ECON 815

Calibration

Winter 2015

Parameter Values

How do we pick our parameters for the model?

1) Inspection and sensitivity analysis

- γ
- η

We start off with the case $\gamma = \eta = 1$ – or $\gamma = 1$ and the indivisible labour model.

2) Match steady state to moments in the data

- β
- α
- δ
- θ

3) Estimate shocks

- ρ
- σ

Matching Moments

Discount Factor β:

- We match the long-run return of capital.
- For example, R long-run average annual return on stock market index (TSX)
- since we deal with quarterly data, $\beta = \frac{1}{1+R/4}$

Labour Share $1 - \alpha$:

- from the income side of the national accounts
- roughly between 50% and 67% of total income
- α falls in between 1/3 and 1/2

Depreciation δ:

- between 5% and 10%
- quarterly we have $\delta = 0.025$

Weight on labour in utility function θ:

- people spend about 20-30% of their (available) time working
- calculate steady state c and k with this assumption
- calculate θ from FOC in SS using $1 - n$

Estimating Productivity Shocks

We can normalize $\bar{z} = 1$, since we are not interested in matching the size of the economy. Thus, we are back to an AR(1) process on TFP shocks.

Step 1:

Calculate Solow Residuals

$$\log SR_t = \log Y_t - \alpha \log K_t - (1 - \alpha) \log N_t$$

Step 2:

Fit a linear trend to the Solow Residual. This captures productivity growth $\gamma^t X_0$.

Step 3:

Take out the residuals from fitting the linear trend and use them to estimate ρ and σ.

Detrending Labor Productivity

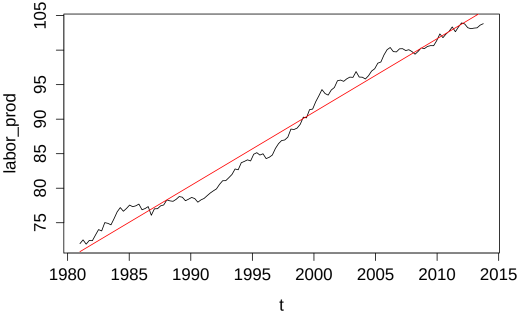

Figure : Labor Productivity – 1981:1 - 2013:3

Issue: no data off the shelf for multifactor (incl. capital) productivity

Next, we fit the residuals from the detrended series to an AR(1) process (with intercept).

We obtain

- $\rho = 0.9562$
- $\sigma = 0.004824$

For US data, people usually assume that

- $\rho_{US} \in [0.95, 0.98]$
- $\sigma_{US} \in [0.005, 0.01]$

A "heroic" assumption is that the properties of TFP shocks are constant across different economies (but not TFP levels).

Obtaining Productivity Shocks Directly

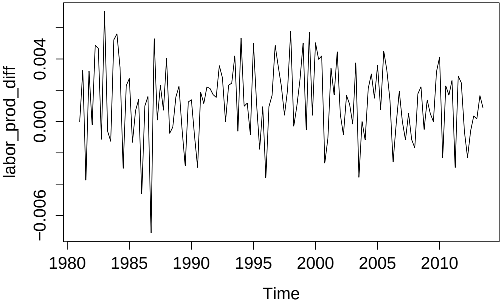

Figure : Log-differences Labor Productivity – 1981:1 - 2013:3

This yields as an estimate $\sigma = 0.00246$.

Calculating the Steady State

From the intertemporal Euler equation we have that

$$1 = \beta \left(f_k + (1 - \delta) \right)$$

which yields k/n and k/y.

Then, from the law of motion and the feasibility constraint, we obtain

$$\begin{aligned} k/y &= x/y + (1 - \delta) k/y \\ 1 &= c/y + x/y. \end{aligned}$$

Finally, we can use the labour-leisure choice to pin down θ

$$\left(\frac{\bar{c}^{-\gamma}}{\theta (1 - \bar{n})^{-\eta}} \right) = \frac{1}{w}.$$

Remark: It is good practice to recalibrate θ when changing γ or η.