Random Sampling Distributions

Data Science for Quality Management: Sampling Distributions, Error and Estimation

with **Wendy Martin**

Learning objectives:

Explore the concept of random sampling distributions in R

Random Sampling Distributions

A RSD is the distribution of a sample statistic calculated from all possible random samples of the given (fixed) size from a given population.

Random Sampling Distributions

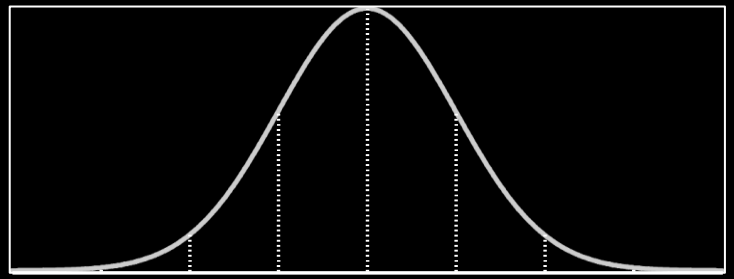
A random sampling distribution is a population distribution and foundational for understanding statistical inference.

Random Sampling Distributions

- Draw all possible random samples of size n from a given research population
- Calculate descriptive statistics for each of the samples
- Construct a distribution for each of the sampled descriptive statistics

Random Sampling Distributions

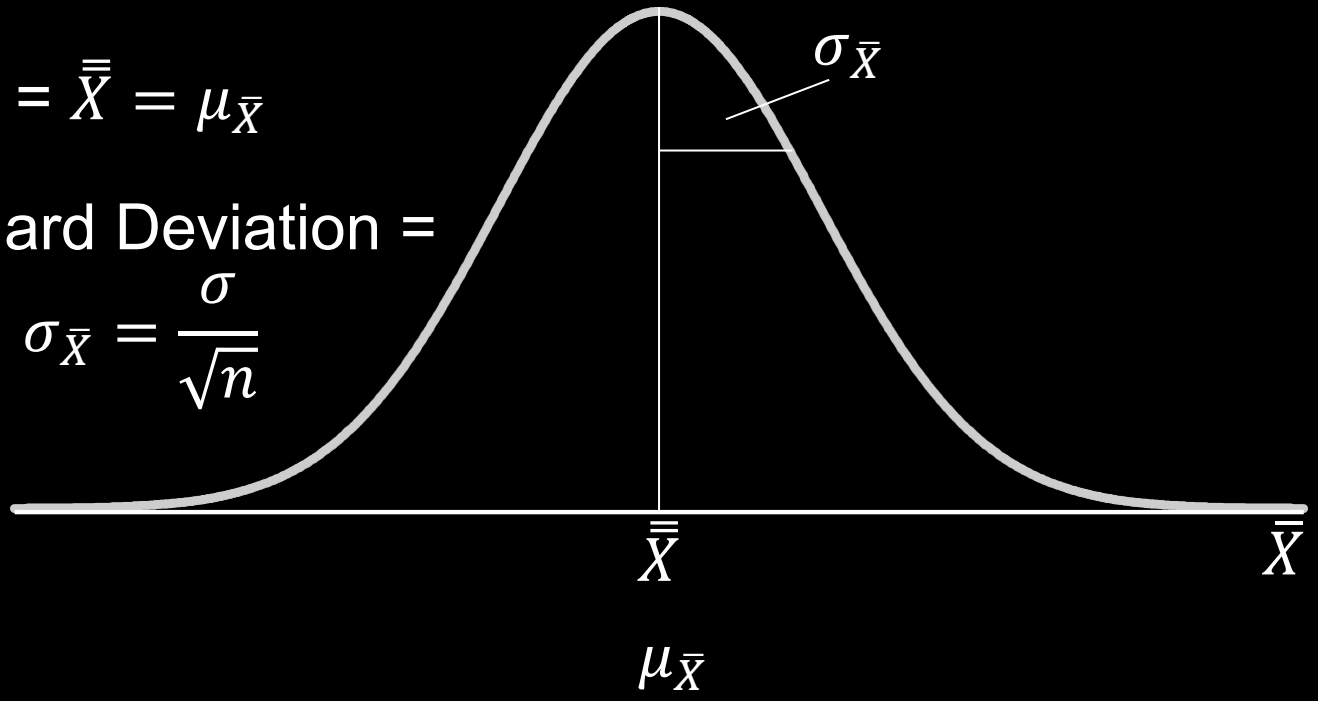
- Each of the resultant distributions constitutes the random sampling distribution of the statistics.



RSD of the Sample Averages

Mean = $\bar{\bar{X}} = \mu_{\bar{X}}$

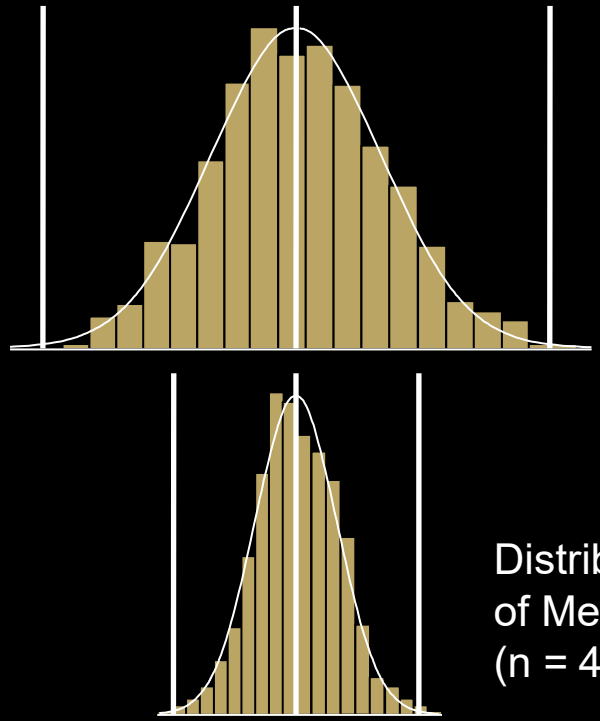
Standard Deviation = $\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}}$



RSD of the Sample Averages

(from a Normally Distributed Population)

Distribution of Individuals



Distribution of Means (n = 4)

Sources

- Luftig, J. An Introduction to Statistical Process Control & Capability. Luftig & Associates, Inc. Farmington Hills, MI, 1982