Lecture 4: Ratio Analysis

FE5105 Corporate Financing and Risk

National University of Singapore

2023/2024 Semester 1

Home Depot's balance sheet

Assets	End of Fiscal 2017#	2016*	Liabilities and Shareholders' Equity	End of Fiscal 2017#	2016*
Current assets					
Cash and marketable securities	$ 3,595	$ 2,538	Current liabilities		
Receivables	1,952	2,029	Debt due for repayment	$ 2,761	$ 1,252
Inventories	12,748	12,549	Accounts payable	7,244	7,000
Other current assets	638	608	Other current liabilities	6,189	5,881
Total current assets	$18,933	$17,724	Total current liabilities	$16,194	$14,133
Fixed assets			Long-term debt	$24,267	$22,349
Tangible fixed assets			Other long-term liabilities	2,614	2,151
Property, plant, and equipment	$41,414	$40,426	Total liabilities	$43,075	$38,633
Less accumulated depreciation	19,339	18,512	Shareholders' equity:		
Net tangible fixed assets	$22,075	$21,914	Common stock and other paid-in capital	10,281	$ 9,008
Intangible asset (goodwill)	$ 2,275	$ 2,093	Retained earnings	39,935	35,519
Other assets	1,246	1,235	Treasury stock	−48,762	−40,194
			Total shareholders' equity	1,454	$ 4,333
			Total liabilities and shareholders' equity	$44,529	$42,966
Total assets	$44,529	$42,966			

TABLE 28.1 Balance sheet of Home Depot, fiscal 2017 and 2016 (figures in $ millions)

#Year ending January 28, 2018
**Year ending January 29, 2017*

Home Depot's income statement

TABLE 28.2 Income Statement of Home Depot, fiscal 2017 (figures in $ millions)

	$ millions
Net sales	$100,978
Cost of goods sold	66,548
Selling, general, and administrative expenses	17,864
Depreciation	1,811
Earnings before interest and income taxes (EBIT)	$ 14,755
Interest expense	1,057
Taxable income	$ 13,698
Taxes	5,068
Net income	$ 8,630
Allocation of net income	
Dividends	4,212
Addition to retained earnings	4,418

Financial ratios and shareholder value

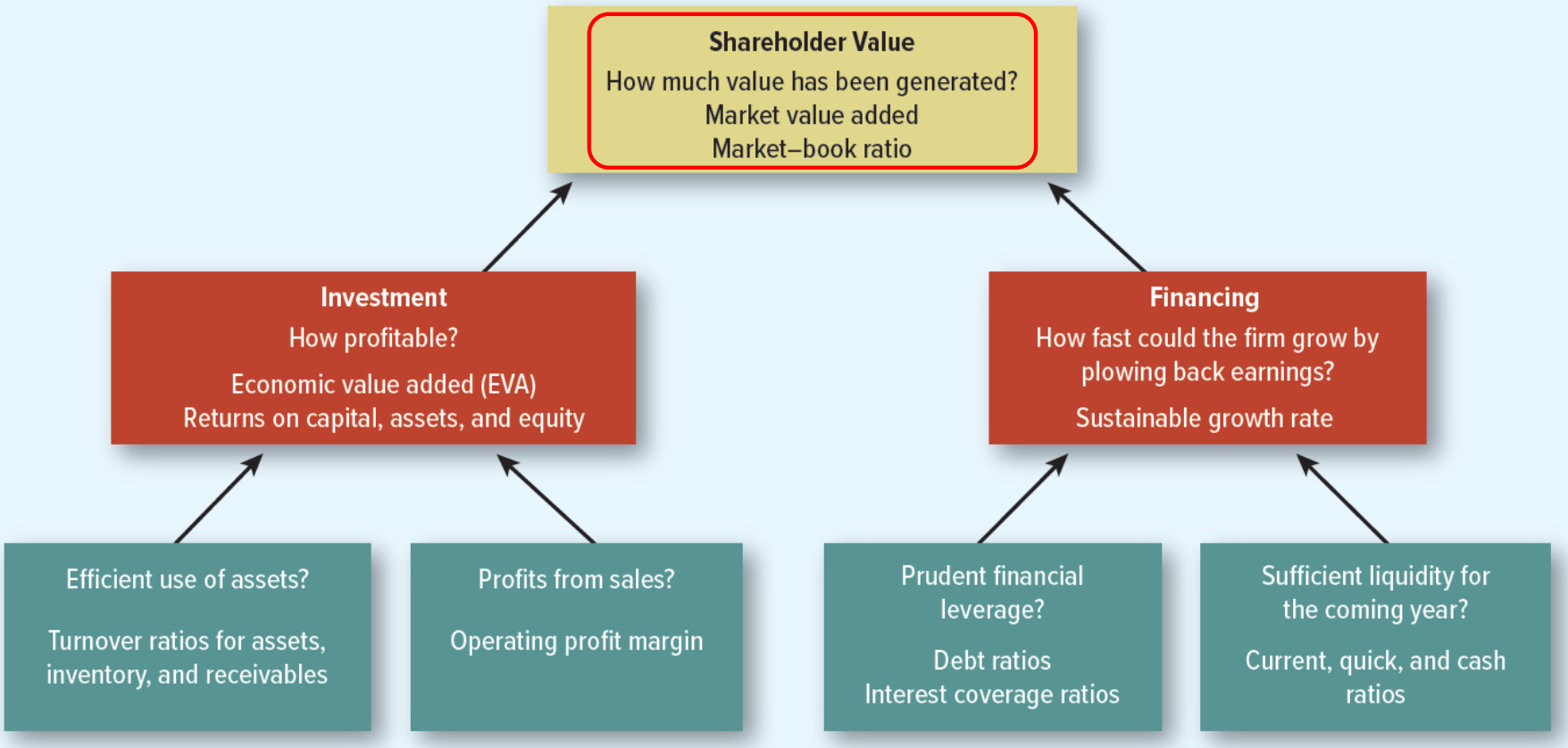


FIGURE 28.1 An organization chart for financial ratios, showing how common financial ratios and other measures relate to shareholder value.

Measuring performance

- Market capitalization: total market value of equity.
  - At the close of fiscal 2017, Home Depot's common stock was priced at \$204.92 per share. There were 1,170 million shares outstanding.
  - Total market capitalization was

$$1,170 \times \$204.92 = \$239,756 \text{ million}.$$

Measuring performance

- Market value added (MVA): market capitalization minus book value of equity.
  - It captures the value contributed to equity holders by operating and investing activities.
  - An alternative definition of MVA is the difference between the market value of the firm's capital (debt plus equity) and the book value of the capital.
  - By the end of 2017,

$$\text{MVA} = \$239,756 - \$1,454 = \$238,302 \text{ million}.$$

- Market-to-book ratio: the ratio of market value to book value.

$$\text{Market-to-book ratio} = \frac{239,756}{1,454} = 164.9.$$

Market-to-book ratios

Stock	Market Value Added	Market-to- Book Ratio	Stock	Market Value Added	Market-to-Book Ratio
Apple	782,164	7.15	Freeport-McMoran	–5,781	0.85
Microsoft	461,134	5.84	CBS	–16,858	0.65
Johnson & Johnson	277,722	3.38	AIG	–30,134	0.64
Walmart	209,010	3.41	Conoco	–53,141	0.47
Coca-Cola	202,102	8.59	Bank of America	–65,878	0.80

TABLE 28.3 Stock market measures of company performance, September 2017 (dollar values in millions). Companies are ranked by market value added.

Source: EVA Dimensions.

Financial ratios and investment decisions

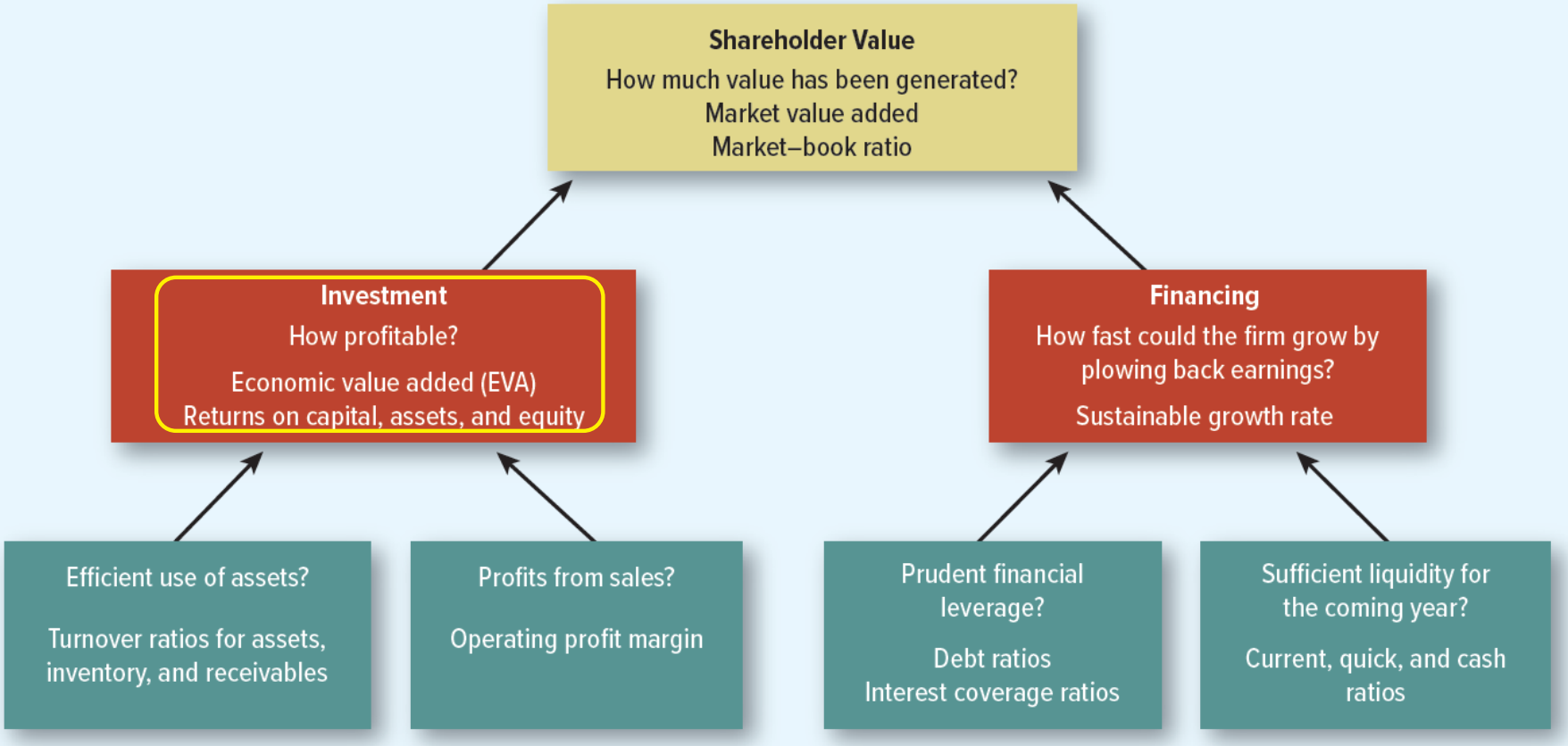


FIGURE 28.1 An organization chart for financial ratios, showing how common financial ratios and other measures relate to shareholder value.

Measuring investment profitability

- We usually measure a firm's profits by deducting operating and other costs from revenues.
- However, is it really a good index of the firm' profitability?
- Usually large firms earn higher profits, but it does not mean they are always better than small firms.
- One thing that is omitted is the cost of capital.

Economic value added

- Economic value added (EVA): the profit after deducting all costs, including the cost of capital. Also called residual income.

$$\text{EVA} = \text{after-tax interest} + \text{net income} - \text{cost of capital} \times \text{capital}.$$

- After-tax interest plus net income is also called the company's net operating profit after tax (NOPAT).
  - Let the tax rate be 35%, then after-tax interest = (1-0.35)×1,057 = \$687 million.
  - NOPAT = 687 + 8,630 = \$9,317 million.

Economic value added

- The cost of capital is calculated using total long-term capital, sometimes called total capitalization.
  - Long-term debt (end of 2016 = beginning of 2017): \$22,349.
  - Equity (end of 2016 = beginning of 2017): \$4,333.
  - Total capitalization = 22,349 + 4,333 = \$26,682 million.
- Let Home Depot's after-tax WACC be 8.2%, then its total cost of capital = 8.2% × 26,682 = \$2,188 million.
- Finally, for fiscal 2017,

$$\text{EVA} = 9,317 - 2,188 = \$7,129 \text{ million}.$$

Return on capital

- An alternative index is the return on capital (ROC):

$$\text{ROC} = \frac{\text{after-tax interest} + \text{net income}}{\text{total capital}} = \frac{9,317}{26,682} = 34.9\%.$$

- Sometimes it is helpful to re-express EVA as follows:

$$\begin{aligned}\text{EVA} &= (\text{return on capital} - \text{cost of capital}) \times \text{total capital} \\ &= (0.349 - 0.082) \times 26,682 = \$7,129 \text{ million}.\end{aligned}$$

- If ROC is higher than WACC, EVA is positive.
- Home Depot's ROC net of WACC is around 27%. So we can say that the company earned nearly 27% more than shareholders demanded.

EVA and ROC for different companies

	1. After - Tax Interest + Net Income	2. Cost of Capital (WACC, %)	3. Total Long-Term Capital	4. EVA = 1 − (2 × 3)	5. Return on Capital (ROC, %) (1 ÷ 3)
Apple	$52,051	7.1	$203,569	$37,638	25.6
Microsoft	20,626	7.1	61,619	16,269	33.5
Johnson & Johnson	17,599	5.7	112,367	11,160	15.7
Walmart	14,891	2.8	206,206	9,076	7.2
Coca-Cola	8,713	5.8	44,678	6,144	19.5
CBS	1,863	6.1	55,820	−1,559	3.3
Freeport-McMoran	1,710	7.1	52,991	−2,068	3.2
Bank of America	18,370	6.7	310,587	−2,439	5.9
AIG	457	6.4	90,107	−5,300	0.5
Conoco	−1,494	6.7	102,820	−8,373	−1.5

TABLE 28.4 Accounting measures of company performance, September 2017 (dollar values in millions). Companies are ranked by economic value added (EVA).

Note: EVAs do not compute exactly because of rounding in column 2.

Source: EVA Dimensions.

Accounting rates of return

- Return on equity: the income to shareholders per dollar invested.

$$\text{ROE} = \frac{\text{net income}}{\text{equity}} = \frac{8,630}{4,333} = 199.2\%.$$

- However, ROE may be sensitive to repurchase: It can be increased easily if the firm repurchase its shares by leverage.
- Return on assets: the income available to debt and equity investors per dollar of the firm's total assets.

$$\text{ROA} = \frac{\text{after-tax interest} + \text{net income}}{\text{total assets}} = \frac{9,317}{42,966} = 21.7\%.$$

Problems with EVA and accounting rates of return

1. All these measures are based on book (balance sheet) values for assets.
   - We ignored the fact that Home Depot has invested large sums in marketing to establish its brand name.
2. It is impossible to include the value of all assets or to judge how rapidly they depreciate.
   - Microsoft's investment over the years in Windows and other software is not shown on the balance sheet and cannot be measured exactly.
3. The balance sheet does not show the current market values of the firm's assets.
   - Older assets may be grossly undervalued in today's market conditions and prices.

Financial ratios and efficiency

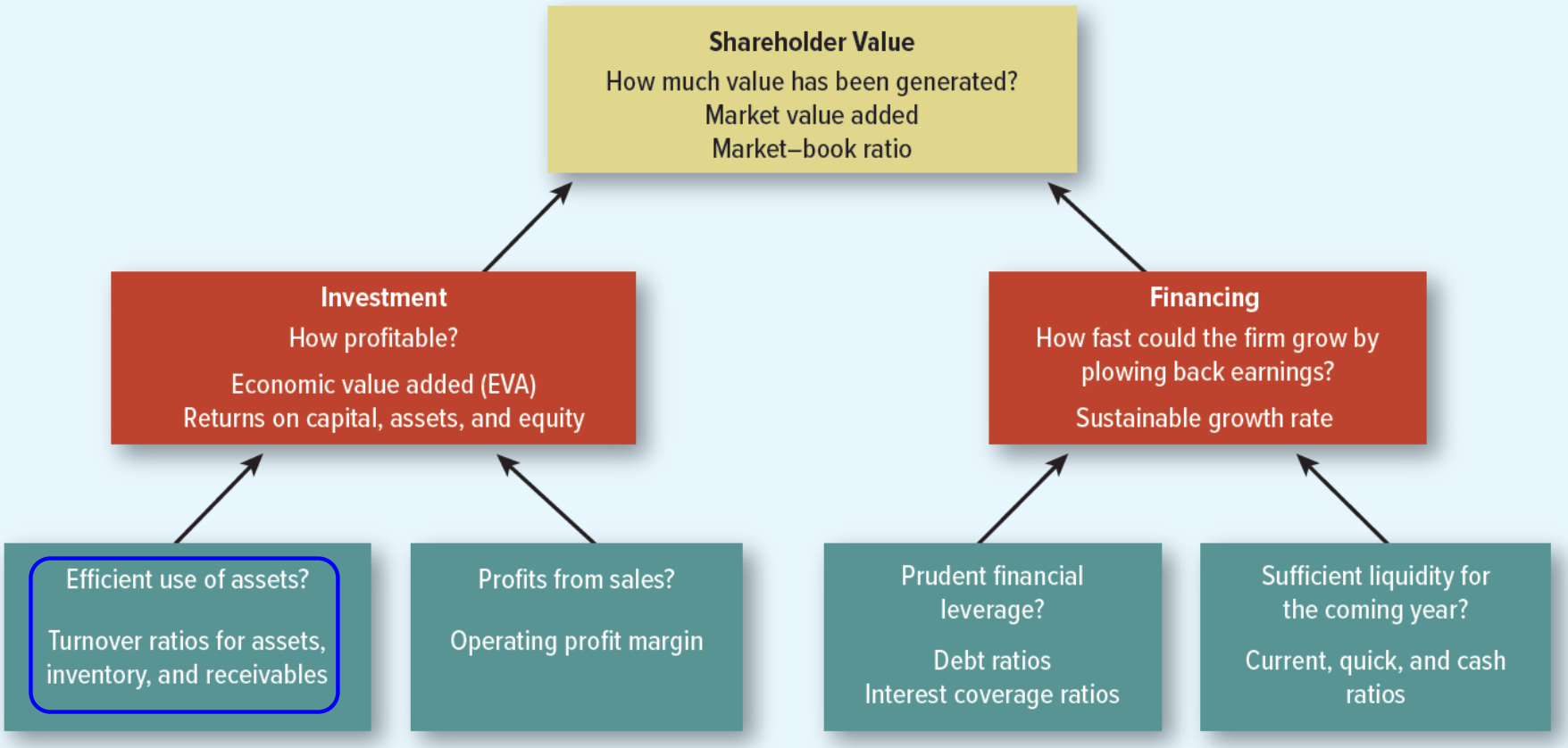


FIGURE 28.1 An organization chart for financial ratios, showing how common financial ratios and other measures relate to shareholder value.

Measuring efficiency

- Asset turnover ratio: how much sales volume is generated by each dollar of total assets. Also called sales-to-assets ratio.

$$\begin{aligned}\text{Asset turnover} &= \frac{\text{sales}}{\text{total assets at start of year}} \\ &= \frac{100,978}{42,966} = 2.35.\end{aligned}$$

- It measures how "hard" the firm's assets are working.
- Sometimes we use the "average" of the firm's assets at the start and end of the year.

$$\begin{aligned}\text{Asset turnover} &= \frac{\text{sales}}{\text{average total assets}} \\ &= \frac{100,978}{(44,529 + 42,966)/2} = 2.31.\end{aligned}$$

Measuring efficiency

- Inventory turnover: how many times inventory has been sold during a period. The efficiency of inventory management.

$$\begin{aligned}\text{Inventory turnover} &= \frac{\text{cost of goods sold}}{\text{inventory at start of year}} \\ &= \frac{66,548}{12,549} = 5.3.\end{aligned}$$

- Inventory period: how many days of output are represented by inventories.

$$\begin{aligned}\text{Inventory period} &= \frac{\text{inventory at start of year}}{\text{daily cost of goods sold}} \\ &= \frac{12,549}{66,548/365} = 69 \text{ days}.\end{aligned}$$

Measuring efficiency

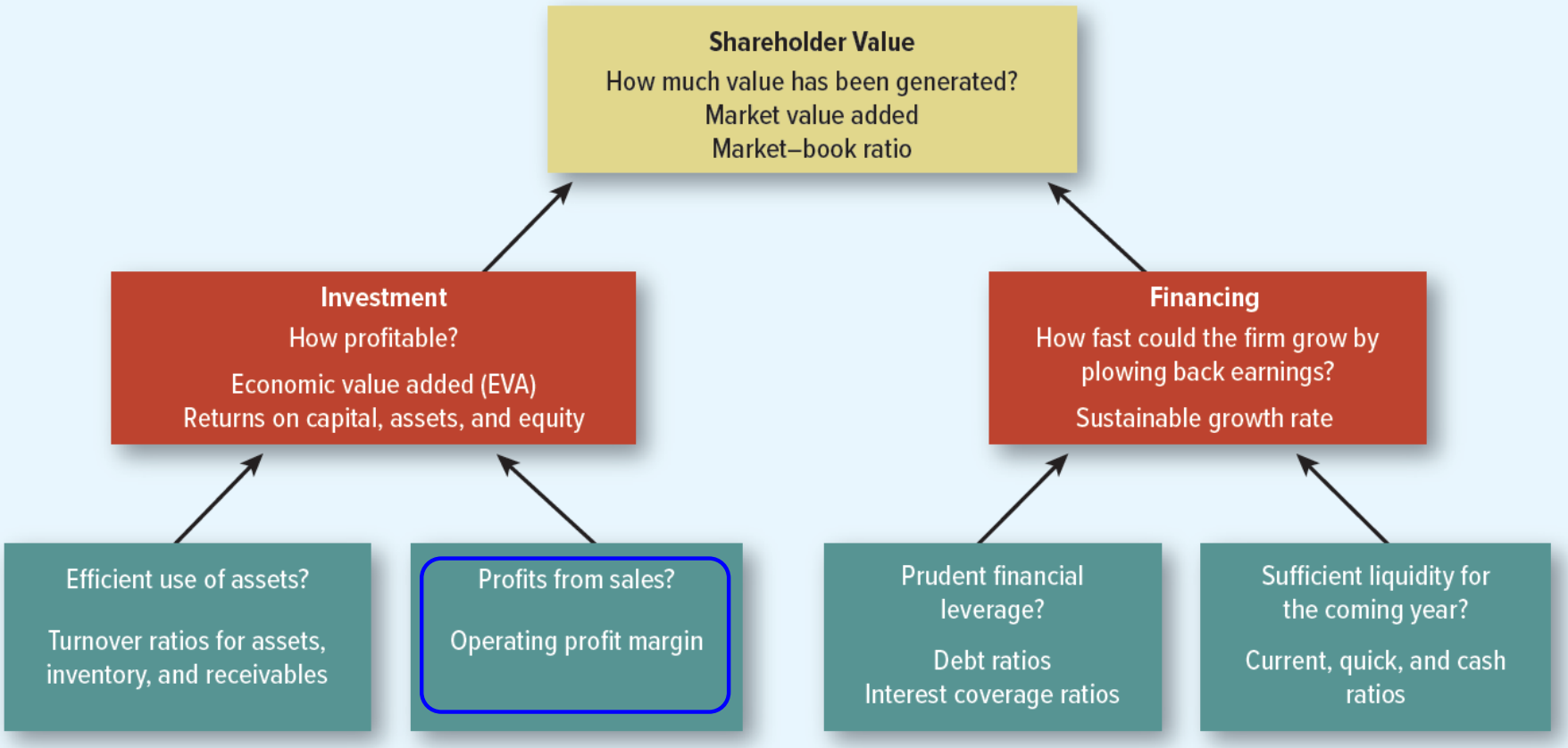
- Receivables turnover: how fast consumers are in paying their bills. The efficiency of credit management.

$$\begin{aligned}\text{Receivables turnover} &= \frac{\text{sales}}{\text{receivables at start of year}} \\ &= \frac{100,978}{2,029} = 49.8.\end{aligned}$$

- Accounts receivable period: the average length of time for customers to pay their bills.

$$\begin{aligned}\text{Accounts receivable period} &= \frac{\text{receivables at start of year}}{\text{average daily sales}} \\ &= \frac{2,029}{100,978/365} = 7.3 \text{ days.}\end{aligned}$$

Financial ratios and profits



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Analyzing the return on assets

- Profit margin: the proportion of sales that finds its way into profits.

$$\text{Profit margin} = \frac{\text{net income}}{\text{sales}} = \frac{8,630}{100,978} = 8.55\%.$$

- However, profit margin may (misleadingly) punish firms that employ debt finance and pay out interest.
- Operating profit margin:

$$\begin{aligned}\text{Operating profit margin} &= \frac{\text{after-tax interest} + \text{net income}}{\text{sales}} \\ &= \frac{9,317}{100,978} = 9.23\%.\end{aligned}$$

The Du Pont system

- We calculated earlier that Home Depot has earned a return of 21.7% on its assets (ROA). Now we decompose it into two sources:
  - the sales that the company generates from its assets (asset turnover);
  - the profit that it earns on each dollar of sales (operating profit margin).
- This is the so-called Du Pont formula:

$$\text{Return on assets} = \frac{\text{after-tax interest} + \text{net income}}{\text{assets}} = \frac{\text{sales}}{\text{assets}} \times \frac{\text{after-tax interest} + \text{net income}}{\text{sales}}$$

$$\uparrow \qquad\qquad \uparrow$$

$$\text{asset turnover} \qquad \text{operating profit margin}$$

The Du Pont system

- In Home Depot's case, the formula gives the following breakdown of ROA:

$$\begin{aligned}\text{ROA} &= \text{asset turnover} \times \text{operating profit margin} \\ &= 2.35 \times 9.23\% = 21.7\%.\end{aligned}$$

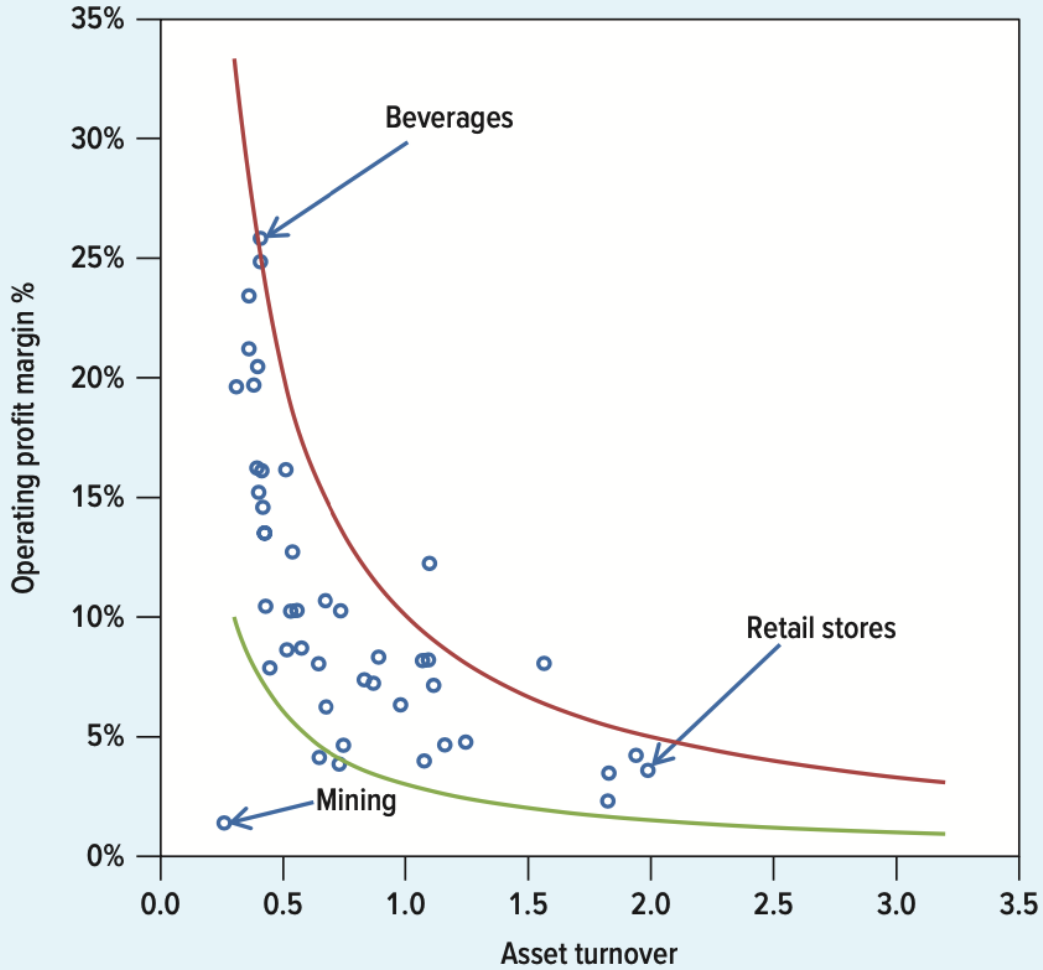
- All firms would like to earn a higher return on their assets, but their ability to do so is limited by competition.
  - Fast-food chains, which have high asset turnover, tend to operate on low margins.
  - Classy hotels have relatively low turnover ratios but tend to compensate with higher margins.

The Du Pont system

FIGURE 28.2

Asset turnover and operating profit margin for 45 U.S. industries in the year ending September 2017. High asset turnover tends to be associated with low profit margins.

Source: U.S. Census Bureau, *Quarterly Financial Report Manufacturing, Mining, Trade, and Selected Service Industries*, Third Quarter 2017.



The Du Pont system

- Firms often seek to improve their profit margins by acquiring a supplier. The idea is to capture the supplier's profit as well as their own.
- Unfortunately, unless they have some special skill in running the new business, any gain in profit margin is offset by a decline in asset turnover.

	Sales	Profits	Assets	Asset Turnover	Profit Margin	ROA
Admiral Motors	$20	$4	$40	0.50	20%	10%
Diana Corporation	8	2	20	0.40	25	10
Diana Motors (the merged firm)	20	6	60	0.33	30	10

TABLE 28.5 Merging with suppliers or customers generally increases the profit margin, but this increase is offset by a reduction in asset turnover

Financial ratios and leverage

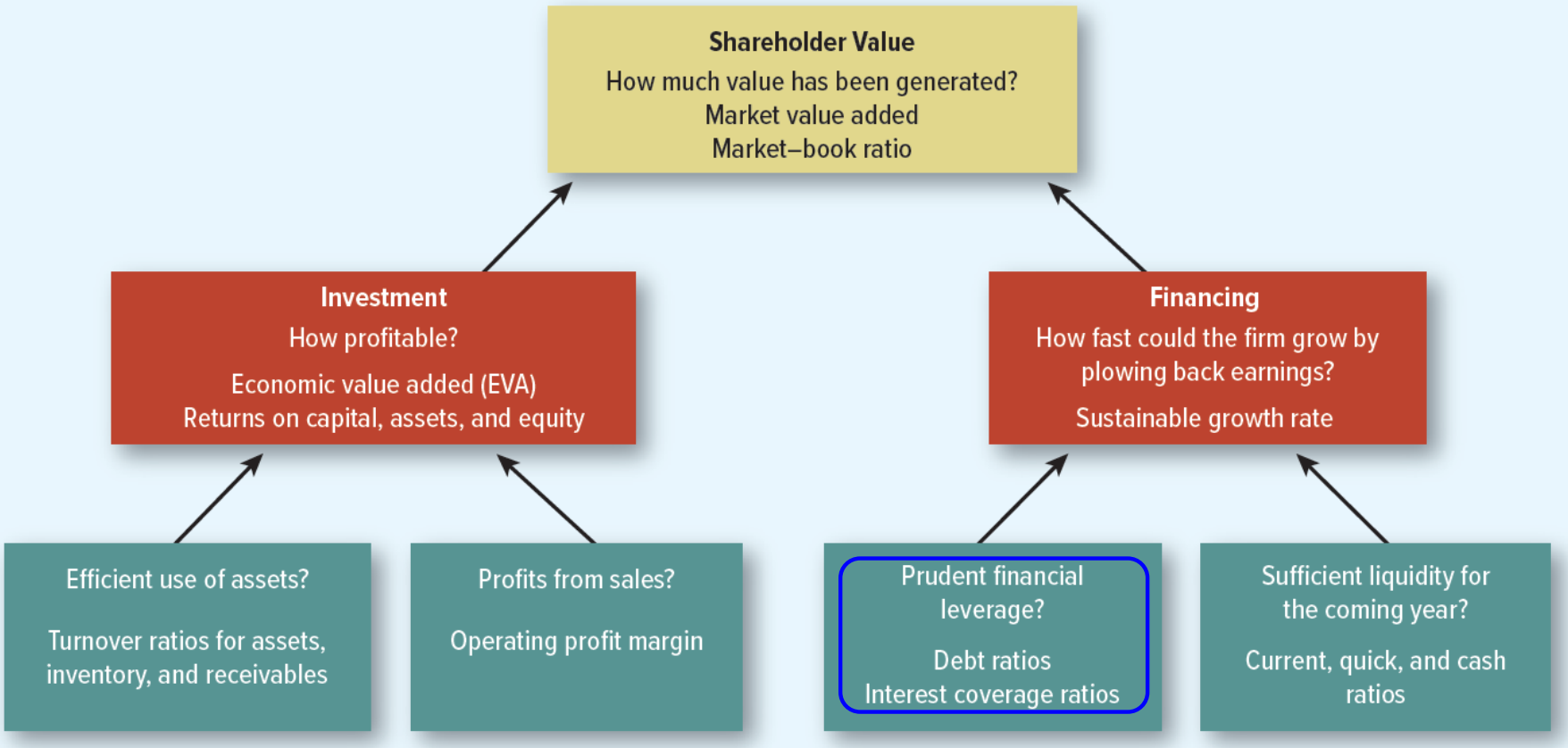


FIGURE 28.1 An organization chart for financial ratios, showing how common financial ratios and other measures relate to shareholder value.

Measuring leverage

- Long-term debt ratio: how many long-term capital takes the form of debt.

$$\begin{aligned}\text{Long-term debt ratio} &= \frac{\text{long-term debt}}{\text{long-term debt} + \text{equity}} \\ &= \frac{24,267}{24,267 + 1,454} = 94\%.\end{aligned}$$

- Long-term debt–equity ratio:

$$\begin{aligned}\text{Long-term debt-equity ratio} &= \frac{\text{long-term debt}}{\text{equity}} \\ &= \frac{24,267}{1,454} = 16.69.\end{aligned}$$

- Some companies deliberately operate at very high debt levels. For example, firms that are acquired in a leveraged buyout (LBO) usually issue large amounts of debt.

Measuring leverage

- If the company is a regular short-term borrower, we may use total debt ratio:

$$\text{Total debt ratio} = \frac{\text{total liabilities}}{\text{total assets}} = \frac{43,075}{44,529} = 97\%.$$

- Similarly, we can define total debt-equity ratio:

$$\text{Total debt-equity ratio} = \frac{\text{total liabilities}}{\text{equity}} = \frac{43,075}{1,454} = 29.6.$$

Measuring leverage

- Times-interest-earned ratio: the extent to which interest obligations are covered by earnings. Also called interest coverage.

$$\begin{aligned}\text{Interest coverage} &= \frac{\text{EBIT}}{\text{interest payments}} \\ &= \frac{14,755}{1,057} = 14.0.\end{aligned}$$

- Sometimes we add back depreciation to EBIT to calculate operating cash flow, and then get a cash coverage ratio:

$$\begin{aligned}\text{Cash coverage} &= \frac{\text{EBIT} + \text{depreciation}}{\text{interest payments}} \\ &= \frac{14,755 + 1,811}{1,057} = 15.7.\end{aligned}$$

Leverage and the return on equity

- When the firm raises cash by borrowing,
  - it must make interest payments to its lenders, which reduces net profits;
  - it has fewer equity holders to share the remaining profits.
- Which effect dominates? An extended version of the Du Pont formula helps us answer this question:

$$\begin{aligned}\text{ROE} &= \frac{\text{net income}}{\text{equity}} \\ &= \underbrace{\frac{\text{assets}}{\text{equity}}}_{\substack{\uparrow \\ \text{leverage} \\ \text{ratio}}} \times \underbrace{\frac{\text{sales}}{\text{assets}}}_{\substack{\uparrow \\ \text{asset} \\ \text{turnover}}} \times \underbrace{\frac{\text{after-tax interest} + \text{net income}}{\text{sales}}}_{\substack{\uparrow \\ \text{operating} \\ \text{profit margin}}} \times \underbrace{\frac{\text{net income}}{\text{after-tax interest} + \text{net income}}}_{\substack{\uparrow \\ \text{“debt burden”}}}\end{aligned}$$

- The product of the 2nd and the 3rd term is ROA, which is unaffected by the firm's financing mix.
- The 1st and 4th terms do depend on leverage, whose effect on ROE is ambiguous.

Financial ratios and liquidity

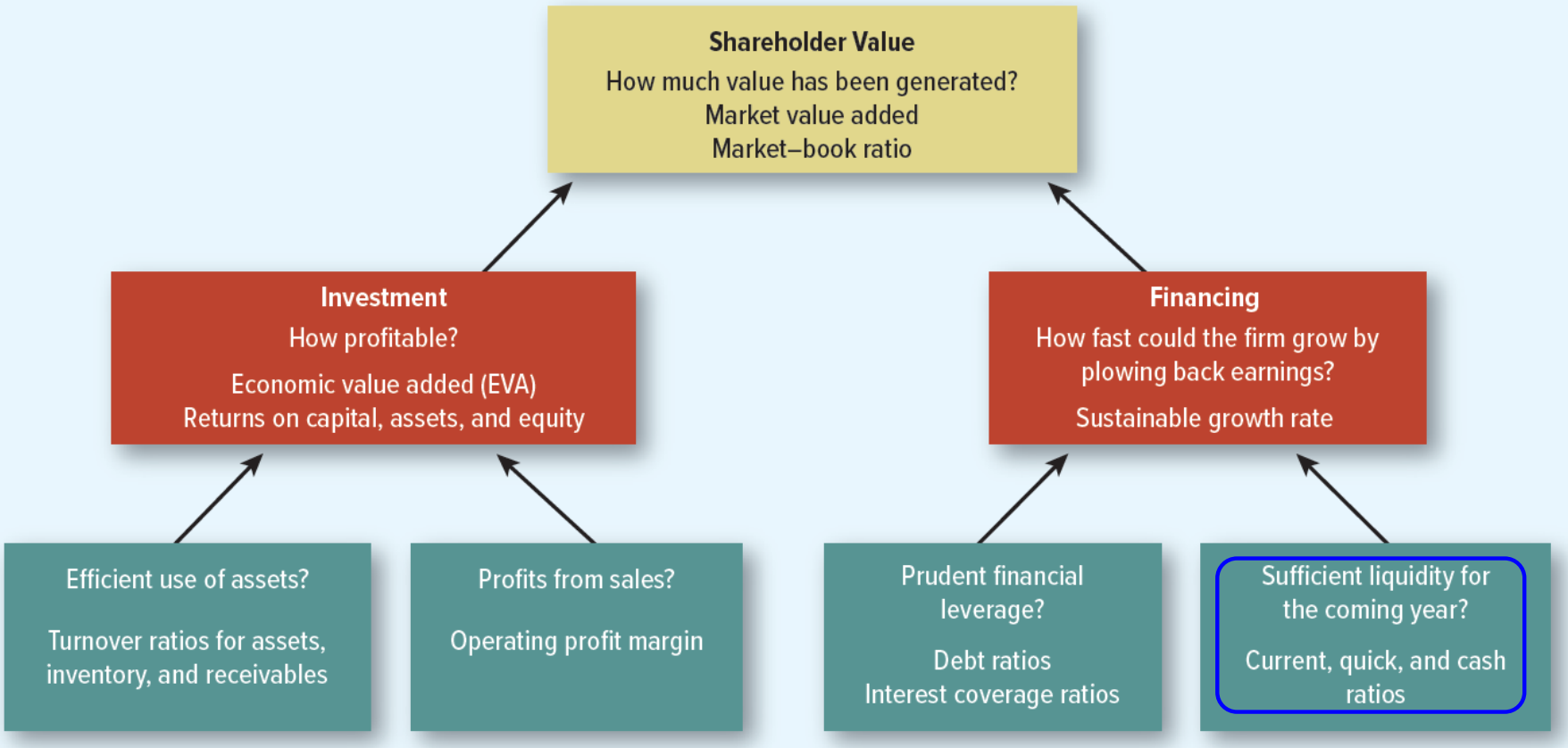


FIGURE 28.1 An organization chart for financial ratios, showing how common financial ratios and other measures relate to shareholder value.

Measuring liquidity

- Current assets include cash, marketable securities, inventories, and accounts receivable. They are mostly liquid.
- The difference between current assets and current liabilities is known as net working capital:

$$\text{Net working capital} = 18,933 - 16,194 = \$2,739 \text{ million}.$$

- Net-working-capital-to-total-assets ratio: how many assets are "working".

$$\frac{\text{Net working capital}}{\text{total assets}} = \frac{2,739}{44,529} = 6.2\%.$$

Measuring liquidity

- Current ratio: the ratio of current assets to current liabilities.

$$\text{Current ratio} = \frac{\text{current assets}}{\text{current liabilities}} = \frac{18,933}{16,194} = 1.17.$$

- Quick (acid-test) ratio: some less liquid components are excluded from current assets, such as inventories.

$$\begin{aligned}\text{Quick ratio} &= \frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{current liabilities}} \\ &= \frac{3,595 + 1,952}{16,194} = 0.343.\end{aligned}$$

- Cash ratio: A company's most liquid assets are its holdings of cash and marketable securities.

$$\text{Cash ratio} = \frac{\text{cash} + \text{marketable securities}}{\text{current liabilities}} = \frac{3,595}{16,194} = 0.222.$$

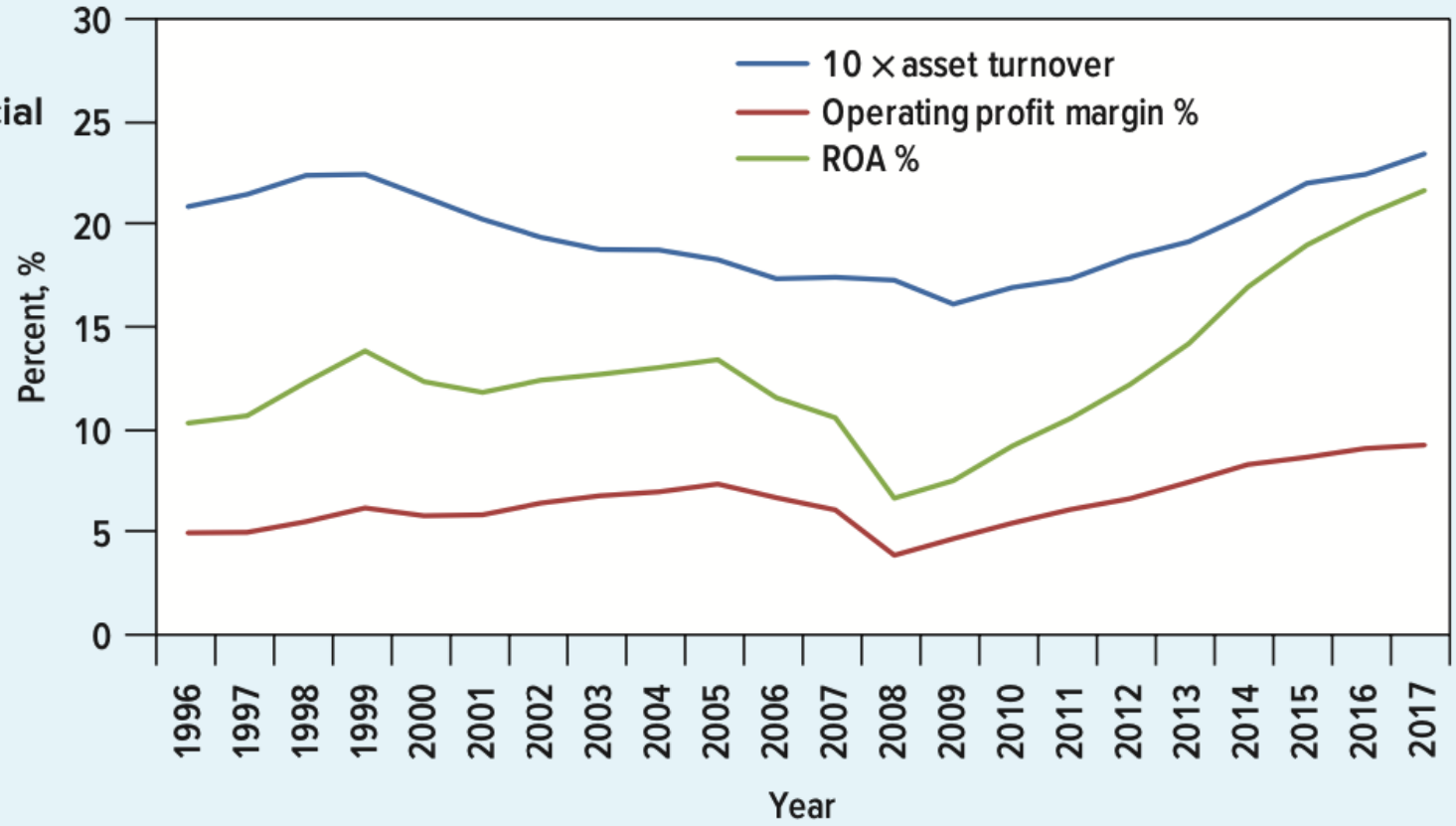
Measuring liquidity

- Changes in the current ratio can be misleading.
  - For example, suppose that a company borrows a large sum from the bank and invests it in marketable securities.
  - Current liabilities rise and so do current assets. Net working capital is unaffected but the current ratio changes.
  - For this reason, it is sometimes preferable to net short-term investments against short-term debt when calculating the current ratio.
- Cash ratio may ignore the firm's "reserve borrowing power". That is, the firm's ability to borrow on short notice.

Interpreting financial ratios

FIGURE 28.3

Home Depot's financial ratios, 1996–2017.



Interpreting financial ratios

- 1999-2007: A steady decline in Home Depot's ability to generate sales from its assets, though for a while this effect was largely offset by a rise in the profit margin.
- 2008: A sharp decline in the profit margin, and ROA fell dramatically.
- 2009-2017: In each of the following years, the company was able to increase both the rate of asset turnover and the profit margin.

Interpreting financial ratios

		Fiscal 2017	
		Home Depot	Lowe's Companies
Performance Measures:			
Market value added ($ millions)	Market value of equity – book value of equity	$238,302	$80,467
Market-to-book ratio	Market value of equity/book value of equity	164.9	13.5
EVA ($ millions)	(After-tax interest + net income) – (cost of capital × capital)	$6,366	$2,150
Return on capital (ROC, %)	(After-tax interest + net income)/total capital	34.9	18.5
Return on equity (ROE, %)	Net income/equity	199.2	53.6
Return on assets (ROA, %)	(After-tax interest + net income)/total assets	21.7	11.2
Efficiency Measures:			
Asset turnover	Sales/total assets at start of year	2.35	1.99
Inventory turnover	Cost of goods sold/inventory at start of year	5.3	4.3
Days in inventory	Inventory at start of year/daily cost of goods sold	68.8	84.4
Receivables turnover[a]	Sales/receivables at start of year	49.8	n.a.
Average collection period (days)[a]	Receivables at start of year/daily sales	7.3	n.a.
Profit margin (%)	Net income/sales	8.55	5.03
Operating profit margin (%)	(After-tax interest + net income)/sales	9.23	5.63
Leverage Measures:			
Long-term debt ratio	Long-term debt/(long-term debt + equity)	0.94	0.73
Total debt ratio	Total liabilities/total assets	0.97	0.83
Times-interest-earned	EBIT/interest payments	14.0	9.7
Cash coverage ratio	(EBIT + depreciation)/interest payments	15.7	12.0
Liquidity Measures:			
Net-working-capital-to-total-assets ratio	Net working capital/total assets	0.06	0.02
Current ratio	Current assets/current liabilities	1.17	1.06
Quick ratio	(Cash + marketable securities + receivables)/current liabilities	0.34	0.05
Cash ratio	(Cash + marketable securities)/current liabilities	0.22	0.05

TABLE 28.6 Selected financial ratios for Home Depot and Lowe's, 2017

[a]Lowe's sells most of its receivables to a third party.

Interpreting financial ratios

- Compared to Lowe's Companies, Home Depot has:
  - higher asset turnover ratio and operating profit margin, which produce a higher return on assets;
  - higher book debt ratios but higher interest cover thanks to its greater profitability;
  - more liquid assets.
- Always remember that all financial ratios must be interpreted in the context of industry norms.

Interpreting financial ratios

	Market-to-Book Ratio	Return on Equity (%)	Asset Turnover	Inventory Turnover	Receivables Turnover	Profit Margin (%)	Long-Term Debt Ratio	Total Debt Ratio	Times-Interest - Earned	Current Ratio	Quick Ratio	Cash Ratio
Autos	2.19	14.1	1.26	6.97	6.45	3.8	.29	.46	5.99	2.05	1.38	.39
Beer and liquor	3.55	12.2	0.82	3.99	9.07	9.5	.22	.42	6.52	2.31	.98	.19
Business equipment	2.09	3.2	0.82	4.14	6.14	2.3	.09	.24	5.72	2.80	2.13	1.18
Chemicals	2.04	9.1	0.80	4.48	6.28	5.2	.43	.53	5.23	2.36	1.48	.59
Clothing	2.19	15.1	1,37	3.10	8.99	5.9	.17	.29	20.60	2.73	1.77	.61
Construction	1.70	7.7	1.06	5.83	7.01	3.2	.35	.44	3.80	2.12	1.49	.32
Electrical equipment	1.82	3.7	0.88	3.79	5.85	2.3	.14	.31	5.32	2.64	1.67	.70
Food	2.77	10.0	0.98	5.84	11.41	6.3	.38	.47	7.89	1.97	1.12	.29
Oil	0.84	−15.8	0.26	18.85	5.72	−35.1	.36	.47	−3.12	1.32	1.15	.37
Paper	2.65	14.7	1.04	5.81	8.07	4.4	.48	.60	7.32	1.58	1.07	.21
Retail	1.99	11.4	1.96	4.64	52.34	2.3	.28	.49	8.54	1.64	.69	.31
Steel	1.17	1.2	1.04	5.35	7.08	−0.6	.34	.43	3.13	2.93	1.47	.33
Telecom	1.84	3.4	0.47	16.76	7.12	3.4	.55	.58	1.92	1.71	1.55	.58
Utilities	1.17	6.2	0.28	11.91	9.22	8.6	.49	.54	3.46	.86	.71	.07

TABLE 28.7 Median financial ratios for publicly traded North American companies, December 2015

Source: WRDS Financial Ratios Suite.

Summary

- Measuring performance: market capitalization, MVA, market-to-book ratio.
- Measuring profitability: EVA, ROC, ROE, ROA.
- Measuring efficiency: asset/inventory/receivables turnover, (operating) profit margin, Du Pont formula.

Summary

- Measuring leverage: long-term/total debt/debt-to-equity ratio, interest/cash coverage.
- The extended Du Pont formula.
- Measuring liquidity: net working capital, net-working-capital-to-total-assets ratio, current/quick/cash ratio.
- Interpreting financial ratios: dynamic, cross-competitor, within-industry comparison.