

Homework Solutions - Lecture 2 Part 2

1. In 1995, Time Warner Inc. had a Beta of 1.61. Part of the reason for this high Beta was the debt left over from the leveraged buyout of Time by Warner in 1989, which amounted to \$10 billion in 1995. The market value of equity at Time Warner in 1995 was also \$10 billion. The marginal tax rate was 40%.
- a) Using the formula for leveraging a beta that includes tax effects (to account for the extremely high and changing leverage), we get:

$$\beta_u = \beta_e \left(\frac{E}{D(1-T) + E} \right) = 1.61 \left(\frac{10}{10(1-.4) + 10} \right) = 1.006$$

- b) The debt/equity ratio in 1995 was $10/10 = 1.0$. If the debt ratio goes from 1.0 in 1995, to 0.9 in 1996, and 0.8 in 1997, the levered betas for 1996 and 1997 would equal:

$$\beta_e = \beta_u \left(1 + \frac{D(1-T)}{E} \right) = 1.006(1 + .9(1-.4)) = 1.549$$

$$\beta_e = \beta_u \left(1 + \frac{D(1-T)}{E} \right) = 1.006(1 + .8(1-.4)) = 1.489$$

2. Cost of Capital for Nike:

In this problem, you will calculate the cost of equity and weighted average cost of capital for Nike as of May 31, 2009. Be sure to explain any assumptions you make to arrive at your answers.

- a. Collect monthly return data for both Nike and the S&P 500 Index for the 60-month period ending in May 2009. Using this data, estimate the Beta for Nike based on a market model (CAPM) regression. Using this Beta estimate, calculate the cost of equity (K_e) for Nike based on the CAPM model. Note that you must choose an appropriate risk-free rate and market risk premium to use in the CAPM equation. Briefly explain your choice for each of these variables.

I will assume that the risk-free rate equals the 10-year Treasury Yield as of 10/1/09, or 3.21%.

The market model regression using 60-months of returns for Nike and the S&P gives a Beta estimate of 0.8597 (see the attached graph).

I will use a market risk premium of 4.5%. This estimate reflects both the historical equity risk premium relative to U.S. Treasury Bonds and the implied equity premium calculations we discussed in class.

Using this information, the cost of equity can be calculated as:

$$K_e = 3.21\% + 0.8597(4.5\%) = 7.08\%$$

- b. Estimate the market value of debt and the market value of equity for Nike as of May 31, 2009. Use the firm's A+ rating and the default spreads provided in the course notes to estimate the firm's cost of debt (K_d). Using these estimates and your answer to (a), calculate the weighted average cost of capital (WACC) for Nike. Assume a marginal tax rate of 40%.

Based on the default spread table provided in the class notes, the average default spread on A+ rated corporate bonds is 1.456%. Combining this with the risk-free rate from (a) gives a cost of debt equal to 4.666% (3.21% + 1.456%).

In the Notes to the Consolidated Financial Statements, Nike estimates the market value of long-term debt to be \$456.4 million. Combining this with the firm's short-term notes payable valued at \$342.9 million gives a total market value for debt of \$799.3 million. Using methods we will discuss in Lecture 3, I find that the debt value of Nike's operating leases equals \$1,496.52 million (see the attached table). Together, this gives a total market value for debt of \$2.296 billion.

Nike's shares outstanding include 95.3 million class A shares and 390.2 class B shares. Treating these shares as identical and multiplying by the stock price as of May 31, 2009 (\$57.05) gives a total equity market value of \$27.698 billion.

Using this information, the weighted average cost of capital (WACC) can be calculated as:

$$WACC = \left(\frac{27.698}{27.698 + 2.296} \right) 7.08\% + \left(\frac{2.296}{27.698 + 2.296} \right) (4.67\%)(1 - .4) = 6.83\%$$

Ignoring operating leases gives WACC=7.05%.

3. Synthetic Debt Ratings:

- a. The following information was taken from the income statement and balance sheet of a real firm. Use this information to calculate the EBITDA-to-interest ratio, the Debt-to-EBITDA ratio, the Debt-to-Capital ratio, and the Return on Capital. Based on the values you calculate, use the S&P Ratings Guide on the attached page to estimate a synthetic debt rating for this firm.

EBIT = \$7,242
 EBITDA = \$8,944
 Interest Expense = \$696
 Total Debt = \$13,430
 Stockholder's Equity = \$17,714
 Tax Rate = 36.4%

$$\frac{EBITDA}{Interest} = \frac{8944}{696} = 12.85$$

$$\frac{Debt}{EBITDA} = \frac{13340}{8944} = 1.49$$

$$\frac{Debt}{Capital} = \frac{13430}{13430 + 17714} = 43.12\%$$

$$ROC = \frac{7242(1 - .364)}{13430 + 17714} = 14.79\%$$

Based on these ratios, the firm is roughly similar to other firms in the **A** ratings category.

- b. The firm described above has significant operating leases. The notes to the financial statements show that the firm's operating lease expenses during the period were \$958, of which \$340 is estimated to be interest expense. In addition, you calculate the debt value of operating leases to be \$5,919. Recalculate the ratios above incorporating this new information. Based on these corrected values, use the S&P Ratings Guide to estimate a revised synthetic debt rating for this firm.

EBIT = \$7,242
 EBITDA = \$8,944
Interest Expense = 696 + 340 = \$1,036
Total Debt = 13,430 + 5,919 = \$19,349
 Stockholder's Equity = \$17,714
 Tax Rate = 36.4%

$$\frac{EBITDA}{Interest} = \frac{8944}{1036} = 8.63$$

$$\frac{Debt}{EBITDA} = \frac{19349}{8944} = 2.16$$

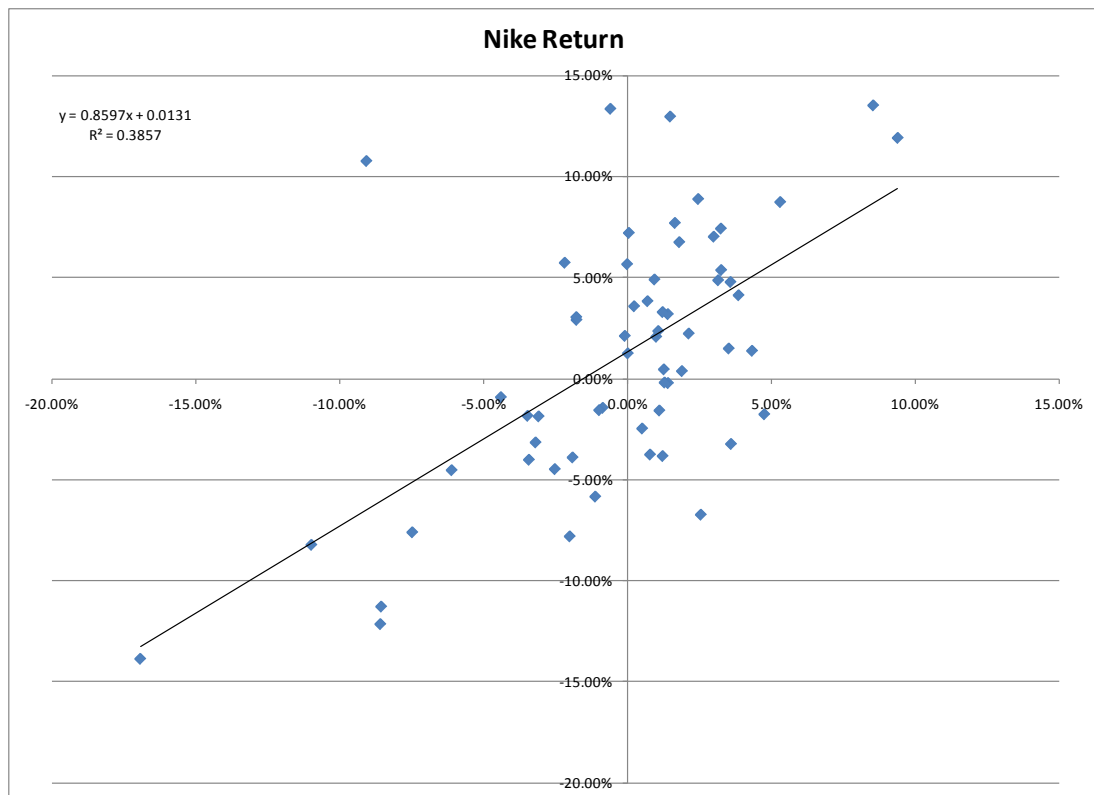
$$\frac{Debt}{Capital} = \frac{19349}{19349 + 17714} = 52.21\%$$

$$ROC = \frac{7242(1 - .364)}{19349 + 17714} = 12.43\%$$

Based on these revised ratios, the firm appears to fall between the **BBB** and **BB** ratings categories. Note that we could also adjust EBIT and EBITDA to reflect the additional interest expense associated with operating leases. For simplicity, I ignored these adjustments above.

Question 2 Regression Output:

SUMMARY OUTPUT	
<i>Regression Statistics</i>	
Multiple R	0.6210
R Square	0.3857
Adjusted R Square	0.3751
Standard Error	0.0491
Observations	60
<i>ANOVA</i>	
	<i>df</i>
Regression	1
Residual	58
Total	59
<i>Coefficients</i>	
Intercept	0.0131
S&P 500	0.8597



Question 2 Nike Operating Lease Information:

Contractual Obligations

Our significant long-term contractual obligations as of May 31, 2009, and significant endorsement contracts entered into through the date of this report are as follows:

Description of Commitment	Cash Payments Due During the Year Ending May 31.						
	2010	2011	2012	2013 (In millions)	2014	Thereafter	Total
Operating Leases	\$ 330.2	\$ 281.3	\$ 233.6	\$ 195.6	\$ 168.6	\$ 588.5	\$ 1,797.8
Long-term Debt	32.0	6.9	167.1	46.9	56.9	144.6	\$ 454.4
Endorsement Contracts ⁽¹⁾	711.7	654.6	601.0	509.7	431.0	1,293.9	\$ 4,201.9
Product Purchase Obligations ⁽²⁾	1,985.7	—	—	—	—	—	\$ 1,985.7
Other ⁽³⁾	247.1	106.3	67.8	78.0	3.0	2.0	\$ 504.2
Total	\$ 3,306.7	\$ 1,049.1	\$ 1,069.5	\$ 830.2	\$ 659.5	\$ 2,029.0	\$ 8,944.0

Current Year:	2009
Inputs:	
Cost of Debt	4.67%
Round Annuity Length? (1=yes, 0=no)	0
Operating Lease Commitments (mil)	
20010 (or year +1)	330.20
2011 (or year +2)	281.30
2012 (or year +3)	233.60
2013 (or year +4)	195.60
2014 (or year +5)	168.60
>2014 (after year)	588.50
	1,797.80
Estimation (based on yr 5 pymt):	
Year 5 payment	168.60
Annuity yrs	3.49
PV of Lease Pmts	1,496.52

Credit Rating Reference Guide

S&P Credit Statistics, S&P / Moody's Comparison, Short-Term Credit Ratings F:\Rewards Network\2005\09-05\DTPI\IRN - Convert Pricing.xls\Sheet1

		Primary Credit Statistics			Other Information			
		EBITDA/ Interest	Total Debt/ EBITDA	Total Debt/ Total Cap.	Return on Capital	FFO/ Total Debt	FOCF/ Total Debt	L-T Debt/ Total Cap.
AAA	Upper Quartile	35.1x	0.4x	13.1%	44.1%	204.3%	127.3%	13.1%
	Mean	27.5x	0.3x	6.7%	31.7%	169.3%	110.0%	6.7%
	Median	27.0x	0.2x	6.5%	27.9%	197.7%	111.4%	6.5%
	Lower Quartile	21.6x	--	--	22.7%	148.6%	93.4%	--
AA	Upper Quartile	31.7x	1.3x	51.7%	33.1%	102.2%	60.1%	51.7%
	Mean	46.7x	1.1x	34.0%	27.6%	174.9%	151.4%	34.0%
	Median	17.7x	0.9x	30.6%	27.6%	89.2%	52.9%	30.6%
	Lower Quartile	16.6x	0.6x	19.2%	21.4%	54.8%	42.3%	19.2%
A	Upper Quartile	15.9x	2.3x	48.2%	23.1%	65.5%	42.3%	48.2%
	Mean	16.4x	1.9x	40.1%	19.5%	76.7%	43.1%	40.1%
	Median	10.2x	1.7x	38.0%	16.9%	45.9%	26.3%	38.0%
	Lower Quartile	7.1x	1.2x	27.8%	11.8%	33.6%	14.2%	27.8%
BBB	Upper Quartile	9.1x	3.2x	53.9%	17.5%	50.4%	29.2%	53.9%
	Mean	8.1x	2.7x	44.3%	14.4%	49.8%	27.0%	44.3%
	Median	5.9x	2.3x	43.1%	13.1%	36.3%	17.4%	43.1%
	Lower Quartile	4.4x	1.7x	32.8%	9.1%	23.7%	8.9%	32.8%
BB	Upper Quartile	5.7x	4.9x	68.9%	15.6%	32.7%	16.6%	68.9%
	Mean	8.2x	4.1x	57.1%	11.6%	33.9%	15.8%	57.1%
	Median	3.3x	3.6x	55.4%	10.8%	21.1%	9.9%	55.4%
	Lower Quartile	2.5x	2.5x	43.6%	7.0%	13.9%	2.2%	43.6%
B	Upper Quartile	2.7x	7.3x	100.3%	12.9%	17.8%	8.9%	100.3%
	Mean	2.1x	7.9x	82.4%	7.7%	14.4%	(3.0%)	82.4%
	Median	1.9x	5.2x	77.5%	7.6%	10.9%	3.2%	77.5%
	Lower Quartile	1.3x	3.7x	57.0%	3.2%	5.1%	(4.7%)	57.0%
CCC	Upper Quartile	1.4x	11.0x	149.1%	13.3%	7.2%	3.1%	149.1%
	Mean	0.6x	10.6x	83.5%	4.9%	(0.5%)	(10.8%)	83.5%
	Median	1.0x	7.6x	108.6%	4.6%	3.4%	(0.4%)	108.6%
	Lower Quartile	0.5x	5.8x	85.2%	(2.9%)	0.3%	(4.9%)	85.2%

FOCF = Funds from operations - Capital Expenditures ± Change in Non-Cash, Non-Interest Bearing Working Capital

FFO = Net Income from Continuing Operations + Depreciation & Amortization and Other Non-Cash Items

S&P Industrials 3 Year Average Credit Statistics - Industrial Comparative Ratio Analysis; Publication Date: August 20, 2002

S&P	Moody's	Long-Term Ratings			Short-Term Ratings		
		S&P	Moody's	Fitch	S&P	Moody's	Fitch
AAA+	Aaa1	AAA	Aaa	AAA			
AAA	Aaa2	AA+	Aa1	AA+	A-1+	P-1	F1+
AAA-	Aaa3	AA	Aa2	AA			
AA+	Aa1	AA-	Aa3	AA-			
AA	Aa2	A+	A1	A+	A-1	P-1	F1
AA-	Aa3	A	A2	A			
A+	A1	A-	A3	A-			
A	A2	BBB+	Baa1	BBB+	A-2	P-2	F2
A-	A3	BBB	Baa2	BBB			
BBB+	Baa1	BBB-	Baa3	BBB-	A-3	P-3	F3
BBB	Baa2	BB+	Ba1	BB+	B	NP	B
BBB-	Baa3						
BB+	Ba1						
BB	Ba2						
BB-	Ba3						
B+	B1						
B	B2						
B-	B3						
CCC+	Caa1						
CCC	Caa2						
CCC-	Caa3						
CC+	Ca1						
CC	Ca2						
CC-	Ca3						
C+	C1						
C	C2						
C-	C3						