Homework Solutions - Lecture 2

1. The value of the S&P 500 index is 1286.12 and the treasury rate is 3.43%. In a typical year, stock repurchases increase the average payout ratio on S&P 500 stocks to over 4%.

   a. Calculate the implied equity premium assuming the dividend yield in the most recent year was 4% of the current index value and dividends are expected to grow at a constant rate of 5% annually. How does this implied premium compare to the value we calculated when ignoring repurchases?

   $$Div_1 = 1286.12(.04)(1.05) = 54.02$$

   $$R = g + \frac{Div_1}{CurrentValue} = .05 + \frac{54.02}{1286.12} = .05 + .0420 = 9.20\%$$

   $$\text{Implied Risk Premium} = 9.20 - 3.43 = 5.77\%$$

   All of the values in this problem are the same as the problem we did in class except the dividend yield. Because the current value of the index (1286.12) does not change, but the forecasted dividends here are higher, the implied premium is higher than the one we calculated in class.

   b. Calculate the implied equity premium assuming the dividend yield in the most recent year was 4% of the current index value, dividends are expected to grow at an annual rate of 10% for the next five years, and at a constant rate of 5% thereafter (Hint: you can use the solver function in excel). How does this implied premium compare to the value we calculated when ignoring repurchases?

   Here you will need to use the Solver function in excel. Specifically, you should solve for the required return that sets the present value of future dividends equal to the current index value.

   $$Div_1 = 1286.12(.04)(1.10) = 56.59$$

   $$1286.12 = \frac{56.59}{(1+R)} + \frac{62.25}{(1+R)^2} + \frac{68.47}{(1+R)^3} + \frac{75.32}{(1+R)^4} + \frac{82.85}{(1+R)^5} + \frac{86.99/(R-.05)}{(1+R)^5}$$

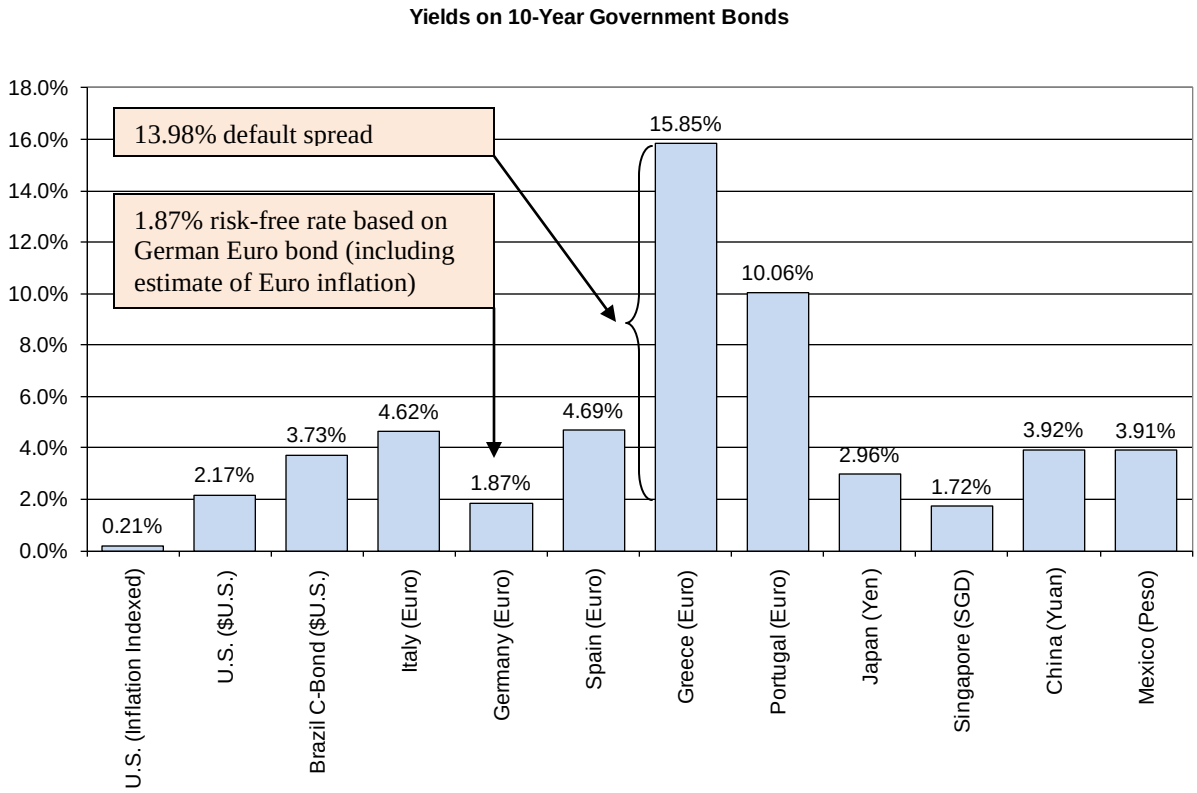
   $$R = 10.20\%$$

   $$\text{Implied Risk Premium} = 10.20 - 3.43 = 6.77\%$$

   Again, all of the values in this problem are the same as the problem we did in class except the dividend yield. Because the current value of the index (1286.12) does not change, but the forecasted dividends here are higher, the implied premium is higher than the one we calculated in class.

2. An analyst at your firm comes to you with a valuation of a Greek firm done with Euro cash flows. The analyst has used the 15.85% yield on the Euro-denominated Greek government bond as the risk-free rate in the cost of equity calculation, along with a 4.5% global equity risk premium. What assumptions is this analyst making about country risk? Would it be appropriate for the analyst to add a separate country risk premium to the CAPM equation?

The **15.85%** yield on the Greek Euro bond includes a real risk-free rate, an expectation of inflation, and a default spread. Including the default spread is one method of estimating country risk. The implicit assumptions are that (1) the country risk premium can be approximated by the default spread on local government bonds, and (2) the sensitivity to country risk is the same across all firms in the Greece, or λ=1. Because the analyst has already implicitly incorporated country risk, an additional country risk term should not be added separately.



$$E(R) = R_f + \beta\left(Risk\ Premium_{U.S.}\right) + Country\ Spread$$

1.87% Euro risk-free rate (excluding 13.98% country default spread)

13.98% country bond default spread for Greek BB+ rated bonds.

15.85%

3. 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:

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

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

4. 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, 2011. 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 2011. 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 5/30/11, or 3.05%. The market model regression using 60-months of returns for Nike and the S&P gives a Beta estimate of 0.9249 (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:

$$K_e = 3.05\% + 0.9249(4.5\%) = 7.21\%$$

b. Estimate the market value of debt and the market value of equity for Nike as of May 31, 2011. 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 36%.

Based on the default spread table provided in the class notes, the average default spread on A+ rated corporate bonds is 1.041%. Combining this with the risk-free rate from (a) gives a cost of debt equal to 4.09% (3.05% + 1.04%).

In the Notes to the Consolidated Financial Statements, Nike estimates the market value of long-term debt (including current installments) to be $482 million (compared to a book value of $476m). Combining this with the firm's short-term debt valued at $187 million gives a total market value for debt of $669 million. Using methods we will discuss in Lecture 3, I find that the debt value of Nike's operating leases equals $1,584.5 million (see the attached table). Together, this gives a total adjusted market value of debt equal to $2,253.5 billion.

Nike's shares outstanding include 90.0 million class A shares and 378.0 million class B shares. Treating these shares as identical and multiplying by the stock price as of May 31, 2011 ($84.45) gives a total equity market value of $39.523 billion. To this, we must add the after-tax value of employee stock options (which will be discussed in more detail in Lecture 5), or $817.4 million. This gives an adjusted market value of equity equal to $40.340 billion.

Ignoring the adjustments for operating lease debt and employee stock options, the weighted average cost of capital (WACC) is calculated as:

$$WACC = \left(\frac{39.523}{39.523 + 0.669}\right)7.21\% + \left(\frac{0.669}{39.523 + 0.669}\right)(4.09\%)(1 - .36) = 7.14\%$$

After incorporating operating lease debt and employee stock options, the weighted average cost of capital (WACC) is calculated as:

$$WACC = \left(\frac{40.340}{40.340 + 2.254}\right)7.21\% + \left(\frac{2.254}{40.340 + 2.254}\right)(4.09\%)(1 - .36) = 6.97\%$$

5. Synthetic Debt Ratings:

c. 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 = $5,839
EBITDA = $7,455
Interest Expense = $530
Total Debt = $9,749
Stockholder's Equity = $18,889
Tax Rate = 36.7%

$$\frac{EBITDA}{Interest} = \frac{7455}{530} = 14.07$$

$$\frac{Debt}{EBITDA} = \frac{9749}{7455} = 1.31$$

$$\frac{Debt}{Capital} = \frac{9749}{9749 + 18889} = 34.04\%$$

$$ROC = \frac{5839(1 - .367)}{9749 + 18889} = 12.91\%$$

Based on these ratios, the firm is roughly similar to other firms in the low ***A*** or high ***BBB*** ratings categories.

d. 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 $823, of which $289 is estimated to be interest expense. In addition, you calculate the debt value of operating leases to be $5,927. 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 = $5,839 + 289 = $6,128
EBITDA = $7,455 + 823 = $8,278
Interest Expense = 530 + 289 = $819
Total Debt = 9,749 + 5,927 = $15,676
Stockholder's Equity = $18,889
Tax Rate = 36.7%

$$\frac{EBITDA}{Interest} = \frac{8278}{819} = 10.11$$

$$\frac{Debt}{EBITDA} = \frac{15676}{8278} = 1.89$$

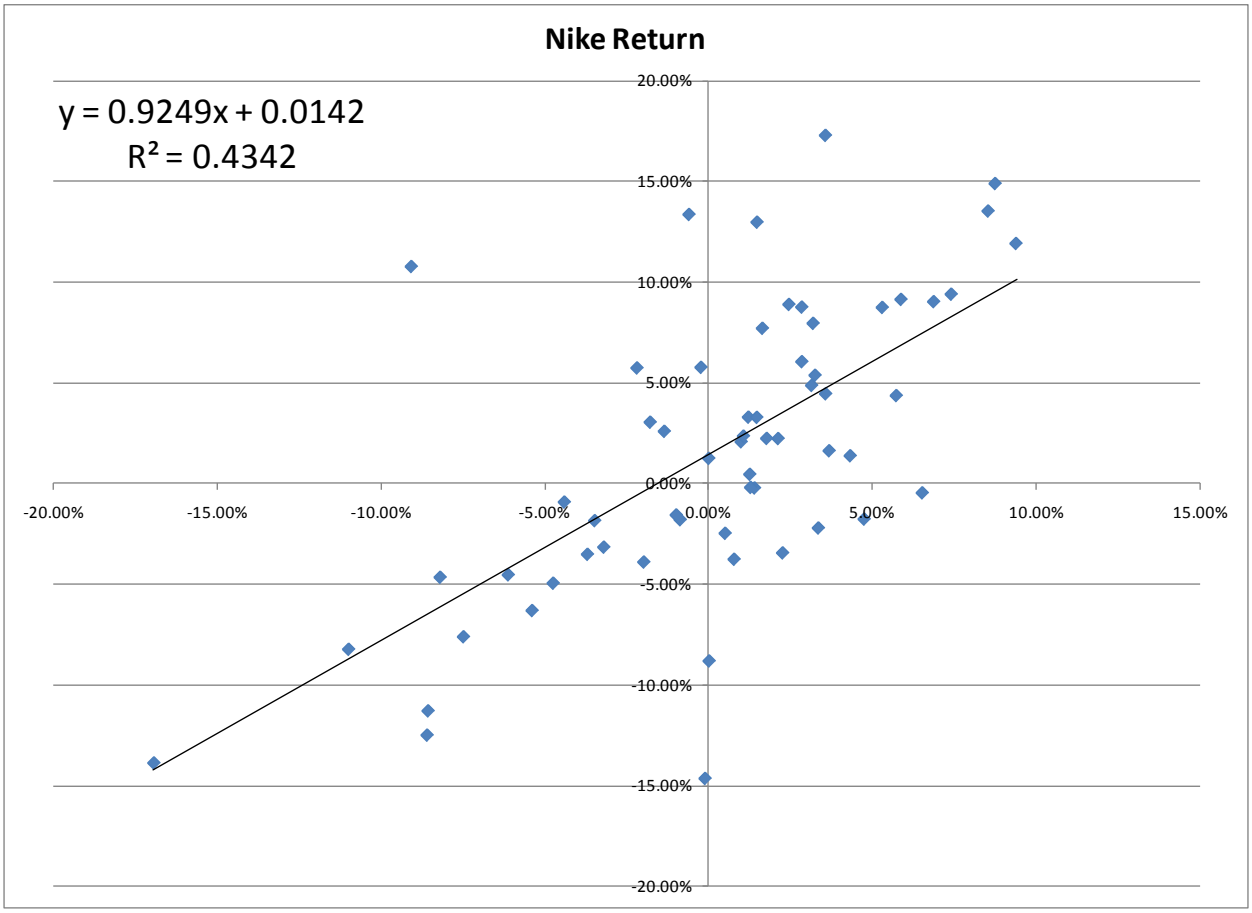
$$\frac{Debt}{Capital} = \frac{15676}{15676 + 18889} = 45.35\%$$

$$ROC = \frac{6128(1 - .367)}{15676 + 18889} = 11.22\%$$

Based on these revised ratios, the firm appears to fall at the middle or high end of **BBB** rated firms (or the very low end of A rated firms). Note that I assume the operating lease expense of $823 is a combination of interest expense and depreciation.

Question 4 Regression Output:

SUMMARY OUTPUT						
Regression Statistics						
R Square	0.4342					
Observations	60					
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.0142	0.0071	1.9992	0.0503	0.0000	0.0284
X Variable 1	0.9249	0.1386	6.6721	0.0000	0.6474	1.2023



NOTE 8 Long-Term Debt

Long-term debt, net of unamortized premiums and discounts and swap fair value adjustments, is comprised of the following:

(In millions)	May 31, 2011	May 31, 2010
5.66% Corporate bond, payable July 23, 2012	$ 26	$ 27
5.40% Corporate bond, payable August 7, 2012	16	16
4.70% Corporate bond, payable October 1, 2013	50	50
5.15% Corporate bond, payable October 15, 2015	114	112
4.30% Japanese Yen note, payable June 26, 2011	130	116
1.52% Japanese Yen note, payable February 14, 2012	62	55
2.60% Japanese Yen note, maturing August 20, 2001 through November 20, 2020	54	53
2.00% Japanese Yen note, maturing August 20, 2001 through November 20, 2020	24	24
Total	476	453
Less current maturities	200	7
	$ 276	**$ 446**

The scheduled maturity of long-term debt in each of the years ending May 31, 2012 through 2016 are $200 million, $48 million, $58 million, $8 million and $109 million, at face value, respectively.

The Company's long-term debt is recorded at adjusted cost, net of amortized premiums and discounts and interest rate swap fair value adjustments. The fair value of long-term debt is estimated based upon quoted prices for similar instruments. The fair value of the Company's long-term debt, including the current portion, was approximately $482 million at May 31, 2011 and $453 million at May 31, 2010.

In fiscal years 2003 and 2004, the Company issued a total of $240 million in medium-term notes of which $190 million, at face value, were outstanding at May 31, 2011. The outstanding notes have coupon rates that range from 4.70% to 5.66% and maturity dates ranging from July 2012 to October 2015. For each of these notes, except the $50 million note maturing in October 2013, the Company has entered into interest rate swap agreements whereby the Company receives fixed interest payments at the same rate as the notes and pays variable interest payments based on the six-month LIBOR plus a spread. Each swap has the same notional amount and maturity date as the corresponding note. At May 31, 2011, the interest rates payable on these swap agreements ranged from approximately 0.3% to 1.0%.

In June 1996, one of the Company's wholly owned Japanese subsidiaries, NIKE Logistics YK, borrowed ¥10.5 billion (approximately $130 million as of May 31, 2011) in a private placement with a maturity of June 26, 2011. Interest is paid semi-annually. The agreement provides for early retirement of the borrowing.

In July 1999, NIKE Logistics YK assumed a total of ¥13.0 billion in loans as part of its agreement to purchase a distribution center in Japan, which serves as collateral for the loans. These loans mature in equal quarterly installments during the period August 20, 2001 through November 20, 2020. Interest is also paid quarterly. As of May 31, 2011, ¥6.3 billion (approximately $78 million) in loans remain outstanding.

In February 2007, NIKE Logistics YK entered into a ¥5.0 billion (approximately $62 million as of May 31, 2011) term loan that replaced certain intercompany borrowings and matures on February 14, 2012. The interest rate on the loan is approximately 1.5% and interest is paid semi-annually.

NOTE 7 Short-Term Borrowings and Credit Lines

Notes payable to banks and interest-bearing accounts payable to Sojitz Corporation of America ("Sojitz America") as of May 31, 2011 and 2010, are summarized below:

	May 31, 2011		May 31, 2010	
(In millions)	Borrowings	Interest Rate	Borrowings	Interest Rate
Notes payable:				
U.S. operations	35	—[1]	18	—[1]
Non-U.S. operations	152	7.05%[1]	121	6.35%[1]
	$ 187		**$ 139**	
Sojitz America	$ 111	0.99%	$ 88	1.07%

(1) Weighted average interest rate includes non-interest bearing overdrafts.

The carrying amounts reflected in the consolidated balance sheet for notes payable approximate fair value.

The Company purchases through Sojitz America certain athletic footwear, apparel and equipment it acquires from non-U.S. suppliers. These purchases are for the Company's operations outside of the United States, Europe and Japan. Accounts payable to Sojitz America are generally due up to 60 days after shipment of goods from the foreign port. The interest rate on such accounts payable is the 60-day London Interbank Offered Rate ("LIBOR") as of the beginning of the month of the invoice date, plus 0.75%.

As of May 31, 2011 and 2010, the Company had no amounts outstanding under its commercial paper program.

In December 2006, the Company entered into a $1 billion revolving credit facility with a group of banks. The facility matures in December 2012. Based on the Company's current long-term senior unsecured debt ratings of A+ and A1 from Standard and Poor's Corporation and Moody's Investor Services, respectively, the interest rate charged on any outstanding borrowings would be the prevailing LIBOR plus 0.15%. The facility fee is 0.05% of the total commitment. Under this agreement, the Company must maintain, among other things, certain minimum specified financial ratios with which the Company was in compliance at May 31, 2011. No amounts were outstanding under this facility as of May 31, 2011 and 2010.

Question 4 Nike Operating Lease Information:

Description of Commitment	Cash Payments Due During the Year Ending May 31,						
(In millions)	2012	2013	2014	2015	2016	Thereafter	Total
Operating Leases	$ 374	$ 310	$ 253	$ 198	$ 174	$ 535	$ 1,844
Long-term Debt	200	48	58	8	109	37	460
Endorsement Contracts[1]	800	806	742	615	463	1,018	4,444
Product Purchase Obligations[2]	3,175	—	—	—	—	—	3,175
Other[3]	277	137	22	4	1	—	441
TOTAL	**$ 4,826**	**$ 1,301**	**$ 1,075**	**$ 825**	**$ 747**	**$ 1,590**	**$ 10,364**

The Company leases space for certain of its offices, warehouses and retail stores under leases expiring from 1 to 24 years after May 31, 2011. Rent expense was $446 million, $416 million, and $397 million for the years ended May 31, 2011, 2010 and 2009, respectively. Amounts of minimum future annual rental commitments under non-cancelable operating leases in each of the five years ending May 31, 2012 through 2016 are $374 million, $310 million, $253 million, $198 million, $174 million, respectively, and $535 million in later years.

Inputs:	5/31/2011	5/31/2010	5/31/2009
Cost of Debt	4.09%	4.09%	4.09%
Round Annuity Length? (1=yes, 0=no)	0	0	0
Operating Lease Commitments (mil)			
2013 (or year +1)	$374.0	$334.0	$330.2
2014 (or year +2)	$310.0	$264.0	$281.3
2015 (or year +3)	$253.0	$220.0	$233.6
2016 (or year +4)	$198.0	$177.0	$195.6
2017 (or year +5)	$174.0	$148.0	$168.6
>2017 (after year)	$535.0	$466.0	$588.5
Total	$1,844.0	$1,609.0	$1,797.8
Estimation (based on yr 5 pymt):			
Year 5 payment	$174.0	$148.0	$168.6
Annuity yrs	3.1	3.1	3.5
PV of Lease Pmts	**$1,584.5**	**$1,382.6**	**1,529.0**

Question 4 Nike Employee Stock Options Valuation:

	Shares[1]		Weighted Average Option Price
	(In millions)		
Options outstanding May 31, 2011	34.8	$	51.29
Options exercisable at May 31,			
2009	21.4	$	36.91
2010	20.4		41.16
2011	20.1	$	44.05

The weighted average contractual life remaining for options outstanding and options exercisable at May 31, 2011 was 6.0 years and 4.5 years, respectively. The aggregate intrinsic value for options outstanding and exercisable at May 31, 2011 was $1,154 million and $811 million, respectively. The aggregate intrinsic value was the amount by which the market value of the underlying stock exceeded the exercise price of the options. The total intrinsic value of the options exercised during the years ended May 31, 2011, 2010, and 2009 was $267 million, $239 million, and $108 million, respectively.

	Year Ended May 31,		
	2011	2010	2009
Dividend yield	1.6%	1.9%	1.5%
Expected volatility	31.5%	57.6%	32.5%
Weighted average expected life (in years)	5.0	5.0	5.0
Risk-free interest rate	1.7%	2.5%	3.4%

Employee Options at Nike					
updated 2011					
Black-Scholes Option Pricing Model			**Black-Scholes Option Pricing Model (with dilution)**		
Inputs:			**Inputs (with dilution effects):**		
Stock Price (S)	$84.45		Stock Price (S)	$84.45	
Strike Price (X)	$51.29		Strike Price (X)	$51.29	
Volatility (σ)	31.50%		Volatility (σ)	31.50%	
Risk-free Rate	3.05%	1.70%	Risk-free Rate	3.05%	
Time to expiration (T)	6.00	yrs	Time to expiration (T)	6.00	yrs
Dividend Yield	1.60%		Dividend Yield	1.60%	
# of Options (mil)	35		# of Options (mil)	35	
# Shares Outstanding (mil)	468		# Shares Outstanding (mil)	468	
Output:			**Output:**		
			Adjusted S (dilution)	$81.16	
D1	1.14483		D1	1.09328	
D2	0.37324		D2	0.32169	
N(D1)	0.87386		N(D1)	0.86287	
N(D2)	0.64552		N(D2)	0.62616	
Call Price	**$39.47**		**Call Price**	**$36.87**	
Put Price	**$5.46**		**Put Price**	**$5.86**	
Value of Call Options (mil)	**$1,373.58**		**Value of Call Options (mil)**	**$1,283.17**	
After-tax Option Value (mil)	**$874.97**		**After-tax Option Value (mil)**	**$817.38**	

Credit Rating Reference Guide

S&P Credit Statistics, S&P / Moody's Comparison, Short-Term Credit Ratings F:\Rewards Network\2005\09-05\DTP\[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
AAA+	Aaa1
AAA	Aaa2
AAA-	Aaa3
AA+	Aa1
AA	Aa2
AA-	Aa3
A+	A1
A	A2
A-	A3
BBB+	Baa1
BBB	Baa2
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

Long-Term Ratings			Short-Term Ratings		
S&P	Moody's	Fitch	S&P	Moody's	Fitch
AAA	Aaa	AAA	A-1+	P-1	F1+
AA+	Aa1	AA+			
AA	Aa2	AA			
AA-	Aa3	AA-			
A+	A1	A+	A-1	P-1	F1
A	A2	A			
A-	A3	A-	A-2	P-2	F2
BBB+	Baa1	BBB+			
BBB	Baa2	BBB			
BBB-	Baa3	BBB-	A-3	P-3	F3
BB+	Ba1	BB+	B	NP	B