

2. This question is based on the information in the following table:

	State 1	State 2	State 3
Probability of state	0.5	0.3	0.2
Return on Market portfolio	20%	12%	4%
Return on Dell stock	12%	18%	3%

(a) Calculate the Beta on the market portfolio and on Dell's stock.

(b) Using the NPV analysis, what should be the correctly risk-adjusted price for Dell's stock, which will pay an expected dividend of \$10 per year forever? The risk-free rate is 5%.

(a) • $\beta_{\text{Market}} = 1$ (always)

• $\bar{R}_{\text{DELL}} = 0.5 \times 12\% + 0.3 \times 18\% + 0.2 \times 3\% = 12\%$

$\sigma_{\text{DELL}}^2 = 0.5(12\% - 12\%)^2 + 0.3(18\% - 12\%)^2 + 0.2(3\% - 12\%)^2 = 2.7$

$\bar{R}_{\text{Market}} = 0.5 \times 20\% + 0.3 \times 12\% + 0.2 \times 4\% = 14.4\%$

$\sigma_{\text{Market}}^2 = 0.5(20 - 14.4)^2 + 0.3(12 - 14.4)^2 + 0.2(4 - 14.4)^2 = 39.04$

$\text{COV}_{\text{DELL, MARKET}} = 0.5(12 - 12)(20 - 14.4) + 0.3(18 - 12)(12 - 14.4) + 0.2(3 - 12)(4 - 14.4)$
 $= 14.4$

$\beta_{\text{DELL}} = \frac{14.4}{39.04} = 0.368852$

(b) Using CAPM, the required (risk-adjusted) return on Dell is:

$\bar{R}_{\text{DELL}} = R_f + \beta_{\text{DELL}} (\bar{R}_M - R_f)$
 $= 5\% + 0.368852 (14.4\% - 5\%)$
 $= 8.467213\%$

\Rightarrow Dell's stock, from the perpetuity formula, equals $\frac{\text{Div}}{R_{\text{Dell}}}$:
 Dell's stock = $\$10 / 0.08467213 = \118.1026