

## Sampling and Inference

In financial analysis, we always infer the real mean return of stocks, or equity funds, based on the historical data of a couple years. This situation is in line with a core part of statistics - Statistical Inference - which we also base on sample data to infer the population of a target variable. In this module, you are going to understand the basic concept of statistical inference such as population, samples and random sampling. In the second part of the module, we shall estimate the range of mean return of a stock using a concept called confidence interval, after we understand the distribution of sample mean. We will also testify the claim of investment return using another statistical concept - hypothesis testing.

### Learning Objectives

- Compare the properties of population and sample
- Illustrate the difference between two kinds of sampling with examples
- Explain the use of unbiased estimator ( $n-1$ ;  $ddof=1$  in python) when calculating sample variance
- Describe the distribution of sample mean and variance of normal distributed population
- Use the central limit theorem to explain the distribution of sample mean of arbitrary population
- Explain the implication of Confidence Interval in estimating average stock return
- Identify the basic concept of Confidence Interval in estimating population mean
- Outline the steps involved in performing hypothesis testing for validating assertion about population
- Apply the steps involved in hypothesis testing in testifying the claims of investment return
- Recognize p-value as an alternative quantitative tool in performing two tail test - a part of hypothesis testing