# Diversification

## Asset return characteristics

Buy an asset (e.g. a stock) at $t = 0$ at price $P_0$. At time $t = 1$,

- its cash flow (dividend) is $D_1$, and
- its price is $P_1$

(both are random variables). The risk-free rate is $r_F$.

**Realized return**: $\boxed{r_1 = \frac{D_1+P_1}{P_0} - 1}$ Returns comes from both dividends and capital gains.

**Expected return**: $\boxed{E[r_1] = \frac{E[D_1]+E[P_1]}{P_0} - 1}$

**Excess return**: (realized) $\boxed{r_1 - r_F}$

**Risk premium**: (expected excess return) $\boxed{E[r_1] - r_F}$

**Mean (average) return**: $\boxed{\bar{r} = E[r] = \frac{1}{T}\sum_{t=1}^{T} r_t}$

Would be same as the expected return $E[r_t]$ if expected returns are constant for all $t$.