Scale Economies, Product Differentiation, and the Pattern of Trade

Dayou Xi

Fudan University

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Outline

Introduction

Research Question

- the causes of trade between economies with similar factor endowments
- the role of a large domestic market in encouraging exports

Motivation

A new framework for analyzing trade is needed

- extensive trade among the industrial countries
- two-way exchanges of differentiated products

The Basic Model

Key assumption

- economies of scale in production
- firms can costlessly differentiate their products

Result: Chamberlinian monopolistic competition

- each firm has some monopoly power
- entry drives monopoly profits to zero

Simplification

- Identical tastes, technology, and factor endowments.
- no strategic interdependence among firms

The Basic Model: Details

same utility function: $U = \sum_i c_i^{\Theta}$
same cost function: $l_i = \alpha + \beta x_i$
consumption under symmetric condition: $x_i = Lc_i$
full employment: $\sum_{i=1}^{n} (\alpha + \beta x_i)$

The Basic Model: Equilibrium

Key idea: Necessary condition

1. **demand function**
   $\theta c_i^{\Theta-1} = \lambda p_i$
   $p_i = \Theta\lambda^{-1}(\frac{x_i}{L})^{\Theta-1}$
2. **profit-maximizing price**
   $p = \frac{w\beta}{1+\frac{1}{\epsilon}}$, $\epsilon = \frac{1}{1-\Theta}$
   $p = p_i = \Theta^{-1}\beta w \qquad (symmetric\ condition)$
3. **output & firm number**
   $\pi_i = px_i - \{\alpha + \beta x_i\}w$
   $x_i = \frac{\alpha}{\frac{p}{w}-\beta} = \frac{\alpha\Theta}{\beta(1-\Theta)}$
   $n = \frac{L}{\alpha+\beta x_i} = \frac{L(1-\Theta)}{\alpha}$

The symmetry of the situation

- $\overline{\epsilon} \rightarrow \overline{\frac{w}{p}} \xrightarrow{\text{zero profit}} \overline{xi} \xrightarrow{\text{if } p \neq p^*}$ consumption contradiction
- $n = L\frac{1-\Theta}{\alpha}; \qquad n^* = L^*\frac{1-\Theta}{\alpha}$

Welfare Gains

- $\overline{X_i}$
- $N \leftarrow n + n^* \; = \frac{(L+L^*)(1-\Theta)}{\alpha}$

key assumption

- iceberg type transportation cost: a fraction *1-g* lost in transit

Demand side - ratio analysis

- $F.O.C:\ \theta c_i^{\theta-1} = \lambda p_i$
- $terminal\ ratio:\ (pg/p^*)^{1/(1-\theta)}$
- $original\ ratio:\ \sigma = (p/p^*)^{1/(1-\theta)} g^{\theta/(1-\theta)}$
- $corresponding\ ratio:\ \sigma^* = (p/p^*)^{1/(1-\theta)} g^{\theta/(1-\theta)}$

Supply side - ratio analysis

- unified elasticity $\epsilon = 1/(1-\theta)$
- $p = \Theta^{-1}\beta w; p^* = \Theta^{-1}\beta w^*$
- $n = L\frac{1-\Theta}{\alpha}; n^* = L^*\frac{1-\Theta}{\alpha}$

Extension1: Transport Costs - Equilibrium

Relative wage rate $w/w^* = p/p^* = \omega$

balance of payments condition

- Net export $B = \frac{\sigma^* n}{n^* + \sigma^* n}\omega L^* - \frac{\sigma n^*}{n\omega + \sigma n^*}\omega L$
- Use monotonicity and set $\omega = 1$:B$(\omega = 1) = LL^*[\frac{1}{\sigma L + L^*} - \frac{1}{L + \sigma L^*}]$
- if $L > L^*, \omega$ must be greater than 1 to balance!

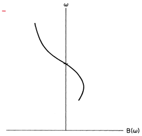


Figure 1

insights

- gain from economies of scale: better terms of trade $w/w^* = p/p^*$
- produce near the larger market
- trade off between wage and market

A simple formal justification

- two classes of products: $\alpha\ and\ \beta$
- isolated preference $U = \sum_i c_i^\theta; \widetilde{U} = \sum_i \tilde{c}_i^\theta$
- identical cost $l_i = \alpha + \beta x_i; \tilde{l}_j = \alpha + \beta x_j$
- Outcome: identical wages, prices and outputs between two industries $npx = wL; \tilde{n}\tilde{p}\tilde{x} = \tilde{w}\tilde{L}$

The foreign country: a mirror image

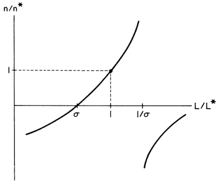
- $L + \tilde{L} = L^* + \tilde{L}^* = \overline{L}$
- symmetric preference: $L = f\overline{L}; L^* = (1-f)\overline{L}$
- $f > 0.5$:home country has the larger domestic market for α
- ratio of demand: $\sigma = \sigma^* = g^{\theta/(1-\theta)} < 1$

Home Market Effect - preference and trade pattern

expenditure on α industry goods

- $npx = \frac{n}{n+\sigma n^*} wL + \frac{\sigma n}{\sigma n+n^*} wL^*$
- $n^*px = \frac{\sigma n^*}{n+\sigma n^*} wL + \frac{n^*}{\sigma n+n^*} wL^*$

rearrangement result: $n/n^* = \frac{L/L^* - \sigma}{1 - \sigma L/L^*}$



Specialization condition: $\mathsf{L}/\mathsf{L}^* \notin [\sigma, 1/\sigma]$
Otherwise incomplete specialization /two-way trade occurs!
Trade balance and home market effect: $B_\alpha = \frac{\sigma w L^*}{\sigma n + n^*}[n - n^*]$