Advanced Accounting
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Lesson 6
Profitability analysis

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Profitability Analysis

- Profitability Analysis provides an insight to the degree of success in creating wealth for the investors.
- Profitability ratios usually express the profit made (net profit or gross profit) or other performance measure (e.g. sales revenue) in relation to other key figures in the financial statement (or to some business resources).
- Profitability Analysis demands a ‘joint analysis’ where we assess the relation between income or profit and invested capital or other resources.

Main profitability ratios

- **ROE (Return on Equity)**

$$\frac{\text{Net profit}}{\text{Owners' equity}}$$

- **ROI (Return on Investments)**

$$\frac{\text{EBIT}}{\text{Operating assets}}$$

- **ROS (Return on Sales)**

$$\frac{\text{EBIT}}{\text{Revenues from sales}}$$

- **Interest cover ratio**

$$\frac{\text{EBIT}}{\text{Interest expense}}$$

Profitability ratios

- Ratios are not «set in stone».
- There is no a generally accepted method for calculating ratios.
- For example, ROI can be also calculated as:

1) Operating profit to operating assets, therefore excluding financial assets (shares, bonds and sometimes even cash…)
2) Operating profit to total assets (ROA);
3) Operating profit to capital employed (owners' equity + long-term liabilities), or ROCE (measuring the relationship between the operating result and the average long-term capital invested in the business during that period).
4) Sometimes, instead of operating income, net income is used.

Return on Investment

- Every profitability analysis should start from ROI (or ROIC – Return on Invested Capital).
- It relates income, or other performance measure, to a company's level and source of financing.
- Operating profitability is the most important goal, and it is linked with a series of business decisions regarding prices, investments, inventories, and accounts receivable.

Return on Investment

- There is no ‘right’ level of ROI, but, as a minimum, the investments should be more profitable than what it costs to finance them (average interest rate paid on debt).
- Riskier investments expected to yield a higher ROI.
- Any change in ROI can be investigated by calculating its components.
- Return on invested capital can be used in several areas of analysis including managerial effectiveness, level of profitability and planning and control.

Components of ROI

$$\frac{\text{Income}}{\text{Invested Capital}}$$

- No universal measure of invested capital
- Different measures of invested capital reflect user's different perspectives

Common alternative measures:

- Net Operating Assets
- Stockholders' Equity

Computed:

- using average capital available for the period;
- typically add beginning and ending invested capital amounts and divide by 2.

- *There is no complete agreement on the computation of either the numerator or denominator in the formula.*

Return on Net Operating Assets (RNOA)

$$\frac{\text{Net Operating Profit After Taxes}}{\text{Average Net Operating Assets}}$$

- Segregating the balance sheet and the income statements into operating and non-operating components, the '**Return on Net Operating Assets (RNOA)**' can be computed.
- Perspective is: operating activities are the most long-lasting and relevant.

RNOA:

- measures operating efficiency/ performance;
- reflects return on net operating assets (excluding financial assets/liabilities).

Return on common equity (ROCE)

$$\frac{\text{Net income less preferred dividends}}{\text{Average common equity}}$$

- Perspective is that of common equity holders.
- Captures the returns on net operating assets and the effect of financial leverage*.
- Excludes all debt financing and preferred equity.

* *The use of debt versus equity in the capital structure.*

Return on Net Operating Assets (RNOA): Computations

Operating and nonoperating activities - Distinction

BALANCE SHEET

Operating assets	OA	Financial liabilities*	FL
Less operating liabilities	(OL)	Less financial assets	(FA)
		Net financial obligations	NFO
		Stockholders' equity†	SE
Net operating assets	NOA	Net financing	NFO + SE‡

**Includes preferred stock.*
†Excludes preferred stock.
‡NOA = NFO + SE.

Return on Net Operating Assets (RNOA): Computations

Operating and nonoperating activities - Distinction

INCOME STATEMENT

Operating revenues		OR
Operating expenses		(OE)
Operating tax expense		
Tax provision	(TAX)	
Tax shield on interest	(SHLD)	
Operating tax expense		(TE)
Operating income		OI
Net financial expense		
Interest expense*	(INTX)	
Interest revenue	INTR	
Tax shield on interest	SHLD	
Net financial expense		(NFE)
Net income		(NI)

*Includes dividends on preferred stock.

Return on Net Operating Assets (RNOA): Computations

EXCELL CORPORATION

Income Statements

For Years Ended December 31, Year 8 and Year 9

($ thousands)	Year 8	Year 9
Sales	$1,636,298	$1,782,254
Cost of goods sold and operating expenses	1,473,293	1,598,679
Operating profit	163,005	183,575
Interest expense	21,825	20,843
Pretax profit	141,180	162,732
Tax expense	52,237	58,584
Net income	$ 88,943	$ 104,148

Return on Net Operating Assets (RNOA): Computations

Balance Sheets
At December 31, Year 8 and Year 9

($ thousands)	Year 8	Year 9
Assets		
Cash	$ 115,397	$ 71,546
Marketable securities	38,008	43,854
Accounts receivable, net	177,538	182,859
Inventories	204,362	256,838
Total current assets	535,305	555,097
Investments in unconsolidated subsidiaries	33,728	62,390
Marketable securities	5,931	56,997
Property, plant, & equipment, net	1,539,221	1,633,458
Goodwill	6,550	6,550
Total long-term assets	1,585,430	1,759,395
Total assets	$2,120,735	$2,314,492

Return on Net Operating Assets (RNOA): Computations

Liabilities		
Notes payable	$ 7,850	$ 13,734
Accounts payable	138,662	155,482
Taxes payable	24,370	13,256
Current maturities of long-term debt	30,440	33,822
Total current liabilities	201,322	216,294
Long-term debt	507,329	473,507
Pension and OPEB liabilities	743,779	852,237
Total long-term liabilities	1,251,108	1,325,744
Equity		
Common stock	413,783	413,783
Additional paid-in capital	19,208	19,208
Retained earnings	436,752	540,901
Treasury stock	(201,438)	(201,438)
Total stockholders' equity	668,305	772,454
Total liabilities and equity	$2,120,735	$2,314,492

Analyzing Return on Net Operating Assets

Disaggregating RNOA

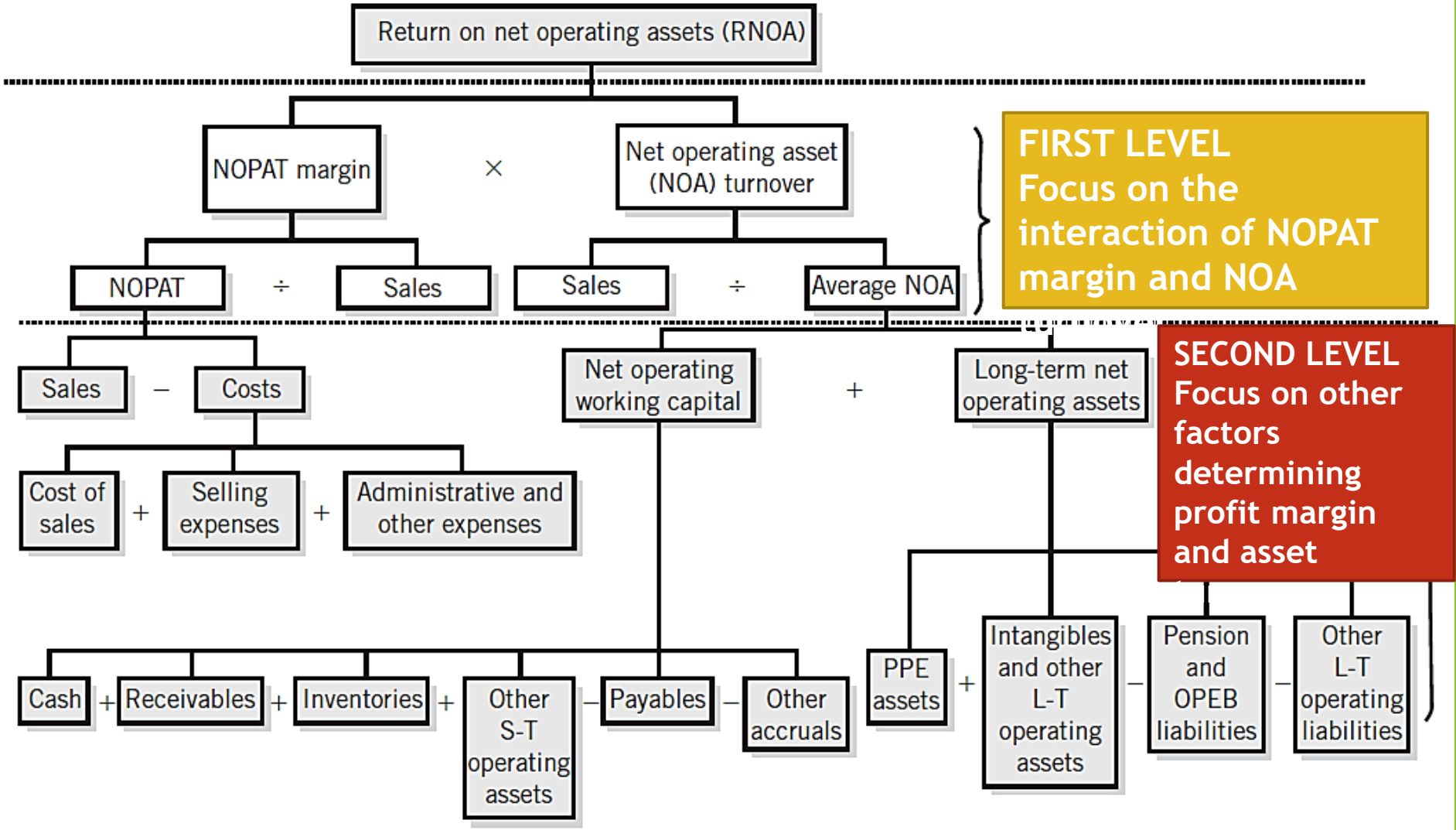
$$RNOA = \frac{\text{NOPAT}}{\text{Avg. NOA}} = \frac{\text{NOPAT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Avg. NOA}}$$

Net Operating Profit margin (or NOPAT margin)
It measures operating profitability relative to sales.

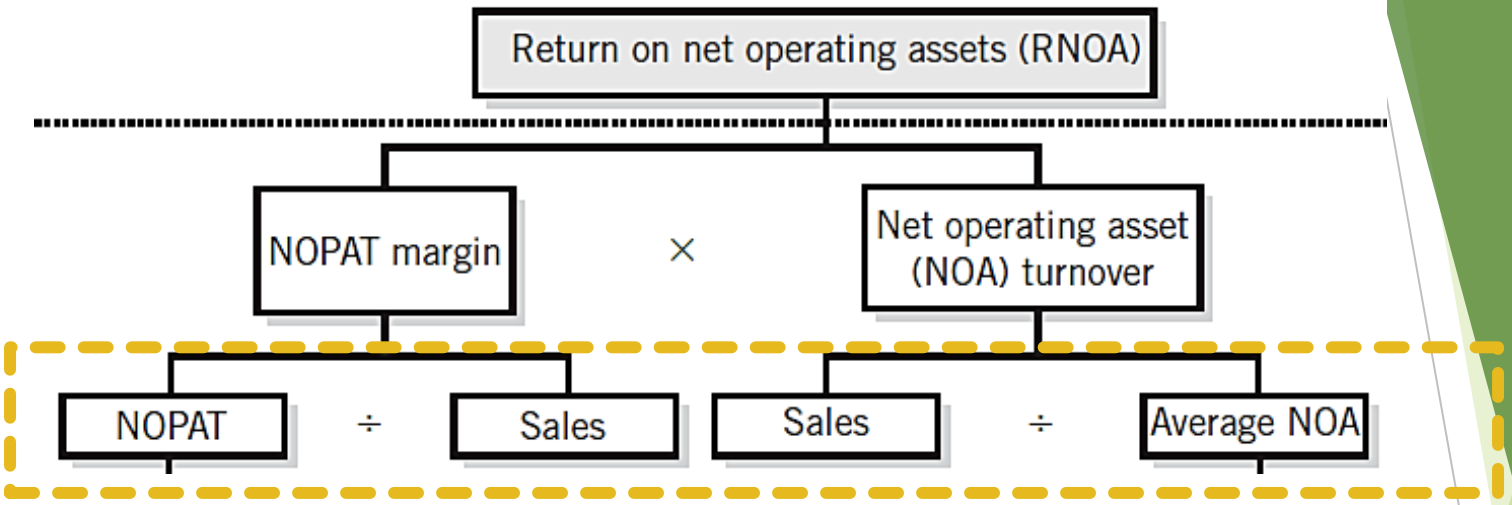
Net Operating Asset turnover (or NOA turnover)
It measures effectiveness in generating sales from operating assets.

Analyzing Return on Net Operating Assets

Disaggregating RNOA



Effect of Operating Leverage on RNOA



Alternative decomposition of RNOA:

$$\text{RNOA} = \frac{\text{NOPAT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average OA}} \times (1 + \text{OLLEV})$$

Where:
OLLEV = Average OL / Average NOA

Profit Margin and Asset Turnover

$$RNOA = \frac{\text{NOPAT}}{\text{Avg. NOA}} = \frac{\text{NOPAT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Avg. NOA}}$$

Analysis of Return on Net Operating Assets			
	Company X	Company Y	Company Z
Sales	5.000.000	10.000.000	10.000.000
NOPAT	500.000	500.000	100.000
NOA	5.000.000	5.000.000	1.000.000
NOPAT margin			
NOA turnover			
Return on net operating assets			

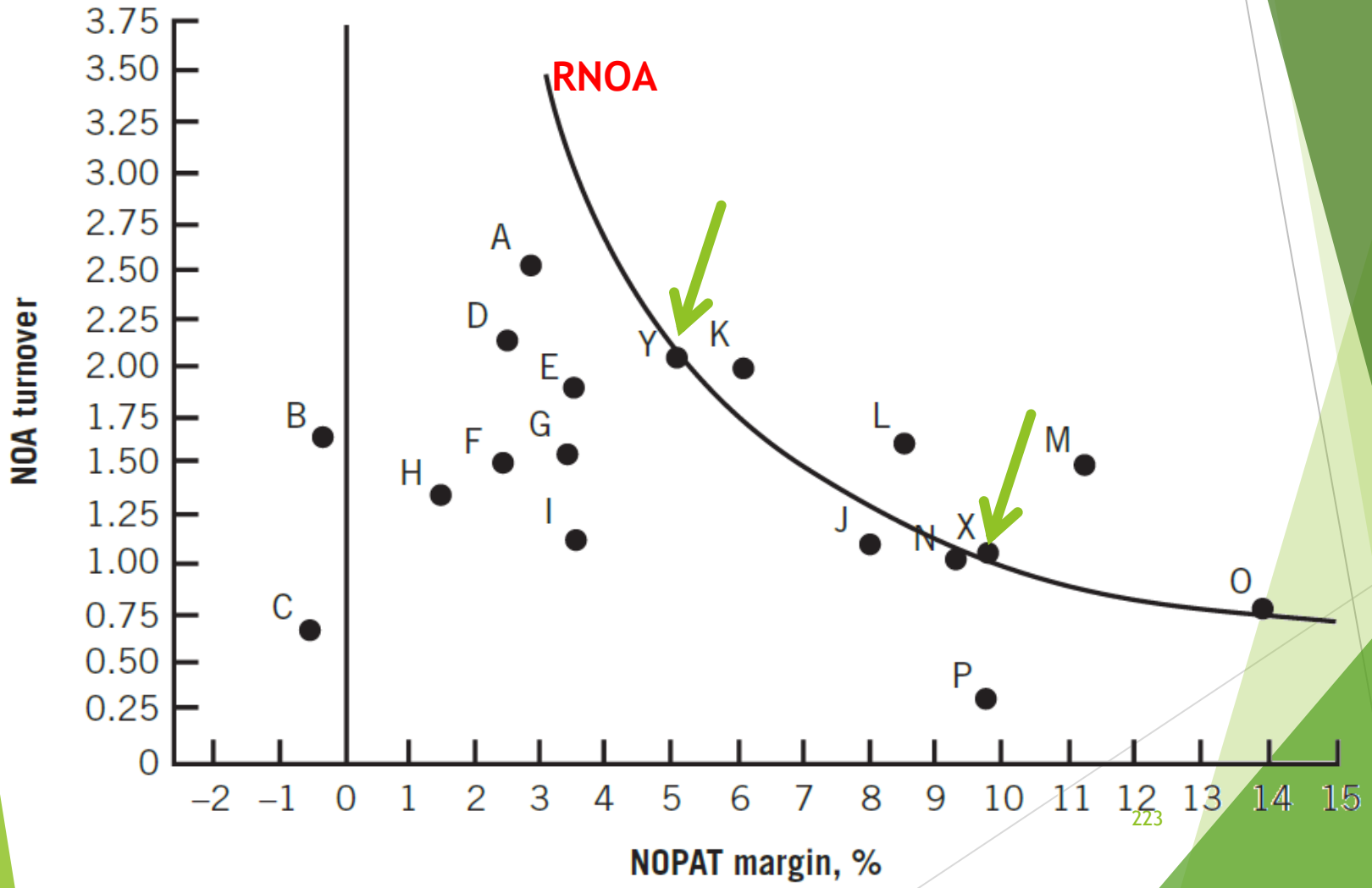
Profit Margin and Asset Turnover

$$RNOA = \frac{\text{NOPAT}}{\text{Avg. NOA}} = \frac{\text{NOPAT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Avg. NOA}}$$

- **Profit margin and asset turnover are interdependent**
  - Profit margin is a function of sales (selling price x units sold) and operating expenses
  - Turnover is also a function of sales (sales/assets)

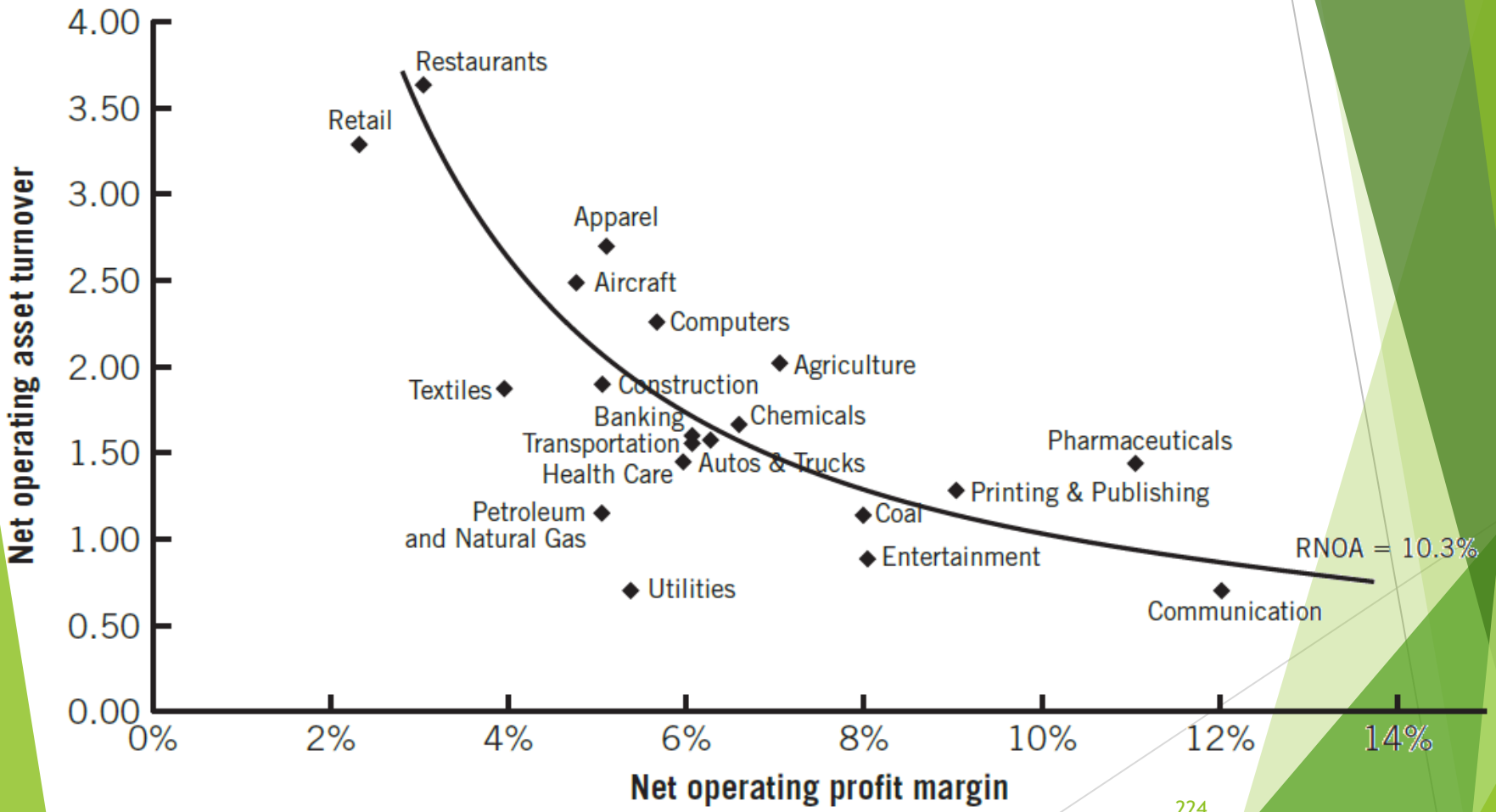
Profit Margin and Asset Turnover

Relation between NOPAT Margin, NOA Turnover, and RNOA



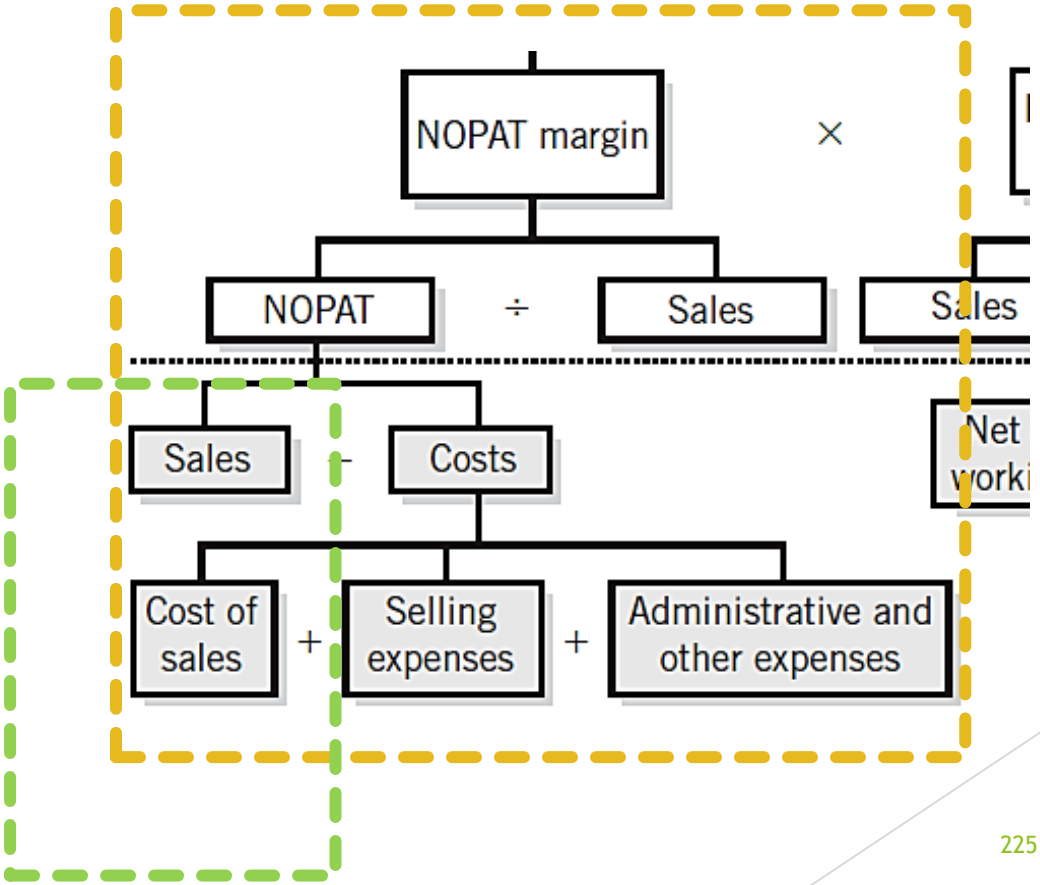
Profit Margin and Asset Turnover

Net operating Asset Turnover v/s Net operating Profit Margin for Selected Industries



Analyzing Return on Assets-ROA

Disaggregating Profit Margin



Analyzing Return on Assets-ROA

Disaggregating Profit Margin

$$\text{Operating profit margin (OPM)} = \frac{\text{NOPAT}}{\text{Sales}}$$

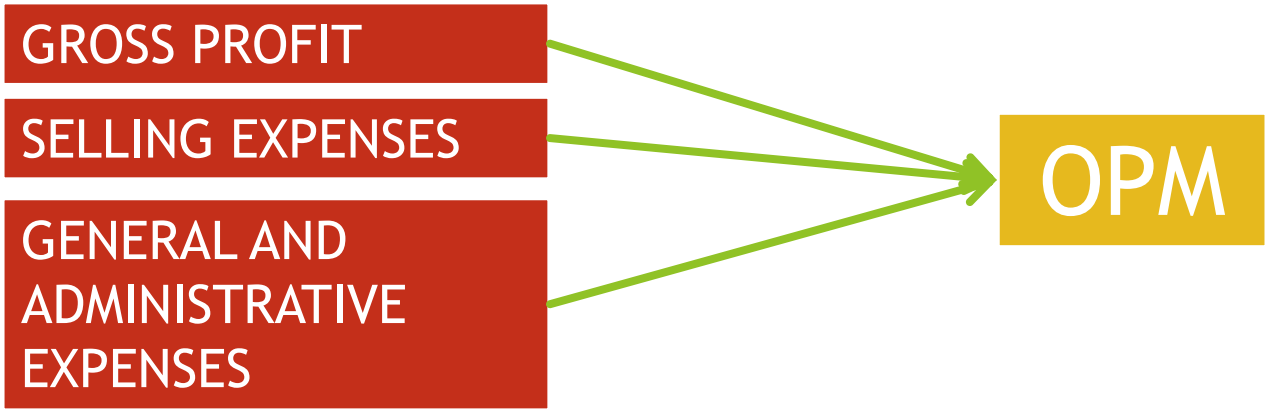
Pretax PM = Pretax sales PM + Pretax other PM

$$\text{Pretax sales PM} = \frac{\text{Gross margin}}{\text{Sales}} - \frac{\text{Selling expense}}{\text{Sales}} - \frac{\text{Administration expense}}{\text{Sales}} - \frac{\text{R\&D}}{\text{Sales}} - \cdots$$

$$\text{Pretax other PM} = \frac{\text{Equity income}}{\text{Sales}} \pm \frac{\text{Special items}}{\text{Sales}} \pm \cdots$$

Analyzing Return on Assets-ROA

Disaggregating Profit Margin



Analyzing Return on Assets-ROA

Disaggregating Profit Margin

GROSS PROFIT = Revenues – Cost of sales

GP % = Gross Profit / Sales

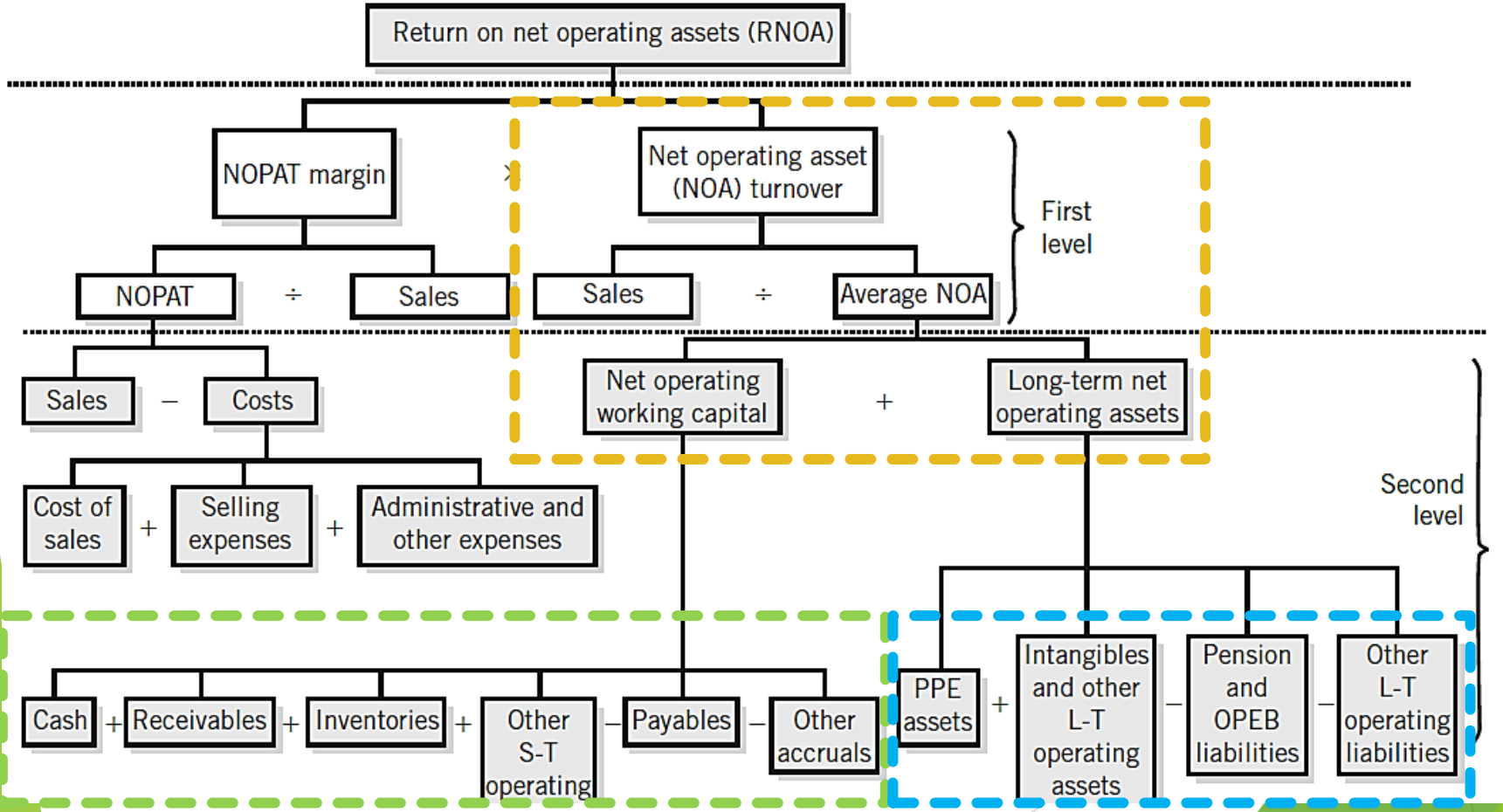
Key performance measure

- *Increase (decrease) in sales volume*
- *Increase (decrease) in unit selling price*
- *Increase (decrease) in cost per unit*

Strategy

Analyzing Return on Assets-ROA

Disaggregation of Asset Turnover



Analyzing Return on Assets-ROA

Disaggregation of Asset Turnover

$$\frac{\text{Sales}}{\text{Average net operating assets}}$$

- Asset turnover measures the intensity with which companies utilize assets.
- In general, turnover rates reflect the relative productivity of assets, that is, the level of sales volume that we derive from each dollar/euro invested in a particular asset.

Analyzing Return on Assets-ROA

Disaggregation of Asset Turnover

- **Accounts Receivable turnover:** Reflects how many times receivables are collected on average.

  Sales / Average accounts receivables

  - Accompanying ratio: Average collection period

    Accounts receivables / Average daily sales

    or Accounts receivables / Sales * 365

- **Inventories turnover:** Reflects how many times inventories are collected on average

  Cost of goods sold / Average inventory

  - Accompanying ratio: Average inventory days outstanding

    Inventory / Average daily cost of goods sold

    or Inventory / Cost of goods sold * 365

Analyzing Return on Assets-ROA

Disaggregation of Asset Turnover

- **Long-term Operating Asset turnover:** Reflects the productivity of long-term operating assets

- **Accounts Payable turnover:** Reflects how quickly accounts payable are paid, on average

  Cost of goods sold / Average accounts payable

  - Accompanying ratio: Average payable days outstanding

    Accounts payable / Average daily cost of goods sold

Analyzing Return on Assets-ROA

Disaggregation of Asset Turnover

Accounts receivable turnover = Sales/Average accounts receivable

Average collection period = Accounts receivable/Average daily sales

Inventory turnover = Cost of goods sold/Average inventory

Average inventory days outstanding = Inventory/Average daily cost of goods sold Long-term operating asset turnover = Sales/Average long-term operating assets

Accounts payable turnover = Cost of goods sold/Average accounts payable

Average payable days outstanding = Accounts payable/Average daily cost of goods sold

Net operating working capital turnover = Net sales/Average net operating working capital

Financial gearing

- ✓ Financial gearing occurs when a business is financed, at least in part, by contributions from outside parties.
- ✓ Where a business borrows, it takes on commitment to:
  - ✓ pay interest charges;
  - ✓ make capital repayments.
- ✓ The level of gearing is important to assess the financial risk of a business.
- ✓ A high proportion between debts and equity can increase the risk of the business becoming insolvent.

Financial gearing

- Why a business would want to take on gearing and take the risk?
  - The owners have insufficient funds.
  - The owners have funds but they don't want to invest them in the company.
  - Macroeconomic factors like:
    - Interest rates;
    - Fiscal regulations.
  - *Because of gearing can have the effect of increase the returns to owners (ROE). Only if the returns generated from borrowed funds exceed the cost of paying interest.*

Financial gearing ratios

- **Financial leverage (Gearing ratio)**

$$\frac{\text{Debt}}{\text{Equity}}$$

- **Equity to fixed (noncurrent) assets ratio**

$$\frac{\text{Owners' equity}}{\text{Noncurrent assets}}$$

- **Long-term claims to fixed assets**

$$\frac{\text{Equity+ long-term liab.}}{\text{Noncurrent assets}}$$

Financial gearing

	COMPANY ONE	COMPANY TWO
EQUITY	100.000	200.000
LONG TERM LOANS (Cost of debts 10%)	200.000	100.000
	300.000	300.000
YEAR 1	**COMPANY ONE**	**COMPANY TWO**
OPERATING PROFIT	**50.000**	**50.000**
INTEREST PAYABLE	20.000	10.000
PROFIT BEFORE TAXATION	**30.000**	**40.000**
Taxes (30%)	9.000	12.000
NET PROFIT (available to ordinary shareholders)	**21.000**	**28.000**

FINANCIAL LEVERAGE	**200%**	**50%**

RETURN ON INVESTMENTS	**16,67%**	**16,67%**
RETURN ON EQUITY	**21,00%**	**14,00%**

In the example: ROI = Operating Profit / Totale Assets; ROE = Net Profit / Equity

Financial gearing

- ✓ At the 50,000 level of operating profit, the shareholders of both ONE and TWO companies benefit from gearing.
- ✓ Were the two businesses totally reliant on equity financing, the profit (after taxes) of the year would be 35,000 (no interests) and ROE would be of 11,7% (35,000/300,000).
- ✓ Using the gearing leverage both businesses generate a higher return on equity than relying only on equity funds.

Financial gearing

- ✓ An effect of gearing is that returns to shareholders become more sensitive to changes in operating profits.
- ✓ For a highly geared business, a change in operating profits will lead to a proportionately greater change in the ROE ratio.

Financial gearing

YEAR ONE	COMPANY ONE	COMPANY TWO
OPERATING PROFIT (+20%)	**60.000**	**60.000**
INTEREST PAYABLE	20.000	10.000
PROFIT BEFORE TAXATION	**40.000**	**50.000**
Taxes (30%)	12.000	15.000
NET PROFIT (available to ordinary shareholders)	**28.000**	**35.000**

GEARING RATIO	**200%**	**50%**

RETURN ON INVESTMENTS	**20,00%**	**20,00%**
RETURN ON EQUITY	**28,00%**	**17,50%**

Financial gearing

YEAR ONE	COMPANY ONE	COMPANY TWO
GEARING RATIO	200%	50%

RETURN ON INVESTMENTS	16,67%	16,67%
RETURN ON EQUITY	21,00%	14,00%

RETURN ON INVESTMENTS	20,00%	20,00%
RETURN ON EQUITY	28,00%	17,50%

- ✓ The effect of gearing can of course, work in both directions.
- ✓ So, for a highly geared business, a small decline in operating profit will bring about a much greater decline in the returns to shareholders.

Financial leverage

Whenever the company is successful in enchasing its ROE through using borrowings, this process is known as “financial leverage”.

The reason that gearing tends to be beneficial to shareholders is that interest rates of borrowings are low by comparison with the returns that the typical business can earn.

ROD = interest rate = cost of debt = interest expenses / average value of debts

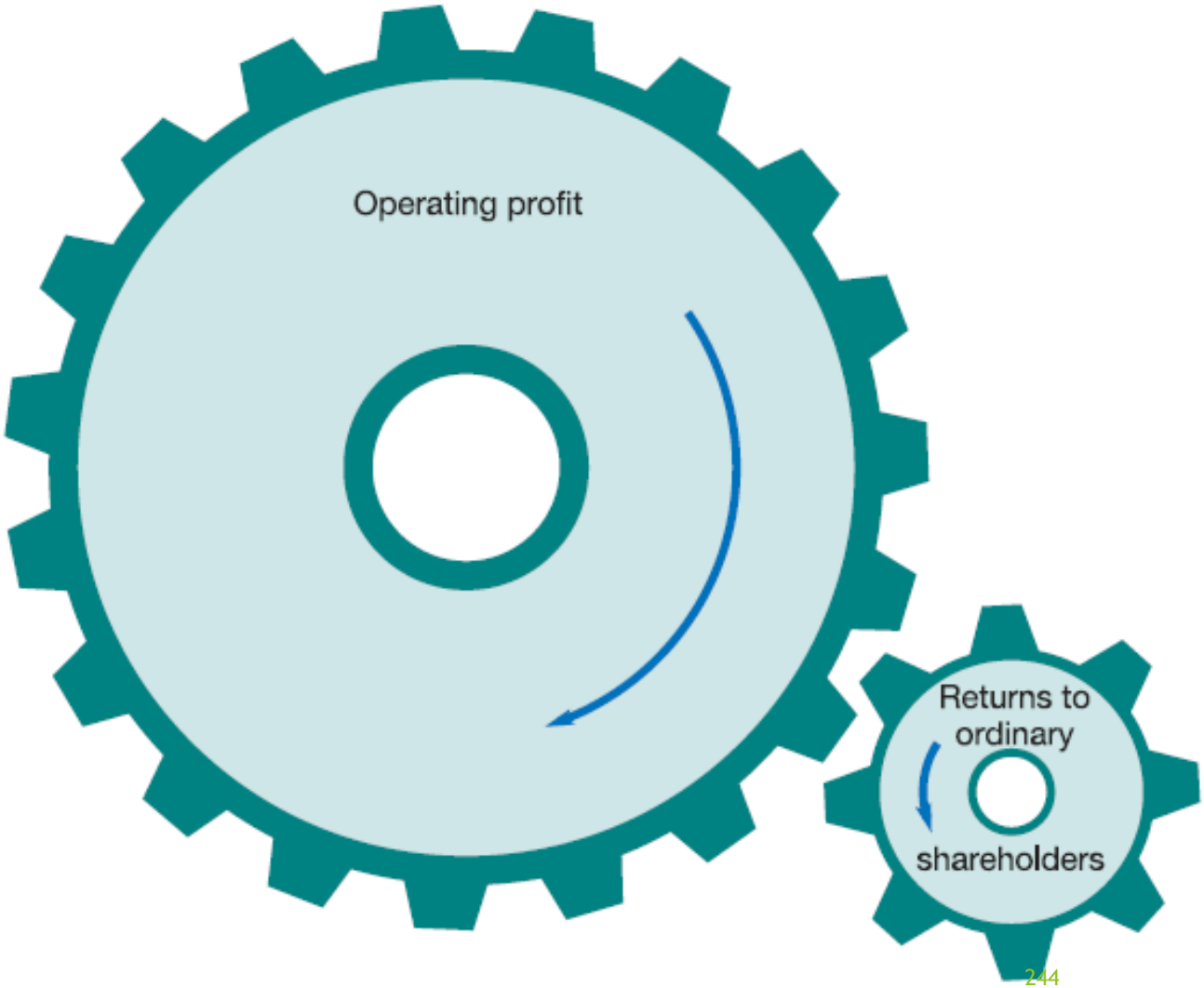
ROI > ROD → « positive financial leverage»
ROI < ROD → «negative financial leverage»

Financial leverage

- ✓ The effect of gearing is like that of two intermeshing cogwheels of unequal size.
- ✓ The movement in the larger cog (operating profit) causes a more than proportionate movement in the smaller cog (returns to ordinary shareholders).

- ✓ If ROI > ROD an increase of the gearing ratio will lead to higher ROE. The company borrowed money from bank and other third parties (e.g. bond-owners) and invested it at a higher rate, giving the shareholders an adjunctive return.

Financial leverage



Analyzing Return on Common Equity-ROCE

Disaggregating ROCE

$$ROCE = \frac{Net\ Income}{Equity} = RNOA + \frac{NFO}{Equity} * (RNOA - Interest\ Rate)$$

- ✓ Return on equity consists of both an operating component and a non-operating component.
- ✓ This formula states that return on equity increases using the leverage ratio (NFO/CE) when the spread between RNOA and cost of debts is positive.
- ✓ When the spread is negative, the financial leverage works in the opposite direction: a reduction of debts will produce a ROE increase.

Analyzing Return on Common Equity-ROCE

Disaggregating ROCE

$$ROCE = \frac{Net\ Income}{Equity} = RNOA + \frac{NFO}{Equity} * (RNOA - Interest\ Rate)$$

Degree of financial leverage

ROCE = RNOA + (LEV × Spread)

FINANCIAL LEVERAGE EFFECT

Term	Definition
LEV (financial leverage)	Average NFO/Average equity
NFO (net financial obligations)	Interest-bearing liabilities less marketable securities and other nonoperating assets (or NOA — Equity)
Spread	RNOA–NFR
NFR(net financial rate)	NFE/Average NFO
NFE (net financial expense)	Interest expense less investment returns from nonoperating assets

Analyzing Return on Common Equity-ROCE

The financial leverage effect

- ✓ Financial leverage increases ROE so long as the spread is positive.
- ✓ Leverage refers to the extent of invested capital from other than common shareholders.
- ✓ If suppliers of capital (other than common shareholders) receive less than ROA, then common shareholders benefit; the reverse occurs when suppliers of capital receive more than ROA.
- ✓ The larger the difference in returns between common equity and other capital suppliers, the more successful (or unsuccessful) is the trading on the equity.

Analyzing Return on Common Equity-ROCE

Alternate View of ROCE Disaggregation

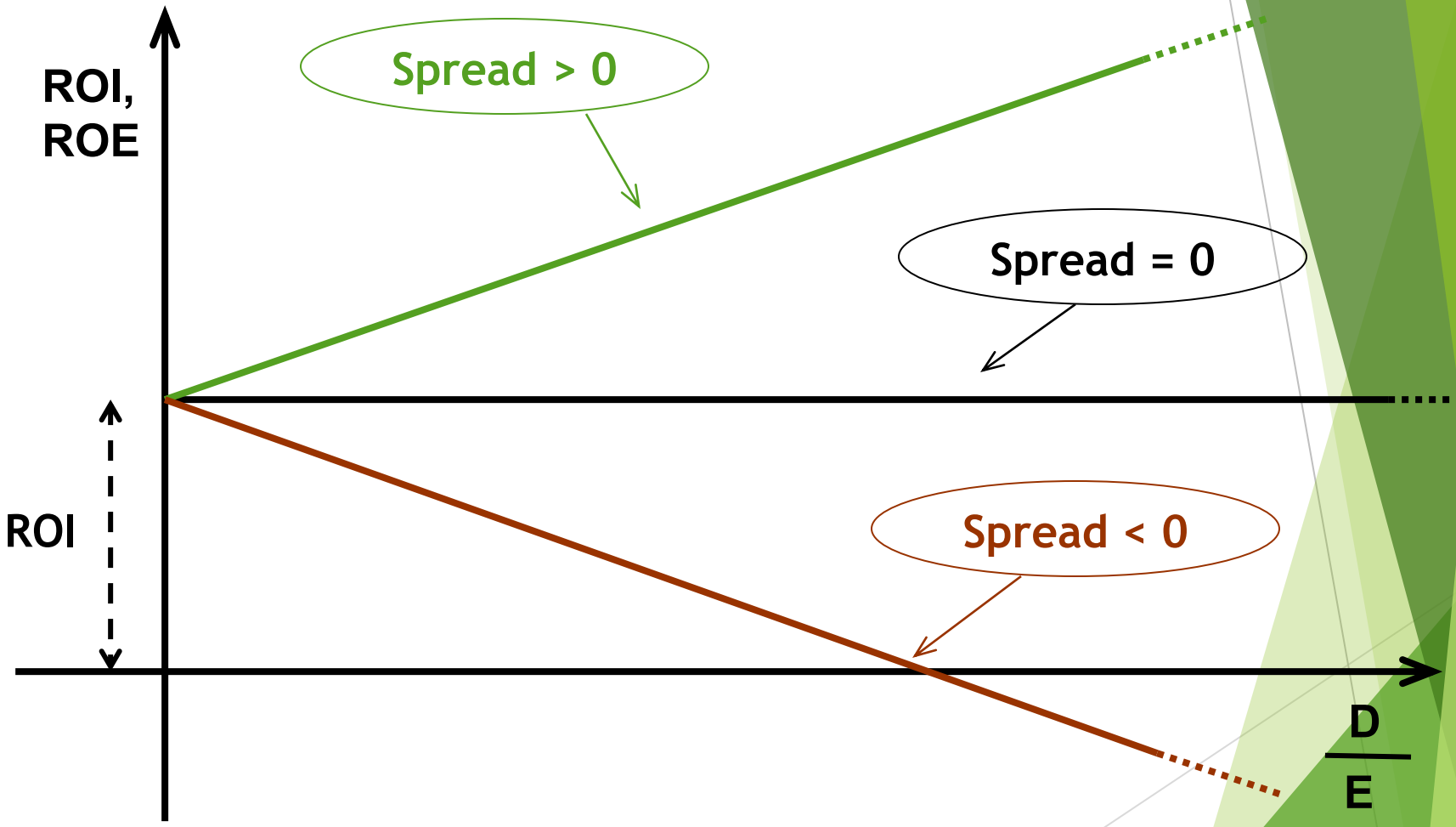
$$\text{ROCE} = \text{Adjusted profit margin} \times \text{Asset turnover} \times \text{Leverage}$$

$$\frac{\text{Net income} - \text{Preferred dividends}}{\text{Average common equity}} = \frac{\text{Net income} - \text{Preferred dividends}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average assets}} \times \frac{\text{Average assets}}{\text{Average common equity}}$$

Capital structure

- Company's profitability: to the extent that ROI exceeds the cost of debts, the borrowed capital produce an increase of ROE and represents an opportunity rather than a mere risk;
- Company's ability to produce cash: the more profitable an enterprise is, the more able it is to sustain a levered capital structure. But profitability is not a sufficient condition for choosing a risky capital structure: borrowings produce also a cash problem, in the sense that the firm must produce enough cash to reimburse all debts within their maturity date.
- Operating profitability and operating cash flow must be examined in order to assess the capital structure of the company.

Financial risk



Gearing amplifies the risk of changes in ROE