計量，若滿足估計量的期望值與母體參數相同
計量 $\hat{\theta}$ 為不偏估計量 (unbiased estimator)。若估計量的期
$E(\hat{\theta}) \neq \theta$，此估計量
mator)

$E(X_i) = \mu$

$V(X_i) = \sigma^2 = E(X_i^2) - \mu^2$

$\therefore E(\bar{X}) = \mu,\ V(\bar{X}) = \frac{\sigma^2}{n} = E(\bar{X}^2) - \mu^2$

$$E(\hat{\theta}_1) = E\left(\frac{\sum_{i=1}^{n}(X_i - \bar{X})^2}{n}\right)$$

$$= \frac{1}{n} E\left(\sum_{i=1}^{n} X_i^2 - n\bar{X}^2\right)$$

$$= \frac{1}{n}(n\sigma^2 + n\mu^2 - \sigma^2 - n\mu^2)$$

$$= \frac{n-1}{n}\sigma^2$$

$$E(\hat{\theta}_2) = E\left(\frac{\sum_{i=1}^{n}(X_i - \bar{X})^2}{n-1}\right)$$

$$= \frac{1}{n-1} E\left(\sum_{i=1}^{n} X_i^2 - n\bar{X}^2\right)$$

$$= \frac{1}{n-1}(n\sigma^2 + n\mu^2 - \sigma^2 - n\mu^2)$$

$$= \sigma^2$$

$\therefore \hat{\theta}_2 = \frac{\sum_{i=1}^{n}(X_i - \bar{X})}{n}$ 是 $\sigma^2$ 的偏估計量

$\hat{\theta}_1 = \frac{(X_1 - \bar{X})^2}{n}$ 是母体變異數 $\sigma^2$ 的偏誤估計量