Measuring regional and global integration

Foundations of structural gravity

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Module 2 — Part 6

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Market structures for Armington-Anderson-type gravity

Market structures

1. Perfect competition
2. Endowment economy
3. Monopolistic competition

Case 3 - Monopolistic competition

- Suppose each country produces its differentiated variety at constant marginal cost c_i
- ... but chooses allocation in order to maximize profit, given CES demand
- Optimization problem is now

$$\max_{\{q_{ij}\}_{j\in S}} \sum_{j\in S} p_{ij}q_{ij} - c_i\tau_{ij}q_{ij} \quad \text{s.t.} \quad q_{ij} = a_{ij}p_{ij}^{-\sigma}Y_jP_j^{\sigma-1}$$

- Plugging in constraint into maximand yields

$$\max_{\{q_{ij}\}_{j\in S}} \sum_{j\in S} a_{ij} p_{ij}^{1-\sigma} Y_j P_j^{\sigma-1} - c_i \tau_{ij} a_{ij} p_{ij}^{-\sigma} Y_j P_j^{\sigma-1} \tag{1}$$

- FOC are

$$\begin{aligned} (1-\sigma) a_{ij} p_{ij}^{-\sigma} Y_j P_j^{\sigma-1} &= -\sigma c_i \tau_{ij} a_{ij} p_{ij}^{-\sigma-1} Y_j P_j^{\sigma-1} \\ \Leftrightarrow p_{ij} &= \frac{\sigma}{\sigma-1} c_i \tau_{ij} \end{aligned}$$

Case 3 - Monopolistic competition

$$\Leftrightarrow p_{ij} = \frac{\sigma}{\sigma - 1} c_i \tau_{ij}$$

- country charges *constant* markup over marginal costs

  $\rightarrow$ if elasticity of substitution increases, markup decreases

- Substituting back into demand

$$X_{ij} = \left(\frac{\sigma}{\sigma - 1} \right)^{1-\sigma} c_i^{1-\sigma} \frac{Y_j}{P_j^{1-\sigma}} a_{ij} \tau_{ij}^{1-\sigma} \tag{2}$$

Armington-Anderson-type gravity

- Perfect competition

$$X_{ij} = \left(\frac{w_i}{A_i}\right)^{1-\sigma} \times \frac{Y_j}{P_j^{1-\sigma}} \times a_{ij}\tau_{ij}^{1-\sigma}$$

- Endowment economy

$$X_{ij} = \frac{Y_i}{\Pi_i^{1-\sigma}} \times \frac{Y_j}{P_j^{1-\sigma}} \times a_{ij}\tau_{ij}^{1-\sigma} \quad \text{with} \quad \Pi_i = \left(\sum_j \tau_{ij}^{1-\sigma} a_{ij} Y_j P_j^{\sigma-1}\right)^{\frac{1}{1-\sigma}}$$

- Monopolistic competition

$$X_{ij} = \left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} \times c_i^{1-\sigma} \times \frac{Y_j}{P_j^{1-\sigma}} \times a_{ij}\tau_{ij}^{1-\sigma}$$

Armington-Anderson-type gravity

- Powerful yet very simple model (hopefully!)
- Caveat: ad-hoc assumptions

$\rightarrow$ CES demand

$\rightarrow$ Countries produce a distinct variety