Advanced Group Accounting (RIKA)

Block 6

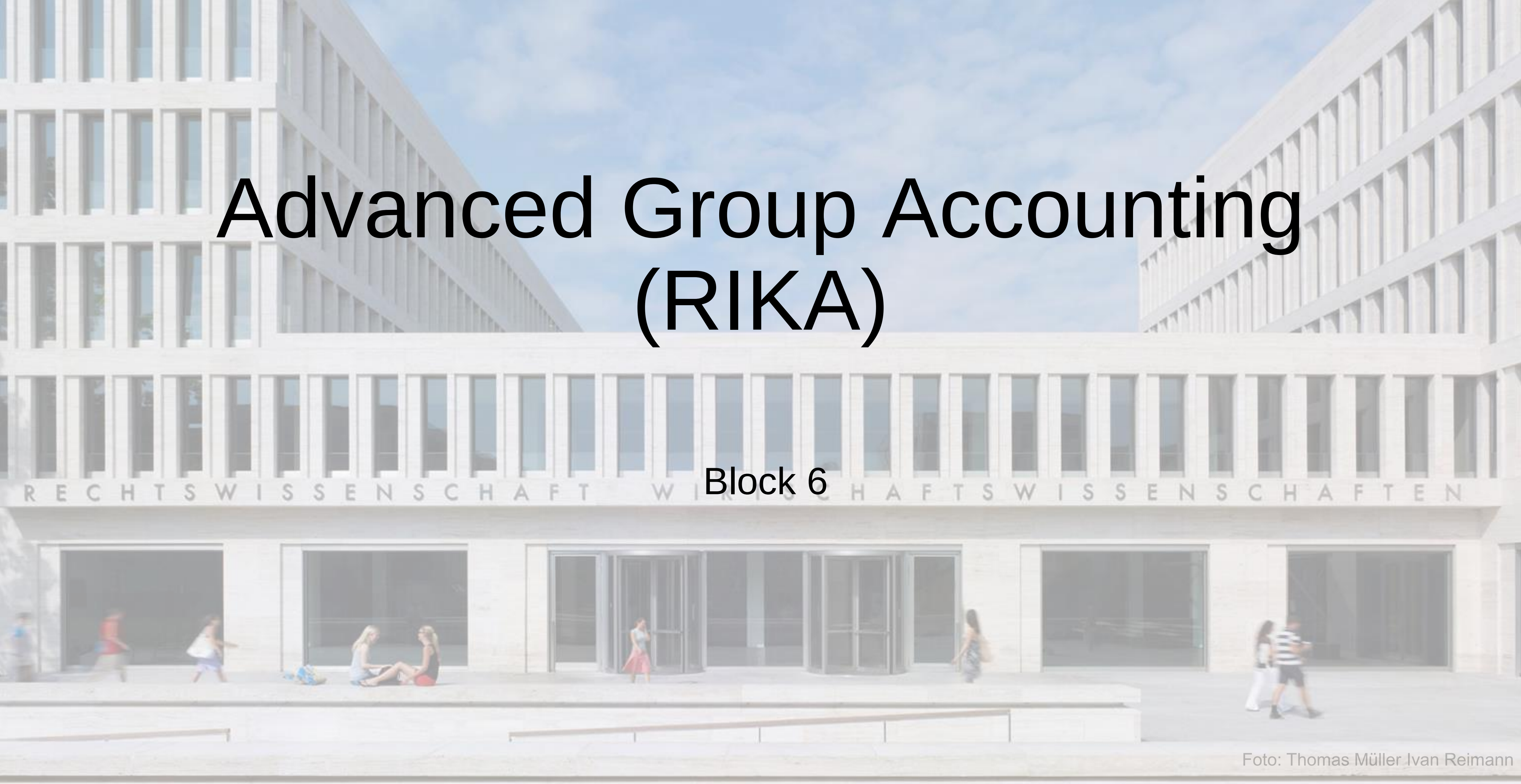


Foto: Thomas Müller Ivan Reimann

Course Structure

Block	Topic
	Preparation: recap double-entry bookkeeping (online, self-study)
1	Key Concepts
2	Acquisition Method
3	Consolidation
4	Subsequent Consolidation Goodwill Impairment
5	Joint Arrangement and Investments at Equity Changes in Control
6	**Analyzing Consolidated F/S**

Course Structure

Block	Topic
6	Analyzing Consolidated F/S
6.1	A Framework for Financial Ratio Analysis
6.2	Financial Ratio Analysis – Details

- How can we use financial ratios to assess the value of the corporate group?

What drives value?

Three Pillars of Firm Value		
Profitability	**Risk**	**Growth**
How large is the return on investment generated by the business?	*Which return does the investment need to generate to be competitive with similar investment opportunities?*	*By how much does the firm change the scale of its business?*
Measured by return on invested capital (equity holders: ***RoE***)	Measured by cost of capital (***r***)	Measured by the change in invested capital (growth rate: *g*)

Value is created by **profitable growth, relative to the firm's risk profile**:

$(1 + g) * (ROE – r) > 0$

What drives profitability?

What drives RoE? – The “**Basic DuPont Model**” provides some insights by decomposing RoE.

$$ROE = \frac{profit}{sales} \times \frac{sales}{average\,total\,assets} \times \frac{average\,total\,assets}{average\,common\,equity}$$

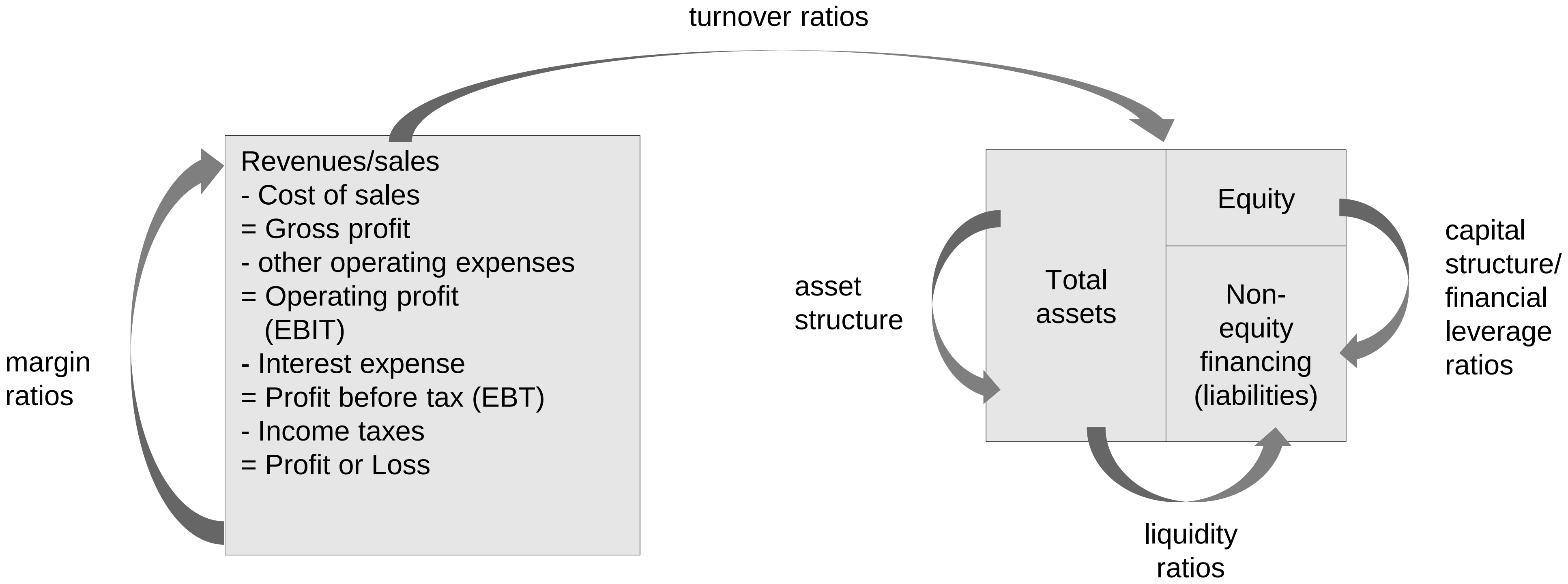
$$ROE = \underbrace{net\ profit\ margin}_{} \times \underbrace{asset\ turnover}_{} \times \underbrace{leverage}_{}$$

Detailed margin analysis
How profitably can the firm convert sales into profits?

Detailed turnover analysis
How efficiently does the firm use its assets to make sales?

Detailed leverage analysis
How do the firm’s long-term solvency and short-term liquidity look like?

Financial Ratios for detailed margin, turnover, and leverage analysis



When comparing flows (→ income statement) to stocks (→ balance sheet): use <u>average</u> stocks for the year!

Balance Sheet Effects of M&A Transactions

Parent Consolidated Balance Sheet (prior to consolidation of Sub) Dec 31, 20X1	
Assets	Equity
	Liabilities
Total	**Total**

\+ Equity attributable to NCI

\+ Sub’s book value of liabilities and fair value adjustments

\- Intragroup liabilities (e.g., loan from Sub to Parent)

\- Intragroup assets (e.g., receivable from Sub owed to Parent)

\+ Sub’s book value of assets, any fair-value revaluations (hidden reserves), newly identified intangibles, and goodwill

Income Statement Effects of M&A Transactions

+ Depreciation / amortization of fair value adjustments

Parent **Consolidated Income Statement** **(prior to consolidation of Sub)** **Dec 31, 20X1**
Sales
- Cost of sales
= Gross profit
- R&D expenses
- SG&A expenses
- Net other operating expenses
= EBIT
+ Income from associates
+ Interest income
- Interest expense
= EBT
- Tax expense
= Net income

- Items from intragroup transactions (e.g., sales from Parent to Sub)

+ Items of Sub's stand-alone income statement

+ Income generated through synergies (e.g., increased sales or lower costs)

Understanding margin ratios

Sales

Costs of goods sold

Gross profit

→ Gross profit margin

$$= \frac{\text{Gross Profit}}{\text{Sales}}$$

Operating expenses

EBITDA

→ EBITDA margin

$$= \frac{\text{EBITDA}}{\text{Sales}}$$

Depreciation & amortization

EBIT

→ EBIT margin

$$= \frac{\text{EBIT}}{\text{Sales}}$$

Interests & taxes

Net profit

→ Net profit margin

$$= \frac{\text{Net profit}}{\text{Sales}}$$

Profit margins for selected industries: lowest gross profit margin

	Profit Margins				Cost Structure		
Industry Name	*Gross Margin*	*Net Margin*	*EBIT Margin*	*EBITDA Margin*	*COGS/ Sales*	*R&D/ Sales*	*SG&A/ Sales*
Engineering/Construction	12.15%	2.18%	4.06%	5.66%	87.85%	0.02%	7.65%
Healthcare Support Services	14.62%	2.46%	4.53%	5.04%	85.38%	0.02%	8.54%
Auto Parts	16.73%	4.92%	8.88%	11.32%	83.27%	3.24%	6.51%
Aerospace/Defense	20.72%	7.92%	11.94%	13.67%	79.28%	3.41%	6.93%
Chemical (Basic)	21.25%	9.30%	12.73%	16.26%	78.75%	0.63%	7.61%
Construction Supplies	22.82%	7.47%	11.79%	13.30%	77.18%	2.47%	8.54%
Computer Services	24.70%	4.03%	8.35%	10.76%	75.30%	1.89%	13.66%
Building Materials	26.62%	5.23%	9.37%	11.90%	73.38%	0.80%	15.89%
Food Processing	27.86%	11.98%	13.22%	16.83%	72.14%	0.60%	14.08%
Retail (Distributors)	28.21%	5.63%	8.01%	8.28%	71.79%	0.01%	18.65%
Advertising	28.54%	3.10%	11.62%	14.43%	71.46%	0.44%	13.80%

Source: Aswhin Damodaran’s data page

Profit margins for selected industries: highest gross profit margin

	Profit Margins				*Cost Structure*		
Industry Name	***Gross Margin***	***Net Margin***	***EBIT Margin***	***EBITDA Margin***	***COGS/ Sales***	***R&D/ Sales***	***SG&A/ Sales***
Information Services	55.28%	18.41%	26.86%	30.45%	44.72%	1.81%	22.41%
Telecom. Services	55.37%	18.76%	18.54%	31.04%	44.63%	0.51%	20.92%
Healthcare Products	57.74%	5.80%	15.30%	21.71%	42.26%	7.67%	32.47%
Semiconductor	58.16%	21.47%	29.61%	37.19%	41.84%	17.07%	9.27%
Oil/Gas (Production and Exploration)	58.49%	9.94%	13.74%	35.31%	41.51%	0.06%	7.82%
Software (Internet)	63.27%	1.88%	11.22%	18.00%	36.73%	12.62%	35.70%
Software (Entertainment)	65.91%	18.91%	27.62%	28.48%	34.09%	15.95%	21.89%
Drugs (Pharmaceutical)	68.60%	10.94%	23.30%	29.77%	31.40%	19.28%	26.46%
Software (System & Application)	70.67%	10.45%	21.28%	26.98%	29.33%	16.91%	31.77%
Drugs (Biotechnology)	70.71%	-1.61%	19.31%	28.69%	29.29%	35.92%	28.48%

Source: Aswhin Damodaran’s data page

M&A Transactions and Margin Ratios

Which margin ratios do you think are affected and how?

- Buyer is an international cosmetics company (production and distribution). Target is a well-known B2C company that operates cosmetics stores in Australia. Buyer purchases Target to gain access to the Australian customer market segment. 40% of the purchase price is allocated to Target’s brand value.

- Buyer is a producer of pharmaceutical products. Target is a research company with significant in-process R&D.

- Buyer is a supermarket chain operating several (physical) stores. Target operates an online shopping platform. The collection and analysis of customer data is key to Target’s business model.
  - Alternative: What if Target operates the physical stores and Buyer operates the online platform?

What drives profitability? – Disaggregating RoE

What drives RoE? – The “**Basic DuPont Model**” provides some insights by decomposing RoE.

$$ROE = \frac{profit}{average common equity}$$

$$ROE = \frac{profit}{sales} \times \frac{sales}{average total\ assets} \times \frac{average total\ assets}{average common equity}$$

$$ROE = \underbrace{net\ profit\ margin}_{} \times \underbrace{asset\ turnover}_{} \times \underbrace{leverage}_{}$$

Detailed margin analysis
How profitably can the firm convert sales into profits?

Detailed turnover analysis
How efficiently does the firm use its assets to make sales?

Detailed leverage analysis
How do the firm’s long-term solvency and short-term liquidity look like?

See also: Lundholm, R. and R. Sloan, Equity Valuation and Analysis with eVal, 3rd edition 2013, pp. 116-121.

Detailed turnover analysis

- General definition: sales / balance sheet item
  - Example: Total asset turnover of 2 means that for \$1 of sales, the firm needs to maintain 0.5\$ of assets.

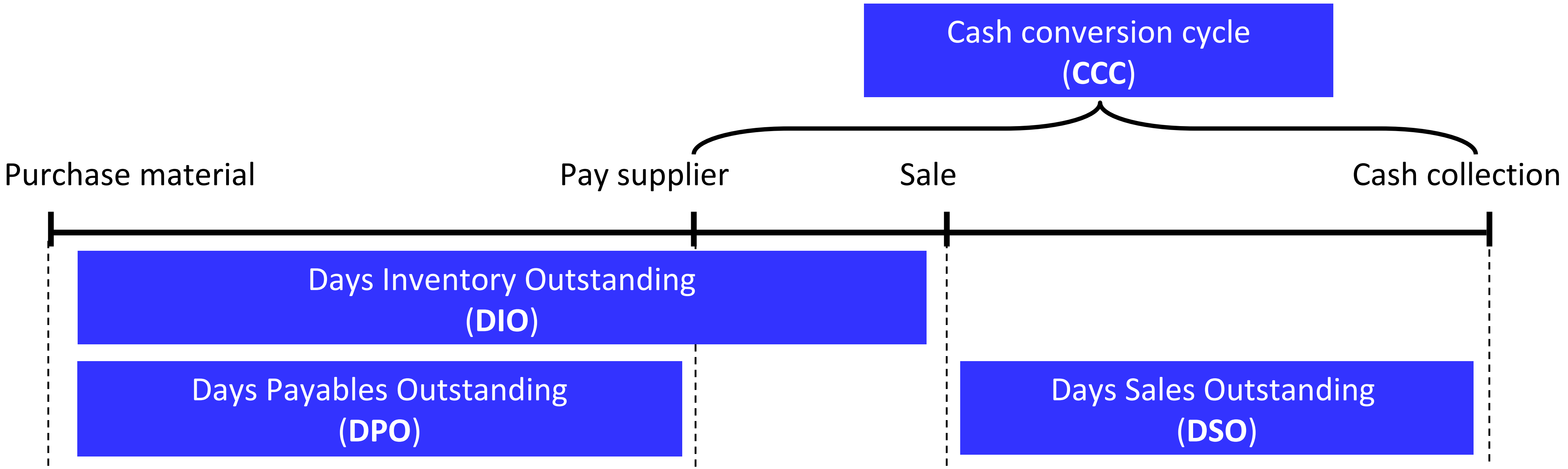
- Turnover ratios reflect the amount of assets which the firm requires to generate its sales.
- Also referred to as “efficiency ratios”, as they reflect how efficiently the firm is employing its assets.

- Turnover ratios may be affected by missing recognition on the balance sheet.
  - Example: intangible assets, self-generated brand value

- Turnover ratios may be affected by working capital management around the balance sheet dates.

Cash conversion cycle

- How efficiently does the company manage its working capital?



CCC = DIO + DSO − DPO

Turnover ratios

- **Net working capital turnover ratio: Sales / (Current Operating Assets – Current Operating Liabilities)**
  - Efficient working capital management would be reflected in low working capital, and high turnover ratio
  - Trade-offs involved in maintaining low working capital (e.g., discounts from suppliers; credit sales needed to attract customer purchases)
- **Receivables turnover: Sales / Receivables**
  - Reflects how often the firm turns over its receivables into sales each year
  - The higher the receivables turnover, the shorter the average days to collect receivables.
- **Inventory turnover: Cost of Goods Sold / Inventory**
  - Use Cost of Goods Sold rather than Sales because inventories are carried at cost; ratio reflect efficiency of inventory use rather than price mark-ups
  - The higher inventory turnover, the shorter the average inventory holding period.
- **Payables turnover: Purchases / Payables**
  - Use Purchases (costs of goods sold plus change in inventory) to reflect input measure rather than price mark-up

Turnover ratios

- **PP&E turnover ratio: Sales / PP&E**
  - Low PP&E ratios may reflect idle capacities (e.g., lavish headquarters)
  - Reveals, e.g., how efficiently a retailer can use its stores
  - Reflects different business models (e.g., internet sales versus offline sales)

- **Intangible assets turnover ratio: Sales / Intangibles**
  - Ability to convert intellectual property into sales (e.g., rents from innovation; licensed/patented products)
  - Affected by different accounting treatments for acquired vs. self-generated intangibles

M&A transactions and turnover ratios

Which turnover ratios do you think are affected and how?

- Buyer is a producer of pharmaceutical products. Target is a research company with significant in-process R&D.
- Buyer is a jewelry manufacturer. Target is a supplier of gold. Previous to the acquisition, Target has supplied gold to Buyer. (Vertical acquisition)
- Buyer and Target are both professional services firms. After the acquisition, they will be able to share Buyer’s headquarter building.

Case: Novartis vs. Roche (see Lecture 2)

How do the different growth strategies affect the financial statements?

Recap:

Growth Strategies and Accounting Implications

Organic growth (internal R&D)	External growth (M&A)
▪ Not all intangibles can be capitalized on the balance sheet (e.g., prohibited according to IAS 38: self-generated brand, customer lists)	▪ Acquiree's intangibles "uncovered" via M&A transaction / purchase price allocation
▪ Innovation/marketing efforts charged through P&L (R&D expenses, marketing expenses)	▪ Purchase price allocated to identifiable intangible assets (capitalization on consolidated financial statements)
▪ Subsequent periods: no amortization expense (no asset)	▪ Subsequent periods: amortization expense and/or impairment testing

Case: Novartis vs. Roche (see Lecture 2)

Organic growth

Roche Group consolidated balance sheet

	31 December 2018
Non-current assets	
Property, plant and equipment [8]	21,818
Goodwill [9]	8,948
Intangible assets [10]	9,346
Deferred tax assets [5]	3,895
Defined benefit plan assets [26]	877
Other non-current assets [15]	1,389
Total non-current assets	**46,273**
Current assets	
Inventories [11]	6,621
Accounts receivable [12]	9,776
Current income tax assets [5]	208
Other current assets [16]	2,521
Marketable securities [13]	6,437
Cash and cash equivalents [14]	6,681
Total current assets	**32,244**
Total assets	**78,517**

Roche Group consolidated income statement f

	Group
Sales [2, 3]	56,846
Royalties and other operating income [2, 3]	2,651
Revenue [2, 3]	**59,497**

External growth

NOVARTIS

Consolidated balance sheets

(At December 31, 2018 and 2017)

(USD millions)	Note	2018
Assets		
Non-current assets		
Property, plant and equipment	9	15 696
Goodwill	10	35 294
Intangible assets other than goodwill	10	38 719
Investments in associated companies	4	8 352
Deferred tax assets	11	8 699
Financial assets	12	2 345
Other non-current assets	12	895
Total non-current assets		**110 000**
Current assets		
Inventories	13	6 956
Trade receivables	14	8 727
Income tax receivables		248
Marketable securities, commodities, time deposits	15	2 693
Cash and cash equivalents	15	13 271
Other current assets	16	2 861
Total current assets without disposal group		**34 756**
Assets of disposal group held for sale	2	807
Total current assets		**35 563**
Total assets		**145 563**

(USD millions unless indicated otherwise)	Note	2018
Net sales to third parties	3	**51 900**
Other revenues	3	1 266

Case: Novartis vs. Roche (see Lecture 2)

- What are the B/S-effects?

Roche Group consolidated balance sheet

	31 December 2018
Non-current assets	
Property, plant and equipment [8]	21,818
Goodwill [9]	8,948
Intangible assets [10]	9,346
Deferred tax assets [5]	3,895
Defined benefit plan assets [26]	877
Other non-current assets [15]	1,389
Total non-current assets	**46,273**
Current assets	
Inventories [11]	6,621
Accounts receivable [12]	9,776
Current income tax assets [5]	208
Other current assets [16]	2,521
Marketable securities [13]	6,437
Cash and cash equivalents [14]	6,681
Total current assets	**32,244**
Total assets	**78,517**

Consolidated balance sheets

NOVARTIS

(At December 31, 2018 and 2017)

(USD millions)	Note	2018
Assets		
Non-current assets		
Property, plant and equipment	9	15 696
Goodwill	10	35 294
Intangible assets other than goodwill	10	38 719
Investments in associated companies	4	8 352
Deferred tax assets	11	8 699
Financial assets	12	2 345
Other non-current assets	12	895
Total non-current assets		**110 000**
Current assets		
Inventories	13	6 956
Trade receivables	14	8 727
Income tax receivables		248
Marketable securities, commodities, time deposits	15	2 693
Cash and cash equivalents	15	13 271
Other current assets	16	2 861
Total current assets without disposal group		**34 756**
Assets of disposal group held for sale	2	807
Total current assets		**35 563**
Total assets		**145 563**

Case: Novartis vs. Roche (see Lecture 2)

What are the I/S-effects?

Roche Group consolidated balance sheet

	31 December 2018
Non-current assets	
Property, plant and equipment [8]	21,818
Goodwill [9]	8,948
Intangible assets [10]	9,346
Deferred tax assets [5]	3,895
Defined benefit plan assets [26]	877
Other non-current assets [15]	1,389
Total non-current assets	**46,273**
Current assets	
Inventories [11]	6,621
Accounts receivable [12]	9,776
Current income tax assets [5]	208
Other current assets [16]	2,521
Marketable securities [13]	6,437
Cash and cash equivalents [14]	6,681
Total current assets	**32,244**
Total assets	**78,517**

Roche Group consolidated income statement f

	Group
Sales [2, 3]	56,846
Royalties and other operating income [2, 3]	2,651
Revenue [2, 3]	**59,497**

Consolidated balance sheets

NOVARTIS

(At December 31, 2018 and 2017)

(USD millions)	Note	2018
Assets		
Non-current assets		
Property, plant and equipment	9	15 696
Goodwill	10	35 294
Intangible assets other than goodwill	10	38 719
Investments in associated companies	4	8 352
Deferred tax assets	11	8 699
Financial assets	12	2 345
Other non-current assets	12	895
Total non-current assets		**110 000**
Current assets		
Inventories	13	6 956
Trade receivables	14	8 727
Income tax receivables		248
Marketable securities, commodities, time deposits	15	2 693
Cash and cash equivalents	15	13 271
Other current assets	16	2 861
Total current assets without disposal group		**34 756**
Assets of disposal group held for sale	2	807
Total current assets		**35 563**
Total assets		**145 563**

(USD millions unless indicated otherwise)	Note	2018
Net sales to third parties	3	**51 900**
Other revenues	3	1 266

Case: Novartis vs. Roche (see Lecture 2)

What are the effects on the total asset turnover?

sales / total assets

Roche	Novartis
0.72	0.36

Roche Group consolidated balance sheet

	31 December 2018
Non-current assets	
Property, plant and equipment [8]	21,818
Goodwill [9]	8,948
Intangible assets [10]	9,346
Deferred tax assets [5]	3,895
Defined benefit plan assets [26]	877
Other non-current assets [15]	1,389
Total non-current assets	**46,273**
Current assets	
Inventories [11]	6,621
Accounts receivable [12]	9,776
Current income tax assets [5]	208
Other current assets [16]	2,521
Marketable securities [13]	6,437
Cash and cash equivalents [14]	6,681
Total current assets	**32,244**
Total assets	**78,517**

Roche Group consolidated income statement f

	Group
Sales [2,3]	56,846
Royalties and other operating income [2,3]	2,651
Revenue [2,3]	**59,497**

Consolidated balance sheets

NOVARTIS

(At December 31, 2018 and 2017)

(USD millions)	Note	2018
Assets		
Non-current assets		
Property, plant and equipment	9	15 696
Goodwill	10	35 294
Intangible assets other than goodwill	10	38 719
Investments in associated companies	4	8 352
Deferred tax assets	11	8 699
Financial assets	12	2 345
Other non-current assets	12	895
Total non-current assets		**110 000**
Current assets		
Inventories	13	6 956
Trade receivables	14	8 727
Income tax receivables		248
Marketable securities, commodities, time deposits	15	2 693
Cash and cash equivalents	15	13 271
Other current assets	16	2 861
Total current assets without disposal group		**34 756**
Assets of disposal group held for sale	2	807
Total current assets		**35 563**
Total assets		**145 563**

(USD millions unless indicated otherwise)	Note	2018
Net sales to third parties	3	**51 900**
Other revenues	3	1 266

Case: Novartis vs. Roche (see Lecture 2)

Roche Group consolidated balance sheet

	31 December 2018
Non-current assets	
Property, plant and equipment [8]	21,818
Goodwill [9]	8,948
Intangible assets [10]	9,346
Deferred tax assets [5]	3,895
Defined benefit plan assets [26]	877
Other non-current assets [15]	1,389
Total non-current assets	**46,273**
Current assets	
Inventories [11]	6,621
Accounts receivable [12]	9,776
Current income tax assets [5]	208
Other current assets [16]	2,521
Marketable securities [13]	6,437
Cash and cash equivalents [14]	6,681
Total current assets	**32,244**
Total assets	**78,517**

Roche Group consolidated income statement f

	Group
Sales [2, 3]	56,846
Royalties and other operating income [2, 3]	2,651
Revenue [2, 3]	**59,497**

What are the effects on the intangible asset turnover?

net sales / intangibles

Roche	Novartis
3.11	0.7

Consolidated balance sheets

NOVARTIS

(At December 31, 2018 and 2017)

(USD millions)	Note	2018
Assets		
Non-current assets		
Property, plant and equipment	9	15 696
Goodwill	10	35 294
Intangible assets other than goodwill	10	38 719
Investments in associated companies	4	8 352
Deferred tax assets	11	8 699
Financial assets	12	2 345
Other non-current assets	12	895
Total non-current assets		**110 000**
Current assets		
Inventories	13	6 956
Trade receivables	14	8 727
Income tax receivables		248
Marketable securities, commodities, time deposits	15	2 693
Cash and cash equivalents	15	13 271
Other current assets	16	2 861
Total current assets without disposal group		**34 756**
Assets of disposal group held for sale	2	807
Total current assets		**35 563**
Total assets		**145 563**

(USD millions unless indicated otherwise)	Note	2018
Net sales to third parties	3	**51 900**
Other revenues	3	1 266

What drives profitability? – Disaggregating RoE

What drives RoE? – The “**Basic DuPont Model**” provides some insights by decomposing RoE.

$$ROE = \frac{profit}{average\,common\,equity}$$

$$ROE = \frac{profit}{sales} \times \frac{sales}{average\,total\,assets} \times \frac{average\,total\,assets}{average\,common\,equity}$$

$$ROE = net\ profit\ margin \times asset\ turnover \times leverage$$

Detailed margin analysis
How profitably can the firm convert sales into profits?

Detailed turnover analysis
How efficiently does the firm use its assets to make sales?

Detailed leverage analysis
How do the firm’s long-term solvency and short-term liquidity look like?

See also: Lundholm, R. and R. Sloan, Equity Valuation and Analysis with eVal, 3rd edition 2013, pp. 116-121.

The leverage effect

1

Operating profit (EBIT) = 24

Total assets	
160	Equity 80
	Debt 80

Profit = 16

Interest = 8

ROE	ROA

Expansion
(fully debt-financed)

2

Operating profit (EBIT) = 48

Total assets	
320	Equity 80
	Debt 240

Profit = 24

Interest = 24

ROE	ROA

Assumption: Interest rate on debt = 10%

The leverage effect

1

Operating profit (EBIT) = 24

Total assets 160	Equity 80
	Debt 80

Profit = 16

Interest = 8

ROE	ROA
$\frac{16}{80}$ = 20 %	$\frac{24}{160}$ = 15 %

2

Operating profit (EBIT) = 48

Total assets 320	Equity 80
	Debt 240

Profit = 24

Interest = 24

ROE	ROA
$\frac{24}{80}$ = 30 %	$\frac{48}{320}$ = 15 %

Assumption: Interest rate on debt = 10%

Better understanding leverage: the Advanced DuPont Model

- The Advanced DuPont model decomposes return on equity into a component that is due to operating profitability (Return on Net Operating Assets = RNOA) and the leverage effect

$$\text{Return on Equity} = \text{Return on Net Operating Assets} + \text{Leverage} \times \text{Spread}$$

- Ratios are calculated based on the **analytical financial statements**
  - Key idea: go line by line and assign all assets, liabilities, revenues, and expenses to the operating *or* financial sphere of the company

Analytical Financial Statements

A	E&L
Operating Assets	Equity
	Financial Liabilities
Financial Assets	
	Operating Liabilities
Total Assets	Equity + Liabilities

Sales

Less: operating expenses
Plus: operating income
Less: financial expenses
Plus: financial income
Less: tax expense
= Net income

A	E&L
Operating assets Less: operating liabilities = Net Operating Assets (**NOA**)	**Equity**
	Financial obligations Less: financial assets = Net Financial Obligations (**NFO**)
NOA	Equity + NFO

Sales + operating income – operating expense = net operating income (NOI) before tax
Less: tax burden on NOI
= **NOI after tax**

Financial expenses – financial income = net financial expenses (NFE) before tax
Less: tax shield on NFE
= **NFE after tax**

Net income = NOI after tax – NFE after tax

From as-reported to analytical financial statements
Your turn!

As-Reported Balance Sheet			
Operating assets	800	Equity	500
Financial assets	200	Operating liabilities	250
		Financial liabilities	250
Total	**1000**	**Total**	**1000**

Analytical Balance Sheet			
Operating assets		Equity	500
Less: Operating liabilities		Financial liabilities Less: Financial assets	
Net Operating Assets (NOA)		**Equity + Net Financial Obligations (NFO)**	

Note:

- The reformulation does not change the overall amount of assets/liabilities.
- Therefore, equity is the same in the analytical financial statements as in the as-reported statements.

From as-reported to analytical financial statements Solutions

As-Reported Balance Sheet			
Operating assets	800	Equity	500
Financial assets	200	Operating liabilities	250
		Financial liabilities	250
Total	**1000**	**Total**	**1000**

Analytical Balance Sheet			
Operating assets	800	Equity	500
Less: Operating liabilities	250	Financial liabilities	250
		Less: Financial assets	200
Net Operating Assets (NOA)	**550**	**Equity + Net Financial Obligations (NFO)**	**550**

Note:

- The reformulation does not change the overall amount of assets/liabilities.
- Therefore, equity is the same in the analytical financial statements as in the as-reported statements.

From as-reported to analytical income statement
Your turn!

As-reported Income Statement	
Sales	500
- Operating expenses	-300
+ other operating income	100
= EBIT	**300**
+ Interest income	5
- Interest expense	-40
= EBT	**265**
- Tax expense (effective tax rate: 20%)	-53
= Net income	**212**

Analytical Income Statement
Net operating income before tax = EBIT
Less: tax on net operating income
= Net operating income after tax
Net financing expense before tax
Less: tax shield on net financing expense
= Net financing expense after tax
Net operating income after tax
Less: Net financing expense after tax
= Net income

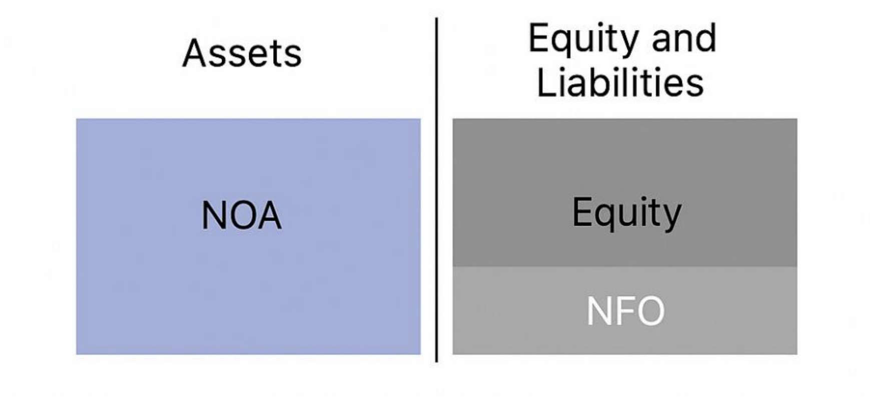
From as-reported to analytical income statement Solutions

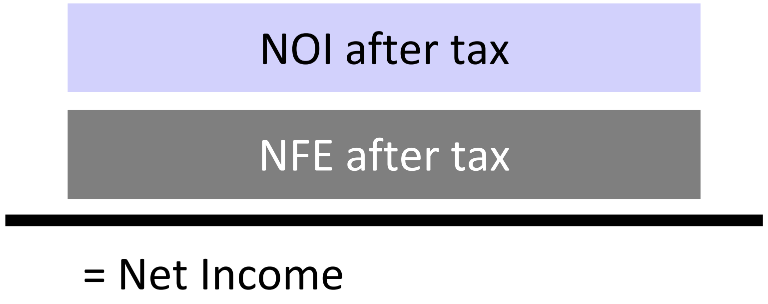
As-reported Income Statement	
Sales	500
- Operating expenses	-300
+ other operating income	100
= EBIT	**300**
+ Interest income	5
- Interest expense	-40
= EBT	**265**
- Tax expense (effective tax rate: 20%)	-53
= Net income	**212**

Analytical Income Statement	
Net operating income before tax = EBIT	300
Less: tax on net operating income	-60
= Net operating income after tax	240
Net financing expense before tax	35
Less: tax shield on net financing expense	-7
= Net financing expense after tax	28
Net operating income after tax	240
Less: Net financing expense after tax	28
= Net income	**212**

Note:
- The reformulation does not change the overall amount of expenses/income. Therefore, net income is the same in the analytical financial statements as in the as-reported statements.
- The reformulation does not change the overall amount of taxes, but only allocates the total tax expense to the financial/operating sphere. Therefore, total tax expense is the same in the analytical as in the as-reported statements (53 = 60 -7).

Financial ratios based on analytical F/S



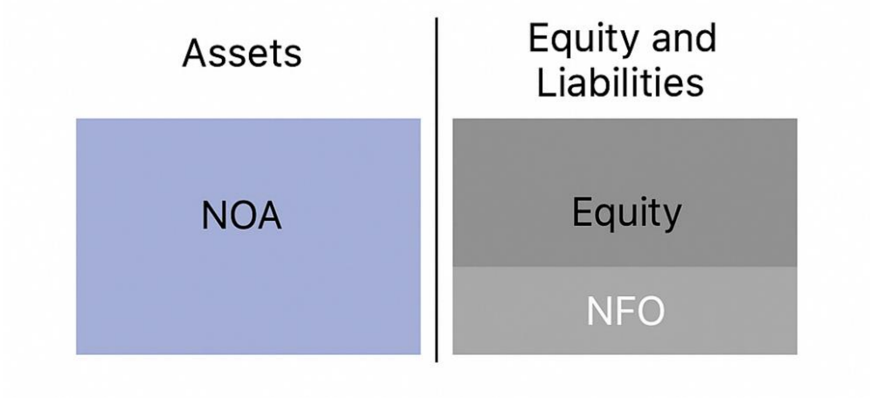


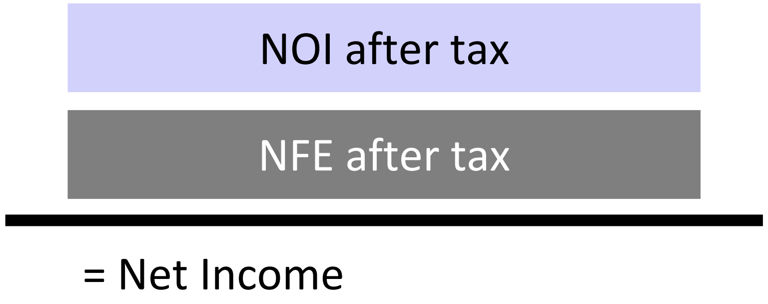
$$\text{Return on Net Operating Assets} = \frac{\text{Net operating income}}{\text{Net operating assets}}$$

<u>Interpretation:</u>

- Net operating income reflects the after-tax income earned by the firm's operating assets
- Net operating assets reflect the resources used to generate the firm's net operating income
- RNOA presents a measure of the firm's operating performance that abstracts from the firm's financing.

Financial ratios based on analytical F/S





$$\text{Net Borrowing Cost} = \frac{\text{Net financing expense}}{\text{Net financial obligations}}$$

<u>Interpretation:</u>

- Net financing expense reflects the after-tax expense incurred by the firm for the financing of its operations
- Net financial obligations reflect the level of external capital (i.e., debt, non-controlling interests, and preferred stock) taken on by the firm to finance its operations
- NBC presents a measure of the flow to external capital providers relative to the amount of capital they provide

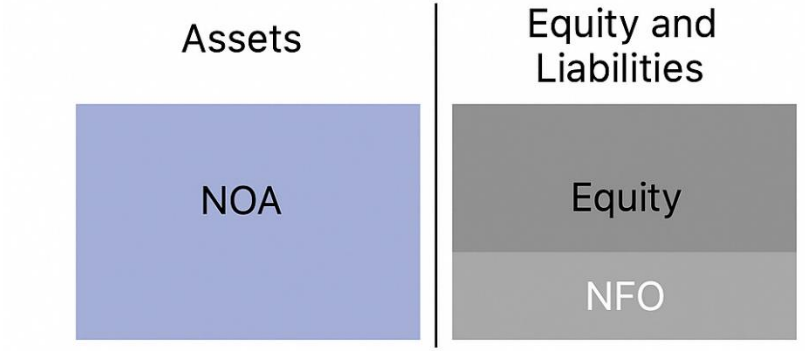
Financial ratios based on analytical F/S

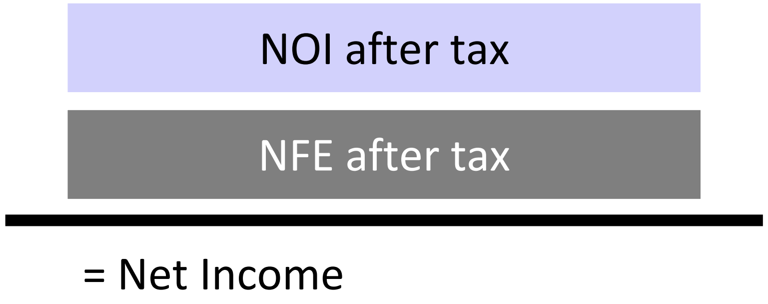
$$\text{Spread} = \text{Return on Net Operating Assets} - \text{Net Borrowing Cost}$$

Interpretation:

- The spread expresses the excess return that the firm can generate via its operations in excess of its financing costs

Financial ratios based on analytical F/S





$$\text{Leverage} = \frac{\text{Net financial obligations}}{\text{Equity}}$$

Interpretation:

- Relates the amount of capital provided by external capital providers to the capital provided by the firm's equity investors.
- The larger the ratio, the larger the leverage effect.

Putting it all together: the Advanced DuPont Model

$$\text{Return on Equity} = \text{Return on Net Operating Assets} + \text{Leverage} \times \text{Spread}$$

- We can decompose ROE into two components:
  - Return generated by the firm in its operations (**RNOA**)
  - Return added by the leverage effect (**Leverage x Spread**)
    - Leverage is good if the firm earns **a positive spread**
    - Leverage is bad if the firm earns a **negative spread**
    - The extent of the leverage effect increases with the **scope of external financing** (a positive/negative spread matters more if leverage is higher)

Putting it all together

Analytical Income Statement	
Net operating income before tax = EBIT	300
Less: tax on net operating income	-60
= Net operating income after tax	240
Net financing expense before tax	35
Less: tax shield on net financing expense	-7
= Net financing expense after tax	28
Net operating income after tax	240
Less: Net financing expense after tax	28
= Net income	**212**

Analytical Balance Sheet			
Operating assets	800	Equity	500
Less: Operating liabilities	250	Financial liabilities	250
		Less: Financial assets	200
Net Operating Assets (NOA)	**550**	**Equity + Net Financial Obligations (NFO)**	**550**

$$RoE = RNOA + Leverage * Spread$$

Putting it all together

Analytical Income Statement	
Net operating income before tax = EBIT	300
Less: tax on net operating income	-60
= Net operating income after tax	240
Net financing expense before tax	35
Less: tax shield on net financing expense	-7
= Net financing expense after tax	28
Net operating income after tax	240
Less: Net financing expense after tax	28
= Net income	**212**

Analytical Balance Sheet			
Operating assets	800	Equity	500
Less: Operating liabilities	250	Financial liabilities	250
		Less: Financial assets	200
Net Operating Assets (NOA)	**550**	**Equity + Net Financial Obligations (NFO)**	**550**

$$RoE = RNOA + Leverage * Spread$$

$$RoE = \frac{240}{550} + \frac{50}{500} * \left(\frac{240}{550} - \frac{28}{50}\right)$$

$$RoE = 43\% + 0.1 * (-13\%) = 42\%$$

Analytical Financial Statements of Corporate Groups

- Classification of non-controlling interests:
  - Analytical balance sheet: equity or NFO
  - Analytical income statement: NOI or NFE; if NFE, no tax shield!

- Classification of income from associates (equity method):
  - Analytical balance sheet: operating asset or financial asset
  - Analytical income statement: NOI or NFE

- In both cases, **consistency** of classification is key!

Analyzing the Profitability Effects of M&A Transactions

$$\text{Return on Equity} = \text{Return on Net Operating Assets} + \text{Leverage} \times \text{Spread}$$

- Consolidated RNOA: How much does the target contribute to the RNOA of the corporate group?
  - Unconsolidated RNOA of Target, relative to that of corporate group
  - Negative: increases in NOA due to uncovering of identifiable assets, fair value adjustments, and goodwill; reductions in revenues due to elimination of intra-group revenues; reductions in NOI due to depreciation and amortization on fair value adjustments
  - Positive: synergies (to the extent not captured by goodwill)

- Consolidated leverage
  - Effect depends on financing of transaction
  - Increase in leverage due to capital consolidation (equity)
  - Potential reduction in leverage due to elimination of intra-group liabilities

Block 6: Key take-aways

- A key objective of financial statement analysis is to better understand the drivers of a firm's return on equity (RoE).

- Margin ratios capture the firm's ability to convert sales into profits further down towards the bottom line of the P&L. They are importantly influenced by a firm's competitive environment. Barriers to competition allow firms to charge higher mark-ups (reflected in the gross profit margin), but typically come with higher expenses below the gross profit line (e.g., R&D, marketing/advertising).

- Turnover ratios reflect how effectively the firm uses its resources. The uncovering of hidden reserves and fair value adjustments of business combinations tentatively reduce turnover ratios of organically grown firms (compared to those that grew by external acquisitions).

- The Advanced DuPont model decomposes the firm's profitability into a component that is driven by its operating profitability (RNOA) and the leverage effect.

What’s next?

- Self-study material, multiple choice questions and textbook references on Moodle

- End of semester:
  - Case study with PwC (11th July)
  - Recap and exam prep session (18th July) – send your questions in advance