Exam name: Corporate Finance Written sit in (UC) - BINBO1136E

Part 1 – Multiple Choice

Question #	Answer
1	D
2	C
3	A
4	A
5	B
6	C
7	B
8	B
9	D
10	E
11	A
12	A
13	A
14	D
15	C
16	E
17	B
18	C
19	A
20	D
21	B
22	C
23	C
24	A
25	A
26	E
27	A
28	D
29	E
30	E

Part 2 – Long Questions

Question 1

To avoid confusion: I am using this table (Second table) to answer the questions:

Scenario	Market	Stock A	Stock B
Boom	14%	18%	11%
Normal	11%	15%	9%
Bust	1%	3%	-4%

The stock betas are 1.3 for stock A and 0.6 for Stock B. The risk-free rate is 2%.

A)

The expected return on a stock is given by:

$$r_{expected} = P_1 * r_1 + P_2 * r_2 + P_3 * r_3$$

Where numbers 1-3 refers to the scenario, P_t is the probability if a scenario and r_t is the return in that scenario. Thus, the return expected return for each stock is:

$$r^A_{expected} = 0.25 * 0.18 + 0.5 * 0.15 + 0.25 * 0.03 = 0.1275 = \mathbf{12.75}\%$$

$$r^B_{expected} = 0.25 * 0.11 + 0.5 * 0.09 + 0.25 * -0.04 = 0.0625 = \mathbf{6.25}\%$$

B)

The fair return on each stock can be calculated using the CAPM model:

$$r_e = r_f + \beta(r_m - r_f)$$

Where r_e is the expected return on equity, r_f is the risk-free rate, and r_m is the market return. The expected market return is:

$$r^A_{expected} = 0.25 * 0.14 + 0.5 * 0.11 + 0.25 * 0.01 = 0.1275 = 0.0925 = 9.25\%$$

The beta (β) is the correlation between historic returns of equity on the firm and the general return on the market.

Thus, the fair returns on the stocks are:

$$r^A_e = 0.02 + 1.3 * (0.0925 - 0.02) = 0.11425 = \mathbf{11.43}\%$$

$$r^B_e = 0.02 + 0.6 * (0.0925 - 0.02) = 0.0635 = \mathbf{6.35}\%$$

C)

In general, a stock can be said to be overpriced if the expected return is lower than the fair return. This is because a price and return are inversely related (the lower the price, the higher the expected return). Holding the fair return of the stock constant, this implies that an overpriced stock has a lower expected return than a fair return. Naturally, the opposite is true for underpriced stocks: they can be said to be underpriced if the expected return is higher than the fair return. In this case:

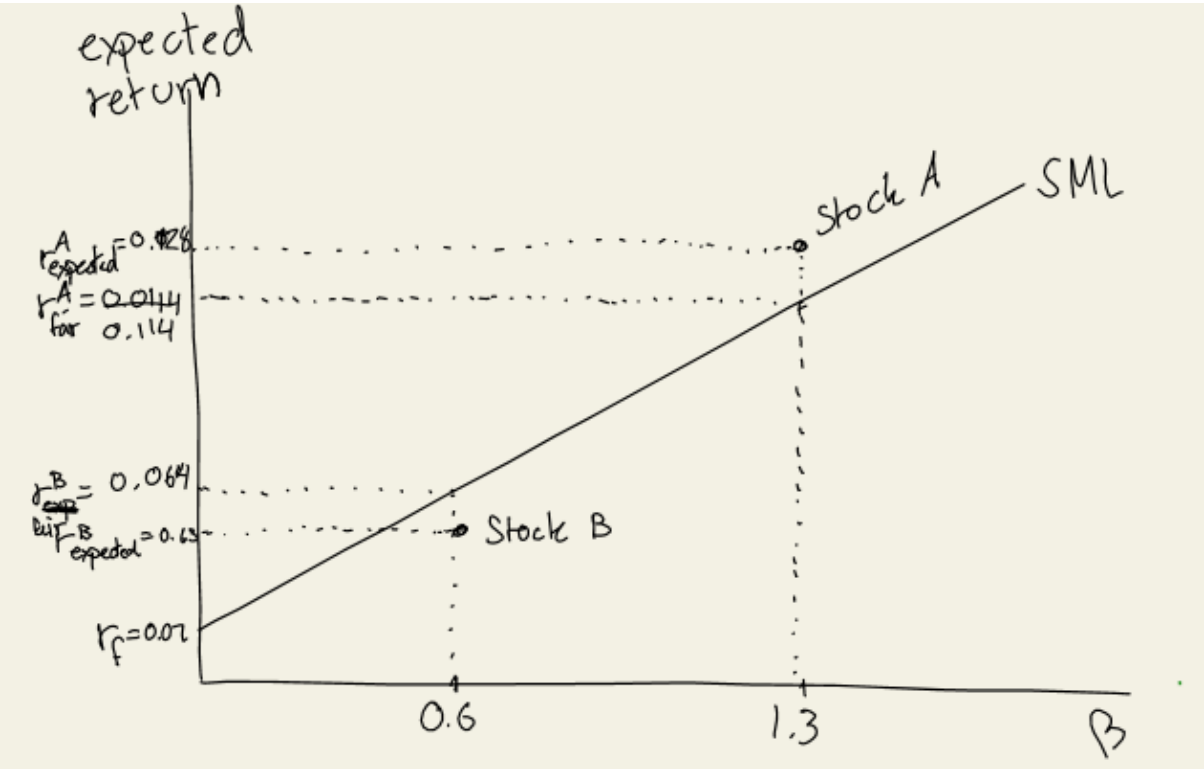
Stock A: $r^A_{expected} = 12.75\% > r^A_{fair} = 11.43\%$

Stock B: $r^B_{expected} = 6.25\% < r^A_{fair} = 6.35\%$

Implying that **Stock A is underpriced**, while **Stock B is overpriced**

D)

The security market line graphs the fair return on an asset, as estimated by the CAPM, as a function of its beta. If an asset lies above the line (higher expected return than fair return), it is underpriced and vice versa. In this case, the SML function is: $r_{expected} = 0.02 + 0.0725\beta$:



As expected, Stock A lies above the SML (underpriced) and Stock B lies below (overpriced).

Question 2

A)

The expected return on equity can be calculated using the CAPM model, which is given by:

$$r_e = r_f + \beta(r_m - r_f)$$

Where r_e is the expected return on equity, r_f is the risk-free rate, and r_m is the market return, meaning $r_m - r_f$ is the market risk premium. The beta (β) is the correlation between historic returns of equity on the firm and the general return on the market. In other words, it is the slope of the regression line. 2.9586. The expected return on equity of TTT is:

$$r_e = 0.02 + 2.9586(0.035) = 0.123551$$

The expected return on equity for TTT, taking into account it's riskiness, is **12.36%**

B)

The WACC is given by:

$$WACC = \left(\frac{D}{V} * (1 - T) r_{Debt}\right) + \left(\frac{E}{V} * r_{Equity}\right)$$

In order to calculate it, the market values of Debt and equity must be determined. Since debt consists of "primarily short term bank debt" it can be assumed that the market value is equal to its book value, \$40 million. The market value of equity is the share price multiplied by the number of shares: $7m * 12 = \$84$ million. Total value, for WACC purposes, is thus $\$124$ million. The WACC of TTT is thus given by:

$$WACC = \left(\frac{40}{124} * (1 - 0.4) * 0.04\right) + \left(\frac{84}{124} * 0.123551\right) = (0.007741935) + (0.0836958387)$$
$$= 0.091438$$

The after tax weighted average cost of capital for TTT is **9.14%**

C)

Using a discounted cash-flow analysis, the market value of TTT is given by its present value of future free cash flows:

$$PV = \frac{FCF_1}{1+WACC} + \frac{FCF_2}{(1+WACC)^2} + \frac{FCF_3}{(1+WACC)^3} + \frac{FCF_4}{(1+WACC)^4} + \frac{1}{(1+WACC)^4} * \frac{FCF_4 * (1+g)}{WACC - g}$$

The free cash flows are profits after tax less investments in fixed assets and investments in working capital + depreciation:

year	1	2	3	4
profit	43,2	46,46	50	53,82
Inv. In fixed assets	30	20	20	20
Inv. In working cap.	10	5	6	2
Depreciation	20	21	22	23
FCF	**23,2**	**42,46**	**46**	**54,82**

**it is assumed that the income statement is in millions*

The present value of projected future cash flows is thus:

$$PV = \frac{23.2}{1+0.091438} + \frac{42.46}{(1+0.091438)^2} + \frac{46}{(1+0.091438)^3} + \frac{54.82}{(1+0.091438)^4} + \frac{1}{(1+0.091438)^4} * \frac{54.82 * (1+0.01)}{0.091438 - 0.01}$$

$$PV = \frac{23.2}{1+0.091438} + \frac{42.46}{1.191236907844} + \frac{46}{1.300161} + \frac{54.82}{1.419} + \frac{1}{1.419} * \frac{54.82 * (1+0.01)}{0.091438 - 0.01}$$

$$PV = 21.25636 + 35.64362 + 35.38023 + 38.63284 + 479.1272922$$

$$\rightarrow \quad PV = 106.02 + 479.11197 = 610.02$$

Using the discounted cash flow analysis, the market value of TTT is estimated to be $610 million

D)

Real options are options tied to real assets, e.g., the option to modify capacity, abandon operations, time operations, etc. This is useful, and thereby valuable, if the future is uncertain. This is the case with the patent, and real options could therefore be very relevant to TTT. It could be valuable for TTT to have a real option to decrease capacity, or in extreme cases abandon entire plants, if they don't get the patent. Likewise, it could also be relevant for them to have an option to increase capacity easily if they do land the patent. A timing (postponement) option could also be useful, since the confirmation of these patents usually take years. This patent seems to be quite important for TTT, meaning that the real option, or lack thereof, should be accounted for when valuing the company.

E)

If this is the case, it is sensible to split the DCF analysis into 3 parts:

1. PV of FCF, year 1-4
2. PV of FCF, year 5-24
3. PV of FCF, year 25-onwards

The present value of these free cash flows are given by:

1. PV of FCF, year 1-4

$$PV = \frac{23.2}{1+0.091438} + \frac{42.46}{(1+0.091438)^2} + \frac{46}{(1+0.091438)^3} + \frac{54.82}{(1+0.091438)^4} = 130.91$$

2. PV of FCF, year 5-24

$$PV = \frac{1}{(1+WACC)^4} * 54.82 * \left(\frac{1}{WACC} - \frac{1}{WACC(1+WACC)^{20}}\right)$$

$$\rightarrow \quad PV = \frac{1}{(1.091438)^4} * 54.82 * \left(\frac{1}{0.091438} - \frac{1}{0.091438(1.091438)^{20}}\right)$$

$$= \frac{1}{(1.091438)^4} * 495{,}34 = 349.065654$$

3. PV of FCF, year 25-onwards

$$PV = \frac{1}{(1+WACC)^{24}} * \frac{FCF_4 * 1.01}{WACC - 0.01}$$

$$\rightarrow \quad PV = 0.122 * 679.88162774$$

$$\rightarrow \quad PV = 82.946$$

Thus, the new market value from the revised DCF analysis is: $349.065654 + 130.91 + +82.946 =$ $\$\mathbf{562.92.}$ As one would expect due to the lack of growth, this is lower than the value from answer c).