EXAM

Course:	BE 414 Financial Statement Analysis and Equity Valuation
Date:	25 November 2016
Time:	0900 - 1300
Number of pages:	5 + 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 (30%)

The following are summaries from financial statements for the warehouse retailer, Home Depot Inc. for fiscal year ending January 29, 2016:

Summary Reformulated Balance Sheet, January 29, 2016
(in millions of dollars)

	2016	2015		2016	2015
Financial assets	757	456	Financial liabilities	4,085	2,159
Operating assets	43,725	38,564	Operating liabilities	13,488	12,703
			Common equity	26,909	24,158
	44,482	39,020		44,482	39,020

Summary Reformulated Income Statement, Year Ended, January 29, 2016
(in millions of dollars)

Sales	81,511
Core operating expenses	72,148
Core operating income	9,363
Taxes allocated to core operating income	3,474
Core operating income, after tax	5,889
Unsustainable operating income, after tax	182
Operating income, after tax	6,071

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Where relevant, make all calculations for 2016 with beginning-of-period balance sheet numbers in the questions below.

(a)   Calculate financial leverage

(b)   Calculate the return on net operating assets (RNOA). Also calculate the **core** return on net operating assets for the year.

(c)   Show that Core RNOA = Core Profit Margin × Asset Turnover

(d)   The firm has a net borrowing cost of 3.0% after tax. Calculate the return on common equity (ROCE).

(e)   Complete the income statement to report the after-tax net financial expenses and comprehensive income.

(f)   In an article in the *Financial Times* on September 9th of this year, Mark Sellers, a hedge fund manager in Chicago, argued that Home Depot should borrow $17 billion to repurchase its stock. Suppose that core operating profitability and the net borrowing cost were forecasted to be the same for 2017 as in 2016. What return on common equity (ROCE) would you forecast for 2017 under the following conditions:

1. Home Depot did not make the stock repurchase

2. Home Depot made the stock repurchase on January 29, 2016

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Exercise 2 (20%)

The following is a comparative balance sheet for a firm for fiscal year 2012 (in millions of dollars):

	2012	2011		2012	2011
Operating cash	60	50	Accounts payable	1,200	1,040
Short-term investments (at market)	550	500	Accrued liabilities	390	450
Accounts receivable	940	790	Long-term debt	1,840	1,970
Inventory	910	840			
Property and plant	2,840	2,710	Common equity	1,870	1,430
	5,300	4,890		5,300	4,890

The following is the statement of common shareholders' equity for 2012 (in millions of dollars):

Balance, end of fiscal year 2011	1,430
Share issues from exercised employee stock options	810
Repurchase of 24 million shares	(720)
Cash dividend	(180)
Tax benefit from exercise of employee stock options	12
Unrealized gain on investments	50
Net income	468
Balance, end of fiscal year 2012	1,870

The firm's income tax rate is 35%. The firm reported $15 million in interest income and $98 million in interest expense for 2012.

Sales revenue is forecasted to grow at a 6% rate per year in the future, on a constant asset turnover of 1.25. Operating profit margins of 14% are expected to be earned each year. The cost of capital for operations is 9%

a. Forecast return on net operating assets (RNOA) for 2013.

b. Forecast residual operating income for 2013.

c. Value the shareholders' equity at the end of the 2012 fiscal year using residual income methods.

d. Forecast abnormal growth in operating income for 2014.

e. Value the shareholders' equity at the end of 2012 using abnormal earnings growth methods.

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Exercise 3 (10%)

Reformulate the following income statement (in millions of dollars):

Sales	2,400
Operating expenses to generate sales	(1,650)
Loss from real estate partnership	(100)
Interest income	40
Interest expense	(160)
	530
Income tax expense	159
Net income	371

The firm's statutory tax rate is 35%.

What is the effective tax rate on operating income **from sales**?

Exercise 4 (10%)

The following numbers were calculated from the financial statements of a firm for fiscal year 2015.

Net operating assets	$107.5 million
Net financial obligations	22.7 million

Asset turnover, 2015	1.9
Core operating profit-margin, after tax	7.5%

The firm's 52 million outstanding shares are trading at $4.75 each. You forecast that the core profit margin and the asset turnover in the future will be the same as in 2015. You also forecast that sales will grow at 4% per year in the future. Given your forecasts, what is your expected rate of return from buying the firm at this price?

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Exercise 5 (30%)

Cisco Systems traded at $20 per share on December 3, 2011. Analysts are forecasting earnings per share of 0.22 for 2012 and 0.39 for 2013. The firm does not pay dividends.

a)

- Value Cisco on the assumption that abnormal earnings growth forecasted for 2013 will continue at the same level into the future. Use a cost of equity capital of 10%.
- Prove mathematically that abnormal earnings growth is equal to the change in residual earnings.

b) Cisco Systems has hired a new assistant financial analyst. He needs you to define the following concepts for him.

- Free cash flow to equity
- Value based management
- Red flag indicator
- Credit risk
- Earnings quality

c) The new analyst wants your opinion on the following statements. Are they right or wrong? Explain your answer.

- Liberal accounting practices are rare in modern GAAP.
- Over time, one can typically expect a company's RNOA to move towards the industry average.

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Appendix

A Summary of Formulas

CHAPTER 1

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

CHAPTER 2

Shareholders' equity = Assets − Liabilities

Net income = Revenues − Expenses

Net revenue − Cost of goods sold = Gross margin

Gross margin − Operating expenses = Operating income

Operating income − Net interest expense = Income before taxes

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

Income before extraordinary items + Extraordinary items = Net income

Net income − Preferred dividends = Net income available to common

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

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

Comprehensive income = Net income + Other comprehensive income

Intrinsic premium = Intrinsic value of equity − Book value of equity

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

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

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

$$V_0^D = \frac{\text{CF}_1}{\rho_D} + \frac{\text{CF}_2}{\rho_D^2} + \frac{\text{CF}_3}{\rho_D^3} + \frac{\text{CF}_4}{\rho_D^4} + \cdots + \frac{\text{CF}_T}{\rho_D^T}$$

(ρ_D is 1 + Required return for the bond)

Value of a project = Present value of expected cash flows

$$V_0^P = \frac{\text{CF}_1}{\rho_P} + \frac{\text{CF}_2}{\rho_P^2} + \frac{\text{CF}_3}{\rho_P^3} + \frac{\text{CF}_4}{\rho_P^4} + \cdots + \frac{\text{CF}_T}{\rho_P^T}$$

(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:

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

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Dividend growth model:

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

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

Page 113

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

Page 113

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

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

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(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

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

Page 116

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

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

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

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

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

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CHAPTER 5

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

Page 145

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:

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

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

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

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$_t$ − ρ$_E$] × 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

$$C - I = NFE - \Delta NFO + d$$

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

$$d = C - I + NFI - \Delta NFA$$

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

$$d = C - I - NFE + \Delta NFO$$

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

$$NOA_t = NOA_{t-1} + OI_t - (C_t - I_t)$$

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

$$\Delta NOA_t = OI_t - (C_t - I_t)$$

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

$$NFA_t = NFA_{t-1} + NFI_t + (C_t - I_t) - d_t$$

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

$$\Delta NFA_t = NFI_t + (C_t - I_t) - d_t$$

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

$$NFO_t = NFO_{t-1} + NFE_t - (C_t - I_t) + d_t$$

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

$$\Delta NFO_t = NFE_t - (C_t - I_t) + d_t$$

Stocks and flows equation for common stockholders' equity:

$$CSE_t = CSE_{t-1} + \text{Comprehensive earnings}_t - \text{Net dividends}_t$$

$$CSE_t = NOA_t - NFO_t$$

CHAPTER 9

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

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

Page 266

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

Page 266

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

Page 266

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

$$= 1 - \text{Dividend payout ratio}$$

Page 267

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

Page 267

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

Page 267

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

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

Page 267

CHAPTER 10

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

Page 305

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

Page 305

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

Page 306

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

Page 307

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

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

Page 312

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

Page 318

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

Page 318

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

Page 318

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

Page 318

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

Page 318

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

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

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

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

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

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

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

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

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

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

CHAPTER 11

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

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

CHAPTER 12

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

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

$$= \text{RNOA} + (\text{Financial leverage} \times \text{Operating spread})$$

$$= \text{RNOA} + (\text{FLEV} \times \text{SPREAD})$$

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

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

Page 369

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

Page 369

Return on net operating assets = Return on operating assets + (Operating liability
leverage × Operating liability leverage spread)

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

Page 369

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

Page 369

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

Page 372

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

Page 372

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

Page 372

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

Page 373

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

Page 373

$$\text{ATO} = \text{Sales/NOA}$$

Page 373

$$\text{PM} = \text{Sales PM} + \text{Other items PM}$$

Page 376

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

Page 376

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

Page 377

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

Page 377

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

Page 377

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

Page 377

The inventory turnover ratio is sometimes measured as:

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

Page 377

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

Page 377

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

Page 378

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

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

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

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

$$+ \left(\frac{\text{Preferred stock}}{NFO} \times \frac{\text{Preferred dividends}}{\text{Preferred stock}} \right) + \cdots \qquad \text{Page 380}$$

CHAPTER 13

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

Return on net operating assets = Core RNOA

$$+ \text{Unusual items to net operating assets} \qquad \text{Page 404}$$

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

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

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

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

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

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

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

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

$$+ \Delta \left(\frac{\text{Core other OI}}{NOA} \right) + \Delta \left(\frac{UI}{NOA} \right) \qquad \text{Page 408}$$

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

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

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

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

(Don't confuse OLEV with OLLEV!)

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

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

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

CHAPTER 14

Residual operating income = Operating income − (Required return for operations
$\times$ Beginning net operating assets)

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

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

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

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

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

Residual operating income = (RNOA − Required return for operations)
$\times$ Net operating assets

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

Abnormal operating income growth$_t$ (AOIG)

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

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

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

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

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$_t$ − (ρ_F − 1) NOA$_{t-1}$ 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)   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 = $\dfrac{\text{Value of operations}}{\text{Forward operating income}} = \dfrac{V_0^{NOA}}{OI_1}$ Page 465

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

$$= \frac{V_0^{\text{NOA}} + \text{FCF}_0}{\text{OI}_0} \qquad \text{Page 466}$$

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

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

$$\text{Trailing levered P/E ratio} = \frac{V_0^E + d_0}{\text{Earn}_0} \qquad \text{Page 466}$$

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

CHAPTER 15

The no-growth forecast of operating income:

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

The no-growth valuation of operations:

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

The growth forecast of operating income:

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

Growth valuation:
  Value of common equity:

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

Value of operations:

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

$$= \text{NOA}_0 \times \frac{\text{Core RNOA}_0 - (g - 1)}{\rho_F - g} \qquad \text{Page 486}$$

Unlevered price-to-book ratio:

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

Unlevered forward P/E ratio:

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

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

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

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

CHAPTER 16

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

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

    Bad debt expense/Actual credit losses
    Bad debt reserves/Accounts receivable (gross)
    Bad debt expense/Sales

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

where

Normalized OI = Free cash flow + ΔNormalized NOA
$$= \text{Free cash flow} + \Delta\text{Sales/Normal ATO}$$

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

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

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

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

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

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

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

Warranty expense/Actual warranty claims
Warranty expense/Sales

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

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

CHAPTER 19

Reverse engineering the expected return:

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

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

CHAPTER 20

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

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

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

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

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

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

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

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

$$\begin{aligned}\text{Cash available for debt service} &= \text{Free cash flow} - \text{Net dividends} \\ &= \text{OI} - \Delta\text{NOA} - \text{Net dividends}\end{aligned}$$ Page 693

$$\begin{aligned}\text{Debt service requirement} = &\text{ Required interest and preferred dividend payments} \\ &+ \text{Required net principal payments} \\ &+ \text{Lease payments}\end{aligned}$$ Page 693