



# Cash flows and Financial ratios

Introduction to finance and marketing for engineers

Week 3

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## Exercise 1

1. If a firm has \$400 Net Working Capital, \$200 in inventories, a current ratio equal to 1.2, \$400

in Accounts Receivable. What is the Cash Ratio?

☒ 0.9

B. 0.99

C 1.1

D. None of the above

E. Cannot be calculated with given info



## Solution

$CA - CL = 400$ ,  $CA = 1.2CL$ ,  $CL = 2000$ ,  $CA = 2400$ , Cash Ratio =  $(2400 - 2000) / 2000 = 0.9$



## Exercise 2

A firm has a return on equity of 15%. The debt-equity ratio is 50%. The total asset turnover is 1.25 and the profit margin is 8%.

The total equity is \$3,200. What is the amount of the net income?



## Solution

$$\text{ROE} = \text{Net Income} / \text{equity} = 0.15$$

$$\text{ROE} = \text{Net Income} / 3,200 = 0.15$$

$$\text{Net Income} = 480$$

Using the Du Pont identity:

$$\text{DE} = 0.50; \text{equity} / \text{equity} + \text{DE} = 1 + 0.50$$

$$\text{Total assets} = (\text{equity} + \text{debt}) / \text{equity} \times \text{equity}$$

$$\text{Total assets} = (1 + .50) \times 3,200 = 4,800$$

$$\text{Total sales} = 4,800 \times 1.25 = 6,000$$

$$\text{Net income} = 6,000 \times .08 = 480$$



# Business cash flow

Business Cash Flows refers to the changes in:

- Assets
- Liabilities
- Stockholder's Equity

Just as the balance sheet balances, the cash flows in changes in our business should also balance



# Cash flow from assets

Cash Flow from Assets: measures the cash flows generated by the firm's assets

It is also known as the Cash Flow of the Firm

These cash flows will be further categorized as:

- Operating Cash Flow
- Cash Flow to Capital Spending
- Cash Flow to Net Working Capital

Cash Flow from Assets = Operating Cash Flow - Cash Flow to Capital Spending -  
Cash Flow to Net Working Capital





# Operating cash flow

Operating Cash Flow: measures the cash flows generated by the firm's main operations

Operating Cash Flow = EBIT + Depreciation - Tax

Note: Interest Expense is not a cash flow that operations are dependent upon

Note: Depreciation Expense (from the Income Statement) is added back because it is a non-cash expense





# Capital spending cash flow

Cash Flow to Capital Spending: reflects the firm's net investment in fixed assets during the period

Capital Spending = Ending Net Fixed Assets - Beginning Net Fixed Assets + Depreciation

Note: Depreciation Expense (from the Income Statement) must be added back



# Cash flow to NWC

Cash Flow to Net Working Capital: measure the firm's investment in Net Working Capital during the period

Also known as Additions to Net Working Capital

Net Working Capital (NWC) is defined as Current Assets - Current Liabilities.

Additions to NWC = Ending NWC - Beginning NWC



# Cash flow to creditors

Cash Flow to Creditors: defined as interest expense and repayments of principal less new long term borrowing

Also known as Cash Flow to Debtholders

Cash Flow to Creditors = Interest - (Ending Long-term Debt - Beginning Long-term Debt)



# Cash flow to stock holders

Cash Flow to Stockholders: represents a cash flow from the Common Stockholders to the firm

To be more specific, the cash flow to stockholders include elements of a stock such as:

- Common Stock
- Capital Surplus
- Treasury Stock

Cash Flow to Stockholders = Dividends - (Stocks Sold - Stock Purchased)



## Exercise 3

Your firm has net income of \$198 on total sales of \$1,200. Costs are \$715 and depreciation is \$145. The tax rate is 34%. What is the operating cash flow?

- A. \$93
- B. \$241
- C. \$340
- D. \$383
- E. \$485



## Solution

D.

Operating Cash flow = EBIT + Depreciation - Tax

Earnings before interest and taxes = \$1,200 - \$715 - \$145 = \$340;

Pretax Income = \$198 / 0.66 Tax = [ $\$198 / 0.66$ ]  $\times 0.34 = \$102$ ;

Operating cash flow = \$340 + \$145 - \$102 = \$383



## Exercise 4

What is the net working capital for 2008?

- A. \$345
- B. \$405
- C. \$805
- D. \$812
- E. \$1,005

Knickerdoodles, Inc.		
	<u>2007</u>	<u>2008</u>
Sales	\$ 740	\$ 785
COGS	430	460
Interest	33	35
Dividends	16	17
Depreciation	250	210
Cash	70	75
Accounts receivables	563	502
Current liabilities	390	405
Inventory	662	640
Long-term debt	340	410
Net fixed assets	1,680	1,413
Common stock	700	235
Tax rate	35%	35%



# Solution

D.

$$\text{Net working capital} = \$75 + \$502 + \$640 - \$405 = \$812$$

## Exercise 5

What is the change in net working capital from 2007 to 2008?

- A. -\$93
- B. -\$7
- C. \$7
- D. \$85
- E. \$97

Knickerdoodles, Inc.		
	<u>2007</u>	<u>2008</u>
Sales	\$ 740	\$ 785
COGS	430	460
Interest	33	35
Dividends	16	17
Depreciation	250	210
Cash	70	75
Accounts receivables	563	502
Current liabilities	390	405
Inventory	662	640
Long-term debt	340	410
Net fixed assets	1,680	1,413
Common stock	700	235
Tax rate	35%	35%



# Solution

A.

Change in net working capital =

$$(\$75 + \$502 + \$640 - \$405) - (\$70 + \$563 + \$662 - \$390) = -\$93$$

## Exercise 6

What is net capital spending for 2008?

- A. -\$250
- B. -\$57
- C. \$0
- D. \$57
- E. \$477

Knickerdoodles, Inc.		
	<u>2007</u>	<u>2008</u>
Sales	\$ 740	\$ 785
COGS	430	460
Interest	33	35
Dividends	16	17
Depreciation	250	210
Cash	70	75
Accounts receivables	563	502
Current liabilities	390	405
Inventory	662	640
Long-term debt	340	410
Net fixed assets	1,680	1,413
Common stock	700	235
Tax rate	35%	35%



# Solution

B.

$$\text{Net capital spending} = \$1,413 - \$1,680 + \$210 = -\$57$$



## Exercise 7

What is the operating cash flow for 2008?

- A. \$143
- B. \$297
- C. \$325
- D. \$353
- E. \$367

Knickerdoodles, Inc.		
	<u>2007</u>	<u>2008</u>
Sales	\$ 740	\$ 785
COGS	430	460
Interest	33	35
Dividends	16	17
Depreciation	250	210
Cash	70	75
Accounts receivables	563	502
Current liabilities	390	405
Inventory	662	640
Long-term debt	340	410
Net fixed assets	1,680	1,413
Common stock	700	235
Tax rate	35%	35%



## Solution

B.

Earnings before interest and taxes =  $\$785 - \$460 - \$210 = \$115$ ;

Taxable income =  $\$115 - \$35 = \$80$ ; Taxes =  $.35(\$80) = \$28$ ;

Operating cash flow =  $\$115 + \$210 - \$28 = \$297$

## Exercise 8

What is the cash flow of the firm for 2008?

- A. \$50
- B. \$247
- C. \$297
- D. \$447
- E. \$517

Knickerdoodles, Inc.		
	<u>2007</u>	<u>2008</u>
Sales	\$ 740	\$ 785
COGS	430	460
Interest	33	35
Dividends	16	17
Depreciation	250	210
Cash	70	75
Accounts receivables	563	502
Current liabilities	390	405
Inventory	662	640
Long-term debt	340	410
Net fixed assets	1,680	1,413
Common stock	700	235
Tax rate	35%	35%



## Solution

D.

$$\text{Cash flow of the firm} = \$297 - (-\$93) - (-\$57) = \$447$$

## Exercise 9

What is net new borrowing for 2008?

- A. -\$70
- B. -\$35
- C. \$35
- D. \$70
- E. \$105

Knickerdoodles, Inc.		
	<u>2007</u>	<u>2008</u>
Sales	\$ 740	\$ 785
COGS	430	460
Interest	33	35
Dividends	16	17
Depreciation	250	210
Cash	70	75
Accounts receivables	563	502
Current liabilities	390	405
Inventory	662	640
Long-term debt	340	410
Net fixed assets	1,680	1,413
Common stock	700	235
Tax rate	35%	35%



solution

A.

Net new borrowing = \$410 - \$340 = \$70



## Exercise 10

What is the cash flow to creditors for 2008?

- A. -\$170
- B. -\$35
- C. \$135
- D. \$170
- E. \$205

Knickerdoodles, Inc.		
	<u>2007</u>	<u>2008</u>
Sales	\$ 740	\$ 785
COGS	430	460
Interest	33	35
Dividends	16	17
Depreciation	250	210
Cash	70	75
Accounts receivables	563	502
Current liabilities	390	405
Inventory	662	640
Long-term debt	340	410
Net fixed assets	1,680	1,413
Common stock	700	235
Tax rate	35%	35%



solution

B.

Cash flow to creditors =  $\$35 - (\$410 - \$340) = -\$35$

## Exercise 11

What is the cash flow to stockholders for 2008?

- A. \$408
- B. \$417
- C. \$452
- D. \$482
- E. \$503

Knickerdoodles, Inc.		
	<u>2007</u>	<u>2008</u>
Sales	\$ 740	\$ 785
COGS	430	460
Interest	33	35
Dividends	16	17
Depreciation	250	210
Cash	70	75
Accounts receivables	563	502
Current liabilities	390	405
Inventory	662	640
Long-term debt	340	410
Net fixed assets	1,680	1,413
Common stock	700	235
Tax rate	35%	35%



## solution

Cash flow to stockholders =  $\$447 - (-\$35) = \$482$

(See problems 7 and 9); or,

Cash flow to stockholders =  $\$17 - (\$235 - \$700) = \$482$



# Financial planning

Financial planning often involves making decisions on how to manage a company's resources:

- Capital Budgeting
- Capital Structuring
- Net Working Capital

Capital Budgeting: the process of determining whether real assets (tangible assets such as machinery and equipment or intangible assets such as patents and trademarks) are worth investing in or not

Capital Structuring: the decision of how to finance the company's investments, either by debt or equity

Net Working Capital: the decision of how much short-term debt to have in comparison to current assets

Generally financial decisions involves achieving some objectives under constraints

# Financial planning

Suppose we are the financial managers for A&W Corp. The board of directors are displeased with the quarter earnings and are looking to increase the sales by 25% to remain competitive in the industry.

However, they want minimal changes to the Net Working Capital and are not planning on issuing more stocks.

How do we achieve this goal?

A&W Corp. Income Statement	
	December 31, 2013
Sales	5,000.00
Cost of Goods Sold	3,750.00
Taxable Income	1,250.00
Taxes (34%)	425.00
Net Income	825.00
Dividends	330.00
Retained Earnings	495.00



# Pro Forma statement

We can project our changes to our company's finances by using Pro Forma Statements.

Pro Forma Statements: project values for changes to the income statement and balance sheet by using the Percentage of Sales Approach

A&W Corp. Income Statement	
	December 31, 2013
Sales	5,000.00
Cost of Goods Sold	3,750.00
Taxable Income	1,250.00
Taxes (34%)	425.00
Net Income	825.00
Dividends	330.00
Retained Earnings	495.00

# Pro Forma income statement

Step 1:

List all numbers as a percentage of sales

By putting all the numbers as a percentage of sales, we can see how much each item must increase in order to keep up with our projected sales number

A&W Corp. Income Statement		
	December 31, 2013	
Sales	5,000.00	-
Cost of Goods Sold	3,750.00	75.0%
Taxable Income	1,250.00	25.0%
Taxes (34%)	425.00	8.5%
Net Income	825.00	16.5%
Dividends	330.00	6.6%
Retained Earnings	495.00	9.9%

# Pro Forma income statement

Step 2:

Project the sales values (25% increase) for the following year and match the rest of the income statement to the projection

A&W Corp. Income Statement			
	December 31, 2013		December 31, 2014
Sales	5,000.00	-	6,250.00
Cost of Goods Sold	3,750.00	75.0%	4,687.50
Taxable Income	1,250.00	25.0%	1,562.50
Taxes (34%)	425.00	8.5%	531.25
Net Income	825.00	16.5%	1,031.25
Dividends	330.00	6.6%	412.50
Retained Earnings	495.00	9.9%	618.75

# Pro Forma balance sheet

## Step 3:

Identify our spontaneous accounts and list them as percentage of sales

Spontaneous Accounts: directly vary with the changes in sale, ie. if sales go up, we must order more parts in our accounts payable

We need to know which accounts will change and how we can adjust our accounts to finance the growth in sales

A&W Corp. Balance Sheet					
Curr. Assets	2013		Curr. Liabilities	2013	
Cash	1,000.00	20.0%	Accts. Pay	1,750.00	35.0%
Accts. Receive	2,250.00	45.0%	Notes Pay	1,000.00	-
Inventory	2,775.00	55.5%	Net Curr. Debt	2,750.00	-
Net Curr. Assets	6,025.00	120.0%	Long-term Debt	5,000.00	-
Net Fixed Assets	9,000.00	180.0%			
			Stock	6,000.00	-
			Retained Earning	1,275.00	-
Total Assets	15,025.00	300.0%	Total L & O.E.	15,025.00	-

# Pro Forma balance sheet

Step 4:

Project numbers that  
will support growth in  
sales (25% increase)

A&W Corp. Balance Sheet							
Curr. Assets	2013		2014	Curr. Liabilities	2013		2014
Cash	1,000.00	20.0%	1,250.00	Accts. Pay	1,750.00	35.0%	2,187.50
Accts. Receive	2,250.00	45.0%	2,812.50	Notes Pay	1,000.00	-	
Inventory	2,775.00	55.5%	3,468.75	Net Curr. Debt	2,750.00	-	
Net Curr. Assets	6,025.00	120.0%	7,531.25	Long-term Debt	5,000.00	-	
Net Fixed Assets	9,000.00	180.0%	11,250.00				
				Stock	6,000.00	-	
				Ret. Earnings	1,275.00	-	
Total Assets	15,025.00	300.0%	18,781.25	Total L & O.E.	15,025.00	-	



# Pro Forma balance sheet

Step 5:

Calculate the retained earnings for 2014 given the projected sales

A&W Corp. Balance Sheet							
Curr. Assets	2013		2014	Curr. Liabilities	2013		2014
Cash	1,000.00	20.0%	1,250.00	Accts. Pay	1,750.00	35.0%	2,187.50
Accts. Receive	2,250.00	45.0%	2,812.50	Notes Pay	1,000.00	-	
Inventory	2,775.00	55.5%	3,468.75	Net Curr. Debt	2,750.00	-	
Net Curr. Assets	6,025.00	120.0%	7,531.25	Long-term Debt	5,000.00	-	
Net Fixed Assets	9,000.00	180.0%	11,250.00				
				Stock	6,000.00	-	
				Ret. Earnings	1,275.00	-	1,893.75
Total Assets	15,025.00	300.0%	18,781.25	Total L & O.E.	15,025.00	-	



# Pro Forma balance sheet

Step 6:

Determine our External  
Financing Needs

EFN : extra financing that we  
will need to obtain (debt or  
equity) in order to reach our  
sales projection

$$\text{EFN} = 18,781.25 - 16,081.25 = 2,700$$

Notice that our balance sheet  
is not balanced! We need to  
somehow finance through  
debt and equity EFN = 2,700

A&W Corp. Balance Sheet							
Curr. Assets	2013		2014	Curr. Liabilities	2013		2014
Cash	1,000.00	20.0%	1,250.00	Accts. Pay	1,750.00	35.0%	2,187.50
Accts. Receive	2,250.00	45.0%	2,812.50	Notes Pay	1,000.00	-	1,000.00
Inventory	2,775.00	55.5%	3,468.75	Net Curr. Debt	2,750.00	-	3,187.50
Net Curr. Assets	6,025.00	120.0%	7,531.25	Long-term Debt	5,000.00	-	5,000.00
Net Fixed Assets	9,000.00	180.0%	11,250.00				
				Stock	6,000.00	-	6,000.00
				Ret. Earnings	1,275.00	-	1,893.75
Total Assets	15,025.00	300.0%	18,781.25	Total L & O.E.	15,025.00	-	16,081.25

# Pro Forma balance sheet

Step 7:

Identify our plug variables to inject our EFN

Plug Variable: are unconstrained accounts that we are use to support our growth

A&W Corp. Balance Sheet							
Curr. Assets	2013		2014	Curr. Liabilities	2013		2014
Cash	1,000.00	20.0%	1,250.00	Accts. Pay	1,750.00	35.0%	2,187.50
Accts. Receive	2,250.00	45.0%	2,812.50	Notes Pay	1,000.00	-	1,000.00
Inventory	2,775.00	55.5%	3,468.75	Net Curr. Debt	2,750.00	-	3,187.50
Net Curr. Assets	6,025.00	120.0%	7,531.25	Long-term Debt	5,000.00	-	5,000.00
Net Fixed Assets	9,000.00	180.0%	11,250.00				
				Stock	6,000.00	-	6,000.00
				Ret. Earnings	1,275.00	-	1,893.75
Total Assets	15,025.00	300.0%	18,781.25	Total L & O.E.	15,025.00	-	16,081.25

## Pro Forma balance sheet

Given that we are trying to keep NWC constant and not issuing stock

$$NWC_{2013} = 6,025 - 2,750 = 3275$$

$$NWC_{2014} = 7,531.25 - 3,187.50 = 4343.75$$

$$\Delta NWC = 4343.75 - 3275 = 1068.75$$

Given that we are trying to keep NWC constant and not issuing stock

$$NWC_{2013} = 6,025 - 2,750 = 3275$$

$$NWC_{2014} = 7,531.25 - 3,187.50 = 4343.75$$

$$\Delta NWC = 4343.75 - 3275 = 1068.75$$

# Pro Forma balance sheet

We can issue 1068.75 of short term debt We can put the remaining into long-term debt

Our short-term and long-term debt are our plug variable

A&W Corp. Balance Sheet							
Curr. Assets	2013		2014	Curr. Liabilities	2013		2014
Cash	1,000.00	20.0%	1,250.00	Accts. Pay	1,750.00	35.0%	2,187.50
Accts. Receive	2,250.00	45.0%	2,812.50	Notes Pay	1,000.00	-	<b>2,068.75</b>
Inventory	2,775.00	55.5%	3,468.75	Net Curr. Debt	2,750.00	-	4,256.50
Net Curr. Assets	6,025.00	120.0%	7,531.25	Long-term Debt	5,000.00	-	<b>6,631.25</b>
Net Fixed Assets	9,000.00	180.0%	11,250.00				
				Stock	6,000.00	-	6,000.00
				Ret. Earnings	1,275.00	-	1,893.75
Total Assets	15,025.00	300.0%	18,781.25	Total L & O.E.	15,025.00	-	<b>18,781.25</b>



# External financing needs

External Financing Needs (EFN): is the set of funds that is needed to support growth in forecasted sales

Generally speaking, EFN can be funded via debt or equity

Upon taking into account of retained earnings for the forecasted year, the EFN is simply the difference between the Assets and Liabilities with Owner's Equity

retention ratio  $b$  as:  $b = 1 - d$

More generally:

$$EFN = \frac{Assets}{Sales} \times \Delta Sales - \frac{Liabilities_{spont}}{Sales} - PM \times Sales_{proj} \times (1 - d)$$

where  $d$  refers to dividends payout ratio (retention ratio,  $b$ , as:  $b = 1 - d$ )

We use the above formula under some assumptions!!! (remember the class discussion! For this formula to work, Profit Margin (PM) and  $d$  should stay the same as the company's sales are growing.

## Exercise 13

The most recent financial statements for Bradley, Inc. are shown (no income taxes):

### Income statement

Sales	\$ 5,700
Costs	<u>3,820</u>
Net income	\$ 1,880

### Balance sheet

Assets	\$ 14,100	Debt	\$ 6,300
		Equity	<u>7,800</u>
Total	\$ 14,100	Total	\$ 14,100

Assets and costs are proportional to sales. Debt and Equity are not. No dividends are paid. Next year's sales are projected to be \$6,669. What is the external financing needed (EFN)?



## Solution

An increase of sales to \$6,669 is an increase of  $(\$6,669 - 5,700) / \$5,700$

Sales increase = .17 or 17%

Assuming costs and assets increase proportionally, the pro forma financial statements will look like this:

### Pro forma income statement

Sales	\$ 6,669
Costs	<u>4,469</u>
Net income	<u>\$ 2,200</u>

### Pro forma balance sheet

Assets \$ 16,497	Debt \$ 6,300
	Equity <u>10,000</u>
Total \$ 16,497	Total <u>\$ 16,300</u>

If no dividends are paid, the equity account will increase by the net income, so:

$$\text{Equity} = \$7,800 + 2,200 = 10,000$$

$$\text{EFN} = \text{Total assets} - \text{Total liabilities and equity} = \$16,497 - 16,300 = \$197$$