Doing Economics:
Teaching data with CORE

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coreecon

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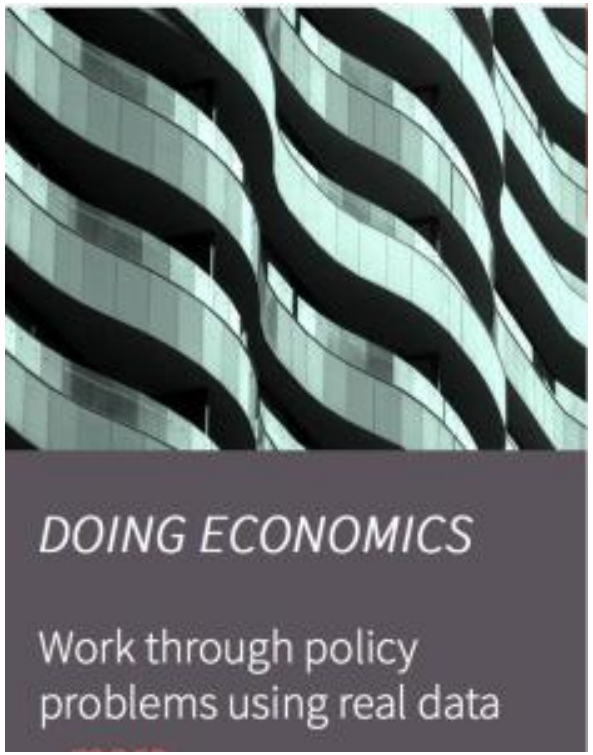
Overview of CORE's resources



Teacher resources

Student resources

CORE Labs

Specialists

Non- specialists

Both

Overview of Doing Economics

What: Hands-on investigation of policy issues, using real-world data.

Non-technical introduction to statistics/statistical software

How: Collection of projects, with step-by-step guidance in R and Excel

"Raw data" -> answer interesting policy questions

Why: Employability - Develop transferable skills.

Data handling/presentation, communicating to non-specialists

1. Focus on intuitive questions

Project 1 (Climate change)

1. How can we tell whether climate change is actually happening or not?
2. If it is real, how can we measure the extent of climate change and determine what is causing it?

Project 2 (Public goods experiments with and without punishment)

1. Were there any differences in behaviour (average contributions) between the experiments?
2. Can we attribute the observed differences in behaviour to the change in conditions, rather than to chance or coincidence?

2. Dealing with random variation in the data

Why might we see differences in behaviour that are due to chance?

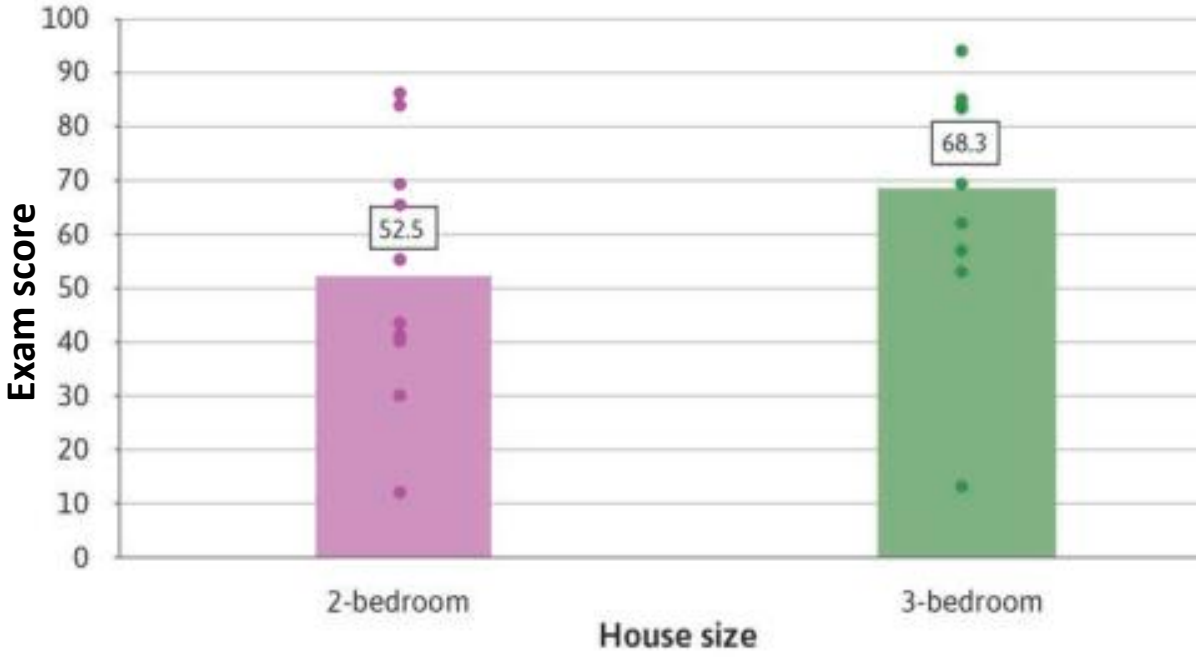
- Flip a coin 6 times and record the outcomes (e.g. T, H, H,…)
- Repeat this exercise under the same conditions (e.g. same coin)
- Compare the outcomes of the two experiments. Was the number of Heads the same? Was the sequence of outcomes the same?

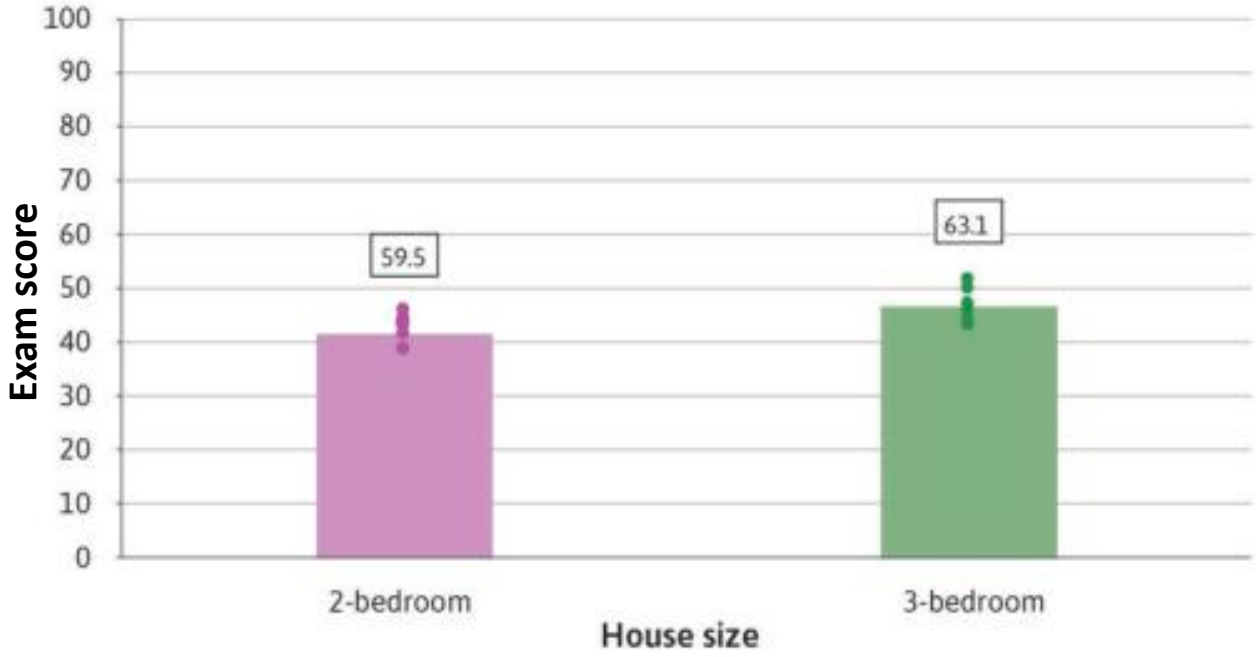
The important point to note is that even when we conduct experiments under the same controlled conditions, due to an element of randomness we may not observe the exact same behaviour each time we do the experiment.

Differences between groups: Points we focus on

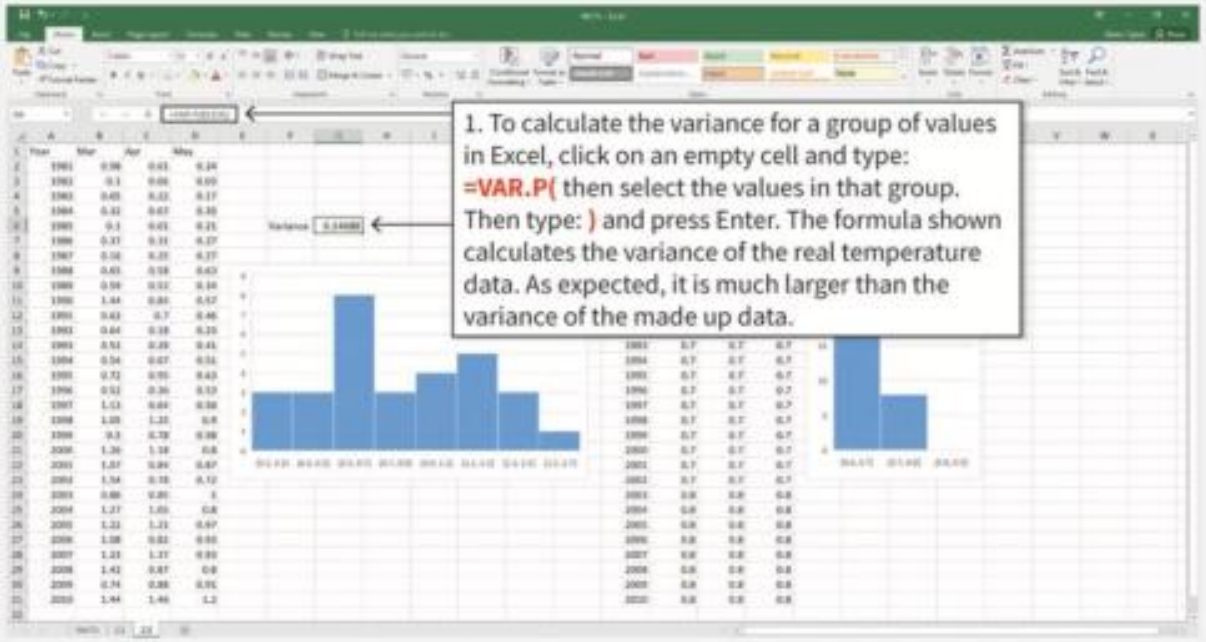
- How likely it is that these differences occurred by chance
- Size of difference/effect is also important
- Learning about correlation but not necessarily causation

Example: House size and exam score





3. Intuitive explanation of statistical concepts



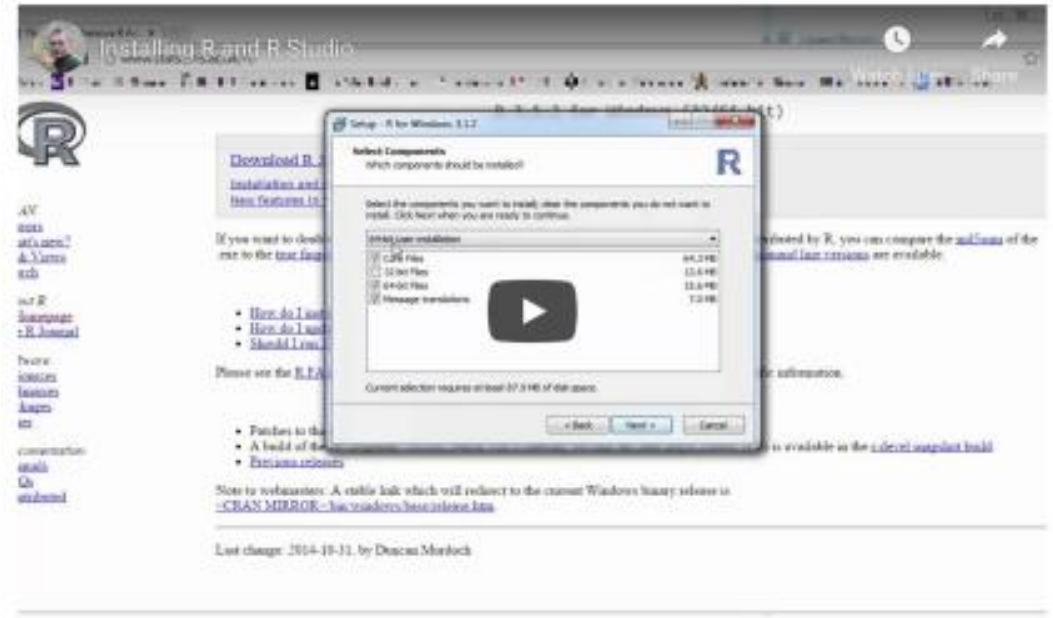
Calculating and interpreting the variance

The variance is a measure of how spread out the data is. Just looking at the charts, we would expect the real temperature data to have a higher variance than the made up data. *Note:* There is a similar function in Excel called VAR.S, which is used to calculate the variance for other types of data. For this temperature data though, we will use VAR.P.

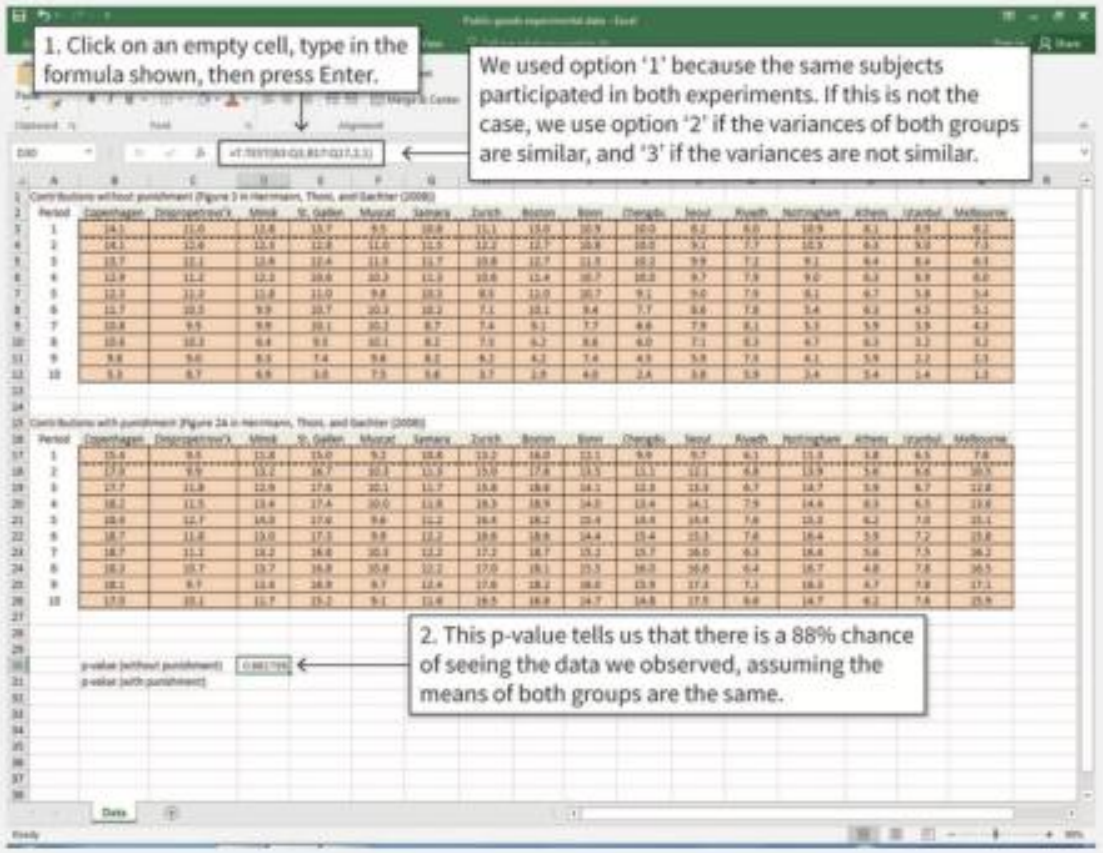
- Focus on intuition rather than mathematical formulas.
- Closely linked to use of statistical software and interpretation of output.

4. Emphasis on practical implementation

- How to use statistical software to answer the questions at hand
- How to interpret the software's output
- Non-technical explanation of how the software works (suitable for absolute beginners)



Examples of Walk-throughs

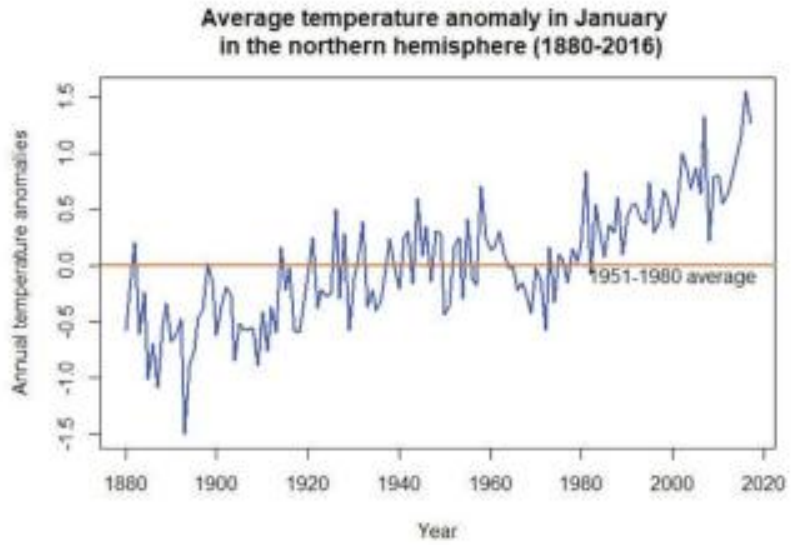


Calculate the p-value for Period 1 data

Excel's T.TEST function will calculate the p-value for the two groups of cells selected. In the example shown, the formula to type is =T.TEST(B3:Q3,B17:Q17,2,1).

To draw a line chart for the years 1880–2016, we use R's `plot` function. The `title` on the next line adds a title to the chart, and the axis draws horizontal and vertical axes according to our specifications. The following code uses data for January as an example.

```
plot(tempdata$Jan,type="l",col="blue", lwd = 2,
# Set line width and colour
     ylab="Annual temperature anomalies",
xlab="Year")
title("Average temperature anomaly in January \n
in the northern hemisphere (1880-2016)")  # \n
creates a line break
abline(h=0,col="darkorange2",lwd = 2) # Add a
horizontal line (at y=0)
text(2000,-0.1,"1951-1980 average") # Add a
label to the horizontal line
```



List of projects and topics

Project	Topic
1	Measuring climate change
2	Collecting and analysing data from experiments
3	Assessing the effect of a sugar tax
4	Measuring wellbeing
5	Measuring economic inequality
6	Measuring management practices
7	Supply and demand
8	Measuring the non-monetary cost of unemployment
9	Credit-excluded households in a developing country
10	Characteristics of banking systems around the world
11	Measuring the WTP for climate change abatement
12	Government policies and popularity

Linking projects to your teaching

Concept	**Project(s)**
Summary statistics (mean, range, SD, variance)	1, 4
Percentiles	1, 5, 6, 8, 9, 12
Correlation (vs causation)	1, 2, 3
Hypothesis testing	2, 6, 8, 9, 10, 11
Gini coefficient/Lorenz curve	5, 12
Natural log transformation	4, 7
Dummy variables	7, 9
Differences-in-differences	2, 3
Other types of means (geometric, weighted)	4, 10
Box and whisker plots	6, 10