Graduate Trade (II): ECON 8433

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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

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Last Reminder: Don't forget FCQ's

Extensions: Economic Geography, Migration & Spatial Economics

Extensions: Migration & Trade

So far, we have assumed that

- Factors of production are immobile across countries
- Factors of production are freely mobile within countries

We will relax one (or both) of these assumptions in a simple Armington framework, where the trade side is well familiar to you!

International Trade

Assume that workers have modified CES preferences. Relative to the usual case, workers derive utility from consuming the CES aggregate and from amenity level u_i in that location:

$$U_j = \log\left\{\left(\sum_i q_{ij}^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}} \times u_i\right\} + \epsilon,$$

where ϵ is and unobserved, stochastic shock. Workers residing in location j earn wage such that their budget constraint is:

$$\sum_i p_{ij} q_{ij} = w_j,$$

where the price p_{ij} is the same as in the Armington model:

$$p_{ij} = \frac{w_i}{A_i}\tau_{ij}$$

International Trade

The trade flows are exactly the same as in the Armington model:

$$X_{ij} = \left(\frac{w_i}{A_i}\right)^{1-\sigma} \tau_{ij}^{1-\sigma} P_j^{\sigma-1} w_j L_j.$$

The only exception here is that L_j is not fixed and depends on how attractive location j is for workers.

The CES price index is as before:

$$P_j^{1-\sigma} = \sum_i \tau_{ij}^{1-\sigma} \left(\frac{w_i}{A_i}\right)^{1-\sigma}$$

In terms of closing the model, we still need the trade balance condition to determine wage rate w_i:

$$L_i w_i = \sum_j X_{ij}$$

International Migration

Assume that there is an initial distribution of workers across locations. The initial stock of labor force is L_i^0. Workers' initial indirect utility can be specified as:

$$V_i = \log\left\{\frac{w_i}{P_i}u_i\right\} + \epsilon = \log d_i + \epsilon,$$

where u_i is assumed to depend on the size of local population:

$$u_i = \bar{u}_i L_i^{-\beta},$$

where $\beta \geq 0$. What does it imply?

International Migration

Workers from location i can choose to migrate to location j subject to migration cost, μ_{ij} that is log-additive. They choose to migrate when the following holds:

$$\log d_j + \epsilon_{ij} - \log(\mu_{ij}) > \log d_i$$

If we assume that ϵ_{ij} follows Gumbel (another extreme value distribution), the share of workers that migration from i to j can be specified as:

$$m_{ij} = \frac{d_j/\mu_{ij}}{\sum_k d_k/\mu_{ik}}$$

International Migration

Substituting all expressions in m_{ij} and multiplying by the initial population stock in i allows us to recover total migration flow from i to j:

$$M_{ij} = \frac{\frac{w_j \bar{u}_j}{\mu_{ij} P_j L_j^{\beta}}}{\sum_k \frac{w_k \bar{u}_k}{\mu_{ik} P_k L_k^{\beta}}} L_i^0 .$$

This allows us to calculate total population in location j:

$$L_j = \sum_i M_{ij}$$

Closing the model

Given primitives $\{\sigma, \tau_{ij}, \mu_{ij}, A_i, \bar{u}_i, \beta, L_i^0\}$ the following equations must hold:

$$X_{ij} = \left(\frac{w_i}{A_i}\right)^{1-\sigma} \tau_{ij}^{1-\sigma} P_j^{\sigma-1} w_j L_j \quad (1)$$

$$P_i = \left(\sum_i \tau_{ij}^{1-\sigma} \left(\frac{w_i}{A_i}\right)^{1-\sigma}\right)^{\frac{1}{1-\sigma}} \quad (2)$$

$$M_{ij} = \left(\frac{w_j \bar{u}_j}{\mu_{ij} P_j L_j^{\beta}} / \sum_k \frac{w_k \bar{u}_k}{\mu_{ik} P_k L_k^{\beta}}\right) L_i^0 \quad (3)$$

$$L_j = \sum_i M_{ij} \quad (4)$$

$$w_i = \sum_j X_{ij} / L_i \quad (5)$$

Counterfactual analysis

- Download data "armington migration data.mat" from D2L
- Use the primitives to solve the model

Use the model to answer the following questions:

- Some economists argue that migration stimulates trade. Use the model to test this claim quantitatively.
- Some economists argue that migrants reduce information frictions between countries which affects both exports and imports. How would you incorporate this insight into the model?