EXPECTED RATE OF RETURN

\[ E(R) = P_1K_1 + P_2K_2 + P_3K_3 \]

\[ \bar{K} = \frac{\sum K}{n} \]

RISK

\[ \sigma^2 = P_1 (K_1 - K_\mu)^2 + P_2 (K_2 - K_\mu)^2 + P_3 (K_3 - K_\mu)^2 \]

\[ S^2 = (K_1 - \bar{K})^2 + (K_2 - \bar{K})^2 + (K_3 - \bar{K})^2 / 2 \]

STANDARD DEVIATION = SQUARE ROOT OF VARIANCE

<table>
<thead>
<tr>
<th>O</th>
<th>P</th>
<th>K</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.2</td>
<td>-10</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>.2</td>
<td>40</td>
<td>-10</td>
</tr>
<tr>
<td>3</td>
<td>.2</td>
<td>-5</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>.2</td>
<td>35</td>
<td>-5</td>
</tr>
<tr>
<td>5</td>
<td>.2</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

\[ K_u = .2(-10) + .2(40) + .2(-5) + .2(35) + .2(15) = 15 \]

\[ W_u = .2(40) + .2(-10) + .2(35) + .2(-5) + .2(15) = 15 \]
\[\sigma_K = \sqrt{.2(625) + .2(625) + .2(400) + .2(400) + .2(0)} = 20.25\]
\[\sigma_W = \sqrt{.2(625) + .2(625) + .2(400) + .2(400) + .2(0)} = 20.25\]
CORRELATION

PERFECT POSITIVE = +1
PERFECT NEGATIVE = -1
UNCORRELATED = 0

COVARIANCE

\[ \sigma_{12} = \frac{1}{n-2} \sum \left( K_1 - \bar{K}_1 \right) \left( K_2 - \bar{K}_2 \right) \]

CORRELATION COEFFICIENT

\[ \rho_{12} = \frac{\sigma_{12}}{\sigma_1 \sigma_2} \]

DIVERSIFICATION

TOTAL RISK = NONDIVERSIFIABLE RISK + DIVERSIFIABLE RISK
TOTAL RISK = SYSTEMATIC RISK + UNSYSTEMATIC RISK
TOTAL RISK = MARKET RISK + FIRM RISK

EXPECTED RETURN ON PORTFOLIO

\[ R_p = w_1 x R_1 + w_2 x R_2 + w_3 x R_3 \]

VARIANCE OF PORTFOLIO

\[ \sigma_p^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + w_3^2 \sigma_3^2 \\
+ 2w_1 w_2 \sigma_{12} + 2w_1 w_3 \sigma_{13} + 2w_2 w_3 \sigma_{23} \]
MEASURING MARKET RISK

BETA = INDEX OF HOW SECURITY RETURN MOVES WITH MARKET

$ < 1$ is Defensive

$ > 1$ is Aggressive

BETA OF PORTFOLIO

$p = w_1 s_1 + w_2 s_2 + w_3 s_3$

CALCULATION OF BETA

$= D_i \times F_i / F_m$

SYSTEMIC RISK

Systematic Risk = $s_2 \times F_m^2$