ACCT7106 – Session #9: Ratio Analysis

PART 1 – Background

overarching objective:

to conduct the fundamental ‘intrinsic value’ of a firm’s **purpose of estimating the**

- ➞ requires an understanding of the firm’s ‘’

  - ➞ need to accumulate a ‘tool kit’ as the basis for developing the *pro forma Financial Statements*

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

➡ core inputs → x g

Sessions #3 → #10

Sessions #1 → #3; #11 – #13

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

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

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

Sessions #10 → #11

- Financial Statements – AASB 101:
  - Balance Sheet
  - Income Statement *and/or* Statement of Comprehensive Income
  - Statement of Changes in Equity
  - Statement of Cash Flows
  - Notes to the financial statements

- building blocks → definitio

- accounting principles → AASB / IFRS rules ounting decisions/choices

- recognition (item to F/S) *versus* disclosure (n

- 'accountability' & 'stewardship'
  - ***'accountability'*** → preservation by management of the resources entrusted to them
  - ***'stewardship'*** → efficient use by management of resources entrusted to them (earning a return)

'articulation' ⇢ Financial Statements constitute an ***'integrated system'***

beginning stock → *flows* → *ending stock*

Beginning Balance Sheet

Cash

+ Other assets

= Total Assets

– Liabilities

= Shareholders' Equity (BV_{t-1})

Cash Flow Statement

Cash from operations
+ Cash from investing
+ Cash from financing

= Net change in cash

Statement of Changes in S/E

+ Net Income & O

= Net Change in S/E

Income Statement

Revenue

– Expenses

= Net Income (NPAT)

Ending Balance Sheet

Cash

+ Other assets

= Total Assets

– Liabilities

= Shareholders' Equity (BV_t)

Reformulation

- **Objectives:**
  - separate **operating** activities from **financing** activities
    - *Operations*: buying and selling goods and services
    - *Financing*: the company's use of debt and equity to finance its operations, as well as the company's investment in financial assets

    Why? industrial companie ir operations, not from their financial activities

  - alter several accounting classifications
  - for the Income Statement, separate revenues and expenses based on their *driver* (sales volume or other), and whether they are recurring or non-recurring
  - for Statement of Cash Flows, separate operating from financing activities; determine free cash flows → operations-related cash flows split by operating versus investing; and separate equity and debt financing cash flows

Accounting Quality / Earnings Management

- **definition:** ***earnings quality***

  a firm's ***reported earnings*** *number is said to be of* ***high quality*** *if it accurately and reliably measures current economic value-added and is a good predictor of economic value likely to be added in the future*

- ***earnings management***

  ⇒ *choices by manag* *as in a systematic direction*

- **mechanisms available to manage earnings:**
  - ***accounting-based*** → selection and/or application of accounting principles
  - ***real activities management*** → business strategy / operations

*** **the identification of statements materially affected by earnings management activity is critical when deciding whether to rely on the Financial Statements as a basis for developing forecasts of the firm's future financial performance**

⇒ ongoing debate – ‘rules-based’ *versus* ‘principles-based’

rules-based

- ⇨ accounting standards prescribe in detail exactly how to account for various items and situations without providing discretion
  - → more limited scope for earnings management type behaviour *BUT* also limited opportunity for management to use accounting policy choice as a means of communication

principles-based

- ⇨ accounting standards provide guidance on items and situations should be accounted for, but also provide flexibility for management to exercise judgement within the spirit of the guidance
  - → more opportunity for management to use accounting policy choice as a means of communication *BUT* also increased scope for earnings management type behaviour

→ debate about trade-offs between costs and benefits of allowing discretion

The 3 basic questions that frame the notion of "*power to detect*" are the following:

1. Where is it most "profitable" to look?

- under what set of circumstances is earnings management activity most likely to occur?
- which firms are the most suspicious (in the most suspicious circumstances)?
- what are management's incentives? (earnings targets? contractual obligations? compensation?)

i.e., small positive earnings; small earnings increases; earnings volatility (smooth earnings)

2. What should be examined?

→ what should the search focus on? what element most likely to utilize to accomplish the earnings management?

i.e., accounting (accruals); real activities

3. How should the investigation be conducted? → technique(s)?

****** our focus – accounting statements (especially Income Statement) → *accruals* ******

e 18.2 – Diagnostics to Detect Manipulation of Operating Income

tigate the quality of sales revenue
tigate the quality of core expenses
tigate unusual items

note – much of the investigation will involve ratios (value of one account(s) relative to value of another account(s))

Step #1

Step #2

Step #3

PART 2 – Financial Statement Analysis (in general)

- intended to shed light on how well a company is doing in achieving its objectives
  - ✓ earning a satisfactory return on investment
  - ✓ maintaining a sound financial position i.e., owners want capital protected from more than normal amount of risk

- structure of analysis – an exa ps between items in the F/S

  - ⇒ in absolute terms

    changes over a period of time

    relative to other firms (in same industry)

- three basic techniques for analysing the Financial Statements
  - → ratio analysis

    common-size financial statements

    trend (indexed) financial statements

1) Financial Ratios → 5 basic categories of commonly used ratios (some overlap)

a) liquidity ratios ⇒ access to cash to pay bills

b) leverage ratios ⇒ dependency on debt financing & ability to make interest payments

c) profitability ratios ⇒ earnings relative to sales, S/E, assets, etc.

d) activity ratios ⇒ emphasis on productivity of assets

e) market ratios ⇒ based on market value information (e.g., price-earnings (P/E), market-to book ratio (M/B))

2) Common Size Financial Stat

- express accounts on the B/S as a % of total assets
- express accounts on the I/S as a % of sales (total rev

⇒ can compare relative weights of various accounts across firms or with industry norm

3) Trend (Index) Analysis

- establish a bench-mark year and set all accounts (or ratios) to 100 in that year
- in subsequent years, express accounts relative to the base year

⇒ can identify relative (percentage) changes over time

Financial Ratios:

a) liquidity ratios ⇒ access to cash to pay bills

e.g., current ratio = CA/CL (*ignores quality and liquidity of assets)

quick ratio = (CA - inventory)/CL

inventory turnover = COGS/inventory

receivables turnov

notes: **liquidity** refers to company's abili current liabilities when due

solvency refers to company's ability to repay its long-term obligations as well

relates to idea of financial flexibility ⇒ company's ability to alter its capital structure to take advantage of new investment opportunities or deal with economic change

b) leverage ratios ⇒ dependency on debt financing & ability to make interest payments

e.g., debt to equity = (CL + L-T debt)/shareholders' equity

times interest earned = (PBT + interest)/interest

c) profitability ratios ⇒ earnings relative to sales, S/E, assets, etc.

e.g., profit margin = NI/

ROA = EBIT/total assets (*or* e r tax / total assets)

ROE = NI/(S/E)

d) activity ratios ⇒ emphasis on productivity of assets

e.g., inventory turnover

receivables turnover

asset turnover = sales/(tot assets)

Coles Income Statement	2020	2019
Sales Revenue	37,408	38,176
Other operating revenue	376	288
Total operating revenue	**37,784**	**38,464**
Cost of sales	(28,043)	(29,253)
Gross Profit	**9,741**	**9,211**
Other income	108	428
Administrative expenses	(8,081)	(8,031)
Other expenses	---	(146)
Share – equity investmen	(6)	5
EBIT	**1,762**	**1,467**
Financing costs	(43)	(42)
PBT	**1,719**	**1,425**
Income tax expense	(341)	(347)
Profit from continuing operations	**978**	**1,078**
Profit from discontinued operations (after tax)	---	357
Profit (NPAT)	**978**	**1,425**
OCI	**(12)**	**(1)**
Total Comprehensive Income	**966**	**1,434**

Coles Balance Sheet	2020	2019
Assets		
Current Assets		
cash & cash equivalents	992	940
receivables	434	360
inventories	2,166	1,965
income tax receivable	42	---
assets held for resale	75	94
other assets	70	47
Total current assets	3,779	3,406
Non-current Assets		
property, plant and equipment	4,127	
right-of-use assets	7,660	
intangible assets	1,597	1,541
deferred tax assets	849	365
equity accounted investments	217	212
other assets	120	134
Total non-current assets	14,570	6,371
Total Assets	**18,349**	**9,777**

Liabilities	2020	2019
Current Liabilities		
payables	3,737	3,380
provisions	861	743
lease liabilities	885	---
other	198	168
Total Current Liabilities	5,681	4,291
Non-current Liabilities		
interest-bearing liabilities	1,354	1,460
provisions	472	598
lease liabilities	8,198	---
	29	71
rrent liabilities	10,053	2,129
T	**15,734**	**6,420**
	2,615	**3,357**
Shareholders' Equity		
contributed equity	1,611	1,628
reserves	43	42
retained earnings	961	1,687
Total Equity	**2,615**	**3,357**

Liquidity ratios	2020	2019
current ratio = CA / CL	0.665	0.794
quick ratio = (CA – inv) / CL	0.284	0.336
inventory turnover = COGS / inventory	12.947	14.887
days inventory = 365 / inventory turnover	29.192	24.518
receivables turnover = revenue / receivables	87.060	106.844
average collection period = 365 / r	3	3.416
Leverage ratios		
debt-to-equity = total liabilities / total equity	6.017	1.912
debt-to-assets = total liabilities / total assets	0.857	0.657
times interest earned = EBIT / interest	3.977	34.929

Profitability ratios	**2020**	**2019**
gross profit margin = gross profit / revenue	0.258	0.239
profit margin = NPAT / revenue	0.026	0.037
return on assets (ROA) = EBIT / total assets	0.096	0.150
return on equity (ROE) = NPAT / (S/E)	0.374	0.424
Activity ratios		
inventory turnover = COGS / invent	7	14.887
receivables turnover = revenue / receivables		106.844
asset turnover = revenue / total assets	2.059	3.934

Notes:

- 2019 and 2020 figures for Coles are largely non-comparable because of the changed treatment of leases (AASB 16) – perhaps the more appropriate comparison is with Woolworth's 2020 figures, or against industry averages (but this assumes that they use the same accounting methods and format)

- the calculations above are based on year-end B/S figures – more typically, they are based on 'average' balances and 2020 reported figures ***BUT*** there is no 'right way' or 'wr to understand how the calculations have been done)

to illustrate inv turn$_{2020}$ = COGS$_{2020}$ / [(inv$_{2019}$ + inv$_{2020}$)/2] 66 + 1,965)/2] = 13.577 *(vs 12.947)*

- the profitability ratios have been based on NPAT rather than Comprehensive Income (CI), although the latter is likely more defensible

- more critically ('concerning'), the profitability ratios have been calculated based on the reported figures – in contrast, we have argued that 'reformulated' figures are more defensible and insightful

Ratios	Coles 2020	Woolies 2020
current ratio = CA / CL	0.665	0.616
quick ratio = (CA – inv) / CL	0.284	0.280
debt-to-equity = total liabilities / total equity	6.017	3.260
debt-to-assets = total liabilities / total assets	0.857	0.765
times interest earned = EBIT / interest	3.977	3.117
gross profit margin = gross profit / revenue	0.258	0.292
profit margin = NPAT / revenue	0.026	0.019
return on assets (ROA) = EBIT / tota	0.096	0.068
return on equity (ROE) = NPAT / (S/E)	.374	0.134
inventory turnover = COGS / inventory	.947	10.173
days inventory = 365 / inventory turnover	29.192	35.881
receivables turnover = revenue / receivables	87.060	86.047
average collection period = 365 / receivables turnover	4.193	4.242
asset turnover = revenue / total assets	2.059	1.655

Finally

while trend and common size statements are relatively uninformative given the changed treatment of leases through the adoption of AASB16, their construction is illustrated in the next set of slides

Common-size statement → all B/S items expressed as a % of total assets

all of revenue

Trend (indexed) statements → all B/S and I/S items expressed as a % of their values in a base year (to display trends / growth over time)

Common-size Income Statement	W - 2020	C - 2020	C - 2019
Sales Revenue	---	0.990	0.993
Other operating revenue	---	0.010	0.009
Total operating revenue	**1**	**1**	**1**
Cost of sales	0.708	0.742	0.761
Gross Profit	**0.292**	**0.258**	**0.239**
Other income		0.003	0.011
Administrative & Other expenses		0.214	0.213
EBIT		**0.047**	**0.038**
Financing costs		0.012	0.001
PBT	**0.028**	**0.035**	**0.037**
Income tax expense	0.009	0.009	0.009
Profit from continuing operations	**0.019**	**0.026**	**0.028**
Profit from discontinued operations (after tax)	---	---	0.009
Profit (NPAT)	**0.019**	**0.026**	**0.037**
Total Comprehensive Income	**0.018**	**0.026**	**0.037**

Common-size Balance Sheet	W - 2020	C - 2020	C - 2019
Current Assets			
cash & cash equivalents	0.054	0.054	0.096
receivables	0.019	0.024	0.037
inventories	0.115	0.118	0.201
income tax receivable	---	0.002	---
assets held for resale	0.009	0.004	0.010
other assets	0.014	0.004	0.005
Total current assets		*0.206*	*0.348*
Non-current Assets			
property, plant and equipment		0.225	0.421
right-of-use (lease) assets	0.314	0.417	---
intangible assets	0.201	0.087	0.158
deferred tax assets	0.034	0.046	0.037
equity accounted investments	0.004	0.012	0.022
other assets	0.005	0.007	0.014
Total non-current assets	*0.789*	*0.794*	*0.652*
Total Assets	**1**	**1**	**1**

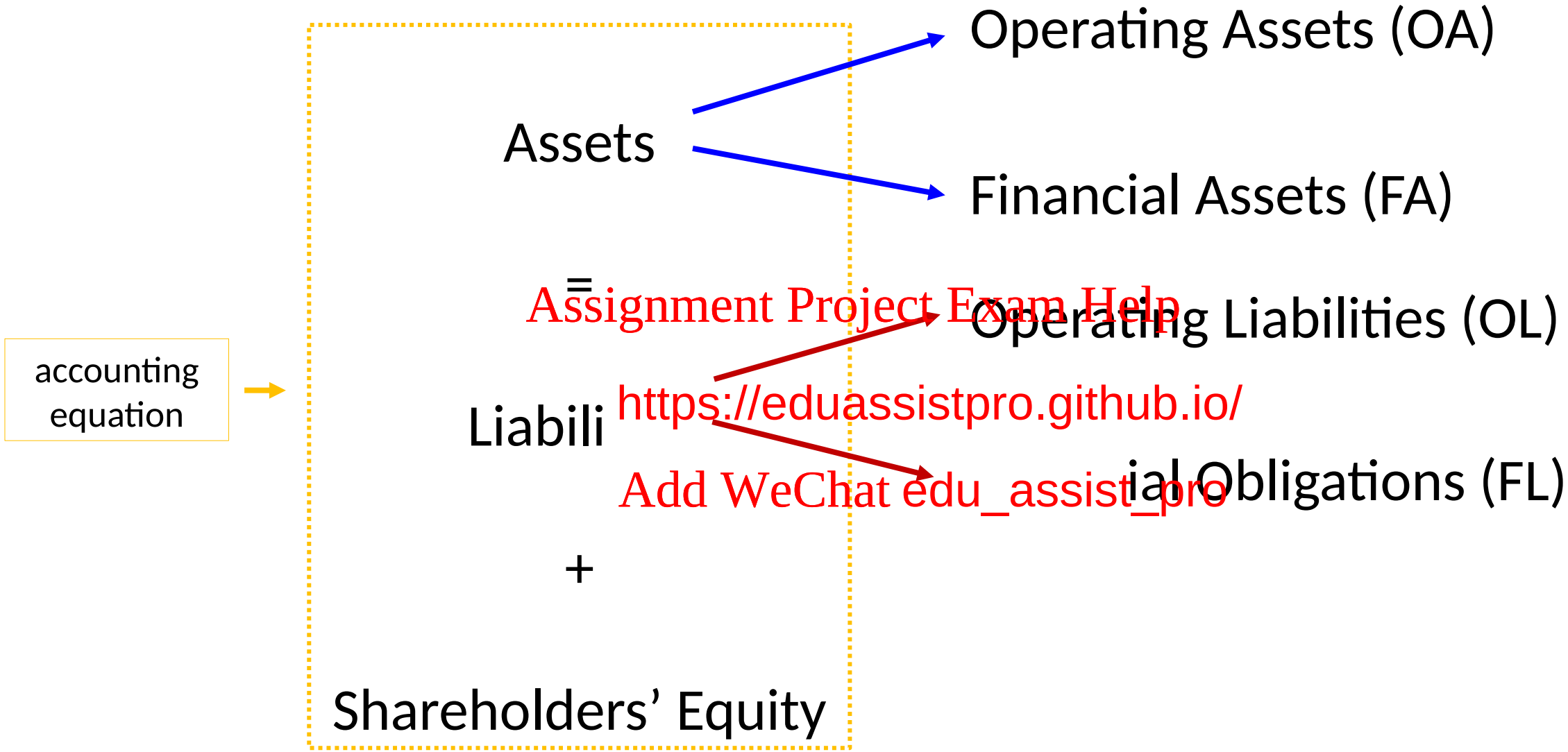
Common-size Balance Sheet	W - 2020	C - 2020	C - 2019
Current Liabilities			
payables	0.195	0.204	0.346
provisions	0.049	0.047	0.076
lease liabilities	0.039	0.048	---
other	0.058	0.011	0.017
Total Current Liabilities	*0.343*	*0.310*	*0.439*
Non-current Liabilities			
interest-bearing liabilities		0.074	0.149
provisions		0.026	0.061
lease liabilities		0.447	---
other		0.002	0.007
Total non-current liabilities	*0.422*	*0.548*	*0.218*
Total Liabilities	**0.765**	**0.857**	**0.657**
Shareholders' Equity			
contributed equity	0.157	0.088	0.167
reserves	0.010	0.002	0.004
retained earnings	0.061	0.052	0.173
Total Equity	**0.235**	**0.143**	**0.343**

Trend (Indexed) Income Statement	C - 2020	C - 2019
Sales Revenue	0.980	**1**
Other operating revenue	1.306	**1**
Total operating revenue	**0.982**	**1**
Cost of sales	0.959	**1**
Gross Profit	**1.058**	**1**
Other income		**1**
Administrative & Other expenses		**1**
EBIT		**1**
Financing costs	10.548	**1**
PBT	0.926	**1**
Income tax expense	0.983	1
Profit from continuing operations	0.907	**1**
Profit (NPAT)	**0.686**	**1**
Total Comprehensive Income	**0.674**	**1**

Common-size Balance Sheet	C - 2020		C - 2020
Current Assets		*Current Liabilities*	
cash & cash equivalents	1.055	payables	1.106
receivables	1.206	provisions	1.159
inventories	1.102	lease liabilities	---
income tax receivable	---	other	1.179
assets held for resale	0.798	*Total Current Liabilities*	1.324
other assets	1.489	*Non-current Liabilities*	
Total current assets		ring liabilities	0.927
Non-current Assets			0.789
property, plant and equipment	1.002	l	---
right-of-use (lease) assets	---		0.408
intangible assets	1.036	*Total non-current liabilities*	*4.722*
deferred tax assets	2.326	**Total Liabilities**	**2.451**
equity accounted investments	1.024	**Shareholders' Equity**	
other assets	0.896	contributed equity	0.990
Total non-current assets	*2.287*	reserves	1.024
Total Assets	**1.877**	retained earnings	*0.570*
		Total Equity	**0.779**

PART 3 – Reformulated F/S & Profitability

- **Objectives of 'Reformulation':**
  - separate **operating** activities from **financing** activities
  - alter several accounting classifications (largely around equity)
  - for the Income Statement xpenses based on their *driver* (sales volume or other), a ing non-recurring
  - for Statement of Cash Flows, separate op financing activities; determine free cash flows → operations-related cas by operating versus investing; and separate equity and debt financing cash flows



AASB / IFRS Balance Sheet

Assets			Liabilities & Equity	
Operating Assets	OA		Operating Liabilities	OL
Financial Assets	FA		Financial Obligations	FO
			Shareholders' Equity	S/E
Total Assets	OA + FA		**Total Claims**	OL + FO + S/E

Reformulated B t

Net Operating Assets			Financial Obligations & Shareholder's Equity	
Operating Assets	OA		Financial Obligations	FO
Operating Liabilities	OL		Financial Assets	(FA)
			Net Financial Obligations	NFO
			Shareholders' Equity	S/E
Total	OA – OL		**Total**	NFO + S/E

AASB/IFRS Income Statement & Statement of Comprehensive Income

Reformulated Income Statement

Sales
- COGS
= Gross margin
- Other expenses
= EBITDA
- Depreciation & amortisation
= EBIT
+ Interest revenue
- Interest expense
= PBT
- Income tax expense
= NPAT
+OCI (with tax effects)
= Comprehensive Income (CI)

Steps 1 and 2 →
- Core Operating Income from Sales (before-tax)
- Core Other Operating Income (before-tax)
- Unusual Operating Income (before-tax)
- Net Financial Expense (before-tax)

Step 3 →
Tax allocation:
- Tax shield from NFE
- Tax on Core Other OI
- Tax on Unusual OI
- Tax on Core OI from Sales

Step 4 →
- Operating OCI (after-tax)
- Financing OCI (after-tax)

Reformulated Statement of Cash Flows

Adjusted Cash flow from operations		*C*
Adjusted Cash investment in operating assets		*I*
Free Cash Flow (FCF)		***C + I***
Equity financing flows		
dividends & share repurchases		
share issuances	(XX	
Debt financing flows		
net purchase of financial assets	(XX)	
interest on financial assets (after tax)	XX	
net issue of debt	XX	
interest on debt (after tax)	(XX)	*F*
Total Financing cash flows		*E + F*

Generation of FCF from operating activities

'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

Penman – E10.6 & E12.3

a) Prepare a reformulated B/S and I/S

b) Calculate FCF for 2012

c) Calculate operating profit margin, asset turnover, and return on NOA for 2012

d) Calculate individual asset turnovers and show that they aggregate to the total asset turnover

e) Show that the financing leverage equation holds:
ROCE = RNOA + (FLEV x operating spread)

f) Calculate the after-tax net borrowing cost. If this borrowing cost were to be sustained in the future, what would the ROCE be if RNOA fell to 6% and FLEV decreased to 0.8?

g) The implicit cost of credit on A/P and accrued liabilities is 3%. Show that the following leverage equation holds:
RNOA = ROOA + [OLLEV x (ROOA – 3%)]

a) Reformulated Balance Sheet S/E = NOA – NFO

Net Operating Assets (NOA)	2012	2011	Net Financial Obligations (NFO)	2012	2011
Operating Assets (OA)			**Financial Assets (FA)**		
operating cash	60	50	short-term investments	550	500
accounts receivable	940	790			
inventory	910	840	**Financial Obligations (FO)**		
property & plant	2,[illegible]	[illegible]	t	1,840	1,970
Total Operating Assets	***4,***				
Operating Liabilities (OL)			**N** **gations (NFO)**	**1,290**	**1,470**
accounts payable	1,200	1,040			
accrued liabilities	390	450	**Shareholders' Equity (S/E)**	**1,870**	**1,430**
Total Operating Liabilities	***1,590***	***1,490***			
Net Operating Assets (NOA)	**3,160**	**2,900**			

Reformulated Statement of S/E

Beginning S/E (BV_{t-1})	**1,430**
Net transactions with Shareholders	
share issues	822
share repurchases	(720)
dividends	(180)
Comprehensive Income	
NPAT	468
OCI	50
Comprehensive Income (CI)	518
Ending S/E (BV_t)	**1,870**

Reformulated Income Statement (to extent possible)

① AASB I/S NPAT ± OCI = CI

from Statement of Shareholders' Equity

Net Income (NPAT)	468
Other Comprehensive Income (OCI) (unrealized gain on debt investment)	50
Comprehensive Income (CI)	518

② Core Net Financing Expenses

from additional information

interest income	15
interest expense	98
E (before tax)	(83)
83 @ 35%	29
(after tax)	(54)

③ Reformulated I/S OI – NFE = CI

from ① & ② above

Operating Income (after tax)		???
Net Financial Expenses (after tax)		
core NFE	(54)	
financial OCI (unrealized gain)	50	(4)
Comprehensive Income (CI)		518

→ **OI – 4 = 518 ➡ OI = 522**

Reformulated Income Statement (to extent possible)

Sales	3,726	
Operating Expenses	?	
Operating Income (before tax)	**?**	
Core NFE (before tax)		
interest expense	(98)	
interest income	15	83
Tax Allocation (s		
income tax expense		
tax shield (83 @ 0.35)		
tax on operating income	?	
Operating Income (after tax)	**522**	
Core NFE (after tax)	(54)	
NPAT	**468**	
Financing OCI (after tax)	50	
Comprehensive Income (CI)	**518**	

b) Free Cash Flow (FCF) (Slide 56, Session #7)

FCF = OI (after tax) – △NOA *or* *FCF = NFE – △NFO + E*

= 522 – (3,160 – 2,900) *= 4 – (1,290 – 1,470) + 78*

= 262 *= 262*

** based on reformulated statem

c) profit margin = OI / Sales → 14.01%

asset turnover = Sales / average NOA = 3 0 + 2,900)/2] = 1.2297

RNOA = OI / average NOA = 522 / [(3,160 + 2,900)/2] = 0.1723 → 17.23%

note: RNOA = = profit margin asset turnover

= 0.1401 * 1.2297 = 0.1723

d) Further disaggregation of 'total asset turnover'

NOA = {*operating cash + receivables + inventory + property & plant*}
– [*accounts payable + accrued liabilities*]

asset turnover =

⇒

⇒ + + + – –

= + + + – – = *0.8132*

⇒ asset turnover =

e) 'financial leverage equation'

return on NOA *less* cost of financing

ROCE = RNOA + (FLEV x operating spread) = RNOA + FLEV x (RNOA – NBC)

ROCE = = = 0.3139 → 31.39%

RNOA = 0.1723 → 17.23%

FLEV = 0.8364

net borrowing cost (NBC) = 0.0029

$\Rightarrow$ ROCE =0.1723 + 0.8364(0.1723 – 0.0029) = 0.3139

f) modified

given *RNOA = 6%* *FLEV = 0.80*

net borrowing cost (NBC) = 0.0029

$\Rightarrow$ ROCE =0.0600 + 0.80(0.0 → 10.57%

g) 'operating liability leverage equation' RNOA = ROOA + [OLLEV x (ROOA – 3%)]

RNOA = 0.1723

implicit interest = 0.03 x average OL = 0.03[(1,590 + 1,490)/2] = 46.2

ROOA = 0.1243

operating liability leverage (OLLEV) = 0.5083

$\Rightarrow$ RNOA = 0.1243 + 0.5083(0.1243 – 0.03) = 0.1723 → 17.23%

PART 4 – ‘Conceptual Foundation’

So why does this all “work”? ⇨ **‘conceptual foundation’**

ROCE = =

⇒ return on S/E after re bt financing

→ ***levered*** m

RNOA = = profit margin asset turnover

⇒ return on net operating assets before considering sources of financing

→ ***unlevered*** measure of profitability

→ at this stage, the difference between ROCE and RNOA appears to simply be whether consideration is given to (an adjustment made for) the implications of debt financing

net borrowing cost (NBC) = ⇒ "borrowing rate" for financing NOA

FLEV = ⇒ measure of finan debt-to-equity ratio)

now consider the following algebraic manipulation of the ROCE formula, starting with

ROCE = =

ROCE = = =

=

=

=

⇒ **ROCE = RNOA + FLEV { RNOA NBC}**

In summary

ROCE is the return to the common shareholder after making the required payments to debtholders (interest expense)

RNOA is the return on the company's operations (before separating that required to satisfy debtholders and the remainder available to shareholders)

RNOA – NBC *(i.e., the **spread**)* is the return the company can earn on its operations and its cost of borrowing

⇒ if *spread* > 0, the company can increase its ROCE from increasing FLEV

→ for a profitable company, the extent of FLEV explains the difference between ROCE and RNOA, with **ROCE > RNOA**

*For **Coles** (from Session #7 after adjusting for the implications of AASB16, leases, in 2019)*

Reformulated I/S *2020* *OI = 1,288.1*
NFE = 322.1
CI = 966

Reformulated (and adjusted) B

	2018	2019	→	ave
NOA	12,[illegible]	3,102		12,653.5
NFO	9,590	10,576		10,083.0
S/E	2,615	2,526		2,570.5

ROCE = 0.3758

RNOA = 0.1018

FLEV = 3.9226

NBC = 319 → *sp* 0.0699

ROCE = RNOA + FLEV {RNOA NBC}

= 0.1018 + 3.9226 {0.1019 – 0.0319} = 0.3758

ROCE = RNOA + FLEV {RNOA NBC}

'first-level' break down of ROCE

given RNOA = = profit margin asset turnover

ROCE = {profit margin asset turnover} + {FLEV spread}

'second-level' break down of ROCE

operations

Clearly there are number of ways in which each of OI, profit margin, asset turnover, and leverage can be further broken down – there further breakdowns provide additional insights into how / why each of these measures or ratios have changed

We will consider some possible further dis-aggregations in Session #10

PART 5 – Penman: E10.10 & E12.9

d. Calculate the operating profit margin ratio (PM) and the asset turnover (ATO). Also calculate the operating profit margin ratio from sales.
e. Calculate the operating liability leverage ratio at the beginning of 2007.
f. The firm's borrowing cost on its short-term commercial paper is 5.5 percent, or 3.6 percent after tax. Show how operating liability leverage levers up the return of net operating assets.

a) Reformulated Balance Sheet

Operating Assets (OA)	2007	2006	Operating Liabilities (OL)	2007	2006
Operating cash	40,000	40,000	Accounts payable	390,836	340,937
S-T invest - trading securities	73,588	53,496	Accrued compensation	332,331	288,963
Accounts receivable	287,925	224,271	Accrued occupancy costs	74,591	54,868
Inventories	621,658	436,222	Accrued taxes	92,516	94,010
Prepaid expenses/other CA	148,75		expenses	257,369	224,154
DTA	129,45		nue	296,900	231,926
Equity-accounted investments	258,846	219,093	liabilities	354,074	262,857
property, plant & equipment	2,890,433	2,287,899	**Total OL**	**1,798,617**	**1,497,715**
Other assets	219,422	186,917			
Other intangible assets	42,043	37,955	**Net Operating Assets (NOA)**	**3,199,133**	**2,565,267**
Goodwill	215,625	161,478			
Total OA	**4,997,750**	**4,062,982**			

Reformulated Balance Sheet (cont)

Financial Assets (FA)	2007	2006	Shareholders' Equity (S/E)	2007	2006
financial cash	241,261	272,606	contributed capital	738	756
available for sale securities	104,867	93,353	other paid-in capital	39,393	39,393
	346,128	365,959	retained earnings (R/E)	2,189,366	2,151,084
			accumulated OCI	54,620	37,273
Financial Obligations (FO)			**Total S/E**	**2,284,117**	**2,228,506**
commercial paper	710,2				
long-term debt	550,8		**S/E = NOA**	**3,199,133**	**2,565,267**
	1,261,144	702,700			
Net Financial Obligation (NFO)	**915,016**	**336,761**			

Reformulated Income Statement ① before tax

Core OI from Sales (before tax)		**Unusual OI** (before tax)	
revenue	9,411,497	gain on asset sales	26,032
COGS	(3,999,124)		
Gross Margin	**5,412,373**	**Total OI before tax**	**1,138,392**
Other Operating Expenses			
store operating expenses	(3,215,889)	**Net Financial Expense (NFE) (before tax)**	
other operating expenses		e	19,700
depreciation & amortisation expense		se	(38,200)
general & administrative expense	(489,249)	rea vail-for-sale investment	3,800
Core OI from Sales (before tax)	**945,939**	**NFE**	**(14,700)**
Core Other OI (before tax)			
profit equity-accounted investments	175,334	**Profit Before Tax (PBT)**	**1,123,692**
other operating charges	(8,913)		
Core Other OI (before tax)	**166,421**		

Reformulated Income Statement ② tax allocation

Core OI from Sales (before tax)	**945,939**
Core Other OI (before tax)	**166,421**
Unusual OI (before tax)	**26,032**
Total OI (before tax)	**1,138,392**
NFE (before tax)	**(14,700)**
Profit Before Tax (PBT)	**1,123,692**

Tax to be allocated	
reported tax expense	383,726
tax on equity-accounted investments**	67,328
Total	451,054

** 2007 I/S income from equity investees **= 108,006 after tax** (note 5)
→ before tax amount = 108,006 / (1 – 0.384) = 175,334
→ tax = 175,334 – 108,006 = 67,328

Tax Allocation (456,699 in total)	
NFE (14,700 @ 0.384)	5,645
Tax on Unusual OI (26,032 @ 0.384)	9,996
Tax on Core Other OI (166,421 @ 0.384)	63,906
Tax on Core OI from Sales (balance) = 451,054 + 5,645 – 9,996 – 63,906)	382,797

Reformulated Income Statement ③ after tax amount

After-tax Amounts	
Core OI from Sales (after tax) = 945,939 – 382,797	563,142
Core Other OI (after tax) = 166,421 – 63,906	102,515
Unusual OI (after tax) = 26,032 – 9,996	16,036
NFE (after tax) = (14,700) + 5,645	(9,055)
Net Profit After Tax (NPAT)	**672,638**
Other Comprehensive Income (OCI)	
Operating OCI (after tax)	
translation adjustment	37,727
Financing OCI (after tax)	
unrealised holding loss	(20,380)

Reformulated Income Statement ④ final form

Operating Income (after tax)	
Core OI from Sales (after tax)	563,142
Core Other OI (after tax)	102,515
Unusual OI (after tax)	16,036
	681,693
Operating OCI (after tax)	37,727
Total Operating Inc	**719,420**
Net Financing Expenses	
NFE (after tax)	(9,055)
Financing OCI (after tax)	(20,380)
Total Financing Expenses	**(29,435)**
Comprehensive Income	**689,985**

b) ROCE = = = 0.3096 → 30.96%

RNOA = 0.2805 → 28.05%

net borrowing cost (NBC) = 0.0874

c) FLEV = 0.1511

ROCE = RNOA + (FLEV x operating spread) FLEV x (RNOA NBC)

⇒ ROCE = 0.2805 + 0.1511(0.2805 – 0.0874) = 0.3097

(difference due to rounding to 4 decimal places only)

d) profit margin = = = 0.0764 → 7.64%

asset turnover = 3.6688

RNOA = = profit margin asset turnover

= 0.0764 3.6688 = 0.2803 *(difference due to rounding to 4 decimal places only)*

profit margin from sales = 0.0598 →

e) OLLEV = 0.5838

f) Implicit interest on OL = 1,497,715 @ 0.036 = 53,918

ROOA = 0.1903

RNOA = ROOA + (OLLEV LEV x (ROOA STBC)

= 0.1903 + 0.5838 (0.1903 – 0.036) = 0.2804

PART 6 – Profitability & Leverage: Further Examples

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

ROCE = RNOA + FLEV x (RNOA – NBC)

operating spread

RNOA —financial leverage→ ROCE

operating leverage → use of operating liabiliti nance OA

RNOA = ROOA + OLLEV x (ROOA – STBC)

OL spread

ROOA —operating leverage→ RNOA

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

Example 9-1 (typical firm → profitable, RNOA > NBC)

Net operating assets (NOA)	28,000	
Net financial obligations (NFO)	15,000	
Shareholders' Equity (S/E)	13,000	
Operating income (OI)		2,000
Net Financial Expense (NFE)		(300)
Comprehensive Income (		

ROCE = = = 0.1154 RNOA = 0.07

FLEV = NBC = 0.0333

ROCE = RNOA + FLEV x (RNOA – NBC) = 0.0714 **+ 1.1538(0.0714 – 0.0333)** = 0.1154

→ use of debt financing (FLEV) magnifies ROCE relative to RNOA

Example 9-2 (loss firm A)

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

ROCE = = = 0.1154 RNOA = 0.03

FLEV = NBC = 0.0333

ROCE = RNOA + FLEV x (RNOA – NBC) = 0.0357 **+ 1.1538(0.0357 – 0.0333)** =

→ use of debt financing (FLEV) magnifies negative loss to common shareholders

Example 9-3 ('loss firm' B)

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

ROCE = = = 0.0385 RNOA = 0.03

FLEV = NBC = 0.1000

ROCE = RNOA + FLEV x (RNOA – NBC) = 0.0357 + 1.1538(0.0357 – 0.1000) = 0.0385

→ use of debt financing (FLEV) can even drive ROCE down into a loss from a positive RNOA

Example 9-4 (borrowing cost > earnings return)

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

ROCE = = = 0.0385 RNOA = 0.07

FLEV = 1.1538 NBC = 0.1000

ROCE = RNOA + FLEV x (RNOA – NBC) = 0.0714 **+ 1.1538(0.0714 – 0.1000)** = 0.0384

→ NBC > RNOA means that the use of FLEV drives ROCE down relative to RNOA

Example 9-5 (net financial assets)

Net operating assets (NOA)	28,000		
Net financial obligations (NFO)	–15,000		*i.e., net financial assets (NFA)*
Shareholders' Equity (S/E)	43,000		
Operating income (OI)		2,000	
Net Financial Income (NFI)		500	*i.e., not an expense (NFE)*
Comprehensive Income (		0	

ROCE = = = 0.0581 RNOA = 0.07

FLEV = – 0.3488 RNFA = 0.0333

ROCE = RNOA + FLEV x (RNOA – NBC) = 0.0714 - 0.3488(0.0714 – 0.0333) = 0.0581

→ lower return on NFA (3.33% versus 7.14% on NOA) drives ROCE down relative to RNOA

ROCE = RNOA + FLEV x (RNOA – NBC)

Summary –

- ***if*** profitable & RNOA > NBC ROCE > RNOA i.e., FLEV magnifies profit (*example #9-1*)
- ***if*** unprofitable ROCE < s (creates) loss (*examples #9-2 & #9-3*)
- ***if*** NBC > RNOA ROCE < RNOA i.e., FLEV t of borrowing is higher than return on investment in NOA (*example #9-4*)
- ***if*** net financial assets (i.e., negative borrowing) RCOE < RNOA since return on financial assets (NFA) is typically lower than RNOA (*example #9-5*)

Example 9-6 (typical firm → profitable, ROOA > STBC)

Net operating assets (NOA)	28,000	OA = 40,000	OL = 12,000
Net financial obligations (NFO)	15,000	FA = 2,000	FO = 17,000
Shareholders' Equity (S/E)	13,000		

Operating income (OI)	2,000
Net Financial Expense (NFE)	(500)
Comprehensive Income (CI)	

OLLEV = *assume* STBC = 0.07(1 – 0.3) = 0.0

→ implicit OL = 12,000 * 0.049 = 588

ROOA = 0.0647

RNOA = ROOA + OLLEV(ROOA – STBC) = 0.0647 + 0.4286(0.0647 – 0.049) = 0.0714

Example 9-7 (loss firm A)

Net operating assets (NOA)	28,000	OA = 40,000	OL = 12,000
Net financial obligations (NFO)	15,000	FA = 2,000	FO = 17,000
Shareholders' Equity (S/E)	13,000		

Operating income (OI) (1,000)

Net Financial Expense (NFE) (600)

Comprehensive Income (CI)

OLLEV = *assume* STBC = 0.07(1 – 0.3) = 0.0

→ Implicit OL = 12,000 * 0.049 = 588

ROOA = – 0.0103

RNOA = ROOA + OLLEV(ROOA – STBC) = -0.0103 + 0.4286(-0.0103 – 0.049) = – 0.0357

Summing Financial Leverage and Operating Liability Leverage Effects on ROCE

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

Return With no leverage

Effect of Operating Liabilities

Effect of Financing Liabilities

profitable firm (examples #9-1 & #9-6)

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

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

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

PART 7 – 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*

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 ** Sessions #9 & #10

Industry dynamics

➔ **Porter's five forces**

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

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