$-1 \le Corr(x,y) = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i-\bar{y})^2}} \le 1$ Post Hoc Ergo Propter H

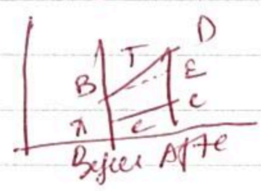
Selfselection Bias → Poorly designed experiments
Voluntary Response Bias → Not rep of population
Non Response bias – Non-respondents differ from respondents

$b_{OLS} = b_1 + \frac{Cov(e,X)}{Cov(X,X)} = \frac{Cov(X,y)}{Cov(X,X)}$ Orthogonality Assumptions $Cov(e,X)=$

When X and e are uncorrelated b_{OLS} is a good estimate of b_1
If X is a dummy Variable $b_{OLS} = b_1 + (\bar{e}_1 - \bar{e}_0)$
b_1 is called treatment effect & $(\bar{e}_1 - \bar{e}_0)$ is selection bias

Randomized control Exp (Rand Nume (0,1)) → <0.5 (Control Group)
→ ≥0.5 (Treatment Group)

$b_{OLS} \Rightarrow$ difference estimator $= \bar{y}_1 - \bar{y}_0 = \sum_{i=1}^{N_1} y_i/N_1 - \sum_{i=1}^{N_0} y_i/N_0$
N_1 = Obs in Treatment group
N_0 = Obs in control group
Counterfactual → Comparing outcome with treatment vs without treatment.
Difference in Difference $= (D-B)-(C-A) = D-E$



Stock Return = $\frac{\text{After} - \text{Before}}{\text{Before}}$

$r_t = \frac{P_t f_t + d_t}{P_{t-1}} - 1$ Compound return $= (r_1+1)(r_2+1)\cdots(r_n+1) - 1$

$s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$ $r_i = \alpha + \beta r_m + \varepsilon$
r_i = Risk facto β = measure of stock sensitn to overall market mona

Draw Down (DD) is cumulative losses: $DD_t = \frac{(HWM_t - P_t)}{HWM_t}$
P_t = current price of asset
Abnormal return = Actual Return – Expected return.
Sharpe Ratio $= \frac{(R-R^f)}{\sigma(R-R^f)}$ → R=Risk R^f = Risk free

Treynor Ratio $= \frac{(R-R^F)}{Beta}$ → Indicates higher rewards/unit risk

Jensen Ratio $= r_{i,t} - r_f = \alpha_i + \beta_i(R_{m,t} - r_f) + \varepsilon_{t1}$ -