

Advanced Macroeconomics

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PROBLEM SET 2

1. Hsieh and Klenow (2009).

Replicate the results in Hsieh and Klenow (2009) using firm-level data from a different country. Select your own country of interest but use the same parametrization as in the original paper. How do TFP gains you obtain compare to the estimates for the US, India and China? Feel free to use any firm-level dataset you have available. Alternatively, you can use data from the WB-ES and download it from:

1. World Bank Enterprise Survey (WB-ES) dataset, file called "Firm-Level-TFP-Estimates-and-Factor-Ratios-Data-and-Documentation.zip"

A sample code to replicate the results in Hsieh and Klenow (2009) is available in Moodle, together with a read-me file.

- Adapt the code accordingly and replicate the results of the paper using your data.
- Interpret the figures generated by the code.
- Notice that we have assumed the same labor share, α and the same elasticity of substitutions across products, σ for every sector. What would happen if either α or σ were different across sectors? Discuss.

References

1. Hsieh, C. T., and Klenow, P. J. 2009. Misallocation and manufacturing TFP in China and India. *The Quarterly journal of economics*. Vol.124 N.4 pp. 1403-1448

2. Restuccia and Rogerson (2008)

Consider the following two extensions to the model in Restuccia and Rogerson (2008).

2.1 - Taxes on capital and labor.

There is a large number of competitive firms that produce a homogeneous good. Each firm has a time-invariant productivity level z and produces output y using capital k and labor n according to the following production function

$$y = zk^\alpha n^\gamma \quad \alpha + \gamma < 1$$

Each firm faces capital and labor distortions, $\tau_k \in (-1, +1)$ and $\tau_n \in (-1, +1)$ respectively. Let $H(z)$ denote the cross-sectional distribution of productivity and let $P(\tau_k, \tau_n|z)$ denote the cross-sectional distribution of distortions conditional on productivity.

1. Let w and r be the wage rate and rental rate for capital. Let $\pi(z, \tau_k, \tau_n)$ denote the per-period profits of a firm with productivity z and distortions (τ_k, τ_n) . Let $k(z, \tau_k, \tau_n)$ and $n(z, \tau_k, \tau_n)$ denote the capital and labor demands (given prices). Solve for $\pi(z, \tau_k, \tau_n)$, $k(z, \tau_k, \tau_n)$ and $n(z, \tau_k, \tau_n)$.
2. Write the value function for a firm (z, τ_k, τ_n)
3. Let $\mu(z, \tau_k, \tau_n)$ denote the measure of firms of type (z, τ_k, τ_n) and let M denote the measure of entering firms in a stationary equilibrium. Provide a formula for $\mu(z, \tau_k, \tau_n)/M$ in terms of model primitives.
4. Define a recursive competitive equilibrium. Be careful with the government budget constraint.

2.2 - Heterogeneous firm exit.

Assume firms face no output distortions. Instead assume firms differ by their time-invariant productivity z and their exit probability λ . Let again $H(z)$ denote the cross-sectional distribution of productivity and let $P(\lambda|z)$ denote the cross-sectional distribution of exit probability conditional on productivity. Everything else remains the same as in the original model.

1. Write the value function for a firm (z, λ)
2. Let $\mu(z, \lambda)$ denote the measure of firms of type (z, λ) and let M denote the measure of entering firms in a stationary equilibrium. Provide a formula for $\mu(z, \lambda)/M$ in terms of model primitives.
3. Does heterogeneity in exit rates generate misallocation? Why? Discuss.

References

1. Restuccia, D., Rogerson, R. 2008. Policy distortions and aggregate productivity with heterogeneous establishments. *Review of Economic dynamics*. Vol.11 N.4 pp. 707-720.