0	1	2	3	4	5
g		0	5%	5%	15%	10%
Div	**3.40**	**3.40**	**3.57**	**3.75**	**4.31**	**4.74**

Re **14%**

12.2 What is the maximum price per share should an investor pay for Win Hom Hotels' common stock? What should be appropriate investment strategy (i.e. to buy, sell, or hold) if the current market stock price is $75? Why? **(10 points)**

Answer:

year	0	1	2	3	4	5
TV					118.5463	
PV		2.98	2.75	2.53	72.74	
Price =	**81.00084**					

Suggest to BUY!

12.3 If the remodeling and expansion project is failed at the end of year 2, so that that the growth in earnings and dividends is constant at 5% starting from year 3, what will be the common stock value of Win Hom Hotels? Will this change your recommendation in (12.2)? How? **(10 points)**

Answer:

Year	0	1	2	3	4	5
g		0	5%	5%	5%	5%
Div	3.40	3.40	3.57	3.75	3.94	4.13
TV		39.66667				
Price =	**37.77778**					

Should SELL!

COST OF CAPITAL

Question 13 (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 (1 million shares)	50,000,000
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%.

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

Answer: MV of Common Stock = 1 million x 60 = 60 Million
MV of Debt = 30,000 x 812.22 = 24,366,600
Hence, We = 71.12% and Wd = 28.88%.

13.2 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: Re = 4% + 8% = 12%
Rd x (1-t) = 15% x (1 – 40%) = 9%
Hence, WACC = 12% x (0.7112) + 9% x (0.2888) = 11.1336%

13.3 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)

Answer: New common equity to be raised = 71.12%($40 million)
The reason is to maintain optimal capital structure.

13.4 (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 Rd and Re are higher.

Question 14 (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.

14.1 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 D1 = 6.50 x (1+8.0185%) x 40% = 2.8085
Cost of equity = Re = 15.8199%

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

Answer: From that We = 62.5% and Wd = 37.5%
WACC = 11.9124%

14.3 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% x 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.

14.4 **(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 Re.

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

Answer: WACC will increase, because of higher Rd and Re.

Question 15 (30 Points)

iPhome Co. Ltd. reported its capital structure as follows:

- 8.5 million shares of common stocks selling at $34 in the market;
- 200,000 shares of preferred stocks with selling price of $83 a share (it was estimated 7% return per annum); and
- 85,000 shares of 15-year corporate bonds with 8.5% coupon interest rate sold at par or $1,000.

The company uses the CAPM to estimate its cost of common equity. It estimates that the risk-free rate is 5%; the market risk premium from 6-month T-bills is 6%, and from 6-year Government Bond is 9%; company's beta is 1.20; and the company's tax rate is 35%.

15.1 Find the component after-tax costs of debt, preferred stock, and common stock. **(5 points)**

Answer:

Source	Cost
CS	15.80%
PS	7.00%
Bond	5.53%

15.2 Calculate market value of iPhome's capital structure and percentage of each source of capital. **(10 points)**

Answer:

	Price	Number	MV	Wi
CS	34	8.5	289	73.99%
PS	83	0.2	16.6	4.25%
Bond	1000	0.085	85	21.76%
		Total Capital	**390.6**	**100%**

15.3 iPhome considers to have a new production base in China in order to lower costs from local production and increase revenues from international market. If this new project has the same risk level as company's other projects, what will be an appropriate *discount rate* for project analysis given the same percentages of each source of capital? **(5 points)**

Answer:

	Price	Number	MV	Cost	Wi	WACC
CS	34	8.5	289	15.80%	73.99%	11.69%
PS	83	0.2	16.6	7.00%	4.25%	0.30%
Bond	1000	0.085	85	5.53%	21.76%	1.20%
		Total Capital	390.6		100%	**13.19%**

WACC = 13.19%

15.4 **(10 points)** ***Qualitatively speaking***, what will happen to the WACC of iPhome if:

(1) iPhome issues new shares of common stock with higher flotation cost?
Answer: WACC increases due to higher Re.

(2) The new project is granted considerably lower tax rate?
Answer: WACC increases due to higher portion from cost of debt, Rd(1-t).

Question 16 (35 Points)

Cookie Win Manufacturing has the following capital structure, which it considers to be optimal:

- ***Debt***: 5,000 7 percent coupon bonds outstanding, $1,000 par value, 20 years to maturity, selling for 92 percent of par; the bonds make semiannual payments.
- ***Common stock***: 100,000 shares outstanding, selling for $57 per share; the beta is 1.15.
- ***Preferred stock***: 13,000 shares of 7 percent return preferred stock outstanding, currently paying dividend for $8 per share.

Assume the company's tax rate is 35 percent. From current market condition, it is found that market return is at 14 percent, and the 6-month T-bills and the 6-year government bonds are at 4 percent and 6 percent, respectively.

16.1 What are Cookie Win Manufacturing's capital structure weights on a market value basis? **(10 points)**

Answer:

	#share	Price	Cost	MV	Wi
Debt	5,000	920	7.80%	4,600,000.00	39.03%
CS	100,000	57	15.20%	5,700,000.00	48.36%
PS	13,000	114.29	7.00%	1,485,714.29	12.61%
			Total	11,785,714.29	100.00%

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

Answer:

	#share	Price	Cost	MV	Wi
Debt *(AF)*	5,000	920	5.07%	4,600,000.00	39.03%
CS	100,000	57	15.20%	5,700,000.00	48.36%
PS	13,000	114.29	7.00%	1,485,714.29	12.61%
			Total	11,785,714.29	100.00%

beta	1.15
Rf	6%
Rm	14%
WACC	**10.2125%**

16.3 If Cookie Win Manufacturing plans to raise $15 million capital for new projects, in order to maintain the present market capital structure, how much of the new investment must be financed by equity? Furthermore, if this new project has higher risk level than company's other projects, what will be an appropriate *discount rate* for project compared with WACC obtained from **(16.2)**? **(10 points)**

Answer:

Total capital	15
New Equity	7.2545

The appropriate discount rate should be HIGHER than **10.2125**%

16.4 *Qualitatively speaking*, if Cookie Win Manufacturing issues new shares of common stock with flotation cost, do you think CAPM is still an appropriate tool to estimate cost of equity? If not, what should be an alternative approach? **(5 points)**

Answer:

CAPM seems to be no longer an appropriate tool.

We should use dividend discounted model.

TIME VALUE OF MONEY

Question 17 (30 Points)

When you were born, your dear old Uncle Winnie promised to deposit $1,500 in a savings account for you on each and every one of your birthdays, beginning with your first. The savings account bears a 7 percent compound annual rate of interest.

17.1 Draw the saving time lines of your money. **(5 Points)**

Answer:

17.2 Suppose you have just turned 20 and want all the cash. How much would you have received? **(10 Points)**

Answer:

Total money in an account would be = **61,493.24**

N	I/Y	PMT	PV	FV
20	7%	1,500	0	?

17.3 Ignore the amount from (17.2) since it turns out that dear old (forgetful) Uncle Winnie forgot making deposits on your fifth, seventh, and eleventh birthdays. How much is in the account now – on your twentieth birthday? **(10 Points)**

Answer:

FV of the 5th year = - 4,138.55
FV of the 7th year = - 3,614.77
FV of the 11th year = - 2,757.69

Total money in an account would be
= 61,493.24 - 4,138.55 - 3,614.77 - 2,757.69
= **50,982.23**

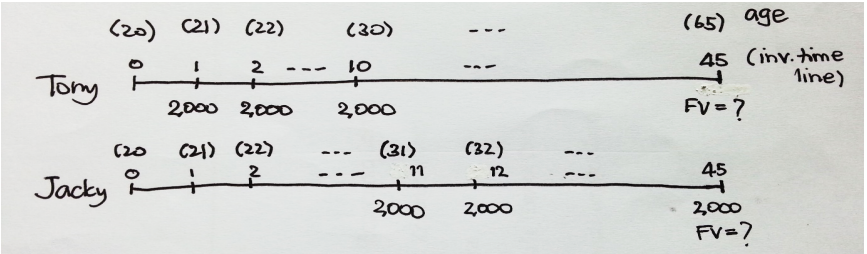
Question 18 (30 Points)

Tony has decided to start saving for his retirement. Beginning on his twenty-first birthday, Tony plans to invest $2,000 each birthday into a savings investment earning a 7 percent compound annual rate of interest. He will continue this savings program for a total of 10 years and then stop making payments. But his savings will continue to compound at 7 percent for 35 more years, until Tony retires at age 65.

Jacky also plans to invest $2,000 a year, on each birthday, at 7 percent, and will do so for a total of 35 years. However, he will not begin his contributions until his thirty-first birthday.

18.1 Draw the investment time lines of Tony's and Jacky's plans. (5 Points)

Answer:



18.2 How much will Tony's and Jacky's savings programs be worth at the retirement age of 65? (10 Points)

Answer:

Tony's FV = 2,000 x ($FVIFA_{7\%, 10 \text{ years}}$) x ($FVIF_{7\%, 35 \text{ years}}$)
= 295,026.864

Jakky's FV = 2,000 x ($FVIF_{7\%, 35 \text{ years}}$)
= 276,480

18.3 Who is better off financially at retirement, and by how much? (5 Points)

Answer:

Tony has more saving from his program, which is higher than Jakky's

= 295,026.864 – 276,480

= 18,546.864

Question 19 (30 Points)

An executive of Win Hom Company Limited plans to retire at age 65 and expects to live more 10 years. He wants to receive the following annual money for living from retirement until death.

Year (after retirement)	1-5	6-7	8-10
Cash	$10,000	$12,000	$15,000

As a financial planning consultant, please help this executive by answering the following questions.

19.1 Draw the financial planning time line of this executive. **(5 Points)**

Answer:

Year	0	1	2	3	4	5	6	7	8	9	10
Cash		10,000	10,000	10,000	10,000	10,000	12,000	12,000	15,000	15,000	15000

19.2 Assuming an average 8% rate of return he can earn after retirement, calculate the amount he must have available at age 65 in order to receive annual money as shown in the table. **(10 Points)**

Answer:

Age	65	66	67	68	69	70	71	72	73	74	75
Year	0	1	2	3	4	5	6	7	8	9	10
Cash		10,000	10,000	10,000	10,000	10,000	12,000	12,000	15,000	15,000	15000
PV		9,259.26	8,573.39	7,938.32	7,350.30	6,805.83	7,562.04	7,001.88	8,104.03	7503.73	6947.9

Sum	77,046.6907

19.3 Suppose he is 55 years old now. Given the amount from (19.2), if he plans to save annually during his working period starting at the end of his 55th year, how much annuity must he invest into a savings program earning an 8% compound annual rate of interest? **(10 Points)**

Answer:

FV =	77,046.69
FVIFA =	14.486562
Annuity =	**5,318.49**

Question 20 (30 Points)

Jammy and Tony, a 20-year-old officer, have planned for their retirement. Both will retire at age 65 and expect to live to age 75. Assume an annual compound interest rate is fixed at 8% for the whole period of investment. Please suggest them by answering the following questions.

20.1 If they want to receive $15,000 annually from retirement until death, what will be the amount they must have available at retirement (at age 65)? Draw an investment time line and show your calculation. **(10 Points)**

Answer:

The amount they must have available at retirement (at age 65)
= **100,651.22**

N	I/Y	PMT	PV	FV
10	8%	15,000	?	0

20.2 For Tony, he will start saving on his thirty-first birthday until retirement. In order to have the total amount from (20.1), how much does he need to save equally each year? **(10 Points)**

Answer:

The amount he must save equally each year = **584.1057**

N	I/Y	PMT	PV	FV
35	8%	?	0	100,651.22

20.3 Jammy plans to start an annuity saving on his twenty-first birthday for a total of 10 years and then stop making payments. However, his savings will continue to compound at 8 percent until he retires at age 65. In order to have the total amount from (20.1), how much does he need to save equally each year? **(10 Points)**

Answer:

From that

$$100,651.22 = A \times FVIFA_{(8\%,10)} \times (1+8\%)^{35}$$

$$6,807.4992 = A \times FVIFA_{(8\%,10)}$$

Hence, the amount he must save equally each year = **469.9182**

N	I/Y	PMT	PV	FV
10	8%	?	0	6,807.4992

20.4 According to your answers in (20.2) and (20.3), who could have less saving each year but get the same amount of (20.1)? Explain possible reasons. **(5 Points)**

Answer:

Jammy could have less saving, but get the same required amount. This is because he starts saving first, so he has longer investment period. Even though a shorter period of deposit, thanks to the 8% rate of return, he could eventually earns the same amount.

Question 21 (30 Points)

Tony is 35 years of age and expects to work until the age of 60. He is considering to save $8,000 every year with the Philo Life Insurance Company, starting from the end of his 35 years old. Assume the approximate rate of return is 8%.

21.1 Please draw an investment time line of Tony's investment plan. What will be the amount Tony must have available at retirement? **(10 Points)**

Answer:

N	I/Y	PV	PMT	FV
25	**8%**	**0**	**8,000**	**?**

FV = 584,847.5196

21. 2 After careful consideration, Tony realizes that he could save $2,000 more for 10 consecutive years in the investment plan. Assuming 8% rate of return, would you recommend Tony to save in the first 10 years or the last 10 years? Show your calculation to support the suggestion. **(15 Points)**

Answer:

The first 10 years: => FV = 676,755.1724

N	I/Y	PV	PMT	FV	FV+15
10	8%	0	10,000	**144,865.6247**	**459,538.261**

N	I/Y	PV	PMT	FV	
15	8%	0	8,000	**217,216.9114**	

The last 10 years => FV = 613,820.6445

N	I/Y	PV	PMT	FV
25	8%	0	8,000	**584,847.5196**

N	I/Y	PV	PMT	FV
10	8%	0	2,000	**28,973.1249**

21.3 Tony expects to live for more 12 years after retirement. Suppose his saving plan yields 10% of return for the period after retirement. How much could Tony spend each year given the total amount at retirement from (21.1)? **(10 Points)**

Answer:

N	I/Y	PV	PMT	FV
12	**10**	**584,847.5196**	**?**	**0**

PMT = 85,834.16

Question 22 (30 Points)

Tony is 38 years old and expects to retire at the age of 65. He wishes to provide saving for himself and is considering an annuity contract with the Philo Life Insurance Company. Such a contract pays him an equal-dollar amount each year that he lives after retirement. According to actuary tables, his life expectancy after retirement is 15 years, and that is the duration on which the insurance company bases its calculations regardless of how long he actually lives.

22.1 If Philo Life uses a compound annual interest rate of 5 percent in its calculations, what must be the insurance cost when Tony retires in order to provide him an annuity amount of $15,000 per year? **(10 Points)**

Answer:

N	I/Y	PV	PMT	FV
15	5%	?	15,000	0

PV = 155,694.87

22.2 If Tony wants to pay the insurance cost as an annuity payment at the end of the year for the rest of his working period, how much does he have to pay? Assume a compound annual interest rate of 5 percent**. (10 Points)**

Answer:

Tony is now 38 years old (= year 37 in the investment timeline). Assuming he would make payment at the end of the year, there are thus 65-37 = 28 years left from now.

N	I/Y	PV	PMT	FV
28	5%	0	?	155,694.87

PMT = 2,665.89

22.3 Tony realizes that he has another possible investment plan, which is the Retirement Mutual Fund (RMF). This option yields only 3% return, but requires him to save $7,000 each year for the rest of his working period. If he chooses this plan, how much will he have at the retirement year? Is it better than saving with Philo Life? Why? **(15 Points)**

Answer:

N	I/Y	PV	PMT	FV
28	3%	0	7,000	?

FV at 65 = 300,516.46. **So, this plan is better.**

SHORT-TERM FINANCING

Question 23 (25 Points)

Suppose that Win Hom Sofa has a line of credit with a quoted interest rate of 10 percent and a compensating balance of 25 percent. The compensating balance earns no interest.

23.1 If the company needs $60,000, how much total loan will it need to borrow? And what is the actual interest rate from this loan? **(10 Points)**

ANSWER

Usable funds	60,000
Total loan =	80,000
Actual interest rate =	13.33%

23.2 Suppose that the bank offers two alternative loan contracts without compensating balance requirement, but the company has to accept different agreements as follows:

Plan A – Paying an annual interest rate of 12 percent quarterly
Plan B – Paying an annual interest rate of 12 percent of a discount bank loan (discount interest)

Given total loan from (23.1), calculate actual interest rate of Plan A and Plan B. **(10 Points)**

ANSWER

Plan A: Actual Interest Rate (EAR) $= \left(1+\frac{12\%}{4}\right)^4 - 1 = 12.5509\%$

Plan B: Actual Interest Rate = $= \frac{12\%(60,000)}{60,000\times(1-12\%)} = 13.6364\%$

23.3 Examining the original loan contracts with Plan A and Plan B, which plan should Win Hom accept? Why? **(5 Points)**

ANSWER

Win Hom Sofa should choose Plan A since it has the lowest cost.

Question 24 (20 Points)

On March 1, 2012, MAMA Corporation purchased $100,000 worth of inventory on credit with terms of 1/20, net/60. In the past, MAMA has always followed the policy of making payment 1 month (30 days) after the goods are purchased.

If MAMA were to take advantage of the discount and pay the bill on March 20 rather than on March 30, the firm would have to borrow the necessary funds for the 10 extra days. National's borrowing terms with a local bank are estimated to be at 9 percent (annual rate), with a 15 percent compensating balance for the term of the loan.

MAMA feels that it makes little sense to take out a 9 percent loan with a compensating balance of 15 percent in order to save 1 percent on its $100,000 by paying the account 10 days earlier than it had planned.

24.1 Calculate the opportunity cost rate of foregoing cash discount if MAMA follows the traditional payment policy (payment is made on the 30th day)?
(7 Points)

ANSWER

Opportunity cost

$$= \frac{1}{99} \times \frac{365}{(Actual\ payment\ -\ discount\ period)} = \frac{1}{99} \times \frac{365}{(30-20)}$$

$$= 36.8687\%$$

24.2 If MAMA rejects such traditional payment policy, what will be the true interest cost rate of borrowing the necessary funds for the 10 extra days?
(8 Points)

ANSWER

Necessary fund to borrow = $100,000x(1 – 1%) = 99,000
Compensating balance at 15%, thus total loan to borrow:
= 99,000/(1 – 15%) = 116,470.5882

Cost of borrowing at 9% = 9%x(116,470.5882) = 10,482.35294
Usable fund = 99,000
Thus, actual interest cost rate = 10,482.35294 / 99,000
= 10.58824%

24.3 Would it be to MAMA's advantage to take 1 percent discount by paying the bill 10 days earlier than usual? Why? (5 Points)

ANSWER

MAMA better take 1 percent discount. If it does not take, this will lead to substantial opportunity cost of foregoing, which is much higher than interest rate from borrow necessary fund.

Question 25 (25 Points)

Jackie Corp. turns over its inventory 9 times during the year, and its days sales outstanding was 36 days. Under regular payment policy, the company payables deferral period is 40 days. Jackie's daily operating cash is around $64,000. Assume a 360-day year.

25.1 Will it be better for Jackie to take 2 percent discount when short-term bank loan costs 15%? Please calculate and compare the opportunity cost rate of foregoing cash discount and the actual interest rate to make decision. **(10 Points)**

ANSWER

$$\text{Effective loan cost} = \left(1+\frac{15\%}{360/25}\right)^{\frac{360}{25}}-1 = \mathbf{16.09\%}$$

$$\text{Opportunity cost} = \frac{2}{98}\times\frac{360}{(40-15)} = \mathbf{29.39\%}$$

Question 26 (35 Points)

MWH Corporation purchases the inventory under the credit terms of **2/15, net 45** for the whole year. Since the company believes that it could not find advantage from taking 2 percent discount, it always takes the full 45 days to pay its bills. Thus, the average payment period is 45 days. A new member in finance department considered that there might be benefit from taking cash discount by paying on the 15th day after purchasing. However, this will require additional short-term capital. If MWH turns over its inventory 6 times each year and has an average collection period of 30 days. The company's annual operating-cycle investment is $630 million. Assume a 360-day year.

26.1 Is there any cost associated with the decision of not taking cash discount? If so, what is such cost and how to calculate? **(10 Points)**

ANSWER

The opportunity cost of foregoing a cash discount of the credit term **2/15, net 45**

$$=\frac{2}{98}\times\frac{360}{(45-15)}=24.49\%$$

26.2 What would be the criteria to help the company making decision whether it should take benefits from cash discount? Explain. **(5 Points)**

ANSWER

Qualitatively speaking, the criterion is to compare the opportunity cost of foregoing a cash discount with the actual cost of short-term debt. That is, if the opportunity cost of foregoing a cash discount is greater (lower) than the actual cost of short-term debt, the company should take (not take) cash discount.

Question 27 (40 Points)

Winnie Manufacturing reported sales last year of $5,000 million with 30% gross profit margin and inventory level at $437.50 million. The company had an average collection period of 60 days and an average payment period of 45 days. Assume a 360-day year.

27.1 Winnie has to borrow from Bank Z for 30 days with a quoted rate of 12% per year. By comparing the opportunity cost of foregoing a cash discount and the actual cost of bank loan, would you recommend the company to take cash discount? Why? **(10 Points)**

ANSWER

Not take => $Opportunity\ cost = \frac{2}{98} \times \frac{360}{30} = 24.4898\%$ **24.4898%**

Take => $\textbf{Actual Cost of Bank Loan} = \left(1 + \frac{12\%}{12}\right)^{12} - 1 = 12.6825\%$ **12.6825%**

So, the company should TAKE CASH DISCOUNT!

27.2 Why there exists a trade-off between liquidity and profitability in current asset investment policy? And under which condition should the company emphasize on liquidity or profitability? **(10 Points)**

ANSWER

Key focus	CA Investment Policy	Financing Policy
Liquidity	CA more, But less capital for long-term investment	Capital more, but more expensive
Profitability	Less money for profitable activity = LESS!	Higher cost of capital = LESS profitability!

AND VICE VERSA

Question 28 (40 Points)

Linda Manufacturing has an inventory conversion period of 60 days, an average collection period of 30 days, and an account payable period of 45 days. Linda's annual sales are $4,860,000 which are all on credit, and the gross profit margin is 20% of sales. Assume a 360-day year.

28.1 Assume that inventory of the company was transacted with the credit terms of **1/15, net 45**. Linda understands that if they do not take cash discount, there should be no cost associated. Is Linda's understanding correct? Why? If there is cost, how great is the percentage? **(10 Points)**

ANSWER

No, Linda's understanding is wrong. There is an opportunity cost of foregoing cash discount.

$$OppCost = \frac{1}{99} \times \frac{360}{30} = \quad 12.12\%$$

28.2 Linda would like to borrow short-term loan for 40 days and rolls over its contract throughout the year. Suppose that the bank offers Linda short-term debt with term loan of 40 days and 15% of interest rate per annum. By comparing the opportunity cost of foregoing a cash discount and the actual cost of bank loan, would you recommend the company to take cash discount? Why? **(10 Points)**

ANSWER

NOT TAKE: $OppCost = \frac{1}{99} \times \frac{360}{30} = \quad 12.12\%$

TAKE: $ActualRate = \left(1 + \frac{15\%}{9}\right)^{9} - 1 = \quad 16.04\%$

28.3 In financing policy, explain possible reason why there exists a trade-off between liquidity and profitability. Under which condition should the company emphasize on a particular aspect (i.e. liquidity or profitability)? **(10 Points)**

ANSWER

- Cost of long-term debt > cost of short-term debt
- If conservative:
  Focus on liquidity => having more long-term debt
  => higher financing cost
  => lower profitability
- If aggressive:
  Focus on profitability
  => having more short-term debt due to lower financing cost
  => less long-term debt
  => lower liquidity