

# Section 9

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# Bootstrapping

Quantitative research: testing and estimation require information about the population distribution and/or analytical formulas.

But sometimes we don't know how the population looks like or there are no analytical formulas to estimate the uncertainty of point estimates.

Bootstrap: estimates the population distribution by using the information in the sample.

## boot·strap

/ˈboʊt,ˌstrəp/ <sup>ⓘ</sup>

**noun**

1. a loop at the back of a boot, used to pull it on.
2. **computer**  
a technique of loading a program into a computer by means of a few initial instructions that enable the introduction of the rest of the program from an input device.

**verb**

1. get (oneself or something) into or out of a situation using existing resources.  
"the company is bootstrapping itself out of a married financial past"
2. **computer**  
fetter form of [load](#)<sup>3</sup> (sense 2 of the verb).

**adjective**

1. (of a person or project) using one's own resources rather than external help.  
"a bootstrap capitalist's trip up the entrepreneurial ladder"

## Slide with Bullets

Boots may have a tab, loop or handle at the top known as a bootstrap, allowing one to use fingers or a tool to provide greater force in pulling the boots on.

## Slide with R Code and Output

```
summary(cars)
```

##	speed	dist
##	Min. : 4.0	Min. : 2.00
##	1st Qu.:12.0	1st Qu.: 26.00
##	Median :15.0	Median : 36.00
##	Mean :15.4	Mean : 42.98
##	3rd Qu.:19.0	3rd Qu.: 56.00
##	Max. :25.0	Max. :120.00

# Slide with Plot

