Practice for Lecture 2: Financial Planning Models

Questions 1-4 are simple background questions whose answers are in the notes:

Question 1. Carefully explain what a firm's external financing need (EFN) for next year is. As part of your answer, write an equation that would allow you to calculate EFN using accounting data for the current year. Interpret all of its terms.

Question 2. How does a firm's external financing need vary with the proposed growth rate for each year? Why? What is the main constraint in choosing a firm's growth rate?

Question 3. What are the assumptions we used to derive formulas for the internal growth rate and sustainable growth rates? Write a firm's external financing need under those simplifying assumptions and explain its terms.

Question 4. What happens with the internal growth rate and the sustainable growth rate if:

i) ROA and ROE decrease?

ii) the retention ratio increases

iii) ROA and ROE increase buy the retention ratio decreases?

Question 5. Under the assumptions we made in class, formally derive the formulas for:

a) the internal growth rate (g^i)

b) the sustainable growth rate (g*)

Show all steps of your derivations!

Solution to Question 5.

a) Derive g^i.

g^i solves EFN = 0, so this is what we do:

EFN = Increase in assets - Addition to RE (Chg in AP=0)

$EFN = A \times g - NI \times r \times (1+g)$

$EFN = [A - NI \times r] \times g - NI \times r$

EFN (g^i) = 0 means that [A – NI × r] × g^i - NI × r = 0 (this defies g^i!)

Solving gives g^i = NI × r / [A - NI × r]

Divide by A & recall ROA = NI / A

Then, $\boldsymbol{g^i = ROA \times r / (1 - ROA \times r)}$

b) Derive g*.

g* solves EEFN = EFN – New Borrowing = 0, so this is what we do:

EEFN = A × g – NI × r × (1+g) – NI × r × (1+g) × (D/E)

What is the last term?

NI × r × (1+g) × (D/E) = ΔRE × (D/E) = (ΔRE / E) × D

So the last term is the amount of borrowing that would keep the D/E constant!

Now solve for g*: EEFN (g*) = 0 means that:

A × g* – NI × r × (1+g*) – NI × r × (1+g*) × (D/E) = 0

A × g* – (1+D/E) × NI × r × (1+g*) = 0

A × g* – (1+D/E) × NI × r – (1+D/E) × NI × r × g* = 0

[A – (1+D/E) × NI × r] × g* = (1+D/E) × NI × r

Note that 1+D/E = (E+D)/E = A/E

Thus, (1+D/E) × NI × r = A/E × NI × r = A × ROE × r

Plug this expression into previous line:

[A – A × ROE × r] × g* = A × ROE × r

Divide by A to get: [1 – ROE × r] × g* = ROE × r

Thus, $\boldsymbol{g^* = ROE \times r / [1 - ROE \times r]}$

Question 6. Consider the following accounting information for Seagate Corp., which corresponds to the fiscal year ending in December 2012.

Seagate Corp - Balance Sheet as of December 2012

Assets:	**2012**	**Liabilities & Equity:**	**2012**
Cash	350.0	Accounts payable	650.0
Accounts receivable	700.0	Notes payable	300.0
Inventory	900.0	Current liabilities	950.0
Current assets	1,950.0		
		Long-term debt	1,900.0
Net fixed assets	4,500.0		
		Common stock	1,600.0
		Retained earnings	2,000.0
		Total equity	3,600.0
Total assets	6,450.0	Total liabilities and equity	6,450.0

Seagate Corp - Income Statement for 2012

	2012
Sales	9,000.0
COGS (70% of sales)	6,300.0
Operating expenses	600.0
EBIT	2,100.0
Interest expense	350.0
Taxable income	1,750.0
Tax (40% tax rate)	700.0
Net income	1,050.0
Dividend (1/3 of NI)	350.0
Addition to retained earnings	700.0

Seagate's management is planning its growth for 2013. Managers want to build pro-forma financial statements for 2013 under a proposed sales growth rate of 30%. They believe the firm's cost structure will remain the same as a percentage of sales, operating expenses will grow 15%, interest expenses will be 8% of beginning notes payable plus long-term debt, the tax rate will remain at 40%, and the dividend payout ratio will remain unchanged. Currently, Seagate is operating at full capacity.

a) What is Seagate's external financing need in 2013 if it is going to grow 30%?

b) What are the options Seagate faces in covering its external financing needs?

c) Choose a financing strategy that you deem appropriate, and complete the pro-forma balance sheet and income statement for 2013.

d) Suppose that Seagate can raise up to $300 in additional notes payable to the bank, but cannot issue long-term debt or equity. What are management's options?

e) Suppose now that Seagate is operating at 70% of its installed productive capacity.

i) What are Seagate's potential sales if it operates at full capacity?

ii) What is Seagate's external financing need in 2013 if it is going to grow 30%?

iii) Choose a financing strategy that you deem appropriate, and complete the pro-forma balance sheet and income statement for 2013.

Solution (see spreadsheet Lecture 2 – Practice Questions.xls)

a) What is Seagate's external financing need in 2013 if it is going to grow 30%?

Seagate Corp - Pro-Forma Income Statement for 2013

	2012	2013F
Sales (+g%)	9,000.0	11,700.0
COGS (70% of sales)	6,300.0	8,190.0
Operating expenses (+ 15%)	600.0	690.0
EBIT	2,100.0	2,820.0
Interest expense (8% of beg. notes payable + LT debt)	350.0	176.0
Taxable income	1,750.0	2,644.0
Tax (40% tax rate)	700.0	1,057.6
Net income	1,050.0	1,586.4
Dividend (1/3 of NI)	350.0	528.8
Addition to retained earnings	700.0	1,057.6

Seagate Corp - Pro-Forma Balance Sheet as of December 2013

Assets:	2012	2013F	Change
Cash (+g%)	350.0	455.0	105.0
Acc. receivable (+g%)	700.0	910.0	210.0
Inventory (+g%)	900.0	1170.0	270.0
Current assets	1,950.0	2,535.0	585.0
Net fixed assets (+g%)	4,500.0	5,850.0	1,350.0
Total assets	6,450.0	8,385.0	1,935.0

Liabilities & Equity:	2012	2013F	Change
Acc. payable (+g%)	650.0	845	195.0
Notes payable (no chg)	300.0	300.0	-
Current liabilities	950.0	1,145.0	195.0
Long-term debt (no chg)	1,900.0	1,900.0	-
Common stock (no chg)	1,600.0	1,600.0	-
Retained earnings	2,000.0	3,057.60	1,057.6
Total equity	3,600.0	4,657.6	1,057.6
Total liab. and equity	6,450.0	7,702.6	1,252.6

EFN = 682.4

b) What are the options Seagate faces in covering its external financing needs?

Well, assuming there are no financing constraints, the firm can issue debt or equity, or borrow a bit more from the bank.

c) Choose a financing strategy that you deem appropriate, and complete the pro-forma balance sheet and income statement for 2013.

You can make any assumptions you like. I assumed you will issue both debt and equity, for amounts of EFN/2, as follows.

Seagate Corp - Pro-Forma Balance Sheet as of December 2013

Assets:	**2012**	**2013F**	**Change**
Cash (+g%)	350.0	455.0	105.0
Acc. receivable (+g%)	700.0	910.0	210.0
Inventory (+g%)	900.0	1170.0	270.0
Current assets	1,950.0	2,535.0	585.0
Net fixed assets (+g%)	4,500.0	5,850.0	1,350.0
Total assets	6,450.0	8,385.0	1,935.0

Liabilities & Equity:	**2012**	**2013F**	**Change**
Acc. payable (+g%)	650.0	845	195.0
Notes payable (no chg)	300.0	300.0	-
Current liabilities	950.0	1,145.0	195.0
Long-term debt	1,900.0	2,241.2	341.2
Common stock	1,600.0	1,941.2	341.2
Retained earnings	2,000.0	3,057.60	1,057.6
Total equity	3,600.0	4,998.8	1,398.8
Total liabilities and equity	6,450.0	8,385.0	1,935.0

d) Suppose that Seagate can raise up to $300 in additional notes payable to the bank, but cannot issue long-term debt or equity. What are management's options?

Well, EFN is more than double the amount of financing Seagate can raise. With no other outside financing options, maybe management can cut dividends. It seems that $300 you can raise plus $528.8 in additional retained earnings should cover EFN. But if cutting dividends is not feasible, then the firm cannot grow 30% and it must revise its proposed growth rate downwards.

e) Suppose now that Seagate is operating at 70% of its installed productive capacity.

i) What are Seagate's potential sales if it operates at full capacity?

.70 x FCS = 9,000 ; thus FCS = $12,857

If Seagate grows 30% sales must go up to $11,700, so this can be done without any new investment in fixed assets!

ii) What is Seagate's external financing need in 2013 if it is going to grow 30%?

Note that the pro-forma income statement is the same as before.

Seagate Corp - Pro-Forma Balance Sheet as of December 2013

Assets:	**2012**	**2013F**	**Change**
Cash (+g%)	350.0	455.0	105.0
Acc. receivable (+g%)	700.0	910.0	210.0
Inventory (+g%)	900.0	1,170.0	270.0
Current assets	1,950.0	2,535.0	585.0
Net fixed assets (no chg)	4,500.0	4,500.0	-
Total assets	6,450.0	7,035.0	585.0

Liabilities & Equity:	**2012**	**2013F**	**Change**
Acc. payable (+g%)	650.0	845.0	195.0
Notes payable (no chg)	300.0	300.0	-
Current liabilities	950.0	1,145.0	195.0
Long-term debt (no chg)	1,900.0	1,900.0	-
Common stock (no chg)	1,600.0	1,600.0	-
Retained earnings	2,000.0	3,057.6	1,057.6
Total equity	3,600.0	4,657.6	1,057.6
Total liab. and equity	6,450.0	7,702.6	1,252.6

EFN = -667.6

A negative EFN means that there is a surplus funds and Seagate must figure out what to do with them.

iii) Choose a financing strategy that you deem appropriate, and complete the pro-forma balance sheet and income statement for 2013.

I choose to use the surplus funds to buy back equal amounts of equity and long-term debt.

Seagate Corp - Pro-Forma Balance Sheet as of December 2013

Assets:	**2012**	**2013F**	**Change**
Cash (+g%)	350.0	455.0	105.0
Acc. receivable (+g%)	700.0	910.0	210.0
Inventory (+g%)	900.0	1,170.0	270.0
Current assets	1,950.0	2,535.0	585.0
Net fixed assets (no chg)	4,500.0	4,500.0	-
Total assets	6,450.0	7,035.0	585.0

Liabilities & Equity:	**2012**	**2013F**	**Change**
Acc. payable (+g%)	650.0	845.0	195.0
Notes payable (no chg)	300.0	300.0	-
Current liabilities	950.0	1,145.0	195.0
Long-term debt (no chg)	1,900.0	1,566.2	-333.8
Common stock (no chg)	1,600.0	1,266.2	-333.8
Retained earnings	2,000.0	3,057.6	1,057.6
Total equity	3,600.0	4,323.8	723.8
Total liab. and equity	6,450.0	7,035.0	585.0

Question 7. Consider the following accounting information for HomeNet (HN) corresponding to the end of its most recent fiscal year end (December 2012).

Home Net's Balance Sheet as of Dec 2012

	2011	2012
Assets		
Current assets	448.0	504.4
Fixed assets	932.8	950.0
Total assets	1380.8	1454.4
Liabilities and shareholders' equity		
Current liabilities	100.0	111.7
Long-term debt	771.5	682.3
Common stock	459.0	497.0
Retained earnings	50.3	163.4
Total liabilities and shareholders' equity	1380.8	1454.4

Home Net's Income Statement for 2012

Revenues	2,200.0
Costs (70% of revenues)	1,540.0
Depreciation	300.0
EBIT	360.0
Interest (10% of beg long-term debt)	77.2
Taxable income	282.9
Tax @ 40%	113.1
Net income	169.7
Dividends (1/3 of NI)	56.6
Addition to retained earnings	113.1

Answer the following questions:

a) Calculate the internal growth rate (g^i) and the sustainable growth rate (g*) and then carefully explain what are the assumptions implicit in the calculations.

b) What will happen with g^i and g* over time if the firm starts to gradually increase its payout ratio over the next few years?

c) What will happen with g^i and g* over time if the firm's ROA and ROE start to decline gradually over the next few years?

d) Under which assumptions will g^i and g* be constant over time?

e) Assume that the g^i and g* you calculated have been roughly constant over the past few years and will remain constant over the next few years as well. Suppose HN cannot issue new equity but lenders are willing to extend the firm more credit, and keep in mind its current debt-to-equity

ratio. Discuss what will happen to the firm's debt-to-equity ratio over the next few years if the firm consistently grows at i) 5%, ii) 15%, or iii) 25% per year. Comment on any potential advantages or risks of these alternative growth strategies.

f) Under the assumption in e), will lenders always finance HN's growth at 25% per year?

g) Suppose that HN faces an expanded market for its products and its sales could grow at 30% per year for the next ten years. What needs to happen on the finance side so that the company can accomplish this 30% growth per year?

h) Based on the previous analysis in a)-g), what is HomeNet's optimal capital structure?

Solutions:

a) Use the accounting info to calculate ROA, ROE, and the retention ratio. Use our formulas to calculate g^i =8.4% and g* = 20.7%. For the assumptions embedded in these calculations see slide 16 on Lecture 2.

b) Look at formulas and use intuition. If you increase the payout ratio you decrease the retention ratio. If you retain a lower fraction of your earnings, then you reduce the firm's amount of internal financing. With less internal financing, you cannot grow so fast. Thus, both rates decrease. Alternatively, just look at the formulas and you will see this is indeed the case.

c) If HN's profitability diminishes over time once again the amount of internal financing it can generate by retaining earnings will diminish, and ultimately this will reduce both growth rates. Again, you can look at the formula.

d) For g^i and g* to be constant over time of course you need that ROA, ROE, and the retention ratio remain constant.

e) See discussion on Lecture 2. The debt-to-equity ratio is about 1.2, which is somewhat high for a small company (54% debt).

i) if HN grows at 5% this means $g < g^i$. The D/E is falling.
ii) if HN grows at 15% this means $g^i < g < g^*$. The D/E is falling.
ii) if HN grows at 25% this means $g > g^*$. The D/E is increasing.

Temporarily growing at $g < g^*$ could be good if you want to reduce the company's leverage, but recall that if leverage is too low you will not have any interest tax shields.

You can grow at $g > g^*$ as long as lenders provide the financing, but this will increase your leverage. You can probably do this for a few years, but at some point the financial risk will be too high and this cause the firm trouble if anything goes wrong (at most often it does). It may be safer to grow more slowly to reduce your EFN and keep you financial risk at a more reasonable level.

f) Clearly, if HN grows at g > g* for many years eventually its leverage will be too high and the risk of default will also be too high. Eventually, lenders will refuse to lend more.

g) The only way to consistently grow at g > g* is to be able to raise new equity financing, so that you can maintain a capital structure that is reasonable given the firm's inherent business risk.

h) None of the previous analysis is useful in deciding what the optimal capital structure is. Recall there is no finance in financial planning models.