

Risk in Practice: Solutions to Problems

<b>Problem 1</b>					
a. Expected Return to Short-term Investor = $5.8\% + 0.95 (8.5\%) =$					13.88%
(I am using the historical premium of 8.5% to estimate expected returns)					
b. Expected Return to Long-term Investor = $6.4\% + 0.95 (5.5\%) =$					11.63%
c. I would use the expected return of 11.63% as the cost of equity					
<b>Problem 2</b>					
a. Unlevered Beta = $0.95 / (1 + (1 - 0.36) (1700/1500)) =$				0.55	
b. The beta of 0.95 can be broken down into business risk (0.55) and financial risk (0.40).					
<b>Problem 3</b>					
a. Cost of Equity = $6.40\% + 1.70 (5.5\%) =$			15.75%		
b. If the long term bond rate rises to 7.5%, the cost of equity will rise by 1.1%.					
c. Since the firm had no debt, all of the risk can be attributed to business risk.					
<b>Problem 4</b>					
a. Expected Return = $11.5\% + 1.15 (7.50\%) =$				20.13%	
{I am using a premium of 7.50% for Malaysian stocks to reflect its higher risk.}					
b. This beta measures risk relative to a Malaysian index. For an international investor an more appropriate beta may be the one estimated relative to a global index.					
<b>Problem 5</b>					
a. Expected Return = $3\% + 1.2 (8.5\%) =$			13.20%		
b. Expected Price Appreciation = $13.20\% - (\$ 2.50 / \$ 50) =$				8.20%	
Expected Price one year from today = $\$ 50 (1.082) =$					
				\$ 54.10	
c. Expected Returns over last year = $5\% + 1.20 (-5\% - 5\%) =$				-7.00%	
Returns on Market = $-8\% + 3\% = -5\%$					
d. Actual Returns over last year = $(50-54+2)/54 =$				-3.70%	
e. Unlevered Beta = $1.20 / (1 + (1-.4) (50/100)) =$				0.923	
If the firm issues \$ 50 million in equity and retires debt, its beta will drop to 0.923					
<b>Problem 6</b>					
Unlevered Beta = $1.20 / (1 + (1-0.4) (50/100)) =$					0.923076923
New Beta = $0.923 (1 + (1-0.4) (8)) =$					5.35
<b>Problem 7</b>					
a. Unlevered Beta for Novell = 1.50		! Firm has no debt			
Unlevered Beta for WordPerfect = 1.30		! Firm has no debt			
Unlevered Beta for Combined Firm = $1.50 (2/(2+1)) + 1.30 (1/(2+1)) =$					1.43
This would be the beta of the combined firm if the deal is all-equity.					
b. If the deal is financed with debt,					
New Debt/Equity Ratio = $1/2 = 0.5$					
New Beta = $1.43 (1 + (1-.4) (0.5)) =$					1.86
<b>Problem 8</b>					
a. Beta for Hewlett Packard = $1.10 (2/8) + 1.50 (2/8) + 2.00 (1/8) + 1.00 (3/8) =$					1.275
This beta may not be equal to the regression estimate of beta, because both of these are estimated with error					
b. Cost of Equity = $7.5\% + 1.275 (5.5\%) =$					14.51%
Mainframes Cost of Equity = $7.5\% + 1.10 (5.5\%) =$					13.55%
Personal Computers Cost of Equity = $7.5\% + 1.5(5.5\%) =$					15.75%
Software Cost of Equity = $7.5\% + 2 (5.5\%) =$					18.50%
Printer Division's Cost of Equity = $7.5\% + 1 (5.5\%) =$					13.00%
To value the printer division, I would use a 13.00% cost of equity.					
c. Assuming that the leverage is equally distributed across the divisions,					
Division	Beta	Unlevered Beta	Value of Equity	Ascribed Debt	Firm Value

Mainframes	1.10	1.019	2.00	0.25	2.25	
PCs	1.50	1.389	2.00	0.25	2.25	
Software	2.00	1.852	1.00	0.125	1.13	
Printers	1.00	0.926	3.00	0.375	3.38	
Unlevered Beta = $1.389 (2.25/6.75) + 1.852 (1.125/6.75) + 0.926 (3.375/6.75) =$						1.235
New Debt/Equity Ratio = <b>1/5.75</b>						
New Levered Beta = $1.235 (1 + (1-.36) (1/5.75)) =$						1.37
<b>Problem 9</b>						
<i>Firm</i>	<i>% Revenue</i>	<i>% OI</i>	<i>Operating Leve</i>	<i>Beta</i>		
PharmaCorp	27%	25%	0.93	1.00		
SynerCorp	25%	32%	1.28	1.15		
BioMed	23%	36%	1.57	1.30		
Safemed	21%	40%	1.90	1.40		
b. Firms with high operating leverage also have high betas.						
<b>Problem 10</b>						
Beta estimation services adjust betas towards one. It is possible that this adjustment is the reason for the difference between the regression beta (1.60) and the reported beta of 1.45.						
<b>Problem 11</b>						
The beta reflects market risk and is estimated relative to a stock index. To the extent that commodity prices and stock prices are not highly positively correlated the low betas reflect the low market risk inherent in these stocks. I would expect these firms to have substantial firm-specific risk.						
<b>Problem 12</b>						
Year	AD	NYSE				
1981	10%	5%				
1982	5%	15%				
1983	-5%	-8%				
1984	20%	12%			0.090829511	
1985	5%	-5%				
a. Regression Results						
Returns on AD = $0.047 + 0.60 ( NYSE)$						
The intercept is 4.7%; the beta is 0.60.						
b. Expected Return over next year = $6\% + 0.60 (8.5\%) =$						11.10%
c. Intercept = 4.70%						
Riskfree Rate (1-Beta) = $6\% (1-0.60) =$						2.40%
Intercept - Riskfree Rate (1-Beta) = $4.7\% - 2.4\% =$						2.30%
On an annual basis, the stock did 2.3% better than expected.						
d. If you were an undiversified investor, you would be exposed to all risk in AD; this can be measured in terms of the standard deviation in AD returns (9.08%).						
The R-squared of this regression is 45%; this suggests that 55% is diversifiable risk.						
e. Beta for divested division = $2 (0.60) =$						1.20
$1.20 (.2) + X (0.8) = 0.6$						
Solve for X,						
$X = 0.36/.8 =$						0.45
This is the beta after the divestiture, assuming that the cash is paid out and that the leverage is unaffected.						
<b>Problem 13</b>						
a. Expected Return = $6\% + 0.46 (5.5\%) =$						8.53%
b. Proportion of the firm's risk that is diversifiable = $1 - R \text{ squared} =$						95%
c. Existing Debt/Equity Ratio = $20/(20*2) =$						50.00%
Unlevered Beta for the firm = $0.46/(1+(1-.36) (.5)) =$						0.35

Unlevered Beta of Firm without divested division						
	0.20 (20/60) + X (40/60) = 0.35					
Solving for X,						
	X = (0.35 - 0.0667)/(40/60) =			0.42		
New Unlevered Beta with new division,						
	0.42 (40/90) + 0.80 (50/90) =			0.63		
New Debt/Equity Ratio = (20 + 30)/40 =				1.25		
New Levered Beta = 0.63 (1 + (1-.36) (1.25)) =				1.13		
<b>Problem 14</b>						
a. R squared = ( $\sigma_m^2 / \sigma_m^2$ )						
	Beta <sup>2</sup> = (0.36*0.67)/0.12 =			2.01		
	Beta =			1.42		
b. Jensen's alpha = Intercept - Riskfree Rate (1-Beta)						
-0.39% = Intercept - 0.39% (1-1.42)						
	Monthly Riskfree Rate = (1.0484) <sup>1/12</sup> - 1 =			0.39%		
Solving for the intercept,						
	Intercept = -0.39% + 0.39% (1-1.42) =			-0.55%		
c. The two firms might not have the same beta, because they might have different total variances.						
<b>Problem 15</b>						
a. Expected Return on the Stock over next year = 4.8% + 1.65 (8.5%) =				18.83%		
b. Yes, i would use the long term bond rate as my riskless rate.						
	Expected Return on the Stock = 6.4% + 1.65 (5.5%) =			15.48%		
c. Monthly Jensen's Alpha = (1.51) <sup>1/12</sup> - 1 =						
	3.49% = 3.28% - Riskfree Rate (1-1.65)			3.49%		
Solving for the riskless rate,						
	Monthly Riskless Rate = 0.21%/(0.65) =			0.32%		
	Annualized Riskless Rate = (1.0032) <sup>12</sup> - 1 =			3.91%		
d. Unlevered Beta = 1.65 / (1 + (1-.4)(.03)) =				1.62		
	Market Value of Equity = 265 * \$ 30 =			\$ 7,950.00		
	Existing Debt = 0.03 (7950) =			\$ 238.50		
	New Debt = \$ 238.50 + \$ 2000 =			\$ 2,238.50		
	New Levered Beta = 1.62 (1 + (1-.4) (2238.5/7950)) =			1.89		
<b>Problem 16</b>						
a. Intercept - Riskfree Rate (1-Beta) = -0.05% - 0.49% (1-1.20) =				0.05%		
	Monthly Riskfree Rate = 1.06 <sup>1/12</sup> - 1 =			0.49%		
The stock did 0.05% better than expected during the period of the regression.						
b. Debt before restructuring = \$ 40 million - \$ 20 million =				\$ 20.00		
	Equity before restructuring = \$ 120 + \$ 40 =			\$ 160.00		
	Debt/Equity Ratio before restructuring = 20/160 =			12.50%		
	Unlevered Beta before restructuring = 1.20 / (1+(1-.4)(.125)) =			1.12		
Unlevered Beta after the divisional sale,						
	0.6(20/180) + X (160/180) = 1.12					
Solving for X,						
	Unlevered Beta after divisional sale =			1.19		
	New Debt/Equity Ratio after restructuring = 40/120 =			0.33333333		
	New Beta = 1.19 (1 + (1-.4) (0.33)) =			1.43		
<b>Problem 17</b>						
a. Unlevered Beta = 1.61 / (1+(1-.4) (10/10)) =				1.01		
b. Estimated Debt Ratios						
	Year	Debt Ratio	D/E	Beta		
	1	40%	0.666666667	1.41		

2	30%	0.428571429	1.27		
<b>Problem 18</b>					
a. Unlevered Beta = $1.05 / (1 + (1-.36)(13000/(355*50))) =$				0.71	
b. With special dividend,					
	Debt/Equity Ratio = $13000/(355*50-5000) =$			1.02	
Assuming that the beta of cash is 0,					
	Value of Firm before dividend = $13000 + 355*50 =$			\$ 30,750.00	
	$0 (8000/30750) + X (22750/30750) = 0.71$				
Solving for X,					
	X =	0.96			
The unlevered beta after the special dividend will be 0.96.					
c. New Beta after the special dividend = $0.96 (1+(1-.36)(1.02)) =$				1.59	
<b>Problem 19</b>					
Company	Beta	Debt	Equity	D/E	
Black & Decker	1.40	2500	3000	83.33%	
Fedders	1.20	5	200	2.50%	
Maytag	1.20	540	2250	24.00%	
National Presto	0.70	8	300	2.67%	
Whirlpool	1.50	2900	4000	72.50%	
	1.20			37.00%	
Unlevered beta = $1.20 / (1+(1-.4)(.37)) =$			0.98		
a. Beta for private firm = $0.98 (1 + (1-.4) (.25)) =$				1.13	
b. The firms might not be directly comparable in terms of business mix. Furthermore, the risk of a firm may be affected by its size; if the private firm is much smaller, this beta might not adequately reflect its risk. Finally, this beta reflects only market risk; the private firm may care about firm-specific risk as well.					
<b>Problem 20</b>					
a. Unlevered Beta for Food Business = $0.95/ (1 + (1-.36) (.35)) =$				0.78	
Beta for Food Division = $0.78 (1 + (1-.36) (.25)) =$				0.90	
b. Yes. The higher fixed cost structure would lead me to use a higher unlevered beta for Nabisco.					
<b>Problem 21</b>					
a. Unlevered Beta of phone business = $0.90 / (1+0.64*1) =$				0.55	
Unlevered Beta of media business = $1.20 / (1 + 0.64*.5) =$				0.91	
Unlevered Beta in 1999 = $0.7 (0.55) + 0.3 (0.91) =$				0.66	
Beta in 1999 = $0.66 (1 + (1-.36) (1.00)) =$				1.08	
b. If it finances its media operations with a 50% D/E ratio,					
	Overall Debt Ratio = $1 (.7) + .5 (.3) =$			0.85	
Beta with this debt ratio = $0.66 (1 + 0.64 (0.85)) =$				1.02	
<b>Problem 22</b>					
a. No, it is not unusual. As firms grow and become larger, they generally become more diversified and less risky.					
b. I would expect it to continue since Adobe still has a beta well above one.					
c. I would expect it to stop as the beta approaches one.					
<b>Problem 23</b>					
a. Unlevered Beta of comparable firms = 1.15					
Beta for Tiffany's based on comparable firms = $1.15 (1+0.6*.2) =$				1.29	
b. Range for beta from regression					
	With one standard error : 0.25 - 1.25				
c. The regression estimate is very noisy. It is entirely possible that both of these estimates are from the same distribution; I would trust the "comparable firm" estimate more.					