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EXAM

Course:	**BE 414 Financial Statement Analysis and Equity Valuation**

Date:	21st May 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%)

a) The following earnings and dividends forecasts made at the end of 2018 for a firm with $20 book value per common share at that time. The firm has a required equity return of 10%.

	2019E	2020E	2021E	2021E	2022E
EPS	4.06	5.21	4.22	5.40	5.88
DPS	0.97	1.21	1.34	1.45	1.64

Forecast book value per share, return on common equity (ROCE), and residual earnings for each year, 2019-2022. Assume that residual earnings will grow at a rate equal to growth in historical GDP (4%), after 2022. What is the value of one share in the company?

b) Do you agree with the following statement?
"The abnormal earnings growth valuation model is more sensitive to the required return estimate than the residual earnings valuation model."
Explain (max ½ page).

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SERVICEBOKS 422   4604 KRISTIANSAND
TELEFON 38 14 10 00   FAKS 38 14 10 01
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Exercise 2 (20%)

a) We are at the end of year 2018. Earnings per share for SnapTalk Inc. is 40. Book value per share for 2017 was 222.22. Required return is 9%. The firm pays no dividends. The market's implied long term growth rate in residual earnings is 4%. What is the market implied growth rate in earnings for 2019?

b) Some investors believe that it is possible to estimate a true and objective intrinsic value of equity. Do you agree? Explain (max ½ page).

Exercise 3 (20%)

a) The market value of Faceblook Inc. is $10 000 000. The firm has 100 000 stocks outstanding, and has issued 30 000 call options on its own stock with an exercise price of $79. Estimate the contingent liability. The firm pays a tax rate of 35%

b) What is a hidden dirty surplus? Explain (max ½ page).

Exercise 4 (20%)

You are given the following income statement:

GAAP Income statement

Revenue	5000
Operating expenses	(4000)
Interest expense	(150)
Income before tax	850
Income tax expense	(300)
Net income	550

a) Do a tax allocation to operations, using both the top-down and bottom-up approaches. Use a tax rate of 35%.

b) Why is it important to reformulate financial statements before you do a valuation? Explain (max ½ page).

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Exercise 5 (20%)

A firm with a return on common equity (ROCE) of 25% has financial leverage of 35% and a net after-tax borrowing cost of 5% on $250 million of net debt.

    a) i)   What rate of return does this firm earn on its operations?

          ii) The firm is considering repurchasing $160 million of its stock and financing the repurchase with further borrowing at a 5% after-tax borrowing cost. What effect will this transaction have on the firm's return on common equity if the same level of operating profitability is maintained?

    b) When we are identifying sustainable earnings it is important to consider, among other items, both "realized gains and losses on shares" and "unrealized gains and losses on equity investments". Why is it important to consider these two items? Explain (max ½ page).

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Appendix

A Summary of Formulas

CHAPTER 1

$$\text{Value of the firm} = \text{Value of debt} + \text{Value of equity}$$

CHAPTER 2

$$\text{Shareholders' equity} = \text{Assets} - \text{Liabilities}$$

$$\text{Net income} = \text{Revenues} - \text{Expenses}$$

$$\text{Net revenue} - \text{Cost of goods sold} = \text{Gross margin}$$

$$\text{Gross margin} - \text{Operating expenses} = \text{Operating income}$$

$$\text{Operating income} - \text{Net interest expense} = \text{Income before taxes}$$

$$\text{Income before taxes} - \text{Income taxes} = \text{Income after taxes}$$
(and before extraordinary items)

$$\text{Income before extraordinary items} + \text{Extraordinary items} = \text{Net income}$$

$$\text{Net income} - \text{Preferred dividends} = \text{Net income available to common}$$

$$\text{Cash from operations} + \text{Cash from investment} + \text{Cash from financing}$$
$$= \text{Change in cash}$$

$$\text{Ending equity} = \text{Beginning equity} + \text{Total (comprehensive) income}$$
$$- \text{Net payout to shareholders}$$

$$\text{Comprehensive income} = \text{Net income} + \text{Other comprehensive income}$$

$$\text{Intrinsic premium} = \text{Intrinsic value of equity} - \text{Book value of equity}$$

$$\text{Market premium} = \text{Market price of equity} - \text{Book value of equity}$$

$$\text{Value added for shareholders} = \text{Ending value} - \text{Beginning value} + \text{Dividend}$$

$$\text{Stock return}_t = P_t - P_{t-1} + d_t$$

CHAPTER 3

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

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

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

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

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

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

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

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

Value of a bond = Present value of expected cash flows

$$V_0^D = \frac{CF_1}{\rho_D} + \frac{CF_2}{\rho_D^2} + \frac{CF_3}{\rho_D^3} + \frac{CF_4}{\rho_D^4} + \cdots + \frac{CF_T}{\rho_D^T}$$

(ρ_D is 1 + Required return for the bond)

Value of a project = Present value of expected cash flows

$$V_0^P = \frac{CF_1}{\rho_P} + \frac{CF_2}{\rho_P^2} + \frac{CF_3}{\rho_P^3} + \frac{CF_4}{\rho_P^4} + \cdots + \frac{CF_T}{\rho_P^T}$$

(ρ_P is 1 + Hurdle rate for the project)

CHAPTER 4

Value of equity = Present value of expected dividends

$$V_0^E = \frac{d_1}{\rho_E} + \frac{d_2}{\rho_E^2} + \frac{d_3}{\rho_E^3} + \frac{d_4}{\rho_E^4} + \cdots$$

(ρ_E is 1 + Required return for the equity)

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

$$V_0^E = \frac{d_1}{\rho_E} + \frac{d_2}{\rho_E^2} + \frac{d_3}{\rho_E^3} + \cdots + \frac{d_T}{\rho_E^T} + \frac{P_T}{\rho_E^T}$$

Perpetuity dividend model:

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

Dividend growth model:

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

Value of a perpetual dividend stream $= V_0^E = \dfrac{d_1}{\rho_E - 1}$

Value of a dividend growing at a constant rate $= V_0^E = \dfrac{d_1}{\rho_E - g}$

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

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

(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

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

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

$$CV_T = \frac{C_{T+1} - I_{T+1}}{\rho_F - 1}$$

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

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

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

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

Earnings = Free cash flow − Net cash interest + Investment + Accruals

Earnings $= (C - I) - i + I + $ Accruals

CHAPTER 5

The value of common equity $(V_0^E) = B_0 + \dfrac{RE_1}{\rho_E} + \dfrac{RE_2}{\rho_E^2} + \dfrac{RE_3}{\rho_E^3} + \cdots$

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

$$RE_t = Earn_t - (\rho_E - 1)B_{t-1}$$

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

$$Earn_t - (\rho_E - 1)B_{t-1} = [ROCE_t - (\rho_E - 1)]B_{t-1}$$

Simple valuation model:

$$V_0^E = B_0 + \frac{RE_1}{\rho_E - g}$$

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

$$V_0^E = B_0 + \frac{RE_1}{\rho_E} + \frac{RE_2}{\rho_E^2} + \frac{RE_3}{\rho_E^3} + \cdots + \frac{RE_T}{\rho_E^T}$$

Case 2 valuation. No growth:

$$V_0^E = B_0 + \frac{RE_1}{\rho_E} + \frac{RE_2}{\rho_E^2} + \cdots + \frac{RE_T}{\rho_E^T} + \left(\frac{RE_{T+1}}{\rho_E - 1}\right)\bigg/\rho_E^T$$

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

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

CHAPTER 6

Value of equity $= V_0^E = \dfrac{1}{\rho_E - 1}\left[Earn_1 + \dfrac{\Delta RE_2}{\rho_E} + \dfrac{\Delta RE_3}{\rho_E^2} + \dfrac{\Delta RE_4}{\rho_E^3} + \cdots\right]$

Normal forward P/E $= \dfrac{1}{\text{Required return}}$

Normal trailing P/E $= \dfrac{(1 + \text{Required return})}{\text{Required return}}$

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

$$V_0^E = \frac{Earn_1}{\rho_E - 1} + \frac{1}{\rho_E - 1}\left[\frac{AEG_2}{\rho_E} + \frac{AEG_3}{\rho_E^2} + \frac{AEG_4}{\rho_E^3} + \cdots\right]$$

$$= \frac{1}{\rho_E - 1}\left[Earn_1 + \frac{AEG_2}{\rho_E} + \frac{AEG_3}{\rho_E^2} + \frac{AEG_4}{\rho_E^3} + \cdots\right]$$

Abnormal earnings growth$_t$ (AEG$_t$) = Cum-dividend earn$_t$ − Normal earn$_t$

$$= [Earn_t + (\rho_E - 1)d_{t-1}] - \rho_E Earn_{t-1}$$

Abnormal earnings growth$_t$ (AEG$_t$) = $[G_t - \rho_E] \times$ Earnings$_{t-1}$

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

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

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

CHAPTER 7

Value = Value based on what we know + Speculative value

Weighted-average expected return formula:

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

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

$$V_0^E = B_0 + \frac{\text{PE}_1}{\rho} + \frac{\text{PE}_2}{\rho(\rho - 1)} + \text{Value of speculative growth}$$

Earnings forecast$_t$ = (Book value$_{t-1}$ × Required return) + Residual earnings$_t$

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

Earnings forecast$_t$ = Normal earnings forecast$_t$ + AEG$_t$
− Forecast of earnings from prior year's dividends

CHAPTER 8

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

$$C - I = d + F$$

Treasurer's rule:

If $C - I - i > d$: Lend or buy down own debt
If $C - I - i < d$: Borrow or reduce lending

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Stocks and flows equation for common stockholders' equity:

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

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

CHAPTER 9

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

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

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

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

$$\text{Retention ratio} = \frac{\text{Comprehensive income} - \text{Dividends}}{\text{Comprehensive income}}$$
$$= 1 - \text{Dividend payout ratio}$$

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

$$\text{Growth rate of CSE} = \frac{\text{Change in CSE}}{\text{Beginning CSE}}$$

$$= \frac{\text{Comprehensive income} + \text{Net transactions with shareholders}}{\text{Beginning CSE}}$$

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

CHAPTER 10

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

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

$$\text{Tax on operating income} = \text{Tax expense as reported} + (\text{Net interest expense} \times \text{Tax rate})$$

$$\text{Effective tax rate for operations} =$$

$$\frac{\text{Tax on operating income}}{\text{Operating income before tax, equity income, and extraordinary and dirty-surplus items}}$$

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

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

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

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

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

$$\text{Expense ratio} = \frac{\text{Expense}}{\text{Sales}}$$

$$1 - \text{Sales PM} = \text{Sum of expense ratios}$$

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

Page 319

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

Page 319

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

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

Page 319

$$\begin{array}{c}\text{Financial leverage ratio} \\ \text{(FLEV)}\end{array} = \frac{\text{Net financial obligations}}{\text{Common stockholders' equity}} = \text{NFO/CSE}$$

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$$\text{Capitalization ratio} - \text{Financial leverage ratio} = 1.0$$

Page 319

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

Page 318

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

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

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CHAPTER 11

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

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

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CHAPTER 12

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

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

Page 366

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

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Implicit interest on operating liabilities = Short-term borrowing rate (after tax) $\times$ Operating liabilities

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

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

RNOA = ROOA + (OLLEV $\times$ OLSPREAD)

OLSPREAD = ROOA $-$ Short-term borrowing rate (after tax)

ROCE = ROCE before MI $\times$ MI sharing ratio

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

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

ROCE = (PM $\times$ ATO) + [FLEV $\times$ (RNOA $-$ NBC)]

PM = OI (after tax)/Sales

ATO = Sales/NOA

PM = Sales PM + Other items PM

Sales PM = Gross margin ratio $-$ Expense ratios

$$\frac{1}{\text{ATO}} = \frac{\text{Cash}}{\text{Sales}} + \frac{\text{Accounts receivable}}{\text{Sales}} + \frac{\text{Inventory}}{\text{Sales}} + \cdots + \frac{\text{PPE}}{\text{Sales}}$$
$$+ \cdots - \frac{\text{Accounts payable}}{\text{Sales}} - \frac{\text{Pension obligations}}{\text{Sales}} - \cdots$$

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

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

$$\text{Days in accounts receivable} = \frac{365}{\text{Accounts receivable turnover}}$$
(sometimes called days sales outstanding)

The inventory turnover ratio is sometimes measured as:

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

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

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

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

$$NBC = \left(\frac{FO}{NFO} \times \frac{\text{After-tax interest on financial obligations (FO)}}{FO} \right)$$

$$- \left(\frac{FA}{NFO} \times \frac{\text{After-tax interest on financial assets (FA)}}{FA} \right)$$

$$- \left(\frac{FA}{NFO} \times \frac{\text{Unrealized gains on FA}}{FA} \right)$$

$$+ \left(\frac{\text{Preferred stock}}{NFO} \times \frac{\text{Preferred dividends}}{\text{Preferred stock}} \right) + \cdots$$

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CHAPTER 13

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

Page 396

$$\text{Return on net operating assets} = \text{Core RNOA} + \text{Unusual items to net operating assets}$$

Page 404

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

Page 404

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

Page 404

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

where $\text{Core sales PM} = \dfrac{\text{Core OI from sales}}{\text{Sales}}$

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$$\text{Net borrowing cost} = \text{Core net borrowing cost} + \text{Unusual borrowing costs}$$

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

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

$$\Delta RNOA_1 = \left(\Delta\text{Core sales PM}_1 \times ATO_0 \right) + \left(\Delta ATO_1 \times \text{Core sales PM}_1 \right)$$

$$+ \Delta\left(\frac{\text{Core other OI}}{NOA} \right) + \Delta\left(\frac{UI}{NOA} \right)$$

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$$\text{Sales PM} = \frac{\text{Sales} - \text{Variable cost} - \text{Fixed costs}}{\text{Sales}}$$

$$= \frac{\text{Contribution margin}}{\text{Sales}} - \frac{\text{Fixed costs}}{\text{Sales}} \qquad \text{Page 409}$$

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

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

(Don't confuse OLEV with OLLEV!) Page 409

% Change in core OI = OLEV × % Change in core sales Page 409

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

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

CHAPTER 14

Residual operating income = Operating income − (Required return for operations
× Beginning net operating assets)

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

Value of operations = Net operating assets
+ Present value of expected residual operating income

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

Value of common equity = Book value of common equity
+ Present value of expected residual operating income

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

Residual operating income = (RNOA − Required return for operations)
× Net operating assets

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

Abnormal operating income growth$_t$ (AOIG)

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

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

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

$$= [G_t - \rho_F] \times \text{OI}_{t-1} \qquad \text{Page 443}$$

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

$$V_0^E = \frac{1}{\rho_F - 1}\left[OI_1 + \frac{AOIG_2}{\rho_F} + \frac{AOIG_3}{\rho_F^2} + \frac{AOIG_4}{\rho_F^3} + \cdots \right] - NFO_0 \qquad \text{Page 445}$$

Core ReOI$_t$ = Core OI$_t$ − $(\rho_F - 1)$ NOA$_{t-1}$ \hspace{2cm} Page 445

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

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

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

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

After-tax cost of net debt (ρ_D) = Nominal cost of net debt × (1 − Tax rate) \hspace{1cm} Page 447

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

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

Earnings growth rate$_t$ = OI growth rate$_t$ + [Earnings leverage$_{t-1}$ × (OI growth rate$_t$ − NFE growth rate$_t$)]

$$g_t^{Earn} = g_t^{OI} + ELEV_{t-1}\left[g_t^{OI} - g_t^{NFE} \right] \qquad \text{Page 458}$$

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

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

$$= \frac{V_0^{NOA}}{NOA_0} \qquad \text{Page 463}$$

Levered P/B ratio = Unlevered P/B ratio + [Financial leverage × (Unlevered P/B ratio − 1)]

$$\frac{V_0^E}{CSE_0} = \frac{V_0^{NOA}}{NOA_0} + FLEV\left(\frac{V_0^{NOA}}{NOA_0} - 1 \right) \qquad \text{Page 464}$$

Forward enterprise P/E ratio = $\dfrac{\text{Value of operations}}{\text{Forward operating income}} = \dfrac{V_0^{NOA}}{OI_1}$ \hspace{1cm} Page 465

$$\text{Trailing enterprise P/E ratio} = \frac{\text{Value of operations} + \text{Free cash flow}}{\text{Current operating income}}$$

$$= \frac{V_0^{\text{NOA}} + \text{FCF}_0}{\text{OI}_0}$$

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

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

$$\text{Trailing levered P/E ratio} = \frac{V_0^E + d_0}{\text{Earn}_0}$$

$$= \frac{V_0^{\text{NOA}} + \text{FCF}_0}{\text{OI}_0} + \text{ELEV}_0\left(\frac{V_0^{\text{NOA}} + \text{FCF}_0}{\text{OI}_0} - \frac{1}{\text{NBC}_0} - 1\right)$$

CHAPTER 15

The no-growth forecast of operating income:

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

The no-growth valuation of operations:

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

The growth forecast of operating income:

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

Growth valuation:
  Value of common equity:

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

Value of operations:

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

$$= \text{NOA}_0 \times \frac{\text{Core RNOA}_0 - (g - 1)}{\rho_F - g}$$

Unlevered price-to-book ratio:

$$\frac{V^{\text{NOA}}}{\text{NOA}_0} = \frac{\text{Core RNOA}_0 - (g - 1)}{\rho_F - g}$$

Unlevered forward P/E ratio:

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

Weighted-average growth rate for ReOI = $(0.7 \times$ Current growth in ReOI$)$
$$+\ (0.3 \times 4\%) \qquad \text{Page 488}$$

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

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

CHAPTER 16

$$\mathrm{ReOI} = \mathrm{Sales} \times \left(\mathrm{Core\ sales\ PM} - \frac{\mathrm{Required\ return\ for\ operations}}{\mathrm{ATO}}\right)$$
$$+\ \mathrm{Core\ other\ OI} + \mathrm{Unusual\ items} \qquad \text{Page 506}$$

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

$$\frac{\mathrm{Normalized\ OI}}{\mathrm{OI}}$$

where

$$\begin{aligned}\mathrm{Normalized\ OI} &= \mathrm{Free\ cash\ flow} + \Delta\mathrm{Normalized\ NOA}\\ &= \mathrm{Free\ cash\ flow} + \Delta\mathrm{Sales/Normal\ ATO}\end{aligned} \qquad \text{Page 605}$$

$$\frac{\mathrm{Adjusted\ ebitda}}{\mathrm{ebit}} \qquad \text{Page 607}$$

$$\frac{\mathrm{Depreciation}}{\mathrm{Capital\ expenditures}} \qquad \text{Page 607}$$

$$\frac{\mathrm{Cash\ flow\ from\ operations\ (CFO)}}{\mathrm{Operating\ income}} \qquad \text{Page 608}$$

$$\frac{\mathrm{CFO}}{\mathrm{Average\ NOA}} \qquad \text{Page 608}$$

$$\frac{\mathrm{Pension\ expense}}{\mathrm{Total\ operating\ expense}} \qquad \text{Page 610}$$

$$\frac{\text{Other postemployment expenses}}{\text{Total operating expense}}$$ Page 610

$$\frac{\text{Operating tax expense}}{\text{OI before taxes}}$$ Page 610

Warranty expense/Actual warranty claims
Warranty expense/Sales   Page 611

$$\frac{\text{R\&D expense}}{\text{Sales}}$$ Page 615

$$\frac{\text{Advertising expense}}{\text{Sales}}$$ Page 615

CHAPTER 19

Reverse engineering the expected return:

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

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

Page 665

CHAPTER 20

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

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

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

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

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

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

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

$$\text{Long-term debt ratio} = \frac{\text{Long-term debt}}{\text{Long-term debt} + \text{Total equity}}$$

Page 686

$$\text{Interest coverage} = \frac{\text{Operating income}}{\text{Net interest expense}} \quad \text{(times interest earned)}$$

Page 686

$$\text{Interest coverage} = \frac{\text{Unlevered cash flow from operations}}{\text{Net cash interest}} \quad \text{(cash basis)}$$

Page 686

$$\text{CFO to debt} = \frac{\text{Unlevered cash flow from operations}}{\text{Total debt}}$$

Page 686

$$\text{Cash available for debt service} = \text{Free cash flow} - \text{Net dividends}$$
$$= \text{OI} - \Delta\text{NOA} - \text{Net dividends}$$

Page 693

$$\text{Debt service requirement} = \text{Required interest and preferred dividend payments}$$
$$+ \text{Required net principal payments}$$
$$+ \text{Lease payments}$$

Page 693