

ACCT7106 – Session #10: Ratio Analysis; Forecasting

PART 1 – Background

overarching objective: **Assignment Project Exam Help**
to conduct the fundamental purpose of estimating the
'intrinsic value' of a firm's <https://eduassistpro.github.io/>
→ requires an understanding of the firm's **Add WeChat edu_assist_pro**
➔ need to accumulate a 'tool kit' as the basis for developing the *pro forma*
Financial Statements

⇒ **projected** {
over the forecast horizon {
Balance Sheet (B/S)
Income Statement (I/S)
Statement of Cash Flows (SCF) }

➡ core inputs ➡ x g
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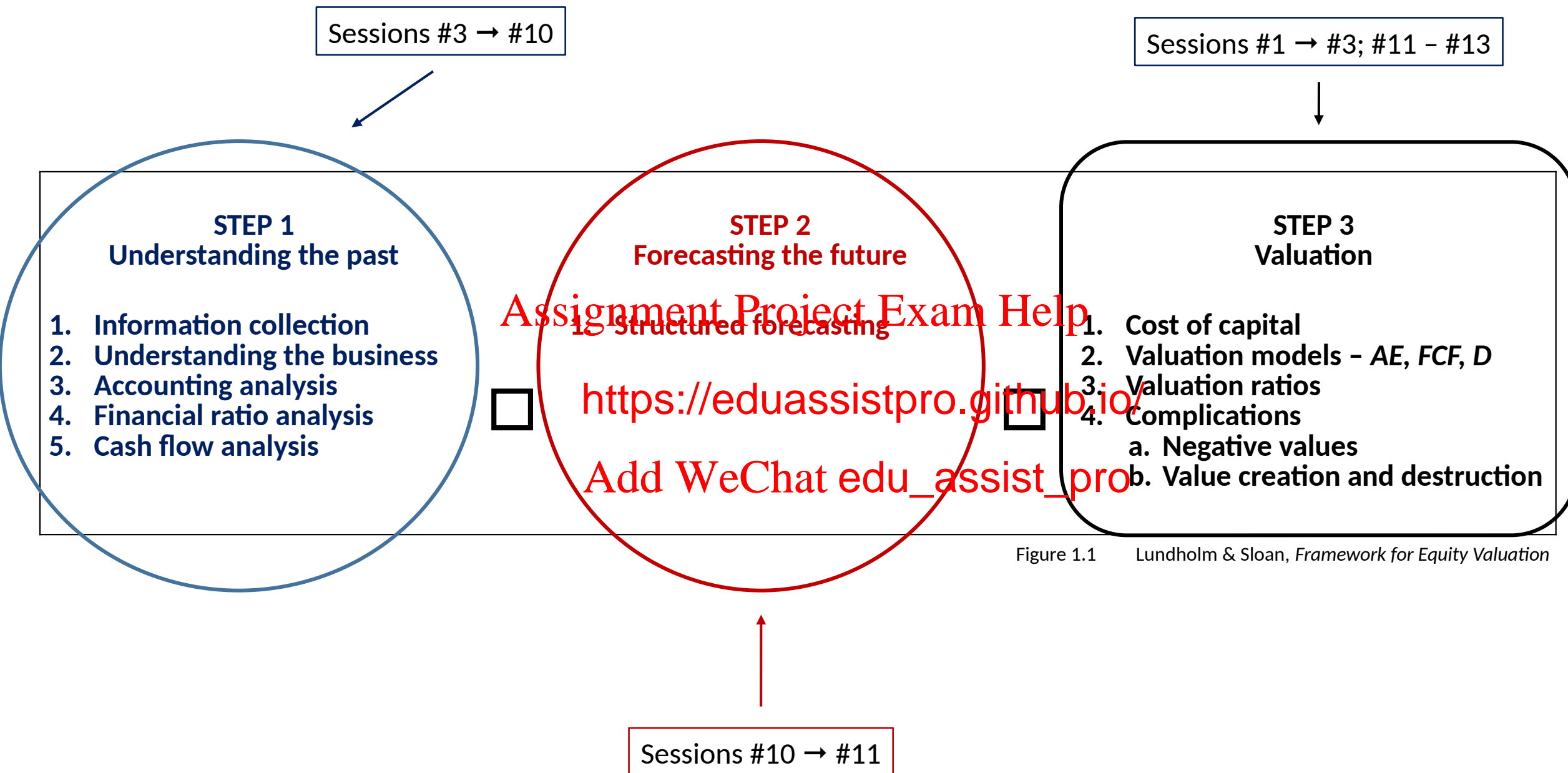
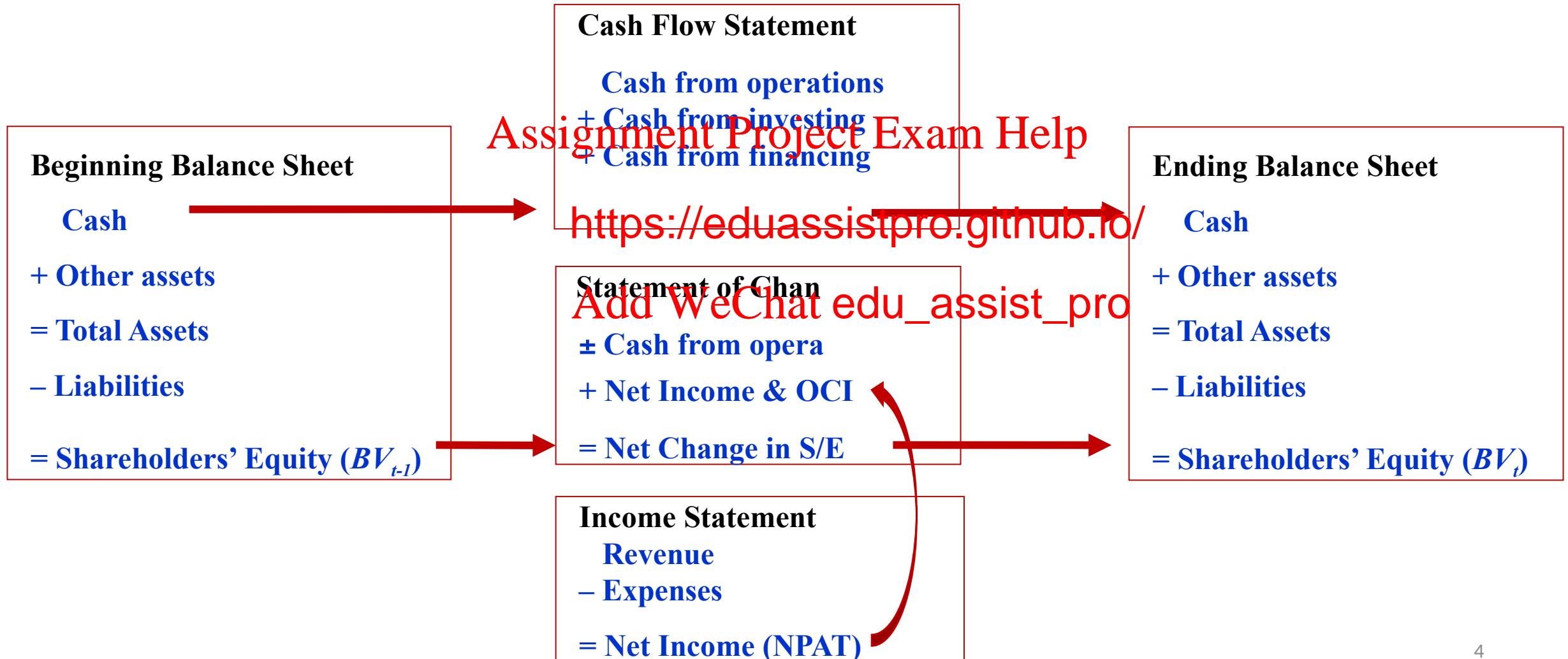


Figure 1.1 Lundholm & Sloan, *Framework for Equity Valuation*

‘articulation’ → Financial Statements constitute an **‘integrated system’**

beginning stock → flows → ending stock



What the reformulation process is **NOT**

- ❑ it does **not** involve adjusting or altering the reported numbers
- ❑ it does **not** involve creating new numbers or erasing numbers

clearly, material errors (whether unintentional or intentional = EM) need to be corrected e.g., restatement of F/S required by the relevant regulatory authority (ASIC, SEC, ...) – but this is not a part of the actual reformulation process

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What the reformulation process **IS**

- ✓ it takes the reported accounting numbers as given (subject to adjustment for errors)
- ✓ it then reclassifies or reorders the various reported accounts to put them into a structure that (hopefully) makes them more informative, and thereby facilitates better forecasts

- **Key Step** separate **operating** items/activities from **financing** items/activities

Why? companies generate value from their operations, not their financial activities

Summary – ‘new’ (reformulated) accounting relations:

☐ Balance Sheet:

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☐ Income Statement:

$CI = OI + NF$ (recall: NFE are negative)
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☐ Cash Flow Statement:

$$FCF = C + I = F + E$$

☐ Equity Statement:

$$\text{Change in S/E} = CI + E$$

■ Balance Sheet

operating assets (OA)
– operating liabilities (OL)

Net Operating Assets (NOA)

– financial assets (FA)
financial obligations (FO)

Net Financial Obligations (NFO)

$$S/E = NOA - NFO$$

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■ Income Statement

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Comprehensive Income (CI) = ~~Add Weight~~ [edu_assist_pro](https://eduassistpro.github.io/) Financial Expenses (NFE)

core operating income from sales
core other operating income
unusual operating income
operating OCI

core NFE
financial OCI

Core Operating Income from Sales (before tax)
Core Other Operating Income (before tax)
Unusual Operating Income (before tax)
Core Net Financial Expenses (before tax)
Profit Before Tax (PBT)
Tax Expense
Net Profit After Tax (NPAT)
Other Comprehensive Income
 operating OCI (after tax)
 financing OCI (after tax)
Comprehensive Income



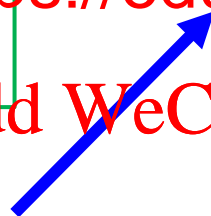
Tax Allocation:

- 1st tax shield from Net Financial Expenses
- 2nd tax on Unusual Operating Income
- 3rd tax on Core Other Operating Income
- ➔ 4th tax on Core Operating Income from Sales

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Operating Income (OI)
Core Operating Income from Sales (after tax)
Core Other Operating Income (after tax)
Unusual Operating Income (after tax)
Operating OCI (after tax)
Operating Income
Net Financial Expenses (NFE)
 financing expense (after tax)
Financing OCI (after tax)
Total Net Financial Expense
Comprehensive Income

Reformulated Statement of Cash Flows

Adjusted Cash flow from operations

C

Adjusted Cash investment in operating assets

I

Free Cash Flow (FCF)

$C + I$

Generation of FCF
from operating
activities

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Equity financing flows

dividends & share repurchases
share issuances

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(XX)

Debt financing flows

net purchase of financial assets
interest on financial assets (after tax)
net issue of debt
interest on debt (after tax)

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(XX)
XX
XX
(XX)

E

Total Financing cash flows

$E + F$

'Uses' of FCF in
financing activities

Reformulated Statement of Changes in Shareholders' Equity

Beginning Book Value of Common Equity

BV_{t-1}

+ Net effect of Transactions with Common Shareholders

+ capital contributions (share issues)

– share repurchases

– cash dividends to common shareholders

= Net cash contributions

+ Effect of operations and non-eq

+ Net Income (from the I/S)

+ Other Comprehensive Income (OCI)

– preferred share dividends

= Comprehensive income available to common shareholders

Ending Book Value of Common Equity

BV_t

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PART 2 – Profitability and Leverage (using the Reformulated F/S)

❑ *levered* view → from the perspective of the common shareholder ⇒ **ROCE**

ROCE (return on common equity) =

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return to c return after satisfying debt)

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❑ *unlevered* view → from the perspective of the firm ⇒ **RNOA**

RNOA (return on net operating assets) =

⇒ return to the firm (i.e., return on the net assets provided by both debt and equity)

Notes:

- while calculations are frequently based on average figures, the ratios can also be based on year-end or beginning-of-year figures depending upon circumstance

e.g., Coles was owned by Wesfarmers up until 2019 – there are no F/S prior to 2019 and hence 2019 ratios could only be based on year-end figures

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with the adoption of AASB16 (leases) in 2020, many of the figures in Coles F/S are non-comparable
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- since ROCE captures the ‘levered view’ whereas RNOA represents the ‘unlevered view’, ‘loosely’ the distinction between ROCE and RNOA is the treatment of financing

⇒ the link between ROCE and RNOA relates to how the firm is financed
(equally, the link between ROOA and RNOA relates to operating leverage)

from Session #2, slides 39 – 42

business risk "The equity risk that comes from the nature of the firm's operating activities"

⇒ in essence, the volatility or variability of the firm's operating income

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further, leverage (both operating and financial) **business risk**

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why? leverage serves to magnify profits in ‘good’ times *and*

leverage serves to magnify losses in ‘bad’ times

financial leverage → use of debt financing with fixed 'interest' payments

$$\text{ROCE} = \text{RNOA} + \text{FLEV} \times \underbrace{(\text{RNOA} - \text{NBC})}_{\text{operating spread}}$$

operating liability leverage → use of operating liabilities (OL) to finance OA

$$\text{RNOA} = \text{ROOA} + \underbrace{\text{OLLE}}_{\text{OL spread}} \times \text{OLLEV}$$

→ leverage, both financial (FLEV) and operating liability (OLLEV), magnifies profit (& loss) available to the common shareholder



financial leverage (FLEV)

Example #9-1 profitable firm

Net operating assets (NOA)	28,000
Net financial obligations (NFO)	<u>15,000</u>
Shareholders' Equity (S/E)	13,000
Operating income (OI)	2,000
Net Financial Expense (NFE)	<u>(500)</u>
Comprehensive Income (CI)	1,500

$$\text{RNOA} = 0.0714$$

$$\text{FLEV} = 1.1538$$

$$\text{NBC} = 0.0333$$

$$\begin{aligned}\text{ROCE} &= \text{RNOA} + \text{FLEV} \times (\text{RNOA} - \text{NBC}) \\ &= 0.0714 + 1.1538(0.0714 - 0.0333) = \mathbf{0.1154}\end{aligned}$$

$$\text{ROCE} = = = \mathbf{0.1154}$$

Example #9-2 loss firm

Net operating assets (NOA)	28,000
Net financial obligations (NFO)	<u>15,000</u>
Shareholders' Equity (S/E)	13,000
Operating income (OI)	(1,000)
Net Financial Expense (NFE)	<u>(500)</u>
Comprehensive Income (CI)	(1,500)

$$\text{RNOA} = .0357$$

$$\begin{aligned}\text{ROCE} &= \text{RNOA} + \text{FLEV} \times (\text{RNOA} - \text{NBC}) \\ &= 0.0357 + 1.1538(0.0357 - 0.0333) = \mathbf{0.1153}\end{aligned}$$

$$\text{ROCE} = = = \mathbf{0.1154}$$

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operating liability leverage (OLLEV)

Example #9-6 profitable firm

OA = 40,000	OL = 12,000	NOA = 28,000
FA = 2,000	FO = 17,000	NFO = 15,000
Shareholders' Equity (S/E)		13,000
Operating income (OI)		2,000
Net Financial Expense (NFE)		(500)
Comprehensive Income (CI)		1,500

OLLEV =

assume $STBC = 0.07(1 - 0.3) = 0.049$

→ implicit interest on OL = $12,000 * 0.049 = 588$

ROOA = 0.0647

$RNOA = ROOA + OOLEV(ROOA - STBC)$
 $= 0.0647 + 0.4286(0.0647 - 0.049) = 0.0714$

RNOA = 0.0714

Example #9-7 loss firm

OA = 40,000	OL = 12,000	NOA = 28,000
FA = 2,000	FO = 17,000	NFO = 15,000
Shareholders' Equity (S/E)		13,000
Operating income (OI)		(1,000)
Net Financial Expense (NFE)		(500)
Comprehensive Income (CI)		(1,500)

ROOA =

$RNOA = ROOA + OOLEV(ROOA - STBC)$
 $= + 0.4286(-0.049) =$

RNOA = 0.0357

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$0.07(1 - 0.3) = 0.049$

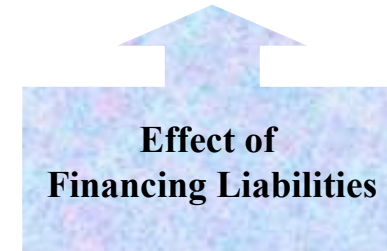
it interest on OL = $12,000 * 0.049 = 588$

Summing Financial Leverage and Operating Liability Leverage Effects on ROCE

$$\text{ROCE} = \text{ROOA} + (\text{RNOA} - \text{ROOA}) + (\text{ROCE} - \text{RNOA})$$



Effect of
Operating Liabilities



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profitable firm (examples #9-1 & #9-6) Add WeChat edu_assist_pro

$$0.1154 = 0.0647 + (0.0714 - 0.0647) + (0.1154 - 0.0714)$$

loss firm (examples #9-2 & #9-7)

$$-0.1154 = -0.0103 + (-0.0357 - 0.0103) + (-0.1154 - 0.0357)$$

⇒ clear benefits to the use of leverage for a profitable firm

Why then don't firms use more leverage, both operating and financial?

- ❑ by definition, leverage increases business risk by introducing fixed costs that must be satisfied in all instances (profit or loss)
- ❑ with more debt, the cost of capital increases (NFE ↑)
- ❑ ???

➔ in reality, it is highly unlikely that one element can be changed without affecting other elements within the system

PART 3 – ‘DuPont System’ & Reported vs Reformulated

$$\text{ROCE} = \text{RNOA} + \text{FLEV} \{ \text{RNOA} \text{ NBC} \}$$

‘first-level’ break down of ROCE

margin asset turnover

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given

RNOA = = profit

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$$\text{ROCE} = \{ \text{profit margin} \text{ asset turnover} \} + \{ \text{FLEV} \text{ spread} \}$$

‘second-level’ break down of ROCE

operations

financing

➡ notion of ‘DuPont’ analysis → decomposition of operating profitability

The standard presentation of the 'DuPont System' based on reported accounting numbers is:

$$ROE = ROA \times leverage$$

where $ROA = \text{profit}$

$\text{margin} \times \text{asset turnover}$

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** when employed 'outside' the DuPont system, ROA is more typically measured as:

→ based on the firm's profit after tax (available to all forms of resource providers i.e., debt and equity)

Notes for the 'DuPont System' based on AASB / IFRS financial statements:

- the system is based on NPAT as opposed to Comprehensive Income (CI)
- both operating and financial income are included in income figure (NPAT)
- total assets includes both operating and financial assets

but ... for example, we 'know' that returns on operating assets are quite different from those on financial a

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In contrast, the 'DuPont System' based on the re statements is as follows:

$$\begin{aligned} \text{ROCE} &= \text{RNOA} + \text{leverage} \times \\ &\{ \text{RNOA} - \text{NBC} \} \\ &\text{leverage} \times \{ \text{RNOA} - \\ &\text{NBC} \} \end{aligned}$$

⇒ under both sets of presentations (reported F/S & reformulated F/S)

return to the common shareholder = **return to the firm, adjusted for leverage**

■ **return to the firm: RNOA versus ROA**

expect ROA to be lower than RNOA (1963 – 2010: median RNOA = 10.5%, median ROA = 7.1%)

- ROA includes financial assets (FA) which earn a lower rate of return
- operating liability lever RNOA but not in ROA

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■ **leverage: versus** Add WeChat edu_assist_pro

expect D/E to be higher than FLEV (1963 – 2010: median D/E = 1.22, median FLEV = 0.43)

- D/E includes operating liabilities which create operating liability leverage (OLLEV) and financial liabilities which create financial leverage (FLEV)
- D/E excludes/ignores financial assets as an offset to financial liabilities

return to the firm: **RNOA** versus **ROA**

Penman Table 12.1

- the biggest differences between *RNOA* and *ROA* are for firms with the biggest investment in FA and the highest OLLEV

e.g., Microsoft

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DuPont System

→ 'second level'

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Penman Figure 12.3 Profit Margin and Asset Turnover Combinations by Industry, 1963-2000

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Note – a given RNOA (e.g., 14%) can be achieved from various combinations of PM and ATO

Penman Table 12.2

- median values for ratios underlying profitability by Industry, 1963-2000
- median ROCE = 12.2%
- median RNOA = 10.3%
- 'pipelines' vs 'food stores'
 - both have RNOA = 12%
 - Pipelines low ATO, high PM
 - Food stores high ATO, low PM
 - pipelines have higher FLEV
→ higher ROCE

	ROCE(%)	FLEV	OLLEV	RNOA(%)	PM(%)	ATO
Pipelines	17.1	1.093	0.154	12.0	27.8	0.40
Tobacco	15.8	0.307	0.272	14.0	9.3	1.70
Restaurants	15.6	0.313	0.306	14.2	5.0	2.83
Printing and publishing	14.6	0.154	0.374	13.6	6.5	2.20
Business services	14.6	0.056	0.488	13.5	5.2	2.95
Chemicals	14.3	0.198	0.352	13.4	7.1	1.91
Food stores	13.8	0.364	0.559	12.0	1.7	7.39
Trucking	13.8	0.641	0.419	10.1	3.8	2.88
Food products	13.7	0.414	0.350	12.1	4.4	2.74
Communications	13.4	0.743	0.284	9.1	12.5	0.76
General stores	13.2	0.389	0.457	11.3	3.5	3.55
Petroleum refining	12.6	0.359	0.487	11.2	6.0	1.96
Trans		0.369	0.422	11.2	4.5	2.47
Airli		0.341	0.516	9.0	4.3	1.99
Utilit		1.434	0.272	8.2	14.5	0.59
Wholesalers, non-durable goods		0.584	0.461	10.2	2.3	3.72
Paper products		0.436	0.296	10.2	5.9	1.74
Lumber		0.312	0.384	10.4	4.0	2.60
Apparel	11.6	0.408	0.317	10.1	4.0	2.55
Hotels	11.5	1.054	0.201	8.5	8.2	1.04
Shipping	11.4	0.793	0.205	9.1	12.6	0.61
Amusements and recreation	11.4	0.598	0.203	10.1	9.5	1.10
Building and construction	11.4	0.439	0.409	10.6	4.5	2.06
Wholesalers, durable goods	11.2	0.448	0.354	9.9	3.4	2.84
Textiles	10.4	0.423	0.266	9.3	4.3	2.09
Primary metals	9.9	0.424	0.338	9.4	5.0	1.80
Oil and gas extraction	9.1	0.395	0.263	8.3	13.0	0.57
Railroads	7.3	0.556	0.362	7.1	9.7	0.78

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Penman E12.7

Using **average** B/S amounts, calculate

- RNOA and NBC
- FLEV
- Show that the financing leverage equation explaining ROCE holds
- Calculate profit margin and asset turnover (ATO) for 2007
- Show $RNOA = PM \times ATO$
- Calculate the gross margin ratio, the operating profit margin ratio, and the operating profit margin from sales ratio

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Summary balance sheets for 2007 and 2006 are as follows (in millions):

	2007	2006
Net operating assets	\$26,858	\$18,952
Net financial obligations	5,114	2,032
Common shareholders' equity	<u>\$21,744</u>	<u>\$16,920</u>

$$\text{RNOA} = 0.2672$$

$$\text{NBC} = 0.0392$$

$$\text{FLEV} = 0.1848$$

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$$\text{ROCE} = \text{RNOA} + \text{FLEV} \times (\text{RNOA} - \text{NBC}) = 0.2672 + 0.1848 \times (0.2672 - 0.0392) = 0.3093$$

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$$\text{ROCE} = 0.3094$$

$$\text{RNOA} = 0.2672$$

$$\text{ATO} =$$

$$\text{operating profit margin} = = 0.2121$$

$$\text{RNOA} = \text{PM} \times \text{ATO} = 0.2121 \times 0.2672 = 0.0567$$

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$$\text{gross profit margin} = = 0.6394$$

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$$\text{operating profit margin from sales} = = 0.1$$

$$\text{operating profit margin} = = 0.2121$$

PART 4 – Deeper Insights into Profitability

$$\text{ROCE} = \text{RNOA} + \text{FLEV} \{ \text{RNOA} - \text{NBC} \}$$

where

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RNOA = profit margin

asset turnover

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both profit margin and asset turnover can be broken down further into their underlying components to gain deeper insights into the 'drivers' of profitability

disaggregation of 'profit margin'

$$OI = \{sales - COGS\}$$


*- [administrative expenses + other operating expenses + depreciation expense]
+ other operating income + unusual operating income
- tax expense*

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⇒ profit margin

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- - - + + -

Note – there is no 'right' or 'wrong' level of disaggregation – it could, for example, also be done by 'product' and/or 'line of business' and/or further disaggregation of Other and Unusual OI whatever provides the greatest insights into the drivers of profitability

disaggregation of 'total asset turnover'

$$\text{NOA} = \{\text{operating cash} + \text{receivables} + \text{inventory} + \text{property \& plant}\} \\ - [\text{accounts payable} + \text{accrued liabilities}]$$

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asset turnover =

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⇒ + + + - -

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DuPont System → 'second level'

'third level'



Penman Table 12.3

- Second and third level breakdown

Nike & General Mills,
2009 – 2010

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second level $RNOA = \text{profit margin} \times \text{asset turnover}$

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profit margin	ATO	30.623 ✓	Add WeChat edu_assist_pro	10.096 ✓	4.058 ✓
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third level profit margin

	Nike		General Mills	
	2010	2009	2010	2009
Second Level				
RNOA	30.6%	28.4%	10.1%	4.1%
Profit margin	9.54%	8.99%	7.95%	3.41%
Asset turnover	<u>1.27</u>	<u>1.19</u>	<u>1.27</u>	<u>1.19</u>

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Actual net (rounding!)

9.6✓

9✓

7.9✓

3.3✓

third level
asset turnover

	Nike		General Mills	
	2010	2009	2010	2009
Second Level				
RNOA	30.6%	28.4%	10.1%	4.1%
Profit margin	9.54%	8.99%	7.95%	3.41%
Asset turnover	<u>3.21</u>	<u>3.16</u>	<u>1.27</u>	<u>1.19</u>

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Actual net (rounding!)

0.313✓

0.317✓

0.785✓

0.841✓

Inverse = ATO

3.195

3.155

1.274

1.189

Summary:

Nike

	RNOA	Profit Margin	Asset Turnover
2010	30.6%	9.54%	3.21
2009	28.4%	8.99%	3.16
	↑ 2.2%	↑ 0.55%	↑ 0.05

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General Mills

	RNOA	t Margin	Asset Turnover
2010	10.1%	.95%	1.27
2009	4.1%	3.41%	1.19
	↑ 6.0%	↑ 4.54%	↑ 0.08

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⇒ for both firms, increase in RNOA largely through an increased profit margin

Further applications / insights illustrated

1. If Nike could increase its Accounts Receivable turnover from 6.85 to General Mill's level of 15.15 while maintaining the current level of sales and all else remaining unchanged, how would its RNOA change?

2010: $= 0.146$ \rightarrow A/R turnover = 6.85 =

new: A/R turno $\frac{15.15}{15.15} = 0.066$ <https://eduassistpro.github.io/>

based on figures provided $= 0.311$ \rightarrow TO = 3.21

revised $0.311 - (0.146 - 0.066) = 0.231 \rightarrow$ ATO = 4.33

\Rightarrow RNOA = 0.954 \rightarrow 41.3% (up from 30.6%)

1. If Nike could increase its Accounts Receivable turnover from 6.85 to General Mill's level of 15.15 while maintaining the current level of sales and all else remaining unchanged, how would its RNOA change?

→ RNOA = 0.954 → 41.3% (up from 30.6%)

feasible / realistic ?

current collection period = $365 / 6.85 = 53.3$ days revised = $365 / 15.15 = 24.1$ days

→ more stringent cr <https://eduassistpro.github.io/>

⇒ would expect sales ↓ or sales discount margin ↓)

bad debt expense ↓ → A/R ↑ → A/R turnover ↓

→ unlikely that A/R turnover can be changed in isolation

(and if feasible, why hasn't the change already been made?)

2. If Nike's gross margin ratio dropped from 46.3% to 44.9% because of increased production costs, what would happen to its RNOA given a tax rate of 36.3%?

Gross Margin ↓ 1.4% pre-tax → $(1 - 0.363) = 0.89\%$ ↓ post tax

→ Profit Margin ↓ 0.89%

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$\Delta \text{RNOA} = -0.89 \div 3.16 =$ %

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again, is it likely that only one account is affected?

Increased production costs ⇒ accounts payable ↑ ??

inventory ↑ ??

ultimately sales price ↑ and sales ↓ ??

???

PART 5 – Coles

- 2020 ratios based on reformulated F/S and year-end B/S figures (given AASB 16)
- **1st step** (slides #45 - #47)
 - financial leverage equation $ROCE = RNOA + FLEV \times (RNOA - NBC)$
 - DuPont System $RNOA = PM \times ATC$
 - operating liability leverage equation $ROOA + OLLEV \times (ROOA - STBC)$
- **2nd step – profit margin drivers** (slide #48)
- **3rd step – asset turnover drivers** (slide #49)

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Coles Reformulated Income Statement		2020
Sales Revenue		37,408
Cost of sales		<u>(28,043)</u>
Gross Margin		9,365
Administrative expenses		<u>(8,122)</u>
Core Income from Sales (before tax)		1,243
Tax expense		<u>(318.2)</u>
Core Income from Sales (after tax)		924.8
Core Other Operating Income	⁴⁾	334.6
Core Unusual Operating Income (after tax) (41 –		<u>28.7</u>
Operating Income after Tax		1,288.1
Financing costs		
Core NFE (after tax)	310.1	
Financing OCI (after tax)	12	<u>(322.1)</u>
Total Comprehensive Income		966

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Coles Reformulated B/S	2020
Operating Assets	
cash & cash equivalents	187
receivables	434
inventories	2,166
assets held for resale	75
other assets	190
property, plant & equipment	4,127
right-of-use assets	7,660
intangible assets	1,577
deferred tax assets	
equity accounted investments	
Total Operating Assets (OA)	
Operating Liabilities	
trade payables	3,737
provisions	1,333
other	<u>227</u>
Total Operating Liabilities (OL)	5,297
Net Operating Assets (NOA)	12,205

	2020
Financial Assets	
financial cash	805
income tax receivable	<u>42</u>
Total Financial Assets (FA)	847
Financial Obligations	
interest-bearing liabilities	1,354

	<u>9,083</u>
Total Financial Obligations (FO)	10,437
Net Financial Obligations (NFO)	9,590
Shareholders' Equity	
contributed equity	1,611
reserves	43
retained earnings	<u>961</u>
Total Equity	2,615

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$$\text{RNOA} = 0.1055$$

$$\text{NBC} = 0.0336$$

$$\text{FLEV} = 3.6673$$

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$$\text{ROCE} = \text{RNOA} + \text{FLEV} \times (\text{RNOA} - \text{NBC}) = 0.1055 + 3.6673 \times (0.1055 - 0.0336) = 0.3694$$

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$$\text{ROCE} = 0.3694$$

$$\text{RNOA} = 0.1055$$

$$\text{ATO} = 0650$$

$$\text{operating profit margin} = 0.0344$$

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$$\text{RNOA} = \text{PM} \times \text{ATO} = 0.0344 \times 3.0650 = 0.1055$$

$$\text{OLLEV} = 0.4340$$

assume after-tax STBC = 0.025

$$\text{Implicit interest on OL} = 5,297 @ 0.025 = 132.425$$

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$$\text{ROOA} = 0.0812$$

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$$\text{RNOA} = \text{ROOA} + \text{OLLEV} \times (\text{ROOA} - \text{STBC}) = 0.0812 + 0.4340 (0.0812 - 0.025) = 0.1056$$

$$\text{RNOA} = 0.1055$$

Profit Margin Drivers			% of sales
	Sales Revenue	37,408	1.0000
	Cost of sales	<u>(28,043)</u>	<u>(0.7497)</u>
	Gross Margin	9,365	0.2503
	Administrative expenses	<u>(8,122)</u>	(0.2171)
	Core Income from Sales (before tax)	1,243	0.0332
	Tax expense	<u>(318.2)</u>	(0.0085)
	Core Income from Sales (after tax)	924.8	0.0247
	Core Other Operating Income (334.6	0.0089
	Core Unusual Operating Income (after tax)	<u>.7</u>	0.0008
	Operating Income after Tax	8.1	0.0344
	Financing costs		
	Core NFE (after tax)	310.1	(0.0083)
	Financing OCI (after tax)	<u>12</u>	<u>(0.0003)</u>
	Total Comprehensive Income	966	0.0258

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Asset Turnover Drivers		turnover = sales / item	inverse = item / sales
Operating Assets			
cash & cash equivalents	187	200.043	0.0050
receivables	434	86.194	0.0116
inventories	2,166	17.271	0.0579
assets held for resale	75	498.773	0.0020
other assets	190	196.884	0.0051
property, plant & equipment	4,127	9.064	0.1103
right-of-use assets			0.2048
intangible assets			0.0427
deferred tax assets	849		0.0227
equity accounted investments	<u>217</u>		0.0058
Total Operating Assets (OA)	17,502	2.137	0.4679
Operating Liabilities			
trade payables	3,737	10.010	0.0999
provisions	1,333	28.063	0.0356
other	<u>227</u>	164.793	0.0061
Total Operating Liabilities (OL)	5,297	7.062	0.1416
Net Operating Assets (NOA)	12,205	3.065	0.3263

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Aside: Microsoft Corporation, 2003

NOA	12,829	OI	6,277
<u>NFA</u>	<u>36,906</u>	<u>NFI</u>	<u>1,548</u>
S/E	49,735	CI	7,825

Why is ROCE < RNOA

NOA earn 48.93%

NFA earn 4.19%

→ investments in NFA reduces the shareholders' rate of return

RNOA = 0.4893

FLEV = -0.7421

RNFA

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ROCE = = = 0.1573

$$\text{ROCE} = \text{RNOA} + \text{FLEV} \times (\text{RNOA} - \text{NBC}) = 0.4893 - 0.7421(0.4893 - 0.0419) = 0.1573$$

What if Microsoft paid a special dividend of \$33 billion (as it did in 2004) by selling financial assets?

NOA	12,829
NFA	<u>3,906</u>
S/E	16,735

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new FLEV = -0.233 <https://eduassistpro.github.io/>

ROCE = 0.4893% - 0.233(0.4893 - 0.041) [Add WeChat edu_assist_pro](#)

PART 6 – Forecasting & Valuation

Objective of the forecasting exercise

- to develop objective and realistic expectations of future value-relevant payoffs

How to achieve this?

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- develop *pro forma* F/S containing _____ of the firm's future operating, investing, and financing activities <https://eduassistpro.github.io/> or conservative nor optimistic
- *pro forma* F/S should be comprehensive – consider the growth rate for each item, not just assume items will grow at a constant rate with sales [Add WeChat edu_assist_pro](#)
- need to make consistent assumptions and maintain the relation between items in the *pro forma* F/S (i.e., the F/S represent an integrated system, both reported and *pro forma*)
- use external information to ensure that assumptions are realistic

Steps comprising the Forecasting Exercise

Income Statement:

- Step 1: Forecast Sales
- Step 2: Forecast Core OI from Sales (before tax)
- Step 3: Forecast Core Othe
- Step 4: Calculate OI (befor
- Step 5: Forecast Income Tax Expense after
- Step 6: Calculate OI (after tax)

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Balance Sheet:

- Step 7: Forecast OA and OL to obtain a forecast of NOA

Unlevered Valuation → valuing the firm

- Step 8: Calculate RNOA, FCF and residual operating income (ReOI)
- Step 9: Estimate the DCF and ReOI models with assumed terminal growth rate and firm's weighted average cost of capital (WACC) → overall value of the firm
- Step 10: Forecast Leverage and NFE (after tax)
- Step 11: Calculate $CI = OI - NFE$ (after tax) $CSE = NOA - NFO$
- Step 12: Forecast Dividends (

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Levered Valuation → valuing common equity (value of common shares)

- Step 13: Calculate RI (residual income or abnormal earnings)
- Step 14: Estimate the DDM and RI models with assumed terminal growth rate (g) and cost of equity capital (k) → value of the firm to the common shareholder

Implementing the forecasting steps

- be aware that the steps are integrated and interdependent
- the amounts in each of the *pro forma* F/S need to agree with each other – be aware of the interrelations between the financial statements
- need some flexible accounts that expand or decrease in response to changes in activities; working through the *pro forma* process, which in turn may result in the need for more than one iteration
- quality of forecast financial information is a direct reflection of the quality of forecast assumptions
- sensitivity analysis should be conducted on the *pro forma* statements

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Step 1: Forecast Sales

sales 'drive' the system !!

- ✓ the sales forecast is the starting point and typically requires the greatest attention during the forecasting process [Assignment Project Exam Help](#)
- ✓ a consideration of historical sales <https://eduassistpro.github.io/> starting point *BUT* need to develop a thorough understanding of the business environment to make meaningful sales forecasts [Add WeChat edu_assist_pro](#)
 - ➔ the firm's business strategy
 - the market for the firm's products
 - the firm's marketing plan
 - how the broader economic factors and the industry dynamics affect the business

1. the firm's business strategy *e.g.*,

- what lines of business is the firm likely to be in?
- is the firm likely to develop new products?
- what stage in their 'lifecycle' are the firm's products at?
- what is the firm's acquisition and takeover strategy?

2. the market for the firm's products *e.g.*,

- is consumer behaviour?
- what is the 'elasticity of demand'?
- are new products likely to emerge that could displace current product line?
- are substitute products a material threat?

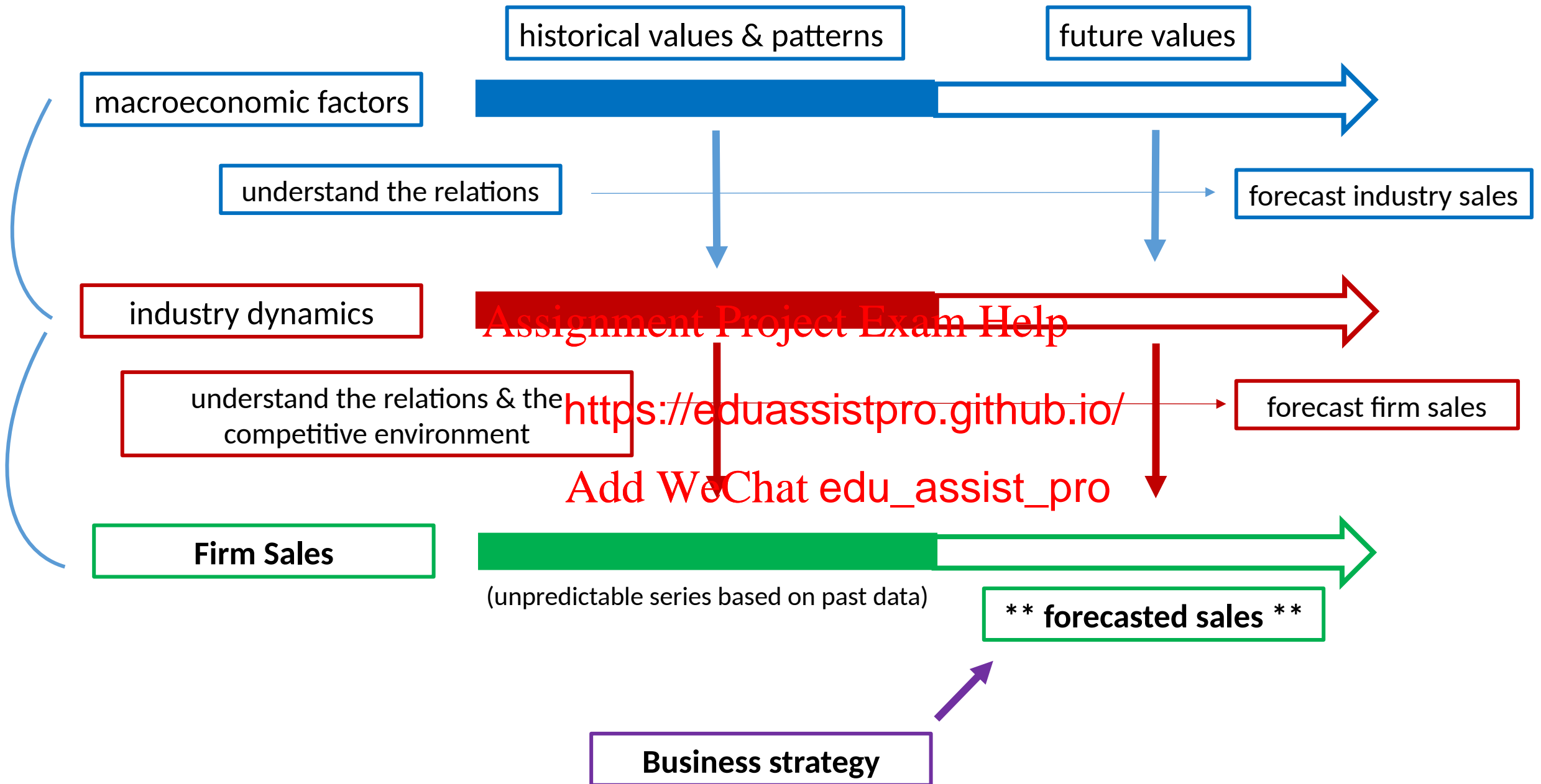
3. The firm's marketing plan *e.g.*,

- is the market for the firm's products expanding, or are new markets opening up?
- what is the firm's pricing strategy (cost leadership; differentiation; focus)?
- what is the firm's advertising strategy?
- does the firm have, or can it develop and maintain brand names (or other intangibles)?

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‘end product’ ⇒ forecast of future sales

considerations / constraints include –

- ❑ ‘regression to mean’ phenomenon
- ❑ appropriate forecast horizon
- ❑ appropriate ‘terminal growth rate’
- ❑ sustainable growth rate

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1) 'regression to mean' phenomenon

- ❑ company performance tends to be 'mean-reverting'
 - companies with above average performance tend to experience a decline in profitability/growth
 - companies with below average performance experience an improvement
- ❑ mean-reversion suggests that most companies reach a **steady state** where their sales growth, RNOA, and other performance metrics 'flatten out'

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❑ why does mean reversion happen?

The answer can be seen through the lens of 'Porter's five forces' coupled with opportunity

- *threat of new entrants*: competitors enter markets that are profitable and exit markets that are unprofitable
- *power of suppliers*: suppliers might consolidate or find new markets for their products, and so become more powerful
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- *threat of substitutes*: high profits encourage the development of substitute products (e.g., Skype versus long-distance telephone calls)
- companies tend to run out of growth opportunities as they mature e.g., Walmart

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PART 7 – Forecasting (cont)

2) appropriate forecast horizon

- ❑ usual approach - sales are forecasted for a finite period at which point a 'steady state growth rate' is established
- ❑ the question that arises is around how long the forecast horizon be
 - usually forecast out as many years as the estimates are reliable – stop once the point where can't estimate stable growth is reached
- ❑ the forecast horizon is also the period during which the firm has a competitive advantage i.e., the period over which the returns are positive.
- ❑ stable growth achieved when:
 - constant sales growth rate
 - margins constant – this means that expenses grow at the same constant rate as sales
 - turnover ratios constant
 - financial leverage ratios constant

- ❑ business/industry life cycle will likely impact on forecast horizon.
 - mature industry – shorter forecast horizon since growth more likely to be stable
 - high growth firms – forecast horizon likely to be longer as less likely that the above factors will be constant
 - *sales growth* – affected by industry wide growth as well as firm's growth in market share; also affected by macroeconomic factors
 - *profit margin* – results from a number of factors
 - *turnover* – tend to be fairly stable over time
 - *leverage* – unlikely to influence forecast horizon
- ➔ ideally, would like to make year-by-year forecasts until the company reaches a steady state, at which point the company's sales growth rate should approximate the 'terminal growth rate' (g) – however, there is also the question of 'practicality'

To illustrate the importance of forecasting to the point of 'steady state', consider the following forecasted data for a 'hypothetical' company

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	1,000	1,300	1,625	2,035.5	2,420.3	2,774.4
%△ Sales		30.00%	27.08%	23.21%	18.91%	14.63%
OI	600.0	764.4	951.9	1,149.5	1,339.4	1,504.7
margin	60.00%	58.47%	58.47%	55.34%	55.34%	54.24%
NOA	400.0	520.6	660.8	842.1	968.1	1,109.8
%△ NOA		30.00%	27.08%	23.21%	18.91%	14.63%
ReOI		724.4	899.9	1,083.4	1,258.0	1,407.9
%△ ReOI			24.23%	20.38%	16.12%	11.91%
FCF		644.4	811.1	996.1	1,185.5	1,363.1
%△ FCF			25.88%	22.80%	19.02%	14.98%

Assume that a “sensible” terminal growth rate for both ReOI and FCF is 3%, and the company’s WACC is 10%

Implications of using a 5-year forecast horizon

- growth in ReOI drops abruptly from 11.91% in year 5 to 3% in year 6
- growth in FCF drops abruptly to 3% in year 6
- using the FCF valuation model, $V = \$16,111$
- using the ReOI valuation model, $V = \$17,212.8$
 - the undesirable outcome of different valuation estimates

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Alternatively, if the forecast horizon is extended to the point where sales, OI, and NOA are growing at (approximately) the terminal growth rate – here for illustrative purposes, 10 years

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Sales	1,000	1,300	1,625	2,035.5	2,420.3	2,774.4	3,072.8	3,303.6	3,468.2	3,577.1	3,684.4
%△ Sales		30.00%	27.08%	23.21%	18.91%	14.63%	10.75%	7.51%	4.98%	3.14%	3.00%
OI	600.0	764.4	951.9	1,149.5	1,339.4	1,504.7	1,633.2	1,720.7	1,770.3	1,789.4	1,842.2
margin	60.00%	58.80%	57.62%	56.47%	55.34%	54.24%	53.15%	52.09%	51.05%	50.02%	50.00%
NOA	400.0	520.0	660.8	814.2	968.1	1,109.8	1,229.1	1,321.4	1,387.3	1,430.8	1,473.8
%△ NOA		30.00%	27.08%	23.21%	18.91%	14.63%	10.75%	7.51%	4.98%	3.14%	3.00%
ReOI		724.4	899.9				22.2	1,597.8	1,638.2	1,650.7	1,699.1
%△ ReOI			24.23%				2%	4.97%	2.53%	0.76%	2.93%
FCF		644.4	811.1	996.1	1,185.5			1,628.4	1,704.5	1,745.9	1,799.3
%△ FCF			25.88%	22.80%	19.02%			7.57%	4.67%	2.43%	3.06%

⇒ by year 10, growth rates in sales, OI, and NOA (and thereby ReOI and FCF) have systematically converged to the ‘terminal growth’ rate

the valuation estimate is the same based on both models (\$17,787.3)

the valuation estimate is higher than based on only 5 years of forecasts → missed value by not forecasting long enough

⇒ In the ideal, it is desirable to forecast on a year-by-year basis until the steady state growth rate has been reached ... **BUT** ... again there is the mitigating factor of ‘practicality’

finally and to re-iterate, both macroeconomic factors and industry dynamics have an important role in the process of forecasting sales

Industry growth

- key determinant in forecast
- attempt to identify variable
- industry data needs to be predictable
- need strong links to the firm’s sales
- factors include demographic trends, nominal GDP growth, competition, market share

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Competitive advantage

- often a factor that is over-estimated
- rare to have indefinitely sustainable competitive advantage (monopoly)

3) appropriate 'terminal growth rate'

- ❑ sales growth – terminal growth rate cannot exceed long-run expected economy-wide growth rate (e.g., nominal GDP growth)
 - if terminal growth rate $>$ economy-wide growth rate, company will outgrow economy
 - if the terminal growth rate $<$ economy-wide growth rate, company will shrink
 - often safe to assume that the company will continue to grow at the long-term economy-wide growth rate
- ❑ guidelines for margins, turnover, and leverage relations with *ROCE* provides a useful basis for analysis – however, their obvious – need to justify assumed growth rates
- remember, *ROCE* is mean reverting (as is *RNOA*); thus, it is reasonable to assume that *ROCE* will move towards the cost of equity capital over time
- if a firm is operating in a long-run competitive equilibrium and there is a relatively close link between *ROCE* and economic rate of return, the terminal *ROCE* growth rate should equal the cost of equity capital

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4) sustainable growth rate, g^*

the sustainable growth rate indicates the maximum rate at which a firm can grow without additional external financing, given its current level of profitability and dividend policy

$g^* = \text{ROCE} \times \text{earnings retention rate}$

$$= \{(\text{profit margin} \times \text{asset turnover} - \text{dividend payout ratio}) \times \text{earnings retention rate}\}$$

\Rightarrow the rate at which the firm can “safely” grow without changing any of these factors

i.e., if the firm wishes to grow at a rate exceeding g^* then it must either turn to external financial markets for additional support, or generate/retain more internally (improved profit margin, improved asset turnover, and/or reduce payout ratio)

HOWEVER

- the profit margin may be relatively inflexible
- dividend policy is typically viewed as “sticky”

⇒ may only have asset turnover and leverage (use of additional debt or equity financing) as the available ways in which to support growth in excess of g^*

Thus, if a firm's forecasted sales growth rate exceeds its sustainable growth rate (g^*), it is useful to try and understand how the additional growth will be financed

- ❑ one possibility is through increased internal financing; however, if the increased profitability is not achieved, the growth plan is curtailed
- ❑ alternatively, the additional growth may be financed externally through new debt and/or equity; this also introduces uncertainty because advance planning is required and capital markets must be receptive to the firm's growth plans
- ❑ a final option is for the firm to cut its dividend payout ratio; however, given that average dividend payout ratios are close to zero for growth firms, this final option is often not available

$$g^* = \{(\text{profit margin} \times \text{asset turnover}) + \text{FLEV} (\text{RNOA} - \text{NBC})\} \times \text{earnings retention rate}$$

Note, the sustainable growth rate also provides a crude starting point for a growth estimate i.e., assuming the firm pays out the same proportion of profits each year, dividends and earnings will both grow by the following rate (all else held equal including feasibility):

$$g = \text{RR} \times \text{ROCE} \quad \text{where RR} = \text{retention rate and ROE} = \text{return on equity}$$

Based on the reformulated F/S, t for the payout ratio is:

comprehensive dividend payout ratio

E = net transactions with shareholders (see reformulated Statement of Cash Flows or Statement of Changes in Shareholders' Equity)

CI = comprehensive income

note – requires $CI > 0$ (a profitable firm)

Coles 2020

sales	37,408	dividends	873
OI	1,288.1	repurchases	17
CI	966	share-based exp	<u>(13)</u>
NOA	12,205	E	<u>877</u>

$$\text{RNOA} = 0.1055$$

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$$\text{ATO} = 0.650$$

$$\text{operating PM} = 0.0344$$

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$$\text{payout ratio} = 0.9079 \quad \rightarrow \quad \text{retention rate} = (1 - 0.9079) = 0.0921$$

$$\text{sustainable growth rate } g^* = 0.3694 \times 0.0921 = 0.0340$$

Coles 2020

sustainable growth rate $g^* = 0.3694 \times 0.0921 = 0.0340$

sales	2019	38,176
	2020	37,408

→ sales growth = 0.0201

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⇒ actual sales growth < of surplus cash during period
formulated SCF, FCF = 2,185)

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→ can retain 'surplus cash' for future investment
(debt and equity) return to resource providers

from the reformulated Statement of Cash Flows

F = (1,308) including net repayment of borrowings = 106 million

E = (877) including repurchase of shares = 17 million

from the reformulated Balance Sheet, 'financing cash' increased by \$56 million

PART 8 – Summary

overarching objective:

to conduct fundamental value for the purpose of estimating the ‘intrinsic value’ of a firm’s common shares

→ requires an understanding of the firm’s ‘value drivers’

→ need to accumulate a ‘tool kit’ as the basis for developing the *pro forma Financial Statement*

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STEP 1 Understanding the past

1. Information collection
2. Understanding the business
3. Accounting analysis
4. Financial ratio analysis
5. Cash flow analysis



STEP 2 Forecasting the future

1. Structured forecasting
2. Income Statement forecasts
3. Balance sheet forecasts
4. Cash flow forecasts



STEP 3 Valuation

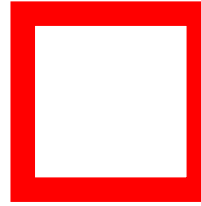
1. Cost of capital
2. Valuation models – AE, FCF, D
3. Valuation ratios
4. Complications
 - a. Negative values
 - b. Value creation and destruction

external environment ✓

- economic prospects
- macroeconomic factors
- socio-cultural forces
- political / regulatory

Analysis of Financial Statements ✓

- understanding current F/S
- re-formulating the F/S
- accounting quality
- ratio analysis



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Industry dynamics ✓

→ Porter's five forces

(suppliers, buyers, new entrants, substitutes, rivalry)

- analysts' reports
- management forecasts
- financial press
- ???