

## Problem Set II: Country-level & Firm-level Productivity Estimation

*This version: April.28, 2021*

**Due on May 12, 2021 at [hjchun9@snu.ac.kr](mailto:hjchun9@snu.ac.kr) with an email subject line that begins with [PS2: M2190.001400]; make sure you saved files as your name**

*In Part I of this problem set, you are asked to replicate growth accounting exercise in a similar way to Young (1995, QJE). This will help you familiarize yourself with dealing with country-level data. You are expected to run country-level OLS regressions to estimate TFP as Solow residual, and perform growth accounting as well as related calculations and data visualization.*

*In Part II of this problem set, you are asked to estimate firm-level productivity (TFP) using various methods, including OLS, Olley and Pakes, and Levinsohn and Petrin estimators. This will help you familiarize yourself with dealing with firm-level data.*

Data files for this problem set can be found on the course website. You are expected to write a do file that addresses all the following questions, which should be submitted along with an excel file (each sheet presenting relevant tables and charts). Please note that extra credits will be given to better-looking tables in professional formats.

Tips: Help in Stata or Googling will be always useful for you to find any solution while working with Stata.

### **Part I: Country-level Productivity (using “pwt91\_v2.xlsx” file)**

- TFP estimation from OLS regression:** Alternative to what we did in class, you may estimate TFP (and production function) from OLS regressions. Define labor and capital variables (real in log) as we did in class. Use “rgdpna” variable for real GDP variable. Run OLS regression of log (rgdpna) on log (labor) and log (capital). What are your coefficient estimate for log (labor) and log (capital)? Can you recover TFP as residuals?
- Growth accounting:** Calculate TFP growth over the period between 1965 and 1995. Do the same for GDP growth, labor growth, and capital growth. Use the estimated coefficients from (1). Draw a bar chart showing growth accounting for Hong Kong, Singapore, Korea, and Taiwan. Refer to the do file shown in class for relevant commands (xtset; l30.xx, graph bar etc.). How does it compare to what we did in class?
- TFP vs. Labor productivity:** Now, calculate labor productivity, and growth in labor productivity over the same period. Draw a correlation chart for all the available sample countries (not just for four Asian tiger countries).

4. According to what we discussed in class, which countries are expected to exhibit higher labor productivity growth than TFP growth? Can you draw one chart that supports/highlights this point?

## **Part II: Firm-level Productivity (using “PS2\_firm-level.dta”)**

5. **Summary stats:** Take a look around the dataset, and provide a summary statistics table with relevant information on key variables. This is Korean firm-level data in the electronics manufacturing sector.
6. **Preparing real variables:** Deflate nominal variables with corresponding deflators. Specifically, deflate revenue variable with producer price index (PPI); deflate domestic inputs with domestic input price index (effective\_PPI\_domestic); deflate imported inputs with imported input price index (effective\_IPI\_input); deflate capital and investment with capital price index (capital\_price\_index); generate real value added variable as (real revenue - real inputs); take logarithm on all the necessary variables including labor (worker\_total).
7. **TFP estimation from OLS regression:** Run OLS regression of revenue on three inputs (labor, capital, and intermediate inputs), all in log real terms. Take TFP (in log) as residuals from the OLS regression. Repeat this with value added and two inputs (labor and capital). Provide a table summarizing the regression results.
8. **TFP estimation from Olley and Pakes method:** Run Olley and Pakes method (command: opreg; you may need to install it) using revenue as the dependent variable and capital as state variable; labor and intermediate inputs as free variable; investment as proxy variable. Make sure your variables (all in log real terms) are named to be readable for this command. Take TFP (in log) using a relevant command (refer to opreg help file). Provide a table summarizing the regression results.
9. **TFP estimation from Levinsohn and Petrin method:** Run Levinsohn and Petrin method (command: levpet; you may need to install it) using value added as the dependent variable and capital as state variable; labor as free variable; intermediate inputs as proxy variable. Take TFP using a relevant command (refer to levpet help file). Provide a table summarizing the regression results.
10. **TFP comparisons across different estimators:** Provide a set of charts comparing TFP estimates from OLS regressions (both based on revenue and value added), Olley and Pakes, and Levinsohn and Petrin.
11. **TFP comparisons between exporters and non-exporters:** Take one year (2012), and compare TFP levels between exporters and non-exporters. You'll need to define exporters and non-exporters first. You may provide a table and/or chart highlighting the comparison for each estimator.

12. **TFP comparisons between importers and non-importers:** Take one year (2012), and compare TFP levels between importers and non-importers. You'll need to define importers and non-importers first. You may provide a table and/or chart highlighting the comparison for each estimator.
13. Please discuss briefly (in your excel file) what lessons you could take from this problem set.