Key to 2:30 Quiz: 2/29/12

Quiz: Use the following information to calculate the beta of and required return on MRK (Merck) if the market risk premium is 6% and the risk-free rate is 2%.

<table>
<thead>
<tr>
<th>Year</th>
<th>MRK</th>
<th>S&amp;P500</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>+21%</td>
<td>+2%</td>
</tr>
<tr>
<td>2010</td>
<td>-9%</td>
<td>+20%</td>
</tr>
<tr>
<td>2009</td>
<td>+41%</td>
<td>+30%</td>
</tr>
<tr>
<td>2008</td>
<td>-35%</td>
<td>-40%</td>
</tr>
</tbody>
</table>

Note: You don’t have to solve anything. Just set up the appropriate equations and plug in all possible numbers.

\[
\beta_{MRK} = \frac{\text{Cov}(R_{MRK}, R_{S&P500})}{\text{Var}(R_{S&P500})}
\]

\[
\text{Cov}(R_{MRK}, R_{S&P500}) = \frac{1}{3} \left( (21 - \bar{R}_{MRK})(2 - \bar{R}_{S&P}) + (-9 - \bar{R}_{MRK})(20 - \bar{R}_{S&P}) + (41 - \bar{R}_{MRK})(30 - \bar{R}_{S&P}) + (-35 - \bar{R}_{MRK})(-40 - \bar{R}_{S&P}) \right)
\]

\[
\bar{R}_{MRK} = \frac{1}{4} (21 - 9 + 41 - 35)
\]

\[
\bar{R}_{S&P500} = \frac{1}{4} (2 + 20 + 30 - 40)
\]

\[
\text{Var}(R_{S&P500}) = \frac{1}{3} \left( (2 - \bar{R}_{S&P})^2 + (20 - \bar{R}_{S&P})^2 + (30 - \bar{R}_{S&P})^2 + (-40 - \bar{R}_{S&P})^2 \right)
\]

\[
r = 2 + \beta_{MRK}(6)
\]