UNIVERSITETET I AGDER

EXAM

Course:	**BE 414 Financial Statement Analysis and Equity Valuation**
Date:	30 May 2016
Time:	0900 - 1300
Number of pages:	4 + 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%)

At the time that of its 10-Q filing of financial statements for the first half of its 2012 fiscal year, Home Depot's shares traded at $50 per share. The following are summaries from those financial statements.

Balance Sheet, July 29, 2011
(in millions of dollars)

		Financial liabilities	1,320
Operating assets	23, 457	Operating liabilities	6,709
Financial assets	1,221	Common equity (on 2,336 million outstanding shares)	16,649
	24,678		24,678

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Statement of Earnings, Six Months Ended, July 29, 2011
(in millions of dollars)

Net sales	26,776
Cost of Merchandise Sold	18,795
Gross Profit	7,981
Operating Expenses:	
Selling and Store Operating	4,963
Pre-Opening	59
General and Administrative	436
Total Operating Expenses	5,458
Operating Income	2,523
Interest Income (Expense):	
Interest and Investment Income	22
Interest Expense	(11)
Interest, Net	11
Earnings Before Income Taxes	2,534
Income Taxes	978
Net Earnings	1,556

According to financial statement footnotes, Home Depot's statutory tax rate (combined Federal and State rates) is 39%. Other comprehensive income (not in net earnings above) is negligible. Use a required six-month return for operations of 4% in calculations below.

(a) Calculate the following from these statements:

1. Financial leverage
2. After-tax operating profit margin

(b) Home Depot earned a return on beginning net operating assets (RNOA) of 9.3% for the six months ending July 29, 2011.

1. What was the asset turnover during these six months?
2. What was the residual operating income over the six months?

(c) Calculate the free cash flow generated by operations during the six months.

(d) At the current market price of \$50 per share, what growth rate for residual operating income does the market forecast for the future?

(e) Calculate Home Depot's unlevered price-to-sales ratio for trailing six-month sales.

(f) If both profit margin and asset turnover are expected to continue at their current levels in the future, what is the sales growth rate forecast implied in the price-to-sales ratio?

Exercise 2 (20%)

The following is an incomplete statement of common shareholders' equity (in millions of dollars).

Balance, December 31, 2014	760
Net income	?
Common dividends	?
Issue of common stock	102
Unrealized gain on available-for-sale securities	8
Foreign currency translation loss	(6)
Balance, December 31, 2015	963

The firm has no net debt (a pure equity firm) and reported an after-tax operating profit margin of 12.5% on sales of \$912 million in its income statement for 2015. All operating expenses in the income statement are involved in generating core income.

Calculate the following for 2015:

(a) Net income and comprehensive income

(b) Free cash flow

(c) (Common) Dividends paid to common shareholders

(d) Core return on net operating assets (on beginning-of-year balance sheet)

(e) Asset turnover

Exercise 3 (20%)

Discuss the following statements: Which of them are right and which are wrong? Explain your answer.

a. Free cash flows are normally more volatile (unstable) than net earnings.
b. Liberal accounting makes companies look less profitable than they really are.
c. When the risk-free interest rate increases, the discount rate of the valuation models will normally also increase.
d. Dirty surplus items should be disregarded in investor-oriented financial statement analysis.

Exercise 4 (20%)

At the end of 2015 Telmia Inc. invested 315,000 in a new project. The economic life of the new project is 5 years. Telmia Inc. uses a weighted average cost of capital (WACC) of 11.24%. The table below presents the book value of the investment over the lifetime of the project. The table also lists expected free cash flows and expected operating income from the project:

	2015	2016	2017	2018	2019	2020
Book value of project	315 000	255 750	196 539	137 364	78 234	0
Project free cash flow		101 250	105 413	109 783	114 372	138 335
Operating income from project		42 000	46 200	50 610	55 241	60 103

a) Estimate residual operating income from the project for the years 2016-2020.

b) Use both the discounted cash flow model and the residual operating income model to estimate the value of the project.

Exercise 5 (10%)

Show (mathematically) that the abnormal earnings growth model can be derived from the residual earnings model.

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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

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

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

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

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

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

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

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

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

Value of a bond = Present value of expected cash flows

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

(ρ_D is 1 + Required return for the bond)

Value of a project = Present value of expected cash flows

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

(ρ_P is 1 + Hurdle rate for the project)

CHAPTER 4

Value of equity = Present value of expected dividends

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

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

Perpetuity dividend model:

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

Dividend growth model:

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

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

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

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

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

(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

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

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

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

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

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

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

$$\text{Earnings} = (C - I) - i + I + \text{Accruals} \qquad \text{Page 126}$$

CHAPTER 5

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

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

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

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

$$Earn_t - (\rho_E - 1)B_{t-1} = [ROCE_t - (\rho_E - 1)]B_{t-1}$$ Page 147

Simple valuation model:

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

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

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

Case 2 valuation. No growth:

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

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

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

CHAPTER 6

$$\text{Value of equity} = V_0^E = \frac{1}{\rho_E - 1}\left[Earn_1 + \frac{\Delta RE_2}{\rho_E} + \frac{\Delta RE_3}{\rho_E^2} + \frac{\Delta RE_4}{\rho_E^3} + \cdots\right]$$ Page 180

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

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

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

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

$$= \frac{1}{\rho_E - 1}\left[Earn_1 + \frac{AEG_2}{\rho_E} + \frac{AEG_3}{\rho_E^2} + \frac{AEG_4}{\rho_E^3} + \cdots\right]$$ Page 185

Abnormal earnings growth$_t$ (AEG_t) = Cum-dividend earn$_t$ − Normal earn$_t$ Page 187

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

Abnormal earnings growth$_t$ (AEG$_t$) = $[G_t - \rho_E] \times$ Earnings$_{t-1}$ Page 187

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

$$V_0^E + d_0 = \frac{\rho_E}{\rho_E - 1}\left[\text{Earn}_0 + \frac{\text{AEG}_1}{\rho_E} + \frac{\text{AEG}_2}{\rho_E^2} + \frac{\text{AEG}_3}{\rho_E^3} + \cdots\right]$$ Page 189

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

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

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

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

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

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

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

$1 - \text{Sales PM} = \text{Sum of expense ratios}$ Page 318

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

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

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

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

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

$\text{Capitalization ratio} - \text{Financial leverage ratio} = 1.0$ Page 319

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

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

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

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

$$\text{ROCE} = \text{RNOA} + \left[\frac{\text{NFO}}{\text{CSE}} \times (\text{RNOA} - \text{NBC})\right]$$ Page 366

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

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

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

Implicit interest on operating liabilities = Short-term borrowing rate (after tax) × 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

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

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

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

CHAPTER 13

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

Return on net operating assets = Core RNOA + Unusual items to net operating assets Page 404

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

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

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

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

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

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

Change in RNOA = Change in core sales profit margin at previous asset turnover level + Change due to change in asset turnover + Change due to change in other core income + Change due to change in unusual items

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

$$\text{Sales PM} = \frac{\text{Sales} - \text{Variable cost} - \text{Fixed costs}}{\text{Sales}} = \frac{\text{Contribution margin}}{\text{Sales}} - \frac{\text{Fixed costs}}{\text{Sales}}$$ Page 409

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

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

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

CHAPTER 14

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

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

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

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

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

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

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

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

Abnormal operating income growth$_t$ (AOIG)

= Cum-dividend operating income$_t$ − Normal operating income$_t$

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

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

Core ReOI_t = Core $\mathrm{OI}_t - (\rho_F - 1)\,\mathrm{NOA}_{t-1}$ Page 445

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

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

$$\rho_F = \frac{V_0^E}{V_0^{\mathrm{NOA}}} \cdot \rho_E + \frac{V_0^D}{V_0^{\mathrm{NOA}}} \cdot \rho_D$$ 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)

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

Earnings growth rate_t = OI growth rate_t + [Earnings leverage_{t-1} × (OI growth rate_t − NFE growth rate_t)]

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

$$\mathrm{ELEV} = \frac{\mathrm{NFE}}{\mathrm{Earnings}}$$ Page 458

$$\text{Unlevered P/B ratio} = \frac{\text{Value of net operating assets}}{\text{Net operating assets}} = \frac{V_0^{\mathrm{NOA}}}{\mathrm{NOA}_0}$$ Page 463

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

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

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

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

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

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

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

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

$$= \frac{V_0^{\text{NOA}} + \text{FCF}_0}{\text{OI}_0} + \text{ELEV}_0\left(\frac{V_0^{\text{NOA}} + \text{FCF}_0}{\text{OI}_0} - \frac{1}{\text{NBC}_0} - 1\right) \qquad \text{Page 466}$$

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:

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

Weighted-average growth rate for ReOI = (0.7 × Current growth in ReOI) + (0.3 × 4%) Page 488

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

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

Normalized OI = Free cash flow + ΔNormalized NOA
= Free cash flow + ΔSales/Normal ATO — 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

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

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

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

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

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