Graduate Trade (II): ECON 8433

Sergey Nigai
University of Colorado Boulder
Fall Semester 2020

Plan

Week	Topic
Week 1	Introduction to Structural Gravity Equation
Week 2	Calibration and Estimation
Week 3	Mapping Models to the Data
Week 4	Designing Counterfactual Experiments in General Equilibrium
Week 5	Presentations (I) and Catch-up
Week 6	Heterogeneous Firms (I)
Week 7	Heterogeneous Firms (II)
Week 8	Ricardian Models
Week 9	Multi-Sector Models
Week 10	Global Value Chains
Week 11	Presentations (II) and Catch-up
Week 12	Extensions: Demand Side
Week 13	Extensions: Supply Side
Week 14	Extensions: Migration and Geography
Week 15	Presentations (III) and Catch-up

Plan

Week	Topic
Week 1	Introduction to Structural Gravity Equation
Week 2	Calibration and Estimation
Week 3	Mapping Models to the Data
Week 4	Designing Counterfactual Experiments in General Equilibrium
Week 5	Presentations (I) and Catch-up
Week 6	Heterogeneous Firms (I)
Week 7	Heterogeneous Firms (II)
Week 8	Ricardian Models
Week 9	Multi-Sector Models
Week 10	Global Value Chains
Week 11	Presentations (II) and Catch-up
Week 12	Extensions: Demand Side
Week 13	Extensions: Supply Side
Week 14	Extensions: Migration and Geography
Week 15	Presentations (III) and Catch-up

Presentation Sign-up

- Presentations are on Nov. 2 and Nov 4
- Sign-up here: https://docs.google.com/spreadsheets/d/1OdA0T0SM5-jAULrxz5e3ttZpK7nB8zdpAoBj4IMjLK0/edit?usp=sharing

Calibration of Multi-sector Models

- In general, it would be challenging to estimate all primitives of a multi-country, multi-industry model of trade
- Instead, it has become a convention to use the hat algebra approach. Recall the following identity for an arbitrary variable a:

$$\widehat{a} = \frac{a'}{a},$$

  where a' is a counterfactual value of a
- We will rewrite the model in *hat* terms

Calibration

$$\widehat{c}_i^j = \widehat{w}_i^{\gamma_i^j} \prod_k (\widehat{P}_i^k)^{\eta_i^{k,j}} \tag{1}$$

$$\widehat{P}_i^j = \left(\sum_n \pi_{ni} (\widehat{c}_n^j \widehat{\tau}_{ni}^j)^{-\theta^j} \right)^{-\frac{1}{\theta^j}} \tag{2}$$

$$\pi_{in}^{j'} = \pi_{in}^j \left(\frac{\widehat{c}_i^j \widehat{\tau}_{in}^j}{\widehat{P}_n^j} \right)^{-\theta^j} \tag{3}$$

$$Y_i^{j'} = \sum_k \eta_i^{j,k} \sum_n \pi_{in}^{k'} Y_n^{k'} + \alpha_i^j I_i' \tag{4}$$

$$I_i' = (L_i w_i) \widehat{w}_i + D_i \tag{5}$$

$$D_i = \sum_j \sum_n \pi_{ni}^{j'} Y_i^{j'} - \sum_j \sum_n \pi_{in}^{j'} Y_n^{j'} \tag{6}$$

Calibration

We need to calibrate benchmark values of the following parameters:

- Value added share: γ_i^j
- Input-output shares: $\eta_i^{k,j}$
- Benchmark trade shares: π_{in}^j
- Consumption shares: α_i^j
- Value added: $(L_i w_i)$
- Deficits: D_i
- Trade elasticity: θ^j (from the literature)

Calibration

- Let us consider at least 2 sectors, e.g., manufacturing and services. You may choose to consider more.
- Use WIOD data on sectoral trade flows for 2005 (CANVAS)
- Combine WIOD with Socio-Economic Accounts for 2005 (CANVAS)
- Calibrate the relevant parameters
- Export all parameters to MATLAB

Multi-sector models

- Let us consider at least 2-sectors: Manufacturing and Services
- Use WIOD data on sectoral trade flows for 2005
- Combine WIOD with Socio-Economic Accounts for 2005
- Calibrate the relevant parameters

With the relevant parameters in hand:

- Solve the model with two sectors (keep your codes general enough to extend it to J-sector case)
- Use the model to quantify how nominal and real wages would have to adjust to eliminate trade imbalances? How do you interpret these results?