

BEAM038 / BEFM016

UNIVERSITY OF EXETER
BUSINESS SCHOOL

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Investment Analysis 2/ Equity Valuation Models and Issues

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Duration:

You have 24 hours to complete this paper from the time of its release

This is an open book exam.

Section A: Answer any TWO out of FOUR questions.

Section B: This is a compulsory question.

All questions are worth equal marks.

Materials to be supplied: Formulae sheet in the appendix at the back of the exam paper

Materials to be supplied on request:
None

Approved calculators are permitted.

Section A: Answer any TWO out of FOUR questions.

Question 1.

You have learnt various equity valuation approaches including the dividend discount model (DDM), residual income valuation model (RIVM), abnormal earnings growth model (AEG) and P/E multiple. Your boss asks you to demonstrate the consistency of the results to your colleagues in the investment group. She has provided you the following information.

AABB is an all equity firm. Current book value of AABB is 400 pence per share. The forecast earnings and dividends are as follows:

Earnings per share: 30 pence in year 1 and 35 pence in year 2;

Dividends per share: 3 pence in year 1 and 3.5 pence in year 2;

For year 3 and beyond, you can assume a growth rate in book values and earnings to be 4%.

You can use the CAPM to estimate the cost of capital. The firm has a beta of 1.3 and the market risk premium is 4.5%. Assume the risk-free rate is 2%.

REQUIRED:

- (a) Estimate earnings, dividends and closing book values for years 3 and 4.
(15 marks)
- (b) Estimate the residual income and abnormal earnings growth for years 2-4.
(13 marks)
- (c) Calculate the current value of AABB using the DDM, RIVM and AEG models. Also, calculate the value of the company at the end of year 2 by using these three models.
(42 marks)
- (d) Calculate the value of the company using the P/E approach at the end of year 2.
(10 marks)
- (e) Compare and contrast the DDM, RIVM, AEG and P/E models.
(20 marks)

(Total 100 marks)

Question 2.

You are working for an aggressive private equity fund. You want to evaluate a possible acquisition of SuperDry Retail plc (SDR), which specialises in selling swimwear and beach clothing. SDR has recently floated on AIM (the Alternative Investment Market), has a modest level of leverage, and has a market value of debt plus equity (i.e. enterprise value) of approximately £4m. You would have to offer a total value of £4.5 to £5m to acquire SDR to set up “NewSDRCo”, with £3m in debt and the balance in equity. The forecasts of the free cash flows (FCF) at firm level for the next 3 years would be:

Year 1	Year 2	Year 3
100k	110k	130k

Beyond year 3, you think growth will be 4% per annum.

Your intention is to float the firm back on AIM at the end of year 3. From analogue firms, you find the following CAPM parameters and other information that typically apply in the retail industry:

Analogue	Estimates
Levered equity beta	1.2
Debt beta	0.3
Debt/(Equity+Debt)	0.45
Equity/(Equity+Debt)	0.55
Tax rate	25%

Assume the current risk-free rate is 2%. Your estimate of the expected return on the equity market is 8.5%. Prior to flotation you will apply 100% of the FCF to paying down the debt. On flotation, you will assume the typical industry leverage structures (as above) will apply. You will use any flotation proceeds to retire debt and apply Ruback (2002) active debt management policy.

REQUIRED

- Estimate the cost of equity, after-tax cost of debt, cost of unlevered equity and weighted average cost of capital (WACC) at flotation. (10 marks)
- Estimate the enterprise value of SDR, unlevered firm value and value of tax shield at flotation. (25 marks)
- Calculate the value of debt at the end of years 1-3. To have the target leverage ratio of 45% (as above), how much equity must be raised to pay off the debt? (20 marks)
- Estimate the value of tax shield, enterprise value and equity value today. (25 marks)
- Describe difference between the passive debt management policy and active debt management policy. (20 marks)

(Total: 100 marks)

Question 3.

The reorganized balance sheet and income statement for Lewis Plc are given below.

Reorganized balance sheet

	Today	Year 1
Operating working capital	100.000	105.000
Net property and equipment (PPE)	700.000	735.000
Invested capital	800.000	840.000
Debt	330.000	346.500
Shareholders' equity	470.000	493.500
Invested capital	800.000	840.000

Income Statement

	Today	Year 1
Revenues	1000.000	1050.000
Operating costs	-800.00	-840.000
Depreciation	-50.000	-52.500
Operating profits	150.000	157.500
Interest	-12.000	-13.200
Earnings before taxes	138.000	144.300
Taxes	-27.600	-28.860
Net Income	110.400	115.440

Assume the cost of equity is 9% and cost of debt before tax is 4%. The operating tax rate (also marginal tax rate) is 20 percent. Assume the market value of debt equals book value of debt. From year 2, operating working capital, PPE, debt, equity and revenues all are expected to grow at a rate of 3% in perpetuity. Assume that ratio of operating costs/revenues = 80% and ratio of depreciation/revenues = 5% forever.

REQUIRED:

- Determine the following values for *years 1 and 2*: net operating profit after tax (NOPLAT), the free cash flow to firm (FCFF), and free cash flow to equity holders (FCFE). (25 Marks)
 - Calculate Lewis' current equity value, and values for *years 1 and 2* by using the free cash flow to equity holders (FCFE) model. (16 Marks)
 - Calculate the current weighted average cost of capital (WACC) and its value for year 1. (14 Marks)
 - Estimate the enterprise economic profit (RIF) for *years 1 and 2*, as well as the current enterprise value and value for year 1 using the economic profit model. (25 Marks)
 - Discuss the main difference between direct and indirect approaches in equity valuation using the residual income valuation (RIVM) and discounted cash flows (DCF) models. (20 Marks)
- (Total 100 Marks)

Question 4.

You are asked to use the Ohlson (1995) model and an extended Ohlson model, namely the Pope and Wang (2005) model to value Monson plc.

At 1st January 2019, the company had a book value of equity of £750m. Earnings for the year ended 31st December 2019 were £70m and dividends were £30m.

Analysts' consensus forecast for the year ended 31st December 2020 will be £75m and book value of equity grows at 3% per year. Assume the clean surplus relationship holds. The cost of equity capital is 8%.

First, you use the Dechow, Hutton and Sloan (1999) approach to estimate the 'other information' parameter by making it equal to the difference between analysts' forecast and the abnormal profits implied by the Ohlson model estimate for the year ended 31st December 2019. You agree with the DHS parameter estimates for the Ohlson model, i.e. $\omega = 0.62$ and $\gamma = 0.32$.

Second, you want to adjust accounting conservatism in the Ohlson LID by using the Pope and Wang (2005) extended model:

$$\begin{aligned} RI_{t+1} &= \omega_1 RI_t + \omega_2 [(1+r)b_{t-1} - b_t] + \mathcal{G}_t + \varepsilon_{x,t+1}, & 0 \leq \omega \leq 1 \\ \mathcal{G}_{t+1} &= \gamma \mathcal{G}_t + \varepsilon_{g,t+1}, & 0 \leq \gamma < 1+r \end{aligned}$$

You estimate that suitable parameter estimates for the Pope and Wang model, $\omega_1 = 0.23$, $\omega_2 = 0.02$ and $\gamma = 1.01$.

REQUIRED

- Calculate the abnormal earnings: RI_j^o for years 2019-2021 and the value of 'other information': \mathcal{G}_j^o for years 2019-2020 based on the Ohlson model. (20 marks)
- Calculate the abnormal earnings: RI_j^{pw} for years 2019-2021 and the value of 'other information': \mathcal{G}_j^{pw} for years 2019-2020 based on the Pope and Wang model. (25 marks)
- Calculate the implied earnings and dividends for year 2021 based on the two models. (15 marks)
- Compute the firm's intrinsic values: V^o and V^{pw} on the 1st January 2020 based on the two models. (20 marks)
- Explain the difference between the Ohlson model and the Pope and Wang model. In your view, which might be able to explain the observable stock price better and why? (20 marks)

(Total 100 Marks)

Section B: This is a compulsory question.

Question 5.

Markets seem to make extensive use of price multiples in equity (and firm) valuation.

REQUIRED:

(a) List three commonly used valuation multiples and explain how they are related to the DCF (RIVM) valuation.

(40 marks)

(b) Explain the normal procedure to do a relative valuation.

(20 marks)

(c) Discuss the difference between conventional P/E and Shiller's CAPE10 ratio.

(10 marks)

(d) Explain the rationale to introduce the price-earnings growth ratio (PEG).

(10 marks)

(e) Discuss the potential problems in applying valuation multiples in practice.

(20 marks)

(Total 100 marks)

Appendix

You may find the following formulae useful to refer to in the examination.

$$(1) \quad EV_0 = \sum_{t=1}^{t=n} \frac{d_t}{(1+r_e)^t} + \frac{1}{(1+r_e)^n} \left[\frac{d_n(1+g)}{(r_e - g)} \right], \quad EV_{t-1} = \frac{d_t + EV_t}{1+r_e}$$

$$(2) \quad EV_0 = \frac{d_1}{1+r} + \frac{d_1(1+g)}{(1+r)^2} + \frac{d_1(1+g)^2}{(1+r)^3} + \dots = \frac{d_1}{r-g}$$

$$(3) \quad FV_0 = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1+WACC)^t} + \frac{1}{(1+WACC)^n} \left[\frac{FCFF_n(1+g)}{(WACC - g)} \right], \quad FV_{t-1} = \frac{FCFF_t + FV_t}{1+WACC}$$

$$(4) \quad FV_0 = \frac{FCFF_1}{1+WACC} + \frac{FCFF_1(1+g)}{(1+WACC)^2} + \frac{FCFF_1(1+g)^2}{(1+WACC)^3} + \dots = \frac{FCFF_1}{WACC - g}$$

$$(5) \quad EV_0 = b_0 + \sum_{t=1}^{t=n} \frac{RI_t}{(1+r)^t} + \frac{1}{(1+r)^n} \left[\frac{RI_n(1+g)}{(r-g)} \right], \text{ where } RI_t = e_t - r \times b_{t-1}$$

$$(6) \quad EV_0 = b_0 + \frac{RI_1}{(r-g)}$$

(7) The relation between levered and unlevered beta:

$$\beta_e = \beta_u + (\beta_u - \beta_d) \frac{ZD}{E} \quad \text{and} \quad \beta_u = \beta_e \frac{E}{E+ZD} + \beta_d \frac{DZ}{E+ZD}$$

where: $Z = 1 - T_c$ or 1.

Value of tax shield $V_{tax} = T_c D$ or $\frac{T_c(r_d D)}{r_u}$.

$$(8) \quad \frac{P_0}{E_1} = \frac{1-q}{r-g}$$

$$(9) \quad P_0 = \frac{e_1}{r} + \frac{1}{r} \left[\frac{AEG_2}{(1+r)} + \frac{AEG_3}{(1+r)^2} + \frac{AEG_4}{(1+r)^3} \dots \right]$$

where $AEG_{t+1} = e_{t+1} + r \cdot d_t - (1+r) \cdot e_t$.

$$(10) \quad P_0 = \frac{e_1}{r} + \frac{1}{r} \left[\frac{AEG_2}{r-g} \right]$$

(11) An extended Ohlson model-the Pope and Wang model:

$$P_t = b_t + \frac{\omega_1}{1+r-\omega_1} RI_t + \frac{(1+r)\omega_2}{1+r-\omega_1} b_{t-1} + \frac{1+r}{(1+r-\gamma)(1+r-\omega_1)} \mathcal{G}_t$$

where

$$RI_{t+1} = \omega_1 RI_t + \omega_2 [(1+r)b_{t-1} - b_t] + \mathcal{G}_t + \varepsilon_{x,t+1},$$

$$\mathcal{G}_{t+1} = \gamma \mathcal{G}_t + \varepsilon_{g,t+1}.$$