

Final Project

ECON 833, Prof. Jason DeBacker
Due Thursday, December 11, 5:00 p.m.

OVERVIEW

For your final project, I want you reinforce the concepts we learned in class by having you apply it to a question relevant to your research. You've done something related to your research in Problem Sets #1, #3, and #5. For your final project, I want something more involved. And it need not be on the same topics as your previous problem sets. In fact, please don't use the same topic if you are no longer interested in it.

The two main things I'm looking for here are:

1. You develop and write down an economic model that is relevant to your research question. This should include the full setup of the model, including the agents' problem(s), the market clearing conditions, and the equilibrium definition (more details below).
2. You use at least one of the following methods used from class in your analysis of your research question:
 - A structural estimator based on your model (e.g, GMM, SMM, MLE, etc.)
 - A solution method for a dynamic model (e.g., value function iteration, policy function iteration, etc.)
 - An application of machine learning to your research question (could be in model solution, used to create data, or in estimation)

MODEL SETUP

Any economic model (including yours) should have the following components clearly laid out:

1. Specification of the environment (underlying stuff of the economy)
 - (a) Population of agents
 - Who are we modeling?- individuals, households, firms, etc.
 - (b) Preferences
 - utility function (individuals)
 - profit function (firms)
 - social welfare function (social planner)
 - rate of time preference
 - (c) Productive technology
 - How do we produce output?
 - What's feasible?
 - (d) Information technology
 - Who knows what?
 - When do they know it?
 - (e) Enforcement technology
 - How are property rights enforced?
 - (f) Matching technology
 - How do people meet?

2. Equilibrium concept (this will determine allocations)
 - (a) Non-cooperative game (SPNE, Ramsey eq., etc)
 - (b) Competitive (Walrasian eq.)
 - (c) Planner's solution

Be able to specify:

- State variables: what do agents take into account when making decisions?
- Transition equations: how do the state variables evolve over time?
- Control variables: what do agents choose?
- Parameters: what does the agent's environment look like?

DELIVERABLE

As in Problem Set #5, I want you to use good coding practice and to make this reproducible. Your deliverable will be submitted by pushing the files to your GitHub repository that you created from forking the repository for this class. You will place all files for the problem set in the path `/CompEcon_Fall2025/ProblemSets/FinalProject/` on your `ProblemSets` branch. These files will include:

1. At least one (and probably several) `*.py` or `*.R` scripts that creates your visualizations, produce summary tables, and solve and/or estimate your model. Note that for any data you use, I want you to commit your data to your repo, or read it in from a URL (NOTE: Github has a maximum file size of 100MB. Do not try to commit a file larger than that.)
2. One `FinalProject_LastName.tex` file that contains your write up of the problem, model description, and a summary of your findings. Write this as you would an short academic paper. The file will read in the images and tables produced with the above. Also include the compiled PDF, but if you do this right, I should be able to recreate it.
3. One `*.sh` file that will run your Python/R script, update figures and tables, and compile a new pdf of your ProblemSet.

Your overall grade will be determined (mostly) by how well you explain your economic model and problem and your execution in solving or estimating a model, as well as (in small part) your ability to automate the project in a way that I can replicate when I run your bash script on my computer (after having downloaded your `ProblemSets` branch).