Recent Advances in the Field of Trade Theory and Policy Analysis Using Micro-Level Data

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Cosimo Beverelli and Nadia Rocha
(World Trade Organization)
Content

a) Basic regression in Stata (see “ols.do”)
b) Panel data regressions in Stata (see “panel.do”)
a) Basic regression in Stata

• Stata’s regress command runs a simple OLS regression
  • *Regress depvar indepvar1 indepvar2 ...., options*

• Always use the option robust to ensure that the covariance estimator can handle heteroskedasticity of unknown form

• Usually apply the cluster option and specify an appropriate level of clustering to account for correlation within groups

• Rule of thumb: apply cluster to the most aggregated level of variables in the model
  • Example: In a model with data by city, state, and country, cluster by country
b) Panel data regressions in Stata

- Fixed effects (within) estimation
- Brute force OLS
- LSDV
- Random effects
- Testing for fixed vs. random effects
Fixed effects (within) estimation

- A variety of commands are available for estimating fixed effects regressions
- The most efficient method is the fixed effects regression (within estimation), \texttt{xtreg}
- Stata’s \texttt{xtreg} command is purpose built for panel data regressions
- Use the \textit{fe} option to specify fixed effects
- Make sure to set the panel dimension before using the \texttt{xtreg} command, using \texttt{xtset}
- For example:
  - \texttt{xtset countries} sets up the panel dimension as countries
  - \texttt{xtreg depvar indepvar1 indepvar2 \ldots, fe} runs a regression with fixed effects by country
- Hint: \texttt{xtset} cannot work with string variables, so use (e.g.) \texttt{egen countries = group(country)} to convert string categories to numbers
Fixed effects (within) estimation (ct’d)

- As with regress, always specify the robust option with *xtreg*

- *xtreg, robust* will automatically correct for clustering at the level of the panel variable (firms in the previous example)

- Note that *xtreg* can only include fixed effects in one dimension. For additional dimensions, enter the dummies manually (see slide 8)
Brute force OLS

• The fixed effects can enter as dummies in a standard regression (brute force OLS)
  • `Regress depvar indepvar1 indepvar2 ... dum1 dum2 ...., options`
  • Specify `dum*` to include all dummy variables with the same stem

• Stata automatically excludes one dummy if a constant is retained in the model

• With the same clustering specification, results should be identical between `regress` with dummy variables and `xtreg, fe`
Brute force OLS (ct’d)

- To create dummy variables based on categories of another variable, use the tabulate command with the `gen()` option.

- For example:
  - `quietly tabulate country, gen(ctr_y_dum_)`
  - Will produce `ctr_y_dum_1`, `ctr_y_dum_2`, etc. automatically.
  - Then `regress depvar indepvar1 indepvar2 ... ctry_dum_*`, `robust cluster()`.

- Or you can use the `i.varname` command to creates dummies.
  - `regress depvar indepvar1 indepvar2 ... i.country`, `robust cluster()`.
LSDV

- The least-squares dummy variable (LSDV) estimator estimates the model without the within transformation and with the inclusion of $N$ individual dummy variables
  - `areg depvar indepvar1 indepvar2 ... , absorb(varname) robust cluster()`
  - where `varname` is the categorical variable to be absorbed
Random effect estimation

- By specifying the `re` option, `xtreg` can also estimate random effects models
  - `xtreg depvar indepvar1 indepvar2 ..., re vce(robust)`

- As for the fixed effects model, you need to specify `xtset` first
  - `xtset countries`
  - `xtreg depvar indepvar1 indepvar2 ..., robust re`
  - Runs a regression with random effects by country

- Fixed and random effects can be included in the same model by including dummy variables

- An alternative that can also be used for multiple dimensions of random effects is `xtmixed` (outside our scope)
Testing for fixed vs. random effects

• The fixed effects model always gives consistent estimates whether the data generating process is fixed or random effects, but random effects is more efficient in the latter case
• The random effects model only gives consistent estimates if the data generating process is random effects
• Intuitively, if random effects estimates are very close to fixed effects estimates, then using random effects is probably an appropriate simplification
• If the estimates are very different, then fixed effects should be used
• The Hausman test exploits this intuition

• To run it:
  • `xtreg ... , fe`
  • estimates store fixed
  • `xtreg ..., re`
  • estimates store random
  • `hausman fixed random`

• If the test statistic is large, reject the null hypothesis that random effects is an appropriate simplification

• Caution: the Hausman test has poor properties empirically and you can only run it on fixed and random effects estimates that do not include the robust option

• The `xtoverid` test (after `xtreg, fe`) should always be preferred to the Hausman test because it allows for cluster-robust standard errors