FN 201 : Lecture Note 7
Introduction to Risk and Return and Portfolio Theory

Dr. Winai Homsombat

Bachelor of Economics, International Program

Thammasat University

Measuring Risk

Variance - Average value of squared deviations from mean. A measure of volatility.

Standard Deviation - Average value of squared deviations from mean. A measure of volatility.

Measuring Risk

Coin Toss Game-calculating variance and standard deviation

(1) Percent Rate of Return	(2) Deviation from Mean	(3) Squared Deviation
+40	+30	900
+10	0	0
+10	0	0
-20	-30	900

Variance=average of squared deviations

Standard deviation=square of root variance

Measuring Risk

<u>Diversification</u> - Strategy designed to reduce risk by spreading the portfolio across many investments.

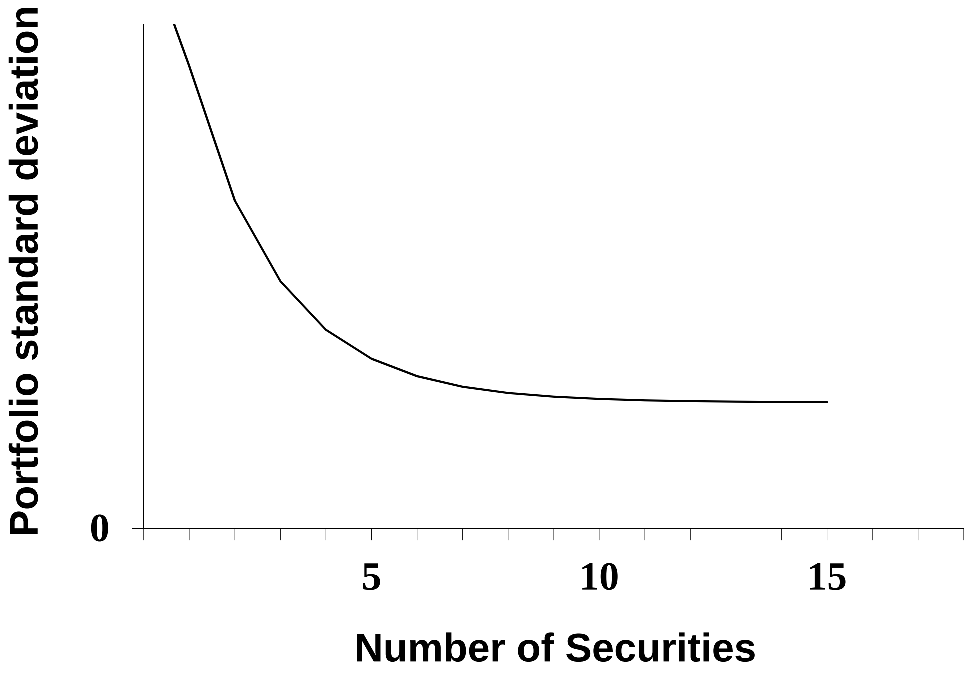
<u>Unique Risk</u> - Risk factors affecting only that firm. Also called "**diversifiable risk.**"

<u>Market Risk</u> - Economy-wide sources of risk that affect the overall stock market. Also called "**systematic risk.**"

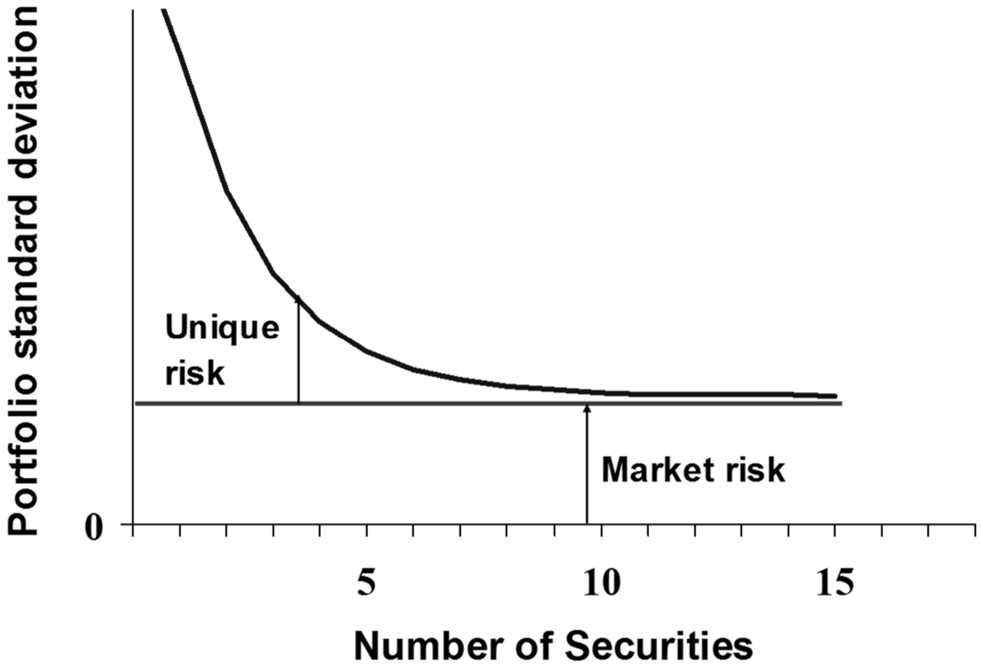
Measuring Risk

$$\text{Portfolio rate of return} = \begin{pmatrix}\text{fraction of portfolio}\\ \text{in first asset}\end{pmatrix} \times \begin{pmatrix}\text{rate of return}\\ \text{on first asset}\end{pmatrix} + \begin{pmatrix}\text{fraction of portfolio}\\ \text{in second asset}\end{pmatrix} \times \begin{pmatrix}\text{rate of return}\\ \text{on second asset}\end{pmatrix}$$

Measuring Risk



Measuring Risk



Portfolio Risk

The variance of a two stock portfolio is the sum of these four boxes

	Stock 1	Stock 2
Stock 1	$x_1^2\sigma_1^2$	$x_1 x_2 \sigma_{12} = x_1 x_2 \rho_{12} \sigma_1 \sigma_2$
Stock 2	$x_1 x_2 \sigma_{12} = x_1 x_2 \rho_{12} \sigma_1 \sigma_2$	$x_2^2\sigma_2^2$

Portfolio Risk

$$\text{Expected Portfolio Return} = (x_1 r_1) + (x_2 r_2)$$

$$\text{Portfolio Variance} = x_1^2\sigma_1^2 + x_2^2\sigma_2^2 + 2(x_1 x_2 \rho_{12}\sigma_1\sigma_2)$$

Portfolio Risk

Example - 1

Suppose you invest 60% of your portfolio in Wal-Mart and 40% in IBM. The expected dollar return on your Wal-Mart stock is 10% and on IBM is 15%. The expected return on your portfolio is:

Portfolio Risk

Example - 1

Suppose you invest 60% of your portfolio in Wal-Mart and 40% in IBM. The expected dollar return on your Wal-Mart stock is 10% and on IBM is 15%. **The standard deviation of their annualized daily returns are 19.8% and 29.7%, respectively. Assume a correlation coefficient of 1.0 and calculate the portfolio variance.**

Portfolio Risk

Example - 1

Suppose you invest 60% of your portfolio in Wal-Mart and 40% in IBM. The expected dollar return on your Wal-Mart stock is 10% and on IBM is 15%. **The standard deviation of their annualized daily returns are 19.8% and 29.7%, respectively. Assume a correlation coefficient of 1.0 and calculate the portfolio variance.**

Portfolio Variance =

Standard Deviation =

Portfolio Risk

Example - 2

Suppose you invest 60% of your portfolio in Exxon Mobil and 40% in Coca Cola. The expected dollar return on your Exxon Mobil stock is 10% and on Coca Cola is 15%. The expected return on your portfolio is:

Portfolio Risk

Example - 2

Suppose you invest 60% of your portfolio in Exxon Mobil and 40% in Coca Cola. The expected dollar return on your Exxon Mobil stock is 10% and on Coca Cola is 15%. **The standard deviation of their annualized daily returns are 18.2% and 27.3%, respectively. Assume a correlation coefficient of 1.0 and calculate the portfolio variance.**

Portfolio Risk

Example - 2

Suppose you invest 60% of your portfolio in Exxon Mobil and 40% in Coca Cola. The expected dollar return on your Exxon Mobil stock is 10% and on Coca Cola is 15%. **The standard deviation of their annualized daily returns are 18.2% and 27.3%, respectively. Assume a correlation coefficient of 1.0 and calculate the portfolio variance.**

Portfolio Variance $=$

Standard Deviation $=$

Portfolio Risk

Example Correlation Coefficient = .4

Stocks	*s*	% of Portfolio	Avg Return
ABC Corp	28	60%	15%
Big Corp	42	40%	21%

Standard Deviation = weighted avg = ?

Standard Deviation = Portfolio = ?

Portfolio Risk

Let's Add stock New Corp to the portfolio!?

Example Correlation Coefficient = .3

Stocks	*s*	% of Portfolio	Avg Return
Portfolio	28.1	50%	17.4%
New Corp	30	50%	19%

NEW Standard Deviation = Portfolio = ?

NEW Return = weighted avg = Portfolio = ?

Question?