1. (Example 1)
   Suppose you buy 500 shares of Ford at $11 per share and 100 shares of Citigroup stock at $28 per share. If Ford's share price goes up to $13 and Citigroup's rises to $40, what is the new value of the portfolio, and what return did it earn? Show that Eq. 11.2 holds. After the price change, what are the new portfolio weights?

   Solution)
   The initial value of the portfolio is $500 \times \$11 + 100 \times \$28 = \$8{,}300$. The new value of the portfolio is $500 \times \$13 = +100 \times \$40 = \$10{,}500$, for a gain of $2,200 or a 26.5% return on your $8,300 investment. Ford's return was $\frac{\$13}{\$11} - 1 = 18.18\%$, and Citigroup's was $\frac{\$40}{\$28} - 1 = 42.86\%$.

   Given the initial portfolio weights of $\frac{\$5{,}500}{\$8{,}300} = 66.3\%$ for Ford and $\frac{\$2{,}800}{\$8{,}300} = 33.7\%$ for Citigroup, we can also compute the portfolio's return from Eq. (2):

   $$R_P = x_{Ford}R_{Ford} + x_{Citigroup}R_{Citigroup} = 0.663 \times (18.2\%) + 0.337 \times (42.9\%) = 26.5\%$$

   Thus, Eq. (2) holds.

   After the price changes, the new portfolio weights are $\frac{\$6{,}500}{\$10{,}500} = 61.9\%$ for Ford and $\frac{\$4{,}000}{\$10{,}500} = 38.1\%$ for Citigroup.

2. (Example 2)
   Assume your portfolio consists of \$25,000 of Intel stock and \$35,000 of ATP Oil and Gas. Your expected return is 18% for Intel and 25% for ATP Oil and Gas. What is the expected return for your portfolio?

   Solution)
   Total Portfolio $= \$25{,}000 + 35{,}000 = \$60{,}000$
   Portfolio Weights
   - Intel: $\frac{\$25{,}000}{\$60{,}000} = 0.4167$
   - ATP: $\frac{\$35{,}000}{\$60{,}000} = 0.5833$

   Expected Return

$$\begin{aligned} E[R] &= (0.4167)(0.18) + (0.5833)(0.25) \\ &= 0.075006 + 0.145825 = 0.220885 = 22.1\% \end{aligned}$$

3. (Example 5)
Using the data From Table 3, what is the covariance between General Mills and Ford?

	Microsoft	HP	Alaska Air	Southwest Airlines	Ford Motor	Kellogg	General Mills
Volatility (Standard Deviation)	32%	36%	36%	31%	47%	19%	17%
Correlation with							
Microsoft	1.00	0.40	0.18	0.22	0.27	0.04	0.10
HP	0.40	1.00	0.27	0.34	0.27	0.10	0.06
Alaska Air	0.18	0.27	1.00	0.40	0.15	0.15	0.20
Southwest Airlines	0.22	0.34	0.40	1.00	0.30	0.15	0.21
Ford Motor	0.27	0.27	0.15	0.30	1.00	0.17	0.08
Kellogg	0.04	0.10	0.15	0.15	0.17	1.00	0.55
General Mills	0.10	0.06	0.20	0.21	0.08	0.55	1.00

Solution)

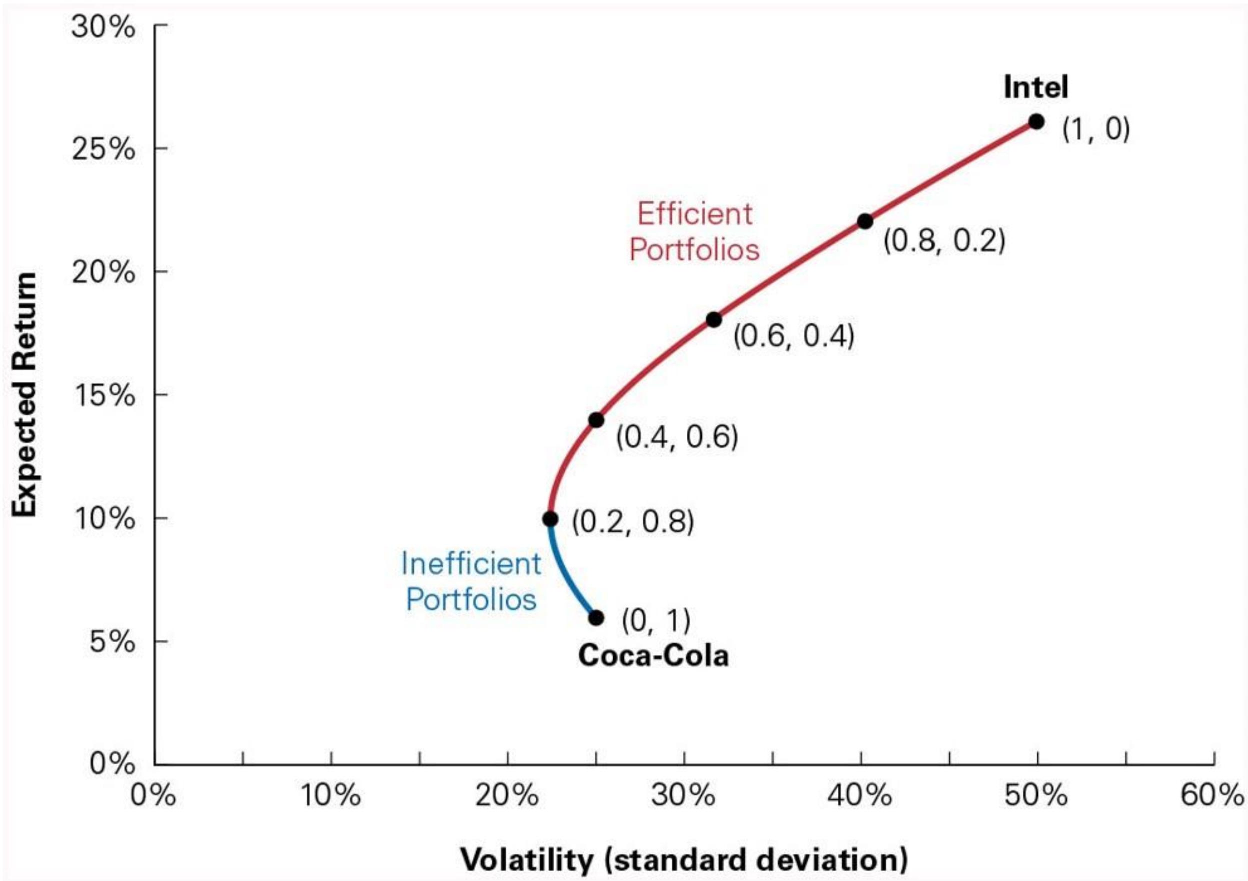
$$\begin{aligned} Cov(R_{General\ Mills}, R_{Ford}) &= Corr(R_{General\ Mills}, R_{Ford})SD(R_{General\ Mills})SD(R_{Ford}) \\ &= (0.08)(0.17)(0.47) = 0.00639 \end{aligned}$$

4. (Example 6)
   Continuing with Problem 2, assume the annual standard deviation of return is 43% for Intel and 68% for ATP Oil and Gas. If the correlation between Intel and ATP is 0.49, what is the standard deviation of your portfolio?

   Solution)

$$SD(R_P) = \sqrt{x_1^2Var(R_1) + x_2^2Var(R_2) + 2x_1x_2Cov(R_1, R_2)}$$
$$= \sqrt{(.4167)^2(.43)^2 + (.5833)^2(.68)^2 + 2(.4167)(.5833)(.49)(.43)(.68)}$$
$$= \sqrt{(.1736)(.1849) + (.3402)(.4624) + 2(.4167).5833)(.49)(.43)(.68)}$$
$$= \sqrt{.0321 + .1573 + .0696} = \sqrt{0.259} = .5089 = 50.89\%$$

5. (Example 9)
   Using Figure 3, what combination of Intel and Coca-Cola provides the worst risk/return trade-off? What combination provides the lowest amount of risk? The greatest amount of risk?



Solution)

The worst risk/return trade-off is 100% in Coca-Cola because you can earn a higher return with the same amount of risk or the same return with a lower amount of risk by moving to a more efficient portfolio. 20% in Intel and 80% in Coca-Cola provides the lowest risk, while 100% in Intel offers the highest amount of risk.

6. (Example 13)
   Assume you own a portfolio of 25 different “large cap” stocks. You expect your portfolio will have a return of 12% and a standard deviation of 15%. A colleague suggests you add gold to your portfolio. Gold has an expected return of 8%, a standard deviation of 25%, and a correlation with your portfolio of −0.05. If the risk-free rate is 2%, will adding gold improve your portfolio’s Sharpe ratio?

   Solution)
   The beta of gold with your portfolio is

$$\beta_{Gold} = \frac{SD(R_{Gold})Corr\left(R_{Gold}, R_{Your\ Portfolio}\right)}{SD\left(R_{Your\ Portfolio}\right)} = \frac{25\% \times -0.05}{15\%} = -0.08333$$

   The required return that makes gold an attractive addition to your portfolio is

$$r_{Gold} = r_f + \beta_{Gold}\left(E\left[R_{Your\ Portfolio}\right] - r_f\right) = 2\% - 0.08333 \times (12\% - 2\%) = 1.167\%$$

   Because the expected return of 8% exceeds the required return of 2.5%, adding gold to your portfolio will increase your Sharpe ratio.

7. (Example 16)
   Assume the risk-free return is 5% and the market portfolio has an expected return of 12% and a standard deviation of 44%. ATP Oil and Gas has a standard deviation of 68% and a correlation with the market of 0.91. What is ATP's beta with the market? Under the CAPM assumptions, what is its expected return?

   Solution)

$$\beta_i = \frac{SD(R_i) \times Corr(R_i, R_{Mkt})}{SD(R_{Mkt})} = \frac{(.68)(.91)}{.44} = 1.41$$

$$E[R_i] = r_f + \beta_i^{Mkt}\left(E[R_{Mkt}] - r_f\right) = 5\% + 1.41(12\% - 5\%) = 14.87\%$$

8. (Example 17)
Assume you own a security with a beta of 1.5 and you have found a security that has a beta of -1.5. How much market risk could be eliminated by adding this security to create a two-security portfolio? Conceptually, what would be the expected return of this portfolio?

Solution)
A portfolio with 50% in a security with a beta of 1.5 and 50% in another security with a beta of -1.5 would yield a portfolio beta of 0, indicating an elimination of the market risk. The expected return on a portfolio with a beta of 0 will be equal to the risk-free rate.

$$E[R_i] = r_f + \beta_{Portfolio}\left(E[R_{Mkt}] - r_f\right) = r_f + 0 \times \left(E[R_{Mkt}] - r_f\right) = r_f$$

9. (Example 18)
Suppose the stock of the 3M Company (MMM) has a beta of 0.69 and the beta of Hewlett-Packard Co. (HPQ) stock is 1.77. Assume the risk-free interest rate is 5% and the expected return of the market portfolio is 12%. What is the expected return of a portfolio of 40% of 3M stock and 60% Hewlett-Packard stock, according to the CAPM?

Solution)

$$\beta_P = \sum_i x_i \beta_i = (.40)(0.69) + (.60)(1.77) = 1.338$$

$$E[R_i] = r_f + \beta_i^{Mkt}\left(E\left[R_{Portfolio}\right] - r_f\right)$$

$$E[R_i] = 5\% + 1.338(12\% - 5\%) = 14.37\%$$