

- **Return on a Security** consists of two parts, the dividend and capital gain. The rate of return for one period is given by the following equation:

Return = Dividend yield + Capital gain rate

$$R = \frac{D_1}{P_0} + \frac{(P_1 - P_0)}{P_0}$$

- **Expected Rate of Return on a Security** is the sum of the products of possible rates of return and their probabilities. Thus

$$E(R) = R_1P_1 + R_2P_2 + \dots + R_nP_n = \sum_{i=1}^n R_iP_i$$

- **Dispersion** When the expected rate of return (also called average rate of return) deviate from the possible outcomes (rates of return), this is referred to as dispersion.
- **Variance and Standard Deviation** Dispersion can be measured by **variance and standard deviation** of returns of a security. Variance (σ^2) or standard deviation (σ) is a measure of the risk of returns on a security. They can be calculated as follows:

$$\begin{aligned}\sigma^2 &= [R_1 - E(R)]^2 P_1 + [R_2 - E(R)]^2 P_2 + \dots + [R_n - E(R)]^2 P_n \\ &= \sum_{i=1}^n [R_i - E(R)]^2 P_i \\ \sigma &= \sqrt{\sigma^2}\end{aligned}$$

Historically investors have earned different rates of returns. The average return on shares has been more than the average returns on government bonds and treasury bills. Also, the variance or standard deviation of returns on shares has been more. Shares are more risky than the government bonds.

- **Treasury Bills** Government issued bonds with guarantees which offers risk-free rate, as they do not have risk of default.
- **Risk Premium** The difference between the (long-term) average share return and (long-term) return on government bonds or treasury bills is the risk premium.
- **Risk Preferences of Investors** Investors have different risk preferences. Investors may be risk averse, risk seeker or risk neutral. Most of them are, however, risk averse.

- **Normal Distribution** is a smoothed, symmetric curve. It best describes the mean-variance (or standard deviation). We generally assume that returns on shares are normally distributed.