ECO220 Lecture Notes

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Content Chapter 1-4,

- Statistics
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- Population
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1.1 Statistics

What is statistics Quantitive methods.

1.1.1 Example 1

Question This summer, 120 students enrolled in ECO220. Find out the number of courses that students are taking, the average number of courses they take, and the % of student taking 1 or 2 courses.

Population 120 students in ECO220. Noted as $N = 120$

Analyze:

1. Number of courses they take.
2. Average number of courses they take.
3. Percent of students taking 1 or 2 courses.

Data information collected from the whole *population* (all individuals). Use data to answer questions above.

number of courses	number of students	percent
1	40	0.33
2	30	0.25
3	30	0.25
4	15	0.14
5	5	0.03
Total	120	1.00

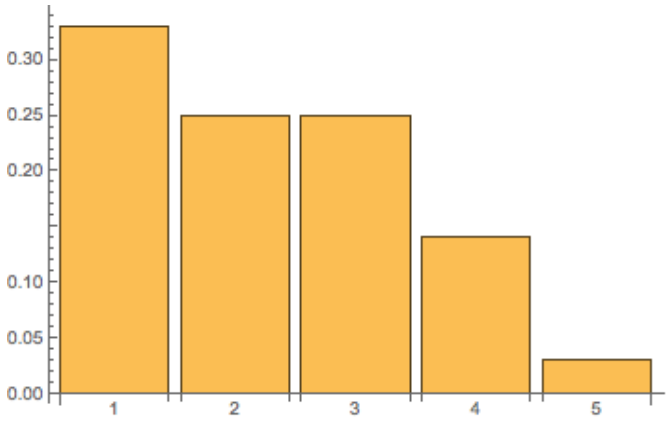

Figure 1: Frequency

Parameters Parameters are fixed numbers. They can be calculated once we measure everyone in population.
Examples of parameters from population

- **Average** $\mu = 2.29$

1.1.2 Example 2

Question Find out the percentage of people in Ontario who are in favour of government policy.

Population People in Ontario.

In favour of policy	# of people in Ontario	%
Very much in favour	*	*
In favour	*	*
neutral	*	*
not in favour	*	*
strongly against	*	*
Total	N = Population of Ontario	1.00

Sample Since N is too large to handle, we select a sample, which is a subset of population, denoted as n, and then analyze the sample.

In favour of policy	# of people in Ontario	%
Very much in favour In favour neutral not in favour strongly against		
Total	n = Size of sample	1.00

The above chart based on sample data to *estimate* the chart using population data.

Let p be the % of people in Ontario(population) who are "very in favour" or "in favour"

Let $\hat{p}$ be the % of people in sample who are "very in favour" or "in favour", can be calculated based on the sample data.

The parameter p has an unknown value. The value of $\hat{p}$ can be calculated from sample data, $\hat{p}$ is an **estimate** for p.

Note p is a fixed value, but $\hat{p}$ will change from sample to sample. We call $\hat{p}$ an **estimator** (or **sample statistic**). The value of sample statistic will change from sample to sample, we call $\hat{p}$ a *random value*.

Parameters on population

- μ: Average
- p: Percentage

Sample Statistic on sample

- $\overline{x}$: Average
- $\hat{p}$: Percentage

Statistics

$$\text{Statistics} \begin{cases} \text{Descriptive statistics} \begin{cases} \text{Graph} \\ \text{Numerical measures} \end{cases} \\ \text{Inferential statistics: } \textit{Draw conclusions on a population based on sample data.} \end{cases}$$