FIN 521: Problem Set #1

Due on Wednesday, February 7, 2018

Wanbae Park

Question 1

Ratios stated on the problem set are calculated as follows.

a. Market/Book = Market Capitalization / Book value of equity

b. Interest coverage = Some measure of income(operating income, EBIT, EBITDA ...) / Interest payments

c. EV/EBITDA = Enterprise value / EBITDA = Market value of equity + Debt - Cash / EBITDA

d. Market leverage = Debt / Equity

e. Current ratio = Current assets / Current liabilities

Table 1 shows numerical values of ratios calculated by using data from Global Corp's financial statement.

	Definition		Numerical Values		
Name of Ratio	Numerator	Denominator	Numerator	Denominator	Ratio
Market/Book	Market Cap.	Book value of equity	36	22.2	1.62
Interest Coverage	Operating income	Interest payments	10.4	7.7	1.35
EV/EBITDA	Enterprise value	EBITDA	131.5	11.6	11.34
Market Leverage	Debt	Equity	147.9	170.1	0.87
Current Ratio	Current assets	Current liabilities	57	34.7	1.64

Table 1: Financial ratios of Global Corp. (Unit: million dollars)

Question 2

a. In this case, $20 million of cash would be credited, and same amount of long-term debt would be debited. Since the same amount of account in balance sheet have been offset, there is no change in Global's book value of equity.

b. Inventory would decrease by $5 million, and there would be also a decrease of book value of equity by $5 million.

c. Since the firm used cash and long-term debt to purchase building, cash amount of $5 million would be credited, long-term debt amount of $5 million would be credited, and $10 million amount of PP&E would be debited. Since the amount of credited and debited balance sheet account is exactly equal, there is no change in Global's book value of equity.

d. Because there is no possibility that Global would ever receive payment, there would be a decrease of accounts receivable by $3 million dollars, as would the book value of equity.

e. Reduction of cost might affect income statement. It might reduce cost of good sold. However, balance sheet of the firm does not change due to this event.

f. The balance sheet does not change since the announcement of key competitor is not an economic event.

Question 3

a. According to the balance sheet of Starbucks for fiscal year 2013, the firm's cash and cash equivalent worth $2,575.7m, and short-term investments worth $658.1m. From the 10-K, approximately $994.4 millions of cash was held in foreign subsidiaries. The majority of short-term investments consisted of US Tresury, commercial paper, corporate bonds, and US Agency securities. Also it is included in certificates of deposit placed through an account registry service.

b. From the balance sheet of Starbucks, the firm has $1,299.4m amount of debts.

c. When rearranging balance sheets, liabilities that is a part of operating business is moved to left side, and assets which is non-operating part(such as cash) is moved to right side. Table 2 shows the rearranged balance sheet using the rule above.

d. Enterprise value is calculated as (*Market capitalization + Debt - Excess cash*). It represents market value of the underlying business operations. Since Stabucks' price per share at Sep 29, 2013 is $55.82, and from 10-K, 749.3 million shares of common stock is outstanding. Therefore, market capitalization of Starbucks is $55.82 \times 749.3 = 41,825.926$ million dollars. From the balance sheet, the amount of cash is 2,575.7 million dollars, and the amount of debt is 1,299.4 million dollars. Therefore, enterprise value of Starbucks is $41,825.926 + 1,299.4 - 2,575.7 = 40,549.626$ million dollars.

e. From the consolidated statements of earnings, diluted EPS is equal to 0.01(unit: million dollars). The number of shares the diluted EPS based on is 762.3 million shares. The reason why the number of diluted shares is different to common stocks is diluted shares contain all convertible securities such as convertible bonds and stock options. Since the denominator is slightly greater than denominator of non-diluted EPS, diluted EPS is slightly less than EPS.

f. From the income statement, other accounts seems relatively stable, but a huge amount of litigation charge came up. According to Note 15 in 10-K, Kraft commenced a federal court action against Starbucks for termination of distribution arrangement. The arbitrator ordered Starbucks to pay $2,227.5 million plus prejudgment interest and attorneys' fees. It was reflected on income statement, so Starbucks made less profit than 2012.

Operating Accounts		Financial Accounts	
Net Working Capital		*Net Debt*	
Accounts receivable, net	561.40	Long-term debt	1,299.40
Inventories	1,111.20	Other long-term liabilities	357.70
Prepaid expenses and other current assets	287.70	Cash and cash equivalents	(2,575.70)
Deferred revenue	(653.70)	Deferred income taxes, net	(277.30)
Accounts payable	(491.70)	Short-term investments	(658.10)
Accrued litigation charge	(2,784.10)	Long-term investments	(58.30)
Insurance reserves	(178.50)	Equity and cost investments	(496.50)
Accrued liabilities	(1,269.30)	Deferred income taxes, net	(967.00)
TOTAL NET WORKING CAPITAL	(3,417.00)	TOTAL NET DEBT	(3,375.80)
Net Fixed Assets		*Shareholder's Equity*	
Property, plant and equipment, net	3,200.50	Shareholder's Equity	4,482.30
Other assets	185.30		
Other intangible assets	274.80		
Goodwill	862.90		
TOTAL NET FIXED ASSETS	4,523.50		
NET OPERATING ASSETS	1,106.50	NET BOOK CAPITAL	1,106.50

Table 2: Rearranged Balance Sheet

g. P/E ratio is calculated by (*Market capitalization / Net income*) or (*Share price / EPS*). It can describe whether value of firm is overvalued or undervalued. P/E ratios are commonly used for comparing value of firms in similar industries. Therefore, it is useful to apply P/E ratio to compare Starbucks' value between other's.

Question 4

According to the question, expected cash flow stream of the project is as follows. The payback period of this

Year	*year 0*	*year 1*	*year 2*	*year 3*	*year 4*	*year 5*
Cash flows	-10	5	2	2	2	2

Table 3: Expected Cash Flows

project is 4 years because cumulative cash flow from year 1 to year 4 is 11, and that from year 1 to year 3 is 10. That means it takes four years to retake the initial investment. If the required payback period is two

years, the project is not accepted since the payback period is larger than required period. Since the cost of capital is given as 10%, NPV of project is calculated as follows.

$$NPV = -10 + \frac{5}{(1+0.1)} + \frac{2}{(1+0.1)^2} + \frac{2}{(1+0.1)^3} + \frac{2}{(1+0.1)^4} + \frac{2}{(1+0.1)^5}$$

$$= 0.309$$

Therefore, the project has a positive NPV, and it means that the project is accepted if we use NPV rule.

Question 5

a. By using NPV formula, we can plot (cost of capital, NPV) on 2-D space. Figure 1 represents plot a function of NPV on r of the project. Decreasing curve on figure 1 represent the NPV curve, and the horizontal line represents NPV = 0, and the vertical line represents cost of capital which makes NPV equals to 0. Therefore, the x-point in which the vertical and horizontal line cross is IRR of the project.
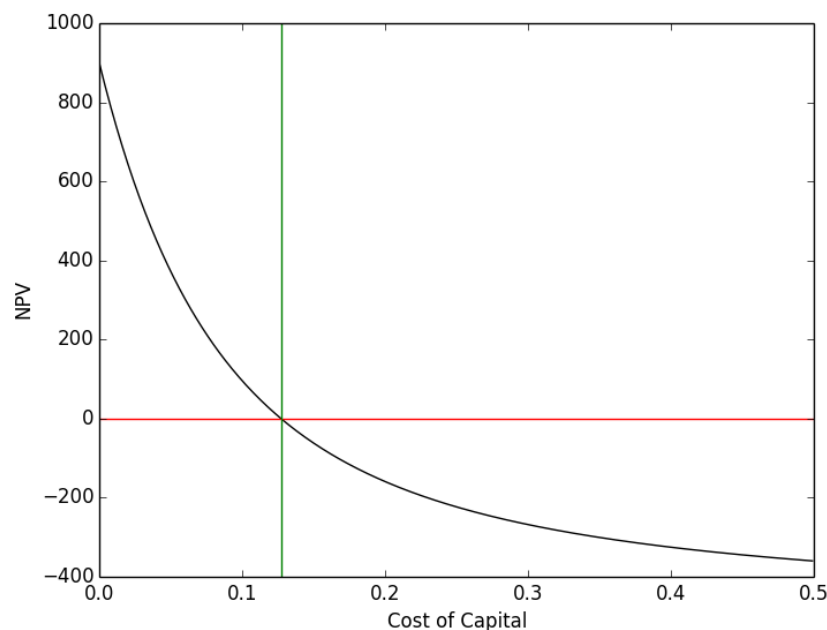

Figure 1: Plot of NPV

b. By some numerical procedures, IRR is calculated as 12.72%. It is consistent to figure 1 since the x-value of the point in which the vertical and horizontal line cross is larger than 0.1.

c. Since IRR of the project is larger than cost of capital, the purchase is attractive based on IRR decision rule.

d. The decision would change if cost of capital of the project becomes larger than 12.72%. Regarding figure 1, we can find that if cost of capital of the project becomes larger than IRR(12.72%), NPV of the project would less than 0. It means that it is acceptable to purchase a new cruise ship unless cost of capital of this project becomes greater than 12.72%.

Question 6

Regarding event study, NPV of a project can be calculated by market capitalization before an announcement of project times rate of return after the announcement. In order to implement event study, data for market price of share and market capitalization of Bayer and Monsanto was collected. Since it is assumed that it would take about two days for disclosure information to be reflected, price data is collected from Sep 14 to Sep 16. Since the changes of return could be due to changes of whole markets, in order to eliminate that effects, returns of share price is adjusted by subtracting market index(S&P 500) return. NPVs of Bayer and Monsanto are calculated as -4347.814 million dollars and -1742.227 million dollars, respectively. More details on calculation of NPVs are on table 4. There are some caveats in the analysis. Although I calculated NPV

Date		Bayer	Monsanto	S&P500
2016.9.14	Closing Price	103.4324	103.725	2125.77
2016.9.16	Closing Price	98.9536	100.51	2139.16
	Return	-4.330%	-3.100%	0.630%
	Adjusted Return	-4.960%	-3.729%	
Market Cap at 2016.9.14 (million dollars)		87656.468	46715.613	
	NPV	-4347.814	-1742.227	

Table 4: NPV of M&A decision

of Bayer and Monsanto by using event study method, the NPV calculated does not guarantee that it is the *real* NPV of M&A decision. If there is some other information disclosed during the event study period, the NPV obtained above becomes wrong information since other information might affect return of stock price. Of course, such disadvantage can be overcome by choosing short enough period for the analysis. However, if market is not efficient enough, short period makes NPV of firm's decision inaccurate since it takes a certain amount of time to information be reflected. Therefore, because there is a trade-off between reflection of information and accuracy of effect, choosing appropriate period is important.

Question 7

From the perspective of capital budgeting, interest expense is ignored when calculating free cash flows. It is

because we want to separate the investment and financial decisions. In order to calculate the free cash flow, the first thing have to do is calculating incremental earnings. It is calculated as *Incremental EBIT*(Incr. Revenues - Incr. Cost - Incr. Depreciation) × *(1 - Marginal tax rate)*. After that, make some adjustments to the incremental earning calculated before. Although the amount of depreciation is subtracted when calculating incremental earning, it is not an actual cash outflow. Therefore, we have to add depreciation again. However, it is incorrect not to subtract depreciation when calculating incremental earning because depreciation affects to the amount of tax. Hence, subtraction-and-addition procedure should be applied. Then, the amount of capital expenditure should be subtracted. It is because capital expenditure is actual cash outflow for the project, but it is not captured in income statement. Finally, the amount of changes in net working capital should be subtracted because an increase of net working capital ties up cash. Table 5 shows calculation of free cash flow of Cellular Access for this year. The free cash flow of Cellular Access for this year is calculated as 40 million dollars.

Account Subject	Value(million dollars)
EBIT	250
Tax Expense	100
Incremental Earnings	150
Depreciation	100
Capital Expenditure	200
Increase of Net Working Capital	10
Free Cash Flow	40

Table 5: Calculation of Free Cash Flow

Question 8

a. The asset beta is calculated by $\beta_a = w_d\beta_d + w_e\beta_e$, where β_a, β_d, and β_e denotes asset beta, debt beta and equity beta, respectively, and w_d and w_e denotes ratio of debt and equity to total amount of debt and equity, respectively. Since the stock price of Thurbinar is $20 per share and there are 15 million shares outstanding, the market capitalization of firm is $20 \times 15 = 300$ million dollars. Assuming the firm has no cash, the ratio of debt and equity is calculated as $w_d = \frac{100}{300+100} = 0.25$ and $w_e = \frac{300}{300+100} = 0.75$. Since $\beta_d = 0$ and $\beta_e = 1$, the asset beta of the firm is $\beta_a = 0.25 \times 0 + 1 \times 0.75 = 0.75$.

b. By CAPM, $r_e = r_f + \beta_e(r_{mkt} - r_f) = 0.04 + 1 \times 0.05 = 0.09$, and since debt beta of the firm is 0, r_d is equal to risk-free rate, 0.04. Since $w_e = 0.75$ and $w_d = 0.25$, $r_a = w_e r_e + w_d r_d = 0.75 \times 0.09 + 0.25 \times 0.04 = 0.0775 = 7.75\%$.