

## Replicating and improving estimation of elasticities

The first big project for this class involves replicating and improving the code and writing for my paper on capital elasticities, and then extending that work to another country.

### Writing a new theory section

The first part of this project is to re-write Section I of the paper “Theoretical Background”. The goal here is to make the explanation clearer, both in notation and in words.

1. You should include an explicit derivation starting with the change in real GDP and how that depends on the sum of changes in real prices multiplied by expenditure shares.
2. You should end up with an expression showing how to calculate the factor elasticities (and only the factor elasticities) using things like expenditure shares and cost shares.
3. Your write-up should include explanations of the intuition used to understand the derivation and what the elasticity calculation is doing.
4. You do not need to replicate the last paragraph which references Basu and Fernald or Hall.
5. You should use good habits to write this well. No passive voice. Write clearly. Be repetitive if necessary.
6. This needs to be written in Latex and typeset.

### Writing better code

The second part of the project is to create a new Stata script that replicates what “Elas\_Part3\_Calculate.do” does from my project on Github.

1. Your script should use variable names and comments to align with the written theory section you produced, so that a reader can easily see how the code calculates your elasticities.
2. Your script should do the calculations in a way that mimics your theory section exactly, in the sense that if you have a  $1 \times J$  matrix multiplied by a  $J \times J$  matrix in the theory section, the code should multiply a  $1 \times J$  by a  $J \times J$  (and not a  $J \times J$  by a  $J \times 1$ , which is then transposed, or something like that). Be consistent across the two items.
3. Your script can ignore lines 36-60 of my code, which handles exclusion of selected industries from consideration.
4. Your script can take as given the names of the imported data such as “./CSV/USA\_V\_‘y’.csv”
5. Your script can take as given that the input file will look like “./Work/USA\_scenario\_3\_data.dta”. Your code should check to ensure that the file only passes one year of data.
6. Your script needs to run to completion producing two matrices: Return and Industry. The column and row names on those matrices should be identical to what my code produces.

7. Your code should be able to replicate exactly the output that my code gives run on the same input file.
8. Your code should be thoroughly commented.
9. Your code should simplify the calculations as much as possible.
10. Note that the Use/Make table conversion in my code does not show up (and should not show up) in the written section on the theory.

### **Extending to another country**

The last part of this project is to collect data from another country that allows you to calculate capital and labor elasticities.

1. It would be ideal if you had multiple years, but you must do this for at least one year of data.
2. You will need to investigate some sources that I post, but ideally you will go directly to a country's national accounts page to find what you are looking for.
3. You will need some sort of input/output tables, information on labor compensation by industry, value-added by industry, final-use by industry, gross output by industry, and any information on capital costs by industry (depreciation, investment) that you can find.

Given that data, you need to use your new code, as well as additional “wrapper” code to prepare the input file and present results, to find the elasticities.

1. Your code should include a “no-profit” assumption when calculating the elasticities, but must also include at least one other alternative calculation of the elasticity (ex. using depreciation costs).
2. Your code needs to include specific lines on how self-employment or proprietors income is handled.

Given the data and code, you need to produce a write-up of your results. That write-up should include:

1. A very short introduction. 1 paragraph
2. The theory section you wrote above.
3. A data section that describes where you found the data, and any manipulations you needed to do to get align data sources. Think of this as putting in writing what your “wrapper” code is doing. That section should include information on how you handle proprietors income and/or self-employment.
4. A results section that describes the different assumptions you make on capital costs, and then presents the results of your calculations.
5. The results must be present in either a table (if you have just a few years) or a figure (if you have say 10 years or more).
6. A short section discussing how these differ from US results. Maybe 2 paragraphs.
7. The write-up has to be in Latex.

## **Due Dates**

The theory section rewrite is due on **Tuesday, February 18th**.

The code rewrite is due on **Tuesday, February 25th**.

The replication with another country has several due dates:

1. You should have the country and raw data identified for this by **Tuesday, February 25th**.
2. You should have code to a rough calculation of the elasticity with that data by **Thursday, March 6th**.
3. You should have the final write-up of everything by **Tuesday, March 18th**.