

Assume that all assumptions of CAPM hold.

Assets	Expected Return (%)	Standard Deviation (%)
Market Portfolio	20	10
Risk Free Rate	4	0

Expected return on the market portfolio ($E(R_m)$) is equal to 0.10 (10%) and standard deviation of the market portfolio is equal to 0.10. The risk-free rate (R_f) is equal to 0.02.

$$ER_p = 0.04 + \left[\frac{0.10 - 0.02}{0.10} \right] \sigma_p, ER_p = 0.04 + 0.8 \sigma_p$$

1. Write down CML equation.

$$ER_p = R_f + \left(\frac{ER_m - R_f}{\sigma_m} \right) \sigma_p; ER_p = 0.04 + \left[\frac{0.10 - 0.04}{0.10} \right] \sigma_p, ER_p = 0.04 + 1.6 \sigma_p$$

2. Suppose an investor has 2000 Baht and the investor wants 16% expected rate of return, how should the investor allocate his or her fund between the market portfolio and risk-free asset?

$ER_p = (1-a)R_f + aER_m$ $0.16 = (1-a)0.04 + a0.20$ $= 0.04 - 0.04a + 0.20a$ $0.12 = 0.16a$ $a = \frac{0.12}{0.16} = \frac{3}{4}, (1-a) = \frac{1}{4}$	$ER_p = (1-a)R_f + aER_m$ $0.16 = (1-a)0.02 + a0.10$ $= 0.02 - 0.02a + 0.10a$ $0.14 = 0.08a$ $a = \frac{4}{7}, (1-a) = \frac{3}{7}$
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Weight of the market portfolio = $\frac{3}{4}$, Weight of risk-free asset = $\frac{1}{4}$

Amount of money invested in the market portfolio = $\frac{3}{4} \times 2000 = 1500$

Amount of money invested in risk-free asset = $\frac{1}{4} \times 2000 = 500$

$$\frac{4}{7} \times 2000$$

$$\frac{3}{7} \times 2000$$

3. Suppose the market portfolio is consisted of 0.2 in X, 0.3 in Y and 0.5 in Z. To invest in the market portfolio in question 2, please calculate how the investor divide their funds in risky asset, X, Y and Z. In other words, of the amount of money invested in the market portfolio, how much money is invested in each risky asset X, Y and Z?

the amount of money invested in the market portfolio is 1500 of which amount of money invested in X = $0.2 \times 1500 = 300$ " " " " Y = $0.3 \times 1500 = 450$ " " " " Z = $0.5 \times 1500 = 750$	$\frac{4}{7} \times 2000$ $0.2 \times \frac{4}{7} \times 2000$ $0.3 \times \frac{4}{7} \times 2000$ $0.5 \times \frac{4}{7} \times 2000$
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The amount of money invested in X = 300, in Y = 450, in Z = 750

4. Please calculate the standard deviation of the portfolio in question 2.

$\sigma_p = a\sigma_m = \frac{3}{4} \times 0.1$ $= 0.075$	$\sigma_p = a\sigma_m = \frac{4}{7} \times 0.1$
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standard deviation of the portfolio = 0.075

Assume that all assumptions of CAPM hold.

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Expected return on the market portfolio ($E(R_m)$) is equal to 0.10 (10%) and standard deviation of the market portfolio is equal to 0.10. The risk-free rate (R_f) is equal to 0.02.

$$ER_p = 0.04 + \left[\frac{0.10 - 0.02}{0.10} \right] \sigma_p, ER_p = 0.04 + 0.8 \sigma_p$$

[20] 1. Write down CML equation.

$$ER_p = R_f + \left(\frac{ER_m - R_f}{\sigma_m} \right) \sigma_p; ER_p = 0.04 + \left[\frac{0.20 - 0.04}{0.10} \right] \sigma_p, ER_p = 0.04 + 1.6 \sigma_p$$

[40] 2. Suppose an investor has 2000 Baht and the investor wants 12% expected rate of return, how should the investor allocate his or her fund between the market portfolio and risk-free asset?

$$ER_p = (1-a)R_f + aER_m$$

$$0.12 = (1-a)0.04 + a0.20$$

$$= 0.04 - 0.04a + 0.20a$$

$$0.08 = 0.16a$$

$$a = \frac{0.08}{0.16} = \frac{1}{2}, (1-a) = \frac{1}{2}$$

$$ER_p = (1-a)R_f + aER_m$$

$$0.12 = (1-a)0.02 + a0.10$$

$$= 0.02 - 0.02a + 0.10a$$

$$0.10 = 0.08a$$

$$a = \frac{4}{7}, (1-a) = \frac{3}{7}$$

Weight of the market portfolio = 0.5, Weight of risk-free asset = 0.5

Amount of money invested in the market portfolio = $\frac{1}{2} \times 2000 = 1000$

Amount of money invested in risk-free asset = $\frac{1}{2} \times 2000 = 1000$

$$\frac{4}{7} \times 2000$$

$$\frac{3}{7} \times 2000$$

[30] 3. Suppose the market portfolio is consisted of 0.2 in X, 0.3 in Y and 0.5 in Z. To invest in the market portfolio in question 2, please calculate how the investor divide their funds in risky asset, X, Y and Z. In other words, of the amount of money invested in the market portfolio, how much money is invested in each risky asset X, Y and Z?

the amount of money invested in the market portfolio is 1000

of which amount of money invested in X = $0.2 \times 1000 = 200$

" " " " Y = $0.3 \times 1000 = 300$

" " " " Z = $0.5 \times 1000 = 500$

$$\frac{4}{7} \times 2000$$

$$0.2 \times \frac{4}{7} \times 2000$$

$$0.3 \times \frac{4}{7} \times 2000$$

$$0.5 \times \frac{4}{7} \times 2000$$

The amount of money invested in X = 200, in Y = 300, in Z = 500

[10] 4. Please calculate the standard deviation of the portfolio in question 2.

$$\sigma_p = a\sigma_m = 0.5 \times 0.1$$

$$= 0.05$$

$$\sigma_p = a\sigma_m = \frac{4}{7} \times 0.1$$

standard deviation of the portfolio = 0.05

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$$ER_p = 0.04 + \left[\frac{0.10 - 0.02}{0.10} \right] \sigma_p, ER_p = 0.04 + 0.8 \sigma_p$$

[20] 1. Write down CML equation.

$$ER_p = R_f + \left(\frac{ER_m - R_f}{\sigma_m} \right) \sigma_p; ER_p = 0.04 + \left[\frac{0.20 - 0.04}{0.10} \right] \sigma_p, ER_p = 0.04 + 1.6 \sigma_p$$

[40] 2. Suppose an investor has 2000 Baht and the investor wants 8% expected rate of return, how should the investor allocate his or her fund between the market portfolio and risk-free asset?

$$ER_p = (1-a)R_f + aER_m$$

$$0.08 = (1-a)0.04 + a0.20$$

$$= 0.04 - 0.04a + 0.20a$$

$$0.04 = 0.16a$$

$$a = \frac{0.04}{0.16} = \frac{1}{4}, (1-a) = \frac{3}{4}$$

$$ER_p = (1-a)R_f + aER_m$$

$$0.16 = (1-a)0.02 + a0.10$$

$$= 0.02 - 0.02a + 0.10a$$

$$0.14 = 0.08a$$

$$a = \frac{4}{7}, (1-a) = \frac{3}{7}$$

Weight of the market portfolio = $\frac{1}{4}$, Weight of risk-free asset = $\frac{3}{4}$

Amount of money invested in the market portfolio = $\frac{1}{4} \times 2000 = 500$

Amount of money invested in risk-free asset = $\frac{3}{4} \times 2000 = 1500$

$$\frac{4}{7} \times 2000$$

$$\frac{3}{7} \times 2000$$

[30] 3. Suppose the market portfolio is consisted of 0.2 in X, 0.3 in Y and 0.5 in Z. To invest in the market portfolio in question 2, please calculate how the investor divide their funds in risky asset, X, Y and Z. In other words, of the amount of money invested in the market portfolio, how much money is invested in each risky asset X, Y and Z?

the amount of money invested in the market portfolio is 500

of which amount of money invested in X = $0.2 \times 500 = 100$

" " " " Y = $0.3 \times 500 = 150$

" " " " Z = $0.5 \times 500 = 250$

$$\frac{4}{7} \times 2000$$

$$0.2 \times \frac{4}{7} \times 2000$$

$$0.3 \times \frac{4}{7} \times 2000$$

$$0.5 \times \frac{4}{7} \times 2000$$

The amount of money invested in X = 100, in Y = 150, in Z = 250

[10] 4. Please calculate the standard deviation of the portfolio in question 2.

$$\sigma_p = a\sigma_m = \frac{1}{4} \times 0.1$$

$$= 0.025$$

$$\sigma_p = a\sigma_m = \frac{4}{7} \times 0.1$$

standard deviation of the portfolio = 0.025