Carrying out an Empirical Project

Empirical Analysis & Style Hint

Ch.19 Carrying out an Empirical Project

1. Posing a Question
2. Literature Review
3. Data Collection
4. Econometric Analysis
5. Writing an Empirical Paper

19.1 Posing a Question

- Start with a general area or set of questions.
- Make sure you are interested in the topic.
  - Use on-line services such as ***EconLit*** to investigate past work on this topic.
- Narrow down your topic to a specific question or issue to be investigated.
  - Work through the theoretical issue.
  - You cannot be too ambitious, especially for a one-term project.

19.2 Literature Review

- All papers, even if they are relatively short, should contain a review of relevant literature.
  - On-line services are useful for "lit-review".
    - You can read abstracts of papers to see how relevant they are to your own work.
  - Think of related topics that might not show up in a search using a handful of key words.
- "Literature review" is included in the ***introduction***, or in a separate section.

19.3 Data Collection

- Deciding on which kind of data to collect depends on the nature of the analysis.
  - Investigate what type of data sets have been used in the past literature.
  - The most important is whether there are enough controls to do a reasonable ceteris paribus analysis.
- Consider collecting your own data.

Inspecting Data, etc.

- You must know the nature of the variables in the data set.
  - Measurement units, rates, …etc.
- Check the data for missing values, errors, outliers, etc.
  - Drawing graph, finding descriptive stats,…etc.
- Create variables appropriate for analysis.
  - For example, create dummy variables from categorical variables, create hourly wages, etc.

19.4 Econometric Analysis

- After deciding on a topic and collecting an appropriate data, decide on the appropriate econometric methods.
- If you want to use OLS, OLS assumptions must be satisfied for your model.
  - The error term must be uncorrelated with ***x***.
- Make functional form decisions.
  - Log, interactions, dummy, etc.

Estimating a Model

- Start with a model that is clearly based in theory.
  - Test for significance of other variables that are theoretically less clear.
- Test for functional form misspecification.
  - Consider reasonable interactions, quadratics, logs, etc.

Cont. Estimating a Model

- Don't lose sight of theory and the *ceteris paribus* interpretation – you need to be careful about including variables that greatly alter the interpretation.
  - For example, effect of bedrooms conditional on square footage.
- Be careful about putting functions of *y* on the right hand side – affects interpretation.

Cont. Estimating a Model

- Once you have a well-specified model, need to worry about the standard errors.
  - Test for heteroskedasticity.
  - Test for serial correlation if there is a time component.
- Correct if necessary.

Other Problems

- Often you have to worry about endogeneity of the key explanatory variable.
- Endogeneity could arise
  - from omitted variables that are not observed in the data.
  - because the model is really part of a simultaneous equation.
  - due to measurement error.

Cont. Other Problems

- If you have panel data, you can consider a fixed effects model (or first differences).
  - Problem with FE is that you need good variation over time.
- You can instead try to find a perfect instrument and perform 2SLS.
  - Problem with IV is finding a good instrument

Interpreting Your Results

- Keep theory in mind when interpreting results.
- Be careful to keep ceteris paribus in mind.
- Keep in mind potential problems with your estimates – be cautious drawing conclusions.
- You can get an idea of the direction of bias due to omitted variables, measurement error or simultaneity.

Further Issues

- Some problems are just too hard to easily solve with available data.
- May be able to approach the problem in several ways, but something wrong with each one.
- Provide enough information for a reader to decide whether they find your results convincing or not.

Cont. Further Issues

- Don't worry if you don't "prove" your theory.
- With unexpected results, you want to be careful in thinking through potential biases.
- But, if you have carefully specified your model and feel confident you have unbiased estimates, then that's just the way things are.

19.5 Writing an Empirical Paper

1. Introduction
2. Conceptual (or Theoretical) Framework
3. Econometric models & Estimation methods
4. The data
5. Results
6. Conclusion