Universidad del Desarrollo
Facultad de Economía y Negocios
Ingeniería Comercial

Solutions Final Exam
Finance I

I. Portfolio Theory

Suppose you are evaluating an investment in a set of assets. Asset A has an expected return of 10% and a standard deviation of 20%. Asset B has an expected return of 18% and a standard deviation of 25%. The correlation coefficient of both assets is 0.5 (zero point five). The return of a risk free asset is 6%.

    a. Determine what is the weight each asset should have in a portfolio, if you require the portfolio to provide an expected return of 15.6%. (5 Pts)

       15.6% = X*10% + (1-X)*18%
       X= 30%
       (1-X)=70%

    b. Calculate the variance of the portfolio from I.a (5 Pts)

       $X_y^2\sigma_y^2 + X_z^2\sigma_z^2 + 2X_yX_z\rho\ \sigma_y\sigma_z$
       $(0.3)^2(0.2)^2 + (0.7)^2(0.25)^2 + 2(0.3)(0.7)(0.5)(0.2)(0.25)$
       0.0447

    c. Calculate the Sharpe Index of Asset A, Asset B and the portfolio from I.a. (3 Pts)

       $\dfrac{r_p - r_f}{\sigma_p}$

       Asset A: (0.1-0.06)/0.2 = 0.2
       Asset B: (0.18-0.06)/0.25 = 0.48
       Portfolio C: (0.156-0.06)/0.21=0.45

    d. If you are asked to construct a NEW portfolio that combines the risk free asset and one of the following: Asset A, Asset B or Portfolio I.a, which one would you choose? Explain why (2 Pts)

       Asset B, because it has the highest Sharpe index, indicating that it´s the asset that provides the highest additional return for each unit of risk

II. CAPM

Suppose a risk free rate of 5%, a market´s expected return of 15%. You are evaluating an investment in a set of companies. Company Alfa has a beta of 0.6 and Company Bravo has a beta of 1.4.

a. What is the appropriate cost of opportunity according to CAPM for companies Alfa and Bravo? (6 Pts)

$$R_x = R_f + \beta_x(R_m - R_f)$$
$$R_{Alfa} = 5\% + 0.6(15\% - 5\%) = 11\%$$
$$R_{Bravo} = 5\% + 1.4(15\% - 5\%) = 19\%$$

b. What is the appropriate cost of opportunity according to CAPM for a portfolio holding 50% of company Alfa and 50% of company Bravo? What should be its beta? (4 Pts)
Many ways to solve it. The easiest is to calculate the beta of the portfolio first, and then calculate the cost of opportunity. As beta is a measure of non diversifiable risk, there is no additional diversification by combining both assets (companies), therefore the non diversifiable risk will be the weighted average of the assets non diversifiable risk (measured by beta). Hence 0.5*0.6+0.5*1.4 = 1.
The cost of opportunity is:
$$R_{Portfolio} = 5\% + 1(15\% - 5\%) = 15\%$$

c. Which of the previous (company Alfa, Bravo or portfolio) has the highest Sharpe Index? (5 pts)
All of them have the same Sharpe Index, as they lay on the capital market line. It's not correct to calculate the Sharpe Index using beta!!!

III. Financial Analysis

Using the financial information provided, please answer the following questions

a. Which company is in a better position to fulfill its short term obligations? (5 pts) Explain and show your calculations

Liquidity	Company Winner	Company Looser
Current ratio	1.74	1.00
Acid Test	1.37	0.36
Cash ratio	0.26	0.15

Using liquidity ratios, you could infer that Company Winner has more current assets than current liabilities, and should be in a better position to fulfill its short term obligations.

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b. By analyzing the balance sheet and income statement, what could you infer about the:

b.1 Credit policy to clients (2 pts)

Winner's customers are taking in average, 6 months before paying. On the other hand, Looser's customers pay on average after 2 months. This doesn't mean that Winner gives more credit than Looser.

b.2 Credit policy from suppliers (2 pts)

Looser hasn´t paid its supplier for over 1 ½ years, while Winner hasn´t paid for almost 2/3 of a year. This doesn't mean that Looser receives more credit than Looser.

c. Suppose both companies can increase their production without investing in additional plants or equipment. If both companies double their sales, which one would be in a better financial position? (5 pts)

Not so simple. Even though Winner will have better liquidity ratios, you should also approach the question by analyzing the working capital requirements. Winner will have greater liquidity BECAUSE its structure assumes a positive working capital. Looser will have lower liquidity BECAUSE its structure assumes a negative working capital. As both companies double their sales, Looser will generate cashflow for the shareholders, while Winner will require cash from shareholders, therefore, Looser will be in a better financial position.

d. If both companies have the same non diversifiable risk, in your opinion, which company is doing a better job at generating returns for their shareholders? (6 pts)

Not so simple… by taking regular profitability ratios:

Profitability	Company Winner	Company Looser
Net profit margin	32.0%	33.3%
Return on assets	19.8%	14.6%
Return on equity	30.4%	30.0%

You could argue that Winner is doing a better job, BUT that's not necessarily correct, as that analysis is based on accounting figures and not according to actual cash generation. Given the working capital structure, Winner demands cash from shareholders, while Looser generates cash to shareholders. Only half of Winners sales have been paid!!!

IV. Bond Valuation

You are an investment manager looking for new investment opportunities. While searching the market, you find the following options:

- A new bond (called Structured Bond) that mixes ensures future payments according to the growth of the market (hence, it's NOT risk free). This bond does not have a face value. It only pays coupons, and it's scheduled to last 4 periods.
- A year zero coupon bond
- A 4 year annuity

	Payment			
Period	1	2	3	4
Structured Bond	15	20	25	35
Zero Coupon	0	0	0	120
Annuity	21	21	21	21

All of the instruments have a market price of 45. You know that 45 is not the true value.

a) An analyst provides you with a cost of opportunity of 30%, which is equal for all instruments. Please determine the present value of each instrument, using that cost of opportunity (15 pts)
See calculations in attached Worksheet.

	Payment				Value	
Period	1	2	3	4	30%	23%
Structured Bond	15	20	25	35	$ 47.01	$ 54.72
Zero Coupon	0	0	0	120	$ 42.02	$ 53.29
Annuity	21	21	21	21	$ 45.49	$ 51.89

b) If you can purchase 2 of the instruments, which ones would you choose and how much would you gain? (5 pts)

You should purchase the ones with HIGHEST VALUE, hence at 30% cost of opportunity, you would choose the structured bond and the annuity, for a cost of 90 and a value of 92.5, implying a gain of 2.5

c) You review the cost of opportunity, because it seems to be too high. The analyst gives you the following explanation: "the risk free rate is 5% and the market premium is 7%, therefore the market return is 12%. Since all the instruments have a beta of 2.5, all of them should have 2.5 times the market return as cost of opportunity". What is the error in the argument? what is the correct cost of opportunity? (5 pts)
The error is by having a beta of 2.5 you should required 2.5 times the market risk PREMIUM, not RETURN. The correct cost of opportunity is 22.5%
$$R_{Instruments} = 5\% + 2.5(12\% - 5\%) = 22.5\%$$

d) Using the correct cost of opportunity calculated in IVc, <u>explain</u> whether the value of the instruments should increase, decrease or remain the same? (5pts)

The values should increase, as the cost of opportunity decreases.

e) Which of the instruments should have a greater impact?/why? (5pts)

The zero coupon bond, since 100% of its cashflow is generated in the last period. The impact of changes in the cost of opportunity increase as cashflows are further away in the future

V. Common Stock Valuation

Suppose a company has a Net Profit (profit after taxes) of $50 and equity of 100 shares with a book value of $2 each. Suppose the company distributes 70% of the profit as dividend.

a) What is the expected dividend growth rate? (5 pts)

retention rate x ROE

30%*25%=7.5%

No formula = 0pts
Wrong calculation/wrong inputs = 1 pt

b) If the cost of opportunity is 20%, how much would you be willing to pay for each share?(10 pts)

$$\frac{D}{r-g} = \frac{0.35}{20\% - 7.5\%} = 2.8$$

No formula = 0pts
Wrong calculation/wrong inputs = 2 pts
Calculate equity value instead of share value = 8 pts