ENG 111 Homework 4 Solutions

Spring 2021

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1. (10 points) Branch Inc. is a company that produces construction material by using its assets at full capacity. According to the end of 2020 financial statements, company has $5,000,000 in assets that are financed 50% by equity and 50% by debt. Assume that company does not have any spontaneous liabilities and it does not have any scheduled long term principal debt payments until 5 years from now. Assume Branch had an annual profit of $800,000 in 2020 and does not have any depreciation. Requirement: Company is not planning on selling or buying back stocks or distributing dividends.

If annual sales grow at the the internal growth rate, fill out the following table given that profit margin stays the same and assets need to increase at the same rate as sales?

	2020	2021	2022	2023	2024
Equity	2,500,000	3,452,320	4,585,961.	5,935,448.	7,541,878.
Debt	2,500,000	2,499,680	2,499,299.	2,498,845.	2,498,305.
D/E	1.00	0.72	0.54	0.42	0.33

*ROA = 800,000/5,000,000 = 0.16, b=1, IGR = ROA*b/(1-ROA*b) = 0.16/(1-0.16) = 0.1904*

Branch will grow at a rate of 19.04% each year. Sales as well as assets grow at this rate. The Debt/Equity ratio will change over time as the company keeps its profit and adds it to Equity.

(2 points each year)

2. (20 points) The accounts related to the Balance Sheet as well as Income Statement for a company are given below as of Dec 31st 20XX. Assume that the company does not distribute any dividends and has no depreciation and no current liabilities. Company is not planning to purchase or sell stock, and will increase its assets at the same rate as sales next year. Costs are expected to increase half as fast as the sales since the company will take advantage of economies of scale (that is, if sales grow at 10%, costs will grow at 5%). Interest next year will be equal to 2% of the total debt in 20XX. If the company would like to grow by r in 2020 and would like to keep its D/E ratio as in 20XX, produce the pro-forma income statement and balance sheet for the next year.

Income Statement		
	20XX	**Projected**
Sales	70	70(1+r)
Costs	10	10(1+r/2)
Interest	0	.02y
Taxable Income	60	70(1+r)—10(1+r/2)—0.02y
Taxes (40%)	24	0.4[70(1+r)—10(1+r/2)—0.02y]
Net Income	36	0.6[70(1+r)—10(1+r/2)—0.02y]

Balance Sheet					
	20XX	**Projected**		**20XX**	**Projected**
Current Assets	75	75(1+r)	Debt	1,520	y
Fixed Assets	2,000	2,000(1+r)	Common Stock	100	100
Total Assets	2,075	2,075(1+r)	Retained Earnings	455	455+0.6[70(1+r)—10(1+r/2)—0.02y]

12 cells in the pro forma statements, given in red, each 2 points

We have two unknowns, r is the growth rate, and y is the new debt. All we need is two equations to solve for r and y.

$D/E = y/(555+0.6(70(1+r)-10(1+r/2)-0.02y)) = 1520/555$

and $2{,}075(1+r) = y+555+0.6(70(1+r)-10(1+r/2)-0.02y))$

x= 6.98% (6 points) and y=1,626 (6 points)

3. (10 points) Suppose a firm maintains a positive retention ratio and keeps its debt-equity ratio constant every year. When sales grow by 20%, the firm has a negative projected EFN.

a) Can you tell, with certainty, that the sustainable growth rate is greater than/equal to/ less than 20%? Why/Why not?

(5 points) The sustainable growth rate is greater than 20%, because at a 20% growth rate the negative

EFN indicates that there is excess financing still available.

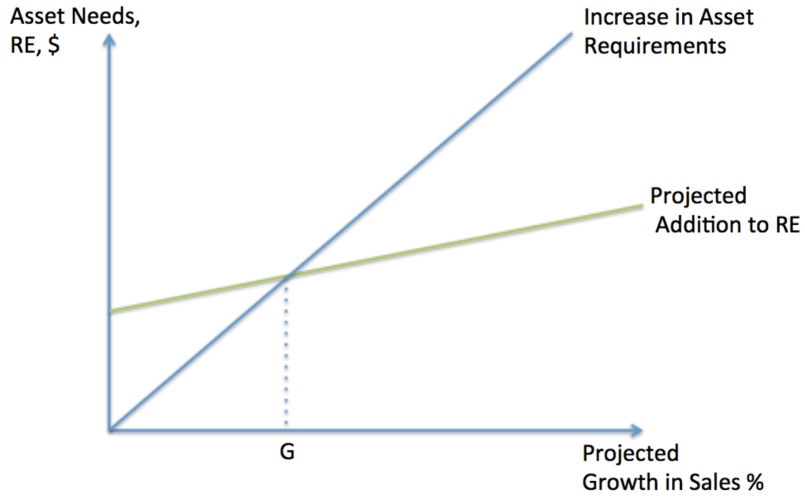
b) Do you know with certainty that the internal growth rate is greater than/equal to/ less than 20%? Why/Why not?

(2 points) If the firm is 100% equity financed, then the sustainable and internal growth rates are equal and the internal growth rate would be greater than 20%.

(3 points) However, when the firm had originally some debt, the internal growth rate is always less than the sustainable growth rate, so it is ambiguous whether the internal growth rate would be greater than or less than 20%.

Graders! Note that the student might have said that Internal Growth Rate is definitely less then 20%. This is NOT correct.

4. (15 points)



In the above diagram, Paddington Inc.'s asset increase requirements in relation to its projected addition to retained earnings are given at each projected growth rate. (Assets are ONLY supposed to be increased at the rate of the sales growth rate)
Financial objective: No new stocks will be issued. Dividend payout ratio will stay the same.

a) If the planned growth rate for next year is less than G and, is it possible for the company to have a higher D/E ratio next year compared to this year? Why/Why not? Is it possible for the company to have a lower D/E ratio next year compared to this year? Why/Why not?

> *(2.5 points) It is not possible to have a higher D/E ratio since at any growth rate that is less than G, the company will have more funds than needed and the only outlet will be to pay off debt which will reduce the D/E ratio.*

(2.5 points) For the same reason, D/E can be lower next year compared to this year when the company grows at a rate less than G.

b) If planned growth rate is more than G, is it possible for the company to keep its D/E ratio next year the same as this year? Why/Why not? Is it possible for the company to have a higher or lower D/E ?

(2.5 points) It is possible to have a higher D/E ratio since the sustainable growth rate is at least as high as internal growth rate, the rate at which D/E stays the same will be equal to or greater than G. (equal only if D=0).

(2.5 points) It is also possible to have a lower D/E ratio if the company grows between G and its sustainable growth rate.

c) If the company plans to grow at rate G, is it possible to keep D/E ratio the same as this year? Why/Why not?

(5 points) If Debt=0, it is possible.

5. (15 points) Read the HBR document titled "Financial Statement Forecasting". Explain clearly how the numbers marked with red arrows on the last page are obtained.

Among the growth assumptions, the following is given:

- There was no plan to change the amount of bonds outstanding, nor to change the level of dividends.

This implies that 2019 dividends will be the same as 2018 dividends. (2 points)

We need to find 2018 dividends.

The Equity from 2017 to 2018 increase from 195 to 255, implying addition to retained earnings of 60.

(2 points)

Net Income 2018 = Addition to Retained Earnings in 2018 + Dividends in 2018

75 = 60 + Dividends in 2018

Dividends in 2018 = 15 (7 points)

Then, If Net Income in 2019 is 36 (alternatively 34) as projected, the addition to retained earnings from 2018 to 2019 will be 36-15 = 21 (alternatively 34-15=19). (2 points)

Equity in 2019 = Equity in 2018 + Additon to retained Earnings

Equity in 2019 will be 255+21=276 (alternatively 255+19=274). *(2 points)*

6. (10 points) You are offered three investment opportunities, each at a cost of $10,000 to be paid today with a cash inflow to be obtained in one bulk payment in 5 years.

A: provides 2% every quarter

B: provides 4.5% every 6 months

C: provides x% every month

a) What are the effective annual rates of A and B? Which one would you choose?

$FV = 10{,}000(1.02)^{4x5} = 14{,}859$ *(3 points)*

$FV = 10{,}000(1.045)^{2x5} = 15{,}530$ *(3 points)*

Choose B.

b) If C has the same effective annual rate as your choice in part a, what is x?

$FV = 10{,}000(1+x/100)^{12x5} = 15{,}530$

$x=0.736\%$ *(4 points)*

7. (10 points) Two years ago, when the market rate was 5%, your company purchased a fixed asset for $50,000. Starting a year after the purchase, fixed asset started to bring in $20,000 annual revenue with annual costs of $8,000. The expected lifetime of the asset is 8 years. You obtained your second cash flow today and due to the changes in the market, you will need to update your revenue, costs, as well as the interest rate.

Going forward, annual revenue will drop by 40% and annual costs will go up by 20%.

a) Assuming that the market rate is still 5% for now and the coming 6 years, if you could sell the asset today at $13,000, should you?

Compare $13,000 versus 2,400 (1/.05)(1-1/1.05^6) = 12,182 Sell* *(5 points)*

b) Assuming that market rate is now 1% and is expected to stay at 1% for the coming 6 years, then, would you sell the fixed asset at $13,000 today?

Compare $13,000 versus 2,400 (1/.01)(1-1/1.01^6) = 13,909 Do Not Sell* *(6 points)*

8. (10 points) You are offered two investment opportunities with the following cash flow starting from a year today.

	Year 1	Year 2	Year 3	Year 4
A	1,800	2,600	2,000	1,850
B	1,200	2,200	1,800	1,900

You can get A at a cost of C and B at a cost of C+100 at time 0 (today). The value of option A is twice as much as option B to you today. If your alternative is earning 6% annually in the market, what is C ?

NPVA = 1,698.11+2,313.99+1,679.23+1,465.37 – C (3 points)
NPVB = 1,132.07+1,957.99+1,511.37+1,504.97 – C – 100 (3 points)

NPVA = 2NPVB (2 points)

C = 4,856 (2 points)