

# Tutorial 9 : Financial Planning & Forecasting

Conducted by : Mr Chong Lock Kuah, CFA

# Percentage of Sales Method

- Some items tend to vary directly with sales, while others do not.
- If costs are assumed to vary directly with sales, then the profit margin is constant. If depreciation and interest expense does not vary directly with sales, then the profit margin is not constant.
- Dividends are a management decision and generally do not vary directly with sales – the amount of dividends paid would affect the RE on the B/S.  $\text{Addition to RE} = \text{Net income} - \text{dividend}$
- On the liabilities side of the B/S, only accounts payables and accrued expenses generally vary directly with sales.
- Notes payable, long-term debt and equity (unless otherwise stated in the question) generally do not vary directly with sales because they depend on management decisions about capital structure.
- External fund needed is the plug figure that makes the pro forma balance sheet.

# Percentage of Sales Method: Steps

## Begin with Income Statement

- Projected sales = current sales (1 + sales growth rate)
- For each spontaneous item compute projected figure (Note that costs are assumed to vary directly with sales)
- If the amount of dividends to be paid are known, we could work out the amount of retained earnings

## On the Balance Sheet

- For each spontaneous item (e.g. all assets, accounts payable and accrued expenses) compute projected figure.
- If the amount of dividends to be paid are known or if the payout ratio is known, we could work out the amount of retained earnings
- Compute the change in retained earnings using the formula  $\Delta RE = NI - \text{Div.}$  EFN is the plug figure to make the B/S balance.

# Income Statement As Percentage of Sales

Assume Sales grow at 10% to \$5,500

## Tasha's Toy Emporium

### Income Statement, 2007

		% of Sales
Sales	5,000	
Costs	3,000	60%
EBT	2,000	40%
Taxes (40%)	800	16%
Net Income	1,200	24%
Dividends	600	
Add. To RE	600	
Div Payout = Retention Ratio= 50%		
Profit Margin = 24%		

## Tasha's Toy Emporium

### Pro Forma Income Statement, 2008

Sales	5,500
Costs	3,300
EBT	2,200
Taxes	880
Net Income	1,320
Dividends	660
Add. To RE	660

Current  
sales  
=\$5,000

# Balance Sheet As Percentage of Sales

## Tasha's Toy Emporium – Balance Sheet

	Current	% of Sales	Pro Forma		Current	% of Sales	Pro Forma
ASSETS				Liabilities & Owners' Equity			
Current Assets				Current Liabilities			
Cash	\$500	10%		Accts Pay	\$900	18 %	
A/R	2,000	40		Notes Pay	2,500	n/a	2,500
Inventory	3,000	60		Total	3,400		
Total	5,500	110		LT Debt	2,000	n/a	2,000
Fixed Assets				Owners' Equity			
Net PP&E	4,000	80		Common Stk	2,000	n/a	2,000
Total Assets	9,500	190		Ret Earnings	2,100	➔?	
				Total	4,100		
				Total L & OE	9,500		

## Using Percentage of Sales Method: Forecasted Income Statement (2013)

	2012	(1+g)	2013 Forecast
Sales	\$2,000	1.25	\$2,500
Less: VC	1,200	1.25	1,500
FC	700	1.25	875
EBIT	\$ 100		\$ 125
Interest	16	→	16
EBT	\$ 84		\$ 109
Taxes (40%)	34		44
Net income	\$ 50		\$ 65
Div. (30%)	\$15		\$19
Add'n to RE	\$35		\$46

# Financing Feedbacks

In the previous Pro Forma Income Statement, we assume that interest expense remains unchanged. In practice, to raise AFN, securities will be issued and additional interest and or/ dividends must be paid on new securities issued.

The interest payments lower the initially forecasted net income, which in turn reduces the retained earnings shown in the projected financial statements. Dividend payment will also reduces addition to retained earnings. That chain of events results in a higher AFN than was forecasted.

For simplicity, in your exam, you can ignore financing feedbacks.

## AFN Equation Method (Cont'd)

$$\text{AFN} = (A^*/S)\Delta S - (L^*/S)\Delta S - MS_1(1 - d),$$

In words,

EFN or AFN = required increase in asset – increase in spontaneous liability – change in retained earnings

Where :

$A^*$  = assets that vary directly with sales

$L^*$  = liabilities that increase spontaneously with sales

$S$  = original sales

$S_1$  = total sales projected for next year (based on projection)

$\Delta S$  = change in sales (based on projection)

$M$  = profit margin ;  $d$  = dividend payout ratio



# AFN Equation Method

- AFN (or EFN) Key Assumptions
  - Each type of asset grows proportionately with sales
  - Payables and accruals grow proportionately with sales
  - Operating at full capacity
  - Constant profit margin
  - Constant dividend payout ratio
- If the fixed asset is operating at less than full capacity, we need to check what is the capacity sales (i.e., what is the sales figure when fixed asset is operating at full capacity)

$$\text{Capacity Sales} = \frac{\text{Actual sales}}{\% \text{ of capacity}}$$

- If the capacity sales are greater than the forecasted sales, no new fixed assets are needed.
- However, if the capacity sales are less than projected sales, we still need to buy additional fixed assets. The additional fixed assets to be bought is less than the required fixed asset if the FA is operating at full capacity

# Example: Income Statement

Assume Sales grow at 10% to \$5,500

## Tasha's Toy Emporium

### Income Statement, 2007

		% of Sales
Sales	5,000	
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Div Payout = Retention Ratio= 50%

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# Example: Balance Sheet

## Tasha's Toy Emporium – Balance Sheet

	Current	% of Sales	Pro Forma		Current	% of Sales	Pro Forma
ASSETS				Liabilities & Owners' Equity			
Current Assets				Current Liabilities			
Cash	\$500	10%	\$550	Accts Pay	\$900	18 %	\$990
A/R	2,000	40	2,200	Notes Pay	2,500	n/a	2,500
Inventory	3,000	60	3,300	Total	3,400		3,490
Total	5,500	110	6,050	LT Debt	2,000	n/a	2,000
Fixed Assets				Owners' Equity			
Net PP&E	4,000	80	4,400	Common Stk	2,000	n/a	2,000
Total Assets	9,500	190	10,450	Ret Earnings	2,100	➔	2,760
				Total	4,100		4,760
				Total L & OE	9,500		10,250

# Additional Financing Needed

- The firm needs an additional \$200 in debt or equity to balance the B/S. This is the plug.

$$\begin{aligned}\text{AFN} &= \text{TA} - (\text{TL} + \text{OE}) \\ &= 10,450 - 10,250 = 200\end{aligned}$$

# What if FA are operating at less than full capacity

Suppose that at sales = \$5,000, the company is operating at 80%

Full Capacity sales =  $\$5000 / 0.8 = \$6,250$

Projected sales = \$5,500

No additional FA will be required. The \$200 AFN calculated based on FA operating at 100% is no longer correct.

$$\text{Required increase in FA} = \frac{\text{Current FA}}{\text{Current Sales}} \times (\Delta \text{Sales})$$

$$\begin{aligned} \text{AFN} &= 200 - \frac{\text{Current FA}}{\text{Current sales}} \times (\Delta \text{Sales}) = 200 - \frac{4000}{5000} \times 500 \\ &= -200 \text{ (surplus fund)} \end{aligned}$$

What if at sales = \$5000, the company is operating at 98.02% capacity?

Full Capacity sales =  $5000 / 0.9802 = 5101$

Projected sales = \$5,500, so need more fixed assets.

How do we compute the fixed assets needed?

To calculate the amount of fixed assets needed, we express current fixed assets as percentage of capacity Sales (Sales if operating at full capacity)

$$\begin{aligned}\text{Target ratio} &= \text{Fixed Assets} / \text{Capacity sales} \\ &= \$4000 / \$5101 \\ &= 0.7842\end{aligned}$$

Current Sales  
= 0.9802 (capacity sales),  
So we need to use  
capacity sales instead of  
current sales in the  
denominator

Apply target ratio to increase in sales of \$5,500

$$\text{Fixed Assets} = 0.7842 (\$399)$$

$$= \$4312.88$$

$$= \$4313$$

So this is the amount of fixed assets needed.

## Cont'd

$$\text{EFN} = \text{required increase in asset} - \text{increase in spontaneous liability} - \text{increase in retained earnings}$$

What if EFN is negative?

⇒ Excess internally generated funds



# How would the following items affect the AFN?

$$\text{AFN} = (A^*/S)\Delta S - (L^*/S)\Delta S - MS_1(1 - d),$$

- Higher dividend payout ratio?
  - Increase AFN: Less retained earnings.
- Higher profit margin?
  - Decrease AFN: Higher profits, more retained earnings.
- Higher capital intensity ratio?
  - Increase AFN: Need more assets for given sales.
- Pay suppliers in 60 days, rather than 30 days?
  - Decrease AFN: Trade creditors supply more capital (i.e.,  $L^*/S_0$  increases).

# Internal Growth Rate

- The max growth rate that can be achieved with no external financing of any kind. In other words, retained earnings as the only source of financing.

In general,  $AFN = \text{Required increase in assets} - \text{spontaneous increase in current liabilities} - \text{addition to retained earnings}$

For internal growth rate, the required increase in assets is only financed by internally generated fund, that is, additional to retained earnings, and  $AFN=0$ .

This implies that spontaneous current liabilities is zero and assumed to be non-spontaneous. Required increase in assets = addition to retained earnings

# Internal Growth Rate

If  $EFN$  = negative, it means that the company has surplus fund.

This usually occurs when the fixed asset is not operating at full capacity. The capacity sales are greater than the projected sales. no new fixed assets are needed.

The internal growth rate is greater than the projected growth rate. In other words, the company has enough fund to support higher sales growth rate.

## Cont'd

- The internal growth rate can be calculated as follows:

$$\text{Internal Growth Rate} = \frac{\text{ROA} \times b}{1 - (\text{ROA} \times b)}$$

Where ROA = return on asset ; b = retention ratio

# Sustainable Growth Rate

- The max growth rate a firm can be achieved with no external equity financing (i.e., only using retained earnings) while maintain a constant debt-to-equity ratio by issuing external debt. Here we assume that the debt-to-equity ratio is optimal.
- Addition to retained earnings causes the equity to increase and the debt-to-equity ratio to be lower.
- The firm is issuing debt to maintain this optimal debt-to-equity ratio.
- Therefore the sustainable growth rate is the max growth rate a firm can maintain without increasing its financial leverage.

## Cont'd

- The sustainable growth rate can be calculated as follows:

$$\text{Sustainable Growth Rate} = \frac{\text{ROE} \times b}{1 - (\text{ROE} \times b)}$$

Where ROE = return on equity ; b = retention ratio

# Determinants of Growth

$$\text{ROE} = \text{PM} \times \text{TATO} \times \text{EM}$$

$$g = \frac{\text{ROE} \times b}{1 - (\text{ROE} \times b)}$$

- Profit margin – operating efficiency
- Total asset turnover – asset use efficiency
- Financial leverage – choice of optimal debt ratio
- Dividend policy – choice of how much to pay to shareholders versus reinvesting in the firm

#1:

The most recent financial statement for Summer Tyme, Inc., are shown here:

<u>Income Statement</u>		<u>Balance Sheet</u>			
Sales	\$4,200	Current assets	\$3,600	Current liabilities	\$2,100
Costs	<u>3,300</u>	Fixed assets	7,900	Long-term debt	3,650
Taxable income	\$9,00			Equity	<u>5,750</u>
Taxes (34%)	<u>306</u>	Total	<u>\$11,500</u>	Total	<u>\$11,500</u>
Net income	\$594				

Assets, costs and current liabilities are proportional to sales. Long-term debt and equity are not. The company maintains a constant 40% dividend payout ratio. As with every other firm in its industry, next year's sales are projected to increase by exactly 15%. What is the external financing needed?



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

### Pro forma income statement

Sales	\$4,830.00
Costs	<u>3,795.00</u>
Taxable income	\$1035.00
Taxes(34%)	<u>\$ 351.90</u>
NI	<u>\$ 683.10</u>

### Pro forma balance sheet

Current assets	\$4,140.00	Current liabilities	\$2,415.00
Fixed assets	9,085.00	Long term debt	3,650.00
		Equity	<u>6,159.86</u>
Total	<u>\$13,225.00</u>	Total	<u>\$12,224.86</u>

Items that vary directly with sales are multiplied by  $(1+g)$

The payout ratio is 40 percent, so dividends will be:

$$\text{Dividends} = 0.40(\$683.10) = \$273.24$$

The addition to retained earnings is:

$$\text{Addition to retained earnings} = \$683.10 - 273.24 = \$409.86$$

So the EFN is:

$$\text{EFN} = \text{Total assets} - \text{Total liabilities and equity}$$

$$\text{EFN} = \$13,225 - 12,224.86$$

$$\text{EFN} = \$1,000.14$$

$$\text{Alternatively, EFN} = (A^*/S_0)\Delta S - (L^*/S_0)\Delta S - M(S_1)(RR)$$

$$= (11,500/4,200)*630 - (2,100/4,200)*630 - (594/4,200)*4,830*60\%$$

$$= \$1,000.14$$

#2:

The most recent financial statement for Live Co. are shown here:

<u>Income Statement</u>		<u>Balance Sheet</u>			
Sales	\$13,250	Current Assets	\$10,400	Debt	\$17,500
Costs	9,480	Fixed assets	28,750	Equity	21,650
Taxable income	\$3,770	Total	\$39,150	Total	\$39,150
Taxes (35%)	1,508				
Net income	\$2,262				

Assets and costs are proportional to sales. Debt and equity are not. The company maintains a constant 30 percent dividend payout ratio. No external equity financing is possible. What is the internal growth rate?

To calculate the internal growth rate, we first need to calculate the ROA, which is:

$$\text{ROA} = \text{NI} / \text{TA}$$

$$\text{ROA} = \$2,262 / \$39,150 = 0.0578 \text{ or } 5.78\%$$

$$\text{Internal Growth Rate} = \frac{\text{ROA} \times b}{1 - (\text{ROA} \times b)}$$

The plowback ratio,  $b$ , is one minus the payout ratio, so:

$$b = 1 - 0.30 = 0.70$$

Now we can use the internal growth rate equation to get:

$$\text{Internal growth rate} = (\text{ROA} \times b) / [1 - (\text{ROA} \times b)]$$

$$\text{Internal growth rate} = [0.0578(0.70)] / [1 - 0.0578(0.70)] = 0.0421 \text{ or } 4.21\%$$

#3:

The most recent financial statement for Live Co. are shown here:

<u>Income Statement</u>		<u>Balance Sheet</u>			
Sales	\$13,250	Current Assets	\$10,400	Debt	\$17,500
Costs	9,480	Fixed assets	28,750	Equity	21,650
Taxable income	\$3,770	Total	\$39,150	Total	\$39,150
Taxes (35%)	1,508				
Net income	\$2,262				

Assets and costs are proportional to sales. Debt and equity are not. The company maintains a constant dividend 30 percent payout ratio. No external equity financing is possible. What is the sustainable growth rate?

To calculate the sustainable growth rate, we first need to calculate the ROE, which is:

$$\text{ROE} = \text{NI} / \text{TE}$$

$$\text{ROE} = \$2,262 / \$21,650 = 0.1045 \text{ or } 10.45\%$$

$$\text{Sustainable Growth Rate} = \frac{\text{ROE} \times b}{1 - (\text{ROE} \times b)}$$

The plowback ratio,  $b$ , is one minus the payout ratio, so:

$$b = 1 - 0.30 = 0.70$$

Now we can use the internal growth rate equation to get:

$$\begin{aligned} \text{Sustainable growth rate} &= (\text{ROE} \times b) / [1 - (\text{ROE} \times b)] \\ &= [0.1045(0.70)] / [1 - 0.1045(0.70)] = \\ &0.0789 \text{ or } 7.89\% \end{aligned}$$

#4:

McCormack Co. wishes to maintain a growth rate 12 percent a year, a debt-equity ratio of 1.20, and a dividend payout ratio of 30 percent. The ratio of total assets to sales is constant at 0.75. What profit margin must the firm achieve?

We can calculate ROE from the sustainable growth rate equation. For this equation we need the retention ratio, so:

$$b = 1 - 0.30$$

$$b = 0.70$$

Using the sustainable growth rate equation and solving for ROE, we get:

$$\text{Sustainable growth rate} = (\text{ROE} \times b) / [1 - (\text{ROE} \times b)]$$

$$0.12 = [\text{ROE}(0.70)] / [1 - \text{ROE}(0.70)]$$

$$\text{ROE} = 0.1531 \text{ or } 15.31\%$$

Now we can use the DuPont identity to find the profit margin as:

$$\text{ROE} = \text{PM}(\text{TAT})(\text{EM})$$

$$0.1531 = \text{PM}(1 / 0.75)(1 + 1.20)$$

$$\text{PM} = (0.1531) / [(1 / 0.75)(2.20)]$$

$$\text{PM} = 0.0522 \text{ or } 5.22\%$$

#5:

You've collected the following information about St. Pierre, Inc.:

Sales = \$195,000

Net income = \$17,500

Dividends = \$9,300

Total debt = \$86,000

Total equity = \$58,000

What is the sustainable growth rate for St. Pierre, Inc.? If it does grow at this rate, how much new borrowing will take place in the coming year, assuming a constant debt-equity ratio? What growth rate could be supported with no outside financing at all?



To calculate the sustainable growth rate, we first must calculate the retention ratio and ROE. The retention ratio is:

$$b = 1 - (\$9,300/\$17,500)$$

$$b = 0.4686$$

And the ROE is:

$$\text{ROE} = \$17,500 / \$58,000 = 0.3017 \text{ or } 30.17\%$$

So, the sustainable growth rate is:

$$\begin{aligned}\text{Sustainable growth rate} &= (\text{ROE} \times b) / [1 - (\text{ROE} \times b)] \\ &= [0.3017(0.4686)] / [1 - 0.3017(0.4686)] \\ &= 0.1647 \text{ or } 16.47\%\end{aligned}$$

If the company grows at the sustainable growth rate, the new level of total assets is:

$$\text{New TA} = 1.1647 \left( \overset{\text{TD}}{\$86,000} + \overset{\text{TE}}{58,000} \right) = \$167,710.84$$

To find the new level of debt in the company's balance sheet, we take the percentage of debt in the capital structure times the new level of total assets. The additional borrowing will be the new level of debt minus the current level of debt.

So:

$$\text{New TD} = [D / (D + E)] (\text{New TA})$$

$$\text{New TD} = [\$86,000 / (\$86,000 + 58,000)] (\$167,710.84)$$

$$\text{New TD} = \$100,160.64$$

And the additional borrowing will be:

$$\text{Additional borrowing} = \$100,160.04 - 86,000 = \$14,160.64$$

Alternatively, we can calculate the additional debt as follows:

$$\begin{aligned} \text{AFN} &= (A^*/S)\Delta S - (L^*/S)\Delta S - MS_1(1 - d), \\ &= (144,000/195,000)(32,116.5) - 0 \\ &\quad - (17,500/195,000)(227,116.5)(0.4686) \\ &= 23,716.8 - 9,551.12 = 14,165.68 \end{aligned}$$

The answer is slightly different due to rounding error.

To grow rate or sustainable growth rate, the required increase in assets to support the sales is financed by addition to retained earnings.

Required increase in assets = Addition to retained earnings.  
spontaneous increase in liabilities = 0

AFN is the additional debt to maintain the debt/equity ratio.

The growth rate that can be supported with no outside financing is the internal growth rate. To calculate the internal growth rate, we first need the ROA, which is:

$$\text{ROA} = \$17,500/(\$86,000 + 58,000) = 0.1215 \text{ or } 12.15\%$$

This means the internal growth rate is:

$$\begin{aligned}\text{Internal growth rate} &= (\text{ROA} \times b)/[1 - (\text{ROA} \times b)] \\ &= [0.1215(0.4686)]/[1 - 0.1215(.4686)] \\ &= 0.0604 \text{ or } 6.04\%\end{aligned}$$

#6:

U-Dunno Corporation's Balance Sheet and Income Statement are as shown below. Note that the firm maintains a cash balance as required for its operations (none of its cash is 'excess cash'):

### U-Dunno Corporation 2012 and 2013 Balance Sheet

	2012	2013		2012	2013
Cash	\$260,000	\$290,000	Accounts Payable	\$110,000	\$130,000
Accounts Receivable	180,000	240,000	Notes Payable	120,000	140,000
Inventory	250,000	270,000	Total	\$230,000	\$270,000
Total	\$690,000	\$800,000	Long-Term Debt	290,000	328,000
Net Fixed Assets	410,000	450,000	Common Stock	250,000	250,000
			Retained Earnings	330,000	402,000
Total Assets	\$1,100,000	\$1,250,000	Total Liab & Equity	\$1,100,000	\$1,250,000

## U-Dunno Corporation 2013 Income Statement

Sales	\$1,600,000
Cost of Goods Sold	1,100,000
Depreciation	200,000
Expense	
Earnings before	<hr/> \$300,000
Interest and Tax	
Interest Expense	<hr/> 60,000
Taxable Income	\$240,000
Less: Taxes (40%)	<hr/> 96,000
Net Income	<hr/> \$144,000

- a. Assume that all assumptions for application of the AFN Equation hold (as discussed in your course notes, i.e. the firm is operating at full capacity, it maintains the same operating relationships, payout ratios, etc.). What is U-Dunno Corporation's AFN given a desired increase in Sales to \$1,800,000 for 2014?

New Sales,  $S_1 = \$1,800,000$

Change in Sales,  $\Delta S = \$1,800,000 - \$1,600,000 = \$200,000$

Since PM & payout ratio (or retention ratio) are constant

$PM = \$144,000 / \$1,600,000 = 0.09$

$b = (\$402,000 - \$330,000) / \$144,000 = 50\%$

$$\begin{aligned}\rightarrow AFN &= (A^*/S_0)\Delta S - (L^*/S_0)\Delta S - M(S_1)(RR) \\ &= (1,250,000/1,600,000)*200,000 - \\ &\quad (130,000/1,600,000)*200,000 - 0.09*1,800,000*50\% \\ &= \$59,000\end{aligned}$$

- b. If Fixed Assets had only been operating at 80% of capacity in 2013, would additional Fixed Assets still be required given desired sales of \$1,800,000 for 2014? If not, what would be the resultant AFN required as per the AFN Equation (as covered in your notes)?

$$\text{Capacity Sales} = \$1,600,000 / 0.8 = \$2,000,000$$

→ Since target sales is only \$1,800,000 and existing fixed assets can support \$2,000,000 sales if operating at full capacity, no additional fixed assets are required.

Projected increase in fixed assets 2014

$$= (\$450,000 / \$1,600,000) * \$200,000 = \$56,250$$

$$\rightarrow \text{New Resultant AFN} = \$59,000 - \$56,250 = \$2,750$$

Express fixed asset as percentage of current sales. The projected increase in FA = current fixed current asset/sales x incremental sales.

- c. Given that Fixed Assets had only been operating at 80% of capacity in 2013, if desired Sales increased to \$2,200,000 for 2014 instead, what would be the increase in Fixed Asset requirement?

$$\text{Target ratio} = \$450,000 / \$2,000,000 = 22.5\%$$

We have enough fixed asset for \$2,000,000 of sales, therefore, need enough for another \$200,000 of sales.

$$\text{Increase in Fixed assets} = 22.5\% * \$200,000 = \$45,000$$

Target ratio is calculated as follows

Target ratio = current FA/capacity sales