Bayesian Estimation

Calibration Example

Tools for Macroeconomists: The essentials

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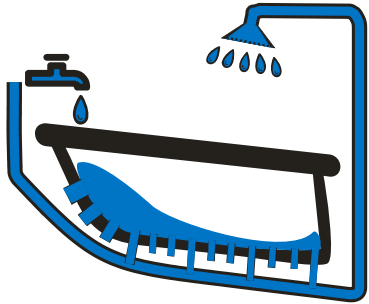
Calibration example

A state-of-the-art labor market model



Simplified search and matching model

Model for understanding worker flows on the labor market

Main idea: labor market characterized by frictions

- finding (the right) job takes time and resources
- $\rightarrow$ co-existence of unemployed (U) and vacant jobs (V)
- $\rightarrow$ not all workers (firms) find (fill) jobs
  - probability of finding a job: $f = M/U$
  - probability of filling a job: $q = M/V$
  - M are total hires: $M = mU^{\mu}V^{1-\mu}$
    - matching function summarizes labor market frictions

Two model equations

1. Unemployment dynamics
   (unemployment tomorrow = unlucky unemployed and fired workers)

$$U_{t+1} = (1 - f_t)U_t + s(1 - U_t)$$

   - labor force normalized to 1
   - s is separation rate (constant for now)

2. Optimal recruitment by firms
   (costs = expected benefits benefits)

$$\kappa = q_t \beta \mathbb{E} J_{t+1}$$

   - J_t is value of a job for the firm

Value of a job for the firm

What's in it for the firm to hire a worker?

$$J_t = y_t - w_t + \beta(1 - s)\mathbb{E}J_{t+1}$$

- y output per worker (exogenous process)
- w wage paid to worker
  - assume wages are a constant share (α) of output

Putting everything together

The model boils down to 2 equations for 2 model variables

$$U_{t+1} = (1 - mU_t^{\mu-1}V_t^{1-\mu})U_t + s(1 - U_t)$$

$$\frac{\kappa}{mU_t^{\mu}V_t^{-\mu}} = \mathbb{E}\beta\left(y_{t+1}(1-\alpha) + (1-s)\frac{\kappa}{mU_{t+1}^{\mu}V_{t+1}^{-\mu}}\right)$$

We need to pick values for the 6 parameters:

- m, μ, s, κ, β, α

Calibrating our model

"Easy" choices:

- β: time preference parameter (frequency of model)
- s: separation rate (observed in the data)

"Harder" choices:

- μ: elasticity of matching function (estimated from data)
- m: matching function level (normalization)

"Hard" choices:

- α: could interpret it as labor share in income (data?)
- κ: could interpret it as (in-)direct hiring costs (data?)

Possible issues with above calibration

Obvious concerns:

- α not really labor share (model has no capital)
- κ literally a per-period resource cost of an open vacancy

Less obvious issues:

- even if we're happy with all our targets
- the calibration may be inconsistent (FOC's may not hold)
- or implied steady state values don't make sense
- way out?
  - use steady state values of variables as targets
  - back out implied parameter values

Calibration example

Taking Stock

Calibration example

- instead of directly setting parameter values
- it is often useful to set steady states of certain variables
- and then back out the implied parameter value that achieves such a steady state
- note that this may not always be possible for some combinations of parameters


That's all Folks!