



EXAM

Course: BE 414 Financial Statement Analysis and Equity Valuation

Date: 28th November 2019

Time: 0900 - 1300

Number of pages: 3 + Appendix (16 pages)

Number of questions: 5

Exam aids: Calculator with empty memory (no communication)
Dictionary

General information: All questions are to be answered. You may answer the exam in English or Norwegian.

Exercise 1 (20%)

The following earnings and dividends forecasts were made at the end of 2018 for a firm with \$23 book value per common share at that time. The firm has a required equity return of 10%.

	2019E	2020E	2021E	2022E	2023E
EPS	4.75	6.09	4.93	6.31	6.87
DPS	1.13	1.41	1.56	1.69	1.91

- Forecast book value per share, return on common equity (ROCE), and residual earnings for each year, 2019-2023. Assume that residual earnings will grow at a rate equal to growth in historical GDP (4%), after 2023. What is the value of one share in the company?
- Describe the five steps in the process of fundamental analysis (max ½ page).

Exercise 2 (20%)

GasPro reports the following amounts in its annual report:

Net income	8500
Accruals = Change in total current assets exclusive of cash	1400
Cash in investing activities:	
Purchase of machinery	1600
Purchase of short term investments in financial securities	400
Sale of short term investments in financial securities	110

The change in total current assets is the only accruals in the company. The firm made interest payments of 800. The tax rate is 35%.

- a)
 - i) Calculate levered cash flow from operations.
 - ii) Calculate free cash flow.
- b) Why might an analyst not put much weight on a firm's current free cash flow as an indication of future free cash flow? Explain (max ½ page).

Exercise 3 (20%)

A firm reported \$270 million in total assets and \$170 million in debt. It had no interest bearing securities among its assets. In the income statement, it reported \$700 million in sales. The firm's 100 million shares traded at \$9 each.

- a) Calculate
 - i). The price-to-book ratio (P/B)
 - ii). The unlevered price-to-sales ratio (P/S)
 - iii). The enterprise price-to-book ratio
- b) Do you recommend using the unlevered price-to-sales ratio or the price-to-sales-ratio? Explain (max ½ page).

Exercise 4 (20%)

At the beginning of its fiscal year 2019, an analyst made the following forecasts for Facebook Inc.

	2019	2020	2021	2022
Cash flow from operations	1913	1954	1990	2001
Cash investment in operations	270	342	397	423

Facebook reported \$5448 million in short-term and long-term debt at the end of 2018, but very little interest bearing debt assets.

- Use a required return of 9% to calculate both the enterprise value and equity value for the company at the beginning of 2019 assuming that long run growth is 3 percent per
- In general, what explains the difference between cash flow from operations and earnings? Explain (max ½ page).

Exercise 5 (20%)

A firm generated free cash flow of \$2300 million and paid net interest of \$20 million after tax. It paid a dividend of \$15 million and issued shares for \$50 million. There were no share repurchases.

- That did the Treasury do with the remaining cash flow and for how much?
- In general, how can a firm pay a dividend with zero free cash flow? Explain (max ½ page).

Appendix

A Summary of Formulas

CHAPTER 1

Value of the firm = Value of debt + Value of equity

Page 12

CHAPTER 2

Shareholders' equity = Assets - Liabilities

Page 36

Net income = Revenues - Expenses

Page 38

Net revenue - Cost of goods sold = Gross margin

Page 39

Gross margin - Operating expenses = Operating income

Page 39

Operating income - Net interest expense = Income before taxes

Page 39

Income before taxes - Income taxes = Income after taxes
(and before extraordinary items)

Page 39

Income before extraordinary items + Extraordinary items = Net income

Page 39

Net income - Preferred dividends = Net income available to common

Page 39

Cash from operations + Cash from investment + Cash from financing
= Change in cash

Page 40

Ending equity = Beginning equity + Total (comprehensive) income
- Net payout to shareholders

Page 40

Comprehensive income = Net income + Other comprehensive income

Page 41

Intrinsic premium = Intrinsic value of equity - Book value of equity

Page 44

Market premium = Market price of equity - Book value of equity

Page 44

Value added for shareholders = Ending value - Beginning value + Dividend

Page 46

Stock return_t = $P_t - P_{t-1} + d_t$

Page 46

CHAPTER 3

$$\text{Unlevered price/sales} = \frac{\text{Market value of equity} + \text{Net debt}}{\text{Sales}} \quad \text{Page 79}$$

$$\text{Unlevered price/ebit} = \frac{\text{Market value of equity} + \text{Net debt}}{\text{ebit}} \quad \text{Page 79}$$

$$\text{Unlevered price/ebitda} = \frac{\text{Market value of equity} + \text{Net debt}}{\text{ebitda}} \quad \text{Page 79}$$

$$\text{Enterprise P/B} = \frac{\text{Market value of equity} + \text{Net debt}}{\text{Book value of equity} + \text{Net debt}} \quad \text{Page 79}$$

$$\text{Trailing P/E} = \frac{\text{Price per share}}{\text{Most recent annual EPS}} \quad \text{Page 79}$$

$$\text{Rolling P/E} = \frac{\text{Price per share}}{\text{Sum of EPS for most recent four quarters}} \quad \text{Page 79}$$

$$\text{Forward or leading P/E} = \frac{\text{Price per share}}{\text{Forecast of next year's EPS}} \quad \text{Page 79}$$

$$\text{Dividend-adjusted P/E} = \frac{\text{Price per share} + \text{Annual DPS}}{\text{EPS}} \quad \text{Page 79}$$

Value of a bond = Present value of expected cash flows

$$V_0^D = \frac{CF_1}{\rho_D} + \frac{CF_2}{\rho_D^2} + \frac{CF_3}{\rho_D^3} + \frac{CF_4}{\rho_D^4} + \dots + \frac{CF_T}{\rho_D^T} \quad \text{Page 90}$$

(ρ_D is 1 + Required return for the bond)

Value of a project = Present value of expected cash flows

$$V_0^P = \frac{CF_1}{\rho_P} + \frac{CF_2}{\rho_P^2} + \frac{CF_3}{\rho_P^3} + \frac{CF_4}{\rho_P^4} + \dots + \frac{CF_T}{\rho_P^T} \quad \text{Page 90}$$

(ρ_P is 1 + Hurdle rate for the project)

CHAPTER 4

Value of equity = Present value of expected dividends

$$V_0^E = \frac{d_1}{\rho_E} + \frac{d_2}{\rho_E^2} + \frac{d_3}{\rho_E^3} + \frac{d_4}{\rho_E^4} + \dots \quad \text{Page 112}$$

(ρ_E is 1 + Required return for the equity)

Value of equity = Present value of expected dividends + Present value of expected terminal price

$$V_0^E = \frac{d_1}{\rho_E} + \frac{d_2}{\rho_E^2} + \frac{d_3}{\rho_E^3} + \dots + \frac{d_T}{\rho_E^T} + \frac{P_T}{\rho_E^T} \quad \text{Page 112}$$

Perpetuity dividend model:

$$V_0^E = \frac{d_1}{\rho_E} + \frac{d_2}{\rho_E^2} + \frac{d_3}{\rho_E^3} + \dots + \frac{d_T}{\rho_E^T} + \left(\frac{d_{T+1}}{\rho_E - 1} \right) / \rho_E^T \quad \text{Page 112}$$

Dividend growth model:

$$V_0^E = \frac{d_1}{\rho_E} + \frac{d_2}{\rho_E^2} + \frac{d_3}{\rho_E^3} + \dots + \frac{d_T}{\rho_E^T} + \left(\frac{d_{T+1}}{\rho_E - g} \right) / \rho_E^T \quad \text{Page 113}$$

$$\text{Value of a perpetual dividend stream} = V_0^E = \frac{d_1}{\rho_E - 1} \quad \text{Page 113}$$

$$\text{Value of a dividend growing at a constant rate} = V_0^E = \frac{d_1}{\rho_E - g} \quad \text{Page 113}$$

Value of the firm = Present value of expected free cash flows

$$V_0^F = \frac{C_1 - I_1}{\rho_F} + \frac{C_2 - I_2}{\rho_F^2} + \frac{C_3 - I_3}{\rho_F^3} + \frac{C_4 - I_4}{\rho_F^4} + \frac{C_5 - I_5}{\rho_F^5} + \dots \quad \text{Page 115}$$

(ρ_F is 1 + Required return for the firm)

Value of the equity = Present value of expected free cash flows minus value of net debt

$$V_0^E = \frac{C_1 - I_1}{\rho_F} + \frac{C_2 - I_2}{\rho_F^2} + \frac{C_3 - I_3}{\rho_F^3} + \dots + \frac{C_T - I_T}{\rho_F^T} + \frac{CV_T}{\rho_F^T} - V_0^D \quad \text{Page 116}$$

If free cash flows after T are forecasted to be a (constant) perpetuity,

$$CV_T = \frac{C_{T+1} - I_{T+1}}{\rho_F - 1} \quad \text{Page 116}$$

If free cash flows are forecasted to grow at a constant rate after the horizon,

$$CV_T = \left(\frac{C_{T+1} - I_{T+1}}{\rho_F - g} \right) \quad \text{Page 116}$$

Cash flow from operations = Reported cash flow from operations
+ After-tax net interest payments Page 120

Cash investment in operations = Reported cash flow from investing
- Net investment in interest-bearing instruments Page 121

Earnings = Free cash flow - Net cash interest + Investment + Accruals
Earnings = $(C - I) - i + I + \text{Accruals}$ Page 126

CHAPTER 5

The value of common equity (V_0^E) = $B_0 + \frac{RE_1}{\rho_E} + \frac{RE_2}{\rho_E^2} + \frac{RE_3}{\rho_E^3} + \dots$ Page 145

Residual earnings = Comprehensive earnings – (Required return for equity
× Beginning-of-period book value of equity) Page 145

$$RE_t = \text{Earn}_t - (\rho_E - 1)B_{t-1}$$

Residual earnings = (ROCE – Required return on equity)
× Beginning-of-period book value of common equity

$$\text{Earn}_t - (\rho_E - 1)B_{t-1} = [\text{ROCE}_t - (\rho_E - 1)]B_{t-1} \quad \text{Page 147}$$

Simple valuation model:

$$V_0^E = B_0 + \frac{RE_1}{\rho_E - g} \quad \text{Page 151}$$

Case 1 valuation. RE is forecasted to be zero after some point:

$$V_0^E = B_0 + \frac{RE_1}{\rho_E} + \frac{RE_2}{\rho_E^2} + \frac{RE_3}{\rho_E^3} + \dots + \frac{RE_T}{\rho_E^T} \quad \text{Page 152}$$

Case 2 valuation. No growth:

$$V_0^E = B_0 + \frac{RE_1}{\rho_E} + \frac{RE_2}{\rho_E^2} + \dots + \frac{RE_T}{\rho_E^T} + \left(\frac{RE_{T+1}}{\rho_E - 1} \right) / \rho_E^T \quad \text{Page 154}$$

Case 3 valuation. Growth is forecasted to continue at a constant rate:

$$V_0^E = B_0 + \frac{RE_1}{\rho_E} + \frac{RE_2}{\rho_E^2} + \frac{RE_3}{\rho_E^3} + \dots + \frac{RE_T}{\rho_E^T} + \left(\frac{RE_{T+1}}{\rho_E - g} \right) / \rho_E^T \quad \text{Page 154}$$

CHAPTER 6

$$\text{Value of equity} = V_0^E = \frac{1}{\rho_E - 1} \left[\text{Eam}_1 + \frac{\Delta RE_2}{\rho_E} + \frac{\Delta RE_3}{\rho_E^2} + \frac{\Delta RE_4}{\rho_E^3} + \dots \right] \quad \text{Page 180}$$

$$\text{Normal forward P/E} = \frac{1}{\text{Required return}} \quad \text{Page 183}$$

$$\text{Normal trailing P/E} = \frac{(1 + \text{Required return})}{\text{Required return}} \quad \text{Page 184}$$

Value of equity = Capitalized forward earnings
+ Extra value for abnormal cum-dividend earnings growth

$$\begin{aligned} V_0^E &= \frac{\text{Eam}_1}{\rho_E - 1} + \frac{1}{\rho_E - 1} \left[\frac{\text{AEG}_2}{\rho_E} + \frac{\text{AEG}_3}{\rho_E^2} + \frac{\text{AEG}_4}{\rho_E^3} + \dots \right] \\ &= \frac{1}{\rho_E - 1} \left[\text{Eam}_1 + \frac{\text{AEG}_2}{\rho_E} + \frac{\text{AEG}_3}{\rho_E^2} + \frac{\text{AEG}_4}{\rho_E^3} + \dots \right] \quad \text{Page 185} \end{aligned}$$

$$\begin{aligned} \text{Abnormal earnings growth}_t (\text{AEG}_t) &= \text{Cum-dividend earn}_t - \text{Normal earn}_t \quad \text{Page 187} \\ &= [\text{Earn}_t + (\rho_E - 1)d_{t-1}] - \rho_E \text{Earn}_{t-1} \end{aligned}$$

Abnormal earnings growth_{*t*} (AEG_{*t*}) = [*G_t* - *ρ_E*] × Earnings_{*t-1*}

Page 187

Value of equity (cum-dividend) = Capitalized current earnings
+ Extra value for abnormal cum-dividend abnormal earnings growth

$$V_0^E + d_0 = \frac{P_E}{\rho_E - 1} \left[\text{Earn}_0 + \frac{\text{AEG}_1}{\rho_E} + \frac{\text{AEG}_2}{\rho_E^2} + \frac{\text{AEG}_3}{\rho_E^3} + \dots \right]$$

Page 189

$$\text{PEG ratio} = \frac{P/E}{1\text{-year-ahead percentage earnings growth}}$$

Page 199

CHAPTER 7

Value = Value based on what we know + Speculative value

Page 213

Weighted-average expected return formula:

$$\text{ER} = \left[\frac{B_0}{P_0} \times \text{ROCE}_1 \right] + \left[\left(1 - \frac{B_0}{P_0} \right) \times (g - 1) \right]$$

Page 214

Value = Value based on book value and near-term forecasts
+ Value of speculative growth

Page 218

$$V_0^E = B_0 + \frac{PE_1}{\rho} + \frac{PE_2}{\rho(\rho - 1)} + \text{Value of speculative growth}$$

Page 218

Earnings forecast_{*t*} = (Book value_{*t-1*} × Required return) + Residual earnings_{*t*}

Page 219

$$V_0^E = \frac{1}{\rho - 1} \left[\text{EPS}_1 + \frac{\text{AEG}_2}{\rho - 1} \right] + \text{Value of speculative growth}$$

Page 221

Earnings forecast_{*t*} = Normal earnings forecast_{*t*} + AEG_{*t*}
- Forecast of earnings from prior year's dividends

Page 222

CHAPTER 8

Free cash flow = Net dividends to shareholders + Net payments to debtholders and issuers

$$C - I = d + F$$

Page 238

Treasurer's rule:

If $C - I - i > d$: Lend or buy down own debt

If $C - I - i < d$: Borrow or reduce lending

Page 238

Free cash flow = Operating income - Change in net operating assets

$$C - I = \text{OI} - \Delta \text{NOA}$$

Page 238

Free cash flow = Change in net financial assets - Net financial income
+ Net dividends

$$C - I = \Delta \text{NFA} - \text{NFI} + d$$

Page 244

Free cash flow = Net financial expenses – Change in net financial obligations
+ Net dividends

$$C - I = \text{NFE} - \Delta\text{NFO} + d$$

Page 244

Net dividends = Free cash flow + Net financial income
– Change in net financial assets

$$d = C - I + \text{NFI} - \Delta\text{NFA}$$

Page 245

Net dividends = Free cash flow – Net financial expenses
+ Change in net financial obligations

$$d = C - I - \text{NFE} + \Delta\text{NFO}$$

Page 245

Net operating assets (end) = Net operating assets (beginning)
+ Operating income – Free cash flow

$$\text{NOA}_t = \text{NOA}_{t-1} + \text{OI}_t - (C_t - I_t)$$

Page 245

Change in net operating assets = Operating income – Free cash flow

$$\Delta\text{NOA}_t = \text{OI}_t - (C_t - I_t)$$

Page 245

Net financial assets (end) = Net financial assets (begin)
+ Net financial income + Free cash flow
– Net dividends

$$\text{NFA}_t = \text{NFA}_{t-1} + \text{NFI}_t + (C_t - I_t) - d_t$$

Page 245

Change in net financial assets = Net financial income + Free cash flow
– Net dividends

$$\Delta\text{NFA}_t = \text{NFI}_t + (C_t - I_t) - d_t$$

Page 246

Net financial obligations (end) = Net financial obligations (begin)
+ Net financial expense – Free cash flow
+ Net dividends

$$\text{NFO}_t = \text{NFO}_{t-1} + \text{NFE}_t - (C_t - I_t) + d_t$$

Page 246

Change in net financial obligations = Net financial expense – Free cash flow
+ Net dividends

$$\Delta\text{NFO}_t = \text{NFE}_t - (C_t - I_t) + d_t$$

Page 246

Stocks and flows equation for common stockholders' equity:

$$\text{CSE}_t = \text{CSE}_{t-1} + \text{Comprehensive earnings}_t - \text{Net dividends}_t$$

Page 246

$$\text{CSE}_t = \text{NOA}_t - \text{NFO}_t$$

Page 247

CHAPTER 9

$$\text{Dividend payout} = \frac{\text{Dividends}}{\text{Comprehensive income}}$$

Page 266

$$\text{Total payout ratio} = \frac{\text{Dividends} + \text{Stock repurchases}}{\text{Comprehensive income}} \quad \text{Page 266}$$

$$\text{Dividends-to-book value} = \frac{\text{Dividends}}{\text{Book value of CSE} + \text{Dividends}} \quad \text{Page 266}$$

$$\text{Total payout-to-book value} = \frac{\text{Dividends} + \text{Stock repurchases}}{\text{Book value of CSE} + \text{Dividends} + \text{Stock repurchases}} \quad \text{Page 266}$$

$$\begin{aligned} \text{Retention ratio} &= \frac{\text{Comprehensive income} - \text{Dividends}}{\text{Comprehensive income}} \\ &= 1 - \text{Dividend payout ratio} \end{aligned} \quad \text{Page 267}$$

$$\text{Net investment rate} = \frac{\text{Net transactions with shareholders}}{\text{Beginning book value of CSE}} \quad \text{Page 267}$$

$$\begin{aligned} \text{Growth rate of CSE} &= \frac{\text{Change in CSE}}{\text{Beginning CSE}} \\ &= \frac{\text{Comprehensive income} + \text{Net transactions with shareholders}}{\text{Beginning CSE}} \end{aligned} \quad \text{Page 267}$$

$$\text{Growth rate of CSE} = \text{ROCE} + \text{Net investment rate} \quad \text{Page 267}$$

CHAPTER 10

$$\text{Tax benefit of net debt} = \text{Net interest expense} \times \text{Tax rate} \quad \text{Page 305}$$

$$\text{After-tax net interest expense} = \text{Net interest expense} \times (1 - \text{Tax rate}) \quad \text{Page 305}$$

$$\begin{aligned} \text{Tax on operating income} &= \text{Tax expense as reported} \\ &\quad + (\text{Net interest expense} \times \text{Tax rate}) \end{aligned} \quad \text{Page 306}$$

$$\text{Effective tax rate for operations} = \frac{\text{Tax on operating income}}{\text{Operating income before tax, equity income, and extraordinary and dirty-surplus items}} \quad \text{Page 307}$$

$$\text{Residual operating income} = \text{ReOI}_t = \text{OI}_t - (\rho - 1)\text{NOA}_{t-1} \quad \text{Page 312}$$

$$\text{Operating profit margin (PM)} = \frac{\text{OI (after tax)}}{\text{Sales}} \quad \text{Page 318}$$

$$\text{Sales PM} = \frac{\text{OI (after tax) from sales}}{\text{Sales}} \quad \text{Page 318}$$

$$\text{Other items PM} = \frac{\text{OI (after tax) from other items}}{\text{Sales}} \quad \text{Page 318}$$

$$\text{Net (comprehensive) income profit margin} = \frac{\text{Comprehensive income}}{\text{Sales}} \quad \text{Page 318}$$

$$\text{Expense ratio} = \frac{\text{Expense}}{\text{Sales}} \quad \text{Page 318}$$

1 – Sales PM = Sum of expense ratios Page 318

Operating asset composition ratio = $\frac{\text{Operating asset}}{\text{Total operating assets}}$ Page 319

Operating liability composition ratio = $\frac{\text{Operating liability}}{\text{Total operating liabilities}}$ Page 319

Operating liability leverage (OLLEV) = $\frac{\text{Operating liabilities}}{\text{Net operating assets}}$ Page 319

Capitalization ratio = $\frac{\text{Net operating assets}}{\text{Common stockholders' equity}} = \text{NOA/CSE}$ Page 319

Financial leverage ratio (FLEV) = $\frac{\text{Net financial obligations}}{\text{Common stockholders' equity}} = \text{NFO/CSE}$ Page 319

Capitalization ratio – Financial leverage ratio = 1.0 Page 319

Return on net operating assets (RNOA_t) = $\frac{\text{OI}_t}{\frac{1}{2} (\text{NOA}_t + \text{NOA}_{t-1})}$ Page 318

Return on net financial assets (RNFA_t) = $\frac{\text{NFI}_t}{\frac{1}{2} (\text{NFA}_t + \text{NFA}_{t-1})}$ Page 318

Net borrowing cost (NBC_t) = $\frac{\text{NFE}_t}{\frac{1}{2} (\text{NFO}_t + \text{NFO}_{t-1})}$ Page 319

CHAPTER 11

Free cash flow = Operating income – Change in net operating assets
 $C - I = \text{OI} - \Delta \text{NOA}$ Page 344

Free cash flow = Net financial expense – Change in net financial obligations
 + Net dividends
 $C - I = \text{NFE} - \Delta \text{NFO} + d$ Page 344

CHAPTER 12

ROCE = $\left(\frac{\text{NOA}}{\text{CSE}} \times \text{RNOA} \right) - \left(\frac{\text{NFO}}{\text{CSE}} \times \text{NBC} \right)$ Page 367

ROCE = $\text{RNOA} + \left[\frac{\text{NFO}}{\text{CSE}} \times (\text{RNOA} - \text{NBC}) \right]$ Page 366
 = RNOA + (Financial leverage × Operating spread)
 = RNOA + (FLEV × SPREAD)

ROCE = $\text{RNOA} - \left[\frac{\text{NFA}}{\text{CSE}} \times (\text{RNOA} - \text{RNFA}) \right]$ Page 368

$$\text{Implicit interest on operating liabilities} = \frac{\text{Short-term borrowing rate (after tax)}}{\times \text{Operating liabilities}} \quad \text{Page 369}$$

$$\text{Return on operating assets (ROOA)} = \frac{\text{OI} + \text{Implicit interest (after tax)}}{\text{Operating assets}} \quad \text{Page 369}$$

$$\text{Return on net operating assets} = \text{Return on operating assets} + (\text{Operating liability leverage} \times \text{Operating liability leverage spread})$$

$$\text{RNOA} = \text{ROOA} + (\text{OLLEV} \times \text{OLSPREAD}) \quad \text{Page 369}$$

$$\text{OLSPREAD} = \text{ROOA} - \text{Short-term borrowing rate (after tax)} \quad \text{Page 369}$$

$$\text{ROCE} = \text{ROCE before MI} \times \text{MI sharing ratio} \quad \text{Page 372}$$

$$\text{ROCE before minority interest (MI)} = \frac{\text{Comprehensive income before MI}}{\text{CSE} + \text{MI}} \quad \text{Page 372}$$

$$\text{Minority interest sharing ratio} = \frac{\text{Comprehensive income/Comprehensive income before MI}}{\text{CSE}/(\text{CSE} + \text{MI})} \quad \text{Page 372}$$

$$\text{ROCE} = (\text{PM} \times \text{ATO}) + [\text{FLEV} \times (\text{RNOA} - \text{NBC})] \quad \text{Page 373}$$

$$\text{PM} = \text{OI (after tax)}/\text{Sales} \quad \text{Page 373}$$

$$\text{ATO} = \text{Sales}/\text{NOA} \quad \text{Page 373}$$

$$\text{PM} = \text{Sales PM} + \text{Other items PM} \quad \text{Page 376}$$

$$\text{Sales PM} = \text{Gross margin ratio} - \text{Expense ratios} \quad \text{Page 376}$$

$$\begin{aligned} \frac{1}{\text{ATO}} = & \frac{\text{Cash}}{\text{Sales}} + \frac{\text{Accounts receivable}}{\text{Sales}} + \frac{\text{Inventory}}{\text{Sales}} + \dots + \frac{\text{PPE}}{\text{Sales}} \\ & + \dots - \frac{\text{Accounts payable}}{\text{Sales}} - \frac{\text{Pension obligations}}{\text{Sales}} - \dots \end{aligned} \quad \text{Page 377}$$

$$\text{Accounts receivable turnover} = \frac{\text{Sales}}{\text{Accounts receivable (net)}} \quad \text{Page 377}$$

$$\text{PPE turnover} = \frac{\text{Sales}}{\text{Property, plant, and equipment (net)}} \quad \text{Page 377}$$

$$\begin{aligned} \text{Days in accounts receivable} &= \frac{365}{\text{Accounts receivable turnover}} \\ &(\text{sometimes called days sales outstanding}) \end{aligned} \quad \text{Page 377}$$

The inventory turnover ratio is sometimes measured as:

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}} \quad \text{Page 377}$$

$$\text{Days in inventory} = \frac{365}{\text{Inventory turnover}} \quad \text{Page 377}$$

$$\text{Days in accounts payable} = \frac{365 \times \text{Accounts payable}}{\text{Purchases}} \quad \text{Page 378}$$

The net borrowing cost is a weighted average of the costs for the different sources of net financing:

$$\begin{aligned} \text{NBC} = & \left(\frac{\text{FO}}{\text{NFO}} \times \frac{\text{After-tax interest on financial obligations (FO)}}{\text{FO}} \right) \\ & - \left(\frac{\text{FA}}{\text{NFO}} \times \frac{\text{After-tax interest on financial assets (FA)}}{\text{FA}} \right) \\ & - \left(\frac{\text{FA}}{\text{NFO}} \times \frac{\text{Unrealized gains on FA}}{\text{FA}} \right) \\ & + \left(\frac{\text{Preferred stock}}{\text{NFO}} \times \frac{\text{Preferred dividends}}{\text{Preferred stock}} \right) + \dots \end{aligned} \quad \text{Page 380}$$

CHAPTER 13

$$\text{OI} = \text{Core OI from sales} + \text{Core other OI} + \text{UI} \quad \text{Page 396}$$

$$\begin{aligned} \text{Return on net operating assets} = & \text{Core RNOA} \\ & + \text{Unusual items to net operating assets} \end{aligned} \quad \text{Page 404}$$

$$\text{RNOA} = \frac{\text{Core OI}}{\text{NOA}} + \frac{\text{UI}}{\text{NOA}} \quad \text{Page 404}$$

$$\text{RNOA} = \frac{\text{Core OI from sales}}{\text{NOA}} + \frac{\text{Core other OI}}{\text{NOA}} + \frac{\text{UI}}{\text{NOA}} \quad \text{Page 404}$$

$$\text{RNOA} = (\text{Core sales PM} \times \text{ATO}) + \frac{\text{Core other OI}}{\text{NOA}} + \frac{\text{UI}}{\text{NOA}}$$

$$\text{where } \text{Core sales PM} = \frac{\text{Core OI from sales}}{\text{Sales}} \quad \text{Page 406}$$

Net borrowing cost = Core net borrowing cost + Unusual borrowing costs

$$\text{NBC} = \frac{\text{Core net financial expenses}}{\text{NFO}} + \frac{\text{Unusual financial expenses}}{\text{NFO}} \quad \text{Page 406}$$

$$\begin{aligned} \text{Change in RNOA} = & \frac{\text{Change in core sales profit margin at previous asset turnover level}}{\text{Change due to change in asset turnover}} + \frac{\text{Change due to change in other core income}}{\text{Change due to change in unusual items}} \end{aligned}$$

$$\begin{aligned} \Delta \text{RNOA}_1 = & (\Delta \text{Core sales PM}_1 \times \text{ATO}_0) + (\Delta \text{ATO}_1 \times \text{Core sales PM}_1) \\ & + \Delta \left(\frac{\text{Core other OI}}{\text{NOA}} \right) + \Delta \left(\frac{\text{UI}}{\text{NOA}} \right) \end{aligned} \quad \text{Page 408}$$

$$\begin{aligned}\text{Sales PM} &= \frac{\text{Sales} - \text{Variable cost} - \text{Fixed costs}}{\text{Sales}} \\ &= \frac{\text{Contribution margin}}{\text{Sales}} - \frac{\text{Fixed costs}}{\text{Sales}}\end{aligned}\quad \text{Page 409}$$

$$\text{Contribution margin ratio} = 1 - \frac{\text{Variable costs}}{\text{Sales}} = \frac{\text{Contribution margin}}{\text{Sales}} \quad \text{Page 409}$$

$$\text{OLEV} = \frac{\text{Contribution margin}}{\text{Operating income}} = \frac{\text{Contribution margin ratio}}{\text{Profit margin}}$$

(Don't confuse OLEV with OLLEV!)

Page 409

$$\% \text{ Change in core OI} = \text{OLEV} \times \% \text{ Change in core sales} \quad \text{Page 409}$$

$$\text{NOA} = \text{Sales} \times \frac{1}{\text{ATO}} \quad \text{Page 410}$$

$$\Delta \text{CSE} = \Delta \left(\text{Sales} \times \frac{1}{\text{ATO}} \right) - \Delta \text{NFO} \quad \text{Page 411}$$

CHAPTER 14

$$\begin{aligned}\text{Residual operating income} &= \text{Operating income} - (\text{Required return for operations} \\ &\quad \times \text{Beginning net operating assets})\end{aligned}$$

$$\text{ReOI}_t = \text{OI}_t - (\rho_F - 1)\text{NOA}_{t-1} \quad \text{Page 439}$$

$$\begin{aligned}\text{Value of operations} &= \text{Net operating assets} \\ &\quad + \text{Present value of expected residual operating income}\end{aligned}$$

$$V_0^{\text{NOA}} = \text{NOA}_0 + \frac{\text{ReOI}_1}{\rho_F} + \frac{\text{ReOI}_2}{\rho_F^2} + \frac{\text{ReOI}_3}{\rho_F^3} + \dots + \frac{\text{ReOI}_T}{\rho_F^T} + \frac{\text{CV}_T}{\rho_F^T} \quad \text{Page 439}$$

$$\begin{aligned}\text{Value of common equity} &= \text{Book value of common equity} \\ &\quad + \text{Present value of expected residual operating income}\end{aligned}$$

$$V_0^E = \text{CSE}_0 + \frac{\text{ReOI}_1}{\rho_F} + \frac{\text{ReOI}_2}{\rho_F^2} + \frac{\text{ReOI}_3}{\rho_F^3} + \dots + \frac{\text{ReOI}_T}{\rho_F^T} + \frac{\text{CV}_T}{\rho_F^T} \quad \text{Page 440}$$

$$\begin{aligned}\text{Residual operating income} &= (\text{RNOA} - \text{Required return for operations}) \\ &\quad \times \text{Net operating assets}\end{aligned}$$

$$\text{ReOI}_t = [\text{RNOA}_t - (\rho_F - 1)]\text{NOA}_{t-1} \quad \text{Page 442}$$

$$\text{Abnormal operating income growth}_t \text{ (AOIG)}$$

$$= \text{Cum-dividend operating income}_t - \text{Normal operating income}_t$$

$$= [\text{Operating income}_t + (\rho_F - 1)\text{FCF}_{t-1}] - \rho_F \text{ operating income}_{t-1}$$

$$= [\text{OI}_t + (\rho_F - 1)\text{FCF}_{t-1}] - \rho_F \text{ OI}_{t-1}$$

$$= [\text{G}_t - \rho_F] \times \text{OI}_{t-1}$$

Page 443

Value of common equity = Capitalized (Forward operating income + Present value of abnormal operating income growth) – Net financial obligations

$$V_0^E = \frac{1}{\rho_F - 1} \left[\text{OI}_1 + \frac{\text{AOIG}_2}{\rho_F} + \frac{\text{AOIG}_3}{\rho_F^2} + \frac{\text{AOIG}_4}{\rho_F^3} + \dots \right] - \text{NFO}_0 \quad \text{Page 445}$$

$$\text{Core ReOI}_t = \text{Core OI}_t - (\rho_F - 1) \text{NOA}_{t-1} \quad \text{Page 445}$$

Cost of capital for operations = Weighted-average cost of equity and cost of net debt

$$= \left(\frac{\text{Value of equity}}{\text{Value of operations}} \times \text{Equity cost of capital} \right) + \left(\frac{\text{Value of debt}}{\text{Value of operations}} \times \text{Cost of debt capital} \right)$$

$$\rho_F = \frac{V_0^E}{V_0^{\text{NOA}}} \cdot \rho_E + \frac{V_0^D}{V_0^{\text{NOA}}} \cdot \rho_D \quad \text{Page 447}$$

$$\text{After-tax cost of net debt } (\rho_D) = \text{Nominal cost of net debt} \times (1 - \text{Tax rate}) \quad \text{Page 447}$$

Required return on equity = Required return for operations + (Market leverage \times Required return spread)

$$\rho_E = \rho_F + \frac{V_0^D}{V_0^E} (\rho_F - \rho_D) \quad \text{Page 449}$$

Earnings growth rate_t = OI growth rate_t + [Earnings leverage_{t-1} \times (OI growth rate_t – NFE growth rate_t)]

$$g_t^{\text{Earn}} = g_t^{\text{OI}} + \text{ELEV}_{t-1} [g_t^{\text{OI}} - g_t^{\text{NFE}}] \quad \text{Page 458}$$

$$\text{ELEV} = \frac{\text{NFE}}{\text{Earnings}} \quad \text{Page 458}$$

Unlevered P/B ratio = $\frac{\text{Value of net operating assets}}{\text{Net operating assets}}$

$$= \frac{V_0^{\text{NOA}}}{\text{NOA}_0} \quad \text{Page 463}$$

Levered P/B ratio = Unlevered P/B ratio + [Financial leverage \times (Unlevered P/B ratio – 1)]

$$\frac{V_0^E}{\text{CSE}_0} = \frac{V_0^{\text{NOA}}}{\text{NOA}_0} + \text{FLEV} \left(\frac{V_0^{\text{NOA}}}{\text{NOA}_0} - 1 \right) \quad \text{Page 464}$$

$$\text{Forward enterprise P/E ratio} = \frac{\text{Value of operations}}{\text{Forward operating income}} = \frac{V_0^{\text{NOA}}}{\text{OI}_1} \quad \text{Page 465}$$

$$\begin{aligned}\text{Trailing enterprise P/E ratio} &= \frac{\text{Value of operations} + \text{Free cash flow}}{\text{Current operating income}} \\ &= \frac{V_0^{\text{NOA}} + \text{FCF}_0}{\text{OI}_0} \quad \text{Page 466}\end{aligned}$$

$$\text{Forward levered P/E ratio} = \frac{V_0^E}{\text{Earn}_1} = \frac{V_0^{\text{NOA}}}{\text{OI}_1} + \text{ELEV}_1 \left(\frac{V_0^{\text{NOA}}}{\text{OI}_1} - \frac{1}{\text{NBC}_1} \right) \quad \text{Page 466}$$

$$\text{Forward levered E/P ratio} = \frac{\text{Earn}_1}{V_0^E} = \frac{\text{OI}_1}{V_0^{\text{NOA}}} + \frac{\text{NFO}_0}{V_0^E} \left[\frac{\text{OI}_1}{V_0^{\text{NOA}}} - \text{NBC}_1 \right] \quad \text{Page 466}$$

$$\begin{aligned}\text{Trailing levered P/E ratio} &= \frac{V_0^E + d_0}{\text{Earn}_0} \\ &= \frac{V_0^{\text{NOA}} + \text{FCF}_0}{\text{OI}_0} + \text{ELEV}_0 \left(\frac{V_0^{\text{NOA}} + \text{FCF}_0}{\text{OI}_0} - \frac{1}{\text{NBC}_0} - 1 \right) \quad \text{Page 466}\end{aligned}$$

CHAPTER 15

The no-growth forecast of operating income:

$$\text{OI}_1 = \text{OI}_0 + (\rho_F - 1)\Delta\text{NOA}_0 \quad \text{Page 484}$$

The no-growth valuation of operations:

$$V_0^{\text{NOA}} = \frac{\text{OI}_1}{\rho_F - 1} \quad \text{Page 484}$$

The growth forecast of operating income:

$$\text{OI}_1 = \text{NOA}_0 \times \text{Core RNOA}_0 \quad \text{Page 484}$$

Growth valuation:

Value of common equity:

$$V_0^E = \text{CSE}_0 + \frac{[\text{Core RNOA}_0 - (\rho_F - 1)]\text{NOA}_0}{\rho_F - g} \quad \text{Page 485}$$

Value of operations:

$$\begin{aligned}V_0^{\text{NOA}} &= \text{NOA}_0 + \frac{[\text{Core RNOA}_0 - (\rho_F - 1)]\text{NOA}_0}{\rho_F - g} \\ &= \text{NOA}_0 \times \frac{\text{Core RNOA}_0 - (g - 1)}{\rho_F - g} \quad \text{Page 486}\end{aligned}$$

Unlevered price-to-book ratio:

$$\frac{V_0^{\text{NOA}}}{\text{NOA}_0} = \frac{\text{Core RNOA}_0 - (g - 1)}{\rho_F - g} \quad \text{Page 486}$$

Unlevered forward P/E ratio:

$$\frac{V_0^{\text{NOA}}}{\text{OI}_1} = \frac{1}{\rho_F - 1} \left[1 + \frac{G_2 - \rho_F}{\rho_F - g} \right] \quad \text{Page 486}$$

Weighted-average growth rate for ReOI = $(0.7 \times \text{Current growth in ReOI}) + (0.3 \times 4\%)$

Page 488

A simple valuation with short-term and long-term growth rates:

$$V_0^{\text{NOA}} = \text{OI}_1 \times \frac{1}{\rho_F - 1} \left[\frac{G_2 - G_{\text{long}}}{\rho_F - G_{\text{long}}} \right] \quad \text{Page 488}$$

CHAPTER 16

$$\text{ReOI} = \text{Sales} \times \left(\text{Core sales PM} - \frac{\text{Required return for operations}}{\text{ATO}} \right) + \text{Core other OI} + \text{Unusual items}$$

Page 506

CHAPTER 18

Quality diagnostics:

Net sales/Cash from sales

Net sales/Net accounts receivable

Net sales/Allowance for sales returns and discounts

Net sales/Unearned revenue

Page 603

Bad debt expense/Actual credit losses

Bad debt reserves/Accounts receivable (gross)

Bad debt expense/Sales

Page 604

$$\frac{\text{Normalized OI}}{\text{OI}}$$

where

$$\begin{aligned} \text{Normalized OI} &= \text{Free cash flow} + \Delta \text{Normalized NOA} \\ &= \text{Free cash flow} + \Delta \text{Sales/Normal ATO} \end{aligned}$$

Page 605

$$\frac{\text{Adjusted ebitda}}{\text{ebit}}$$

Page 607

$$\frac{\text{Depreciation}}{\text{Capital expenditures}}$$

Page 607

$$\frac{\text{Cash flow from operations (CFO)}}{\text{Operating income}}$$

Page 608

$$\frac{\text{CFO}}{\text{Average NOA}}$$

Page 608

$$\frac{\text{Pension expense}}{\text{Total operating expense}}$$

Page 610

<u>Other postemployment expenses</u>	Page 610
Total operating expense	
<u>Operating tax expense</u>	Page 610
OI before taxes	
Warranty expense/Actual warranty claims	
Warranty expense/Sales	Page 611
<u>R&D expense</u>	Page 615
Sales	
<u>Advertising expense</u>	Page 615
Sales	

CHAPTER 19

Reverse engineering the expected return:

$$\text{Expected equity return} = \left[\frac{B_0}{P_0} \times \text{ROCE}_1 \right] + \left[\left(1 - \frac{B_0}{P_0} \right) \times (g - 1) \right] \quad \text{Page 665}$$

$$\text{Expected return for operations} = \left[\frac{\text{NOA}_0}{P_0^{\text{NOA}}} \times \text{RNOA}_1 \right] + \left[\left(1 - \frac{\text{NOA}_0}{P_0^{\text{NOA}}} \right) \times (g - 1) \right] \quad \text{Page 665}$$

CHAPTER 20

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}} \quad \text{Page 685}$$

$$\text{Quick (or acid test) ratio} = \frac{\text{Cash} + \text{Short-term investments} + \text{Receivables}}{\text{Current liabilities}} \quad \text{Page 685}$$

$$\text{Cash ratio} = \frac{\text{Cash} + \text{Short-term investments}}{\text{Current liabilities}} \quad \text{Page 685}$$

$$\text{Defensive interval} = \frac{\text{Cash} + \text{Short-term investments} + \text{Receivables}}{\text{Capital expenditures}} \times 365 \quad \text{Page 685}$$

$$\text{Cash flow to capital expenditures} = \frac{(\text{Unlevered}) \text{ cash flow from operations}}{\text{Capital expenditures}} \quad \text{Page 685}$$

$$\text{Debt to total assets} = \frac{\text{Total debt (current + long-term)}}{\text{Total assets (liabilities + total equity)}} \quad \text{Page 686}$$

$$\text{Debt to equity} = \frac{\text{Total debt}}{\text{Total equity}} \quad \text{Page 686}$$

Long-term debt ratio = $\frac{\text{Long-term debt}}{\text{Long-term debt} + \text{Total equity}}$	Page 686
Interest coverage = $\frac{\text{Operating income}}{\text{Net interest expense}}$ (times interest earned)	Page 686
Interest coverage = $\frac{\text{Unlevered cash flow from operations}}{\text{Net cash interest}}$ (cash basis)	Page 686
CFO to debt = $\frac{\text{Unlevered cash flow from operations}}{\text{Total debt}}$	Page 686
Cash available for debt service = Free cash flow – Net dividends = OI – Δ NOA – Net dividends	Page 693
Debt service requirement = Required interest and preferred dividend payments + Required net principal payments + Lease payments	Page 693

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