GEOGRAPHICAL ECONOMICS B

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ELTE Faculty of Social Sciences, Department of Economics

Geographical Economics "B"

week 6

MONOPOLISTIC COMPETITION AND THE DIXIT-STIGLITZ MODEL

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Outline

1. Monopolistic competition: Introduction
2. Dixit-Stiglitz model: demand side
3. Monopolistic competition II - Supply
   - Production structure
   - Price setting and profit

NEG market structure

The nuts and bolts of Geographical Economics

- Market structure - monopolistic competition (mixing the elements of perfect competition and monopoly)
- Dixit, A - J. Stiglitz 1977 "Monopolistic competition, and the optimum product diversity," AER (top 20)
- Necessary to understand the (later) core model

Topics for today

- Basics: theory and reality
- Model: demand
- Model: supply

Industrial Organization

Market structure - hing on the market power of the firms

- Perfect competition
- Oligopoly (Bertrand / Cournot)
- Monopoly
- Monopolistic competition (mixing the elements of perfect competition and monopoly)
  - Firms determine the prices of their products in part as a monopoly,
  - but the competition is close to the perfectly competitive model
  - There may arise economic profit (disappear when there are plenty of firms)

Product varieties

- (Product) differentiation – each firm produces a variety which is different in some aspects from the products of the other firms
  - Product varieties are near but imperfect substitutes varieties
  - Price-elastic demand: when price goes up, the quantity demanded decreases
- Love-of-variety
- Rational for competition – difference, quality
- = design, reliability, services, marketing, etc.
- Differentiating products decrease the price elasticity

Product differentiation

The features of product differentiation

- Material difference
- Convenience
- Feeling
- Reputation
- Vanity, snobbery
- Fear and desire
- Private services
- The place and circumstances of shopping

Competition

Monopolistic competition in reality

- A lot but not too much competitors
- Innovation – differentiating products
- Low concentration level
- Concentration is measurable
  - Market share of the first three or four largest companies
  - Hirschmann-Herfindahl index (0-100)
  - : HHI: $\sum_{i=1}^{n} sh^2/100$
  - USA: lower than 10 = competitive market; higher than 18 = enquiry of the Competition Authority
- Distinguishable
  - Almost competitive market
  - Oligopoly
  - Monopolist with Competitive Fringe

Demand side: Introduction

BGM Chapter 3.4

- The economy has two good sectors: agriculture (F) (producing food) and manufacturing industry (M) (producing manufacturing varieties)
- Firms produce plenty of varieties (N) in the manufacturing industry
- Consumers have Cobb-Douglas utility function

$$U = F^{1-\delta} M^{\delta}, \qquad 0 < \delta < 1 \tag{1}$$

- Let the price of food be equal to one, that is all other products are expressed relative to this (numèraire).
- Let the price index of manufactures be I (it will be defined later)
- The income of the consumers: Y; the budget constraint:

$$F + IM = Y \tag{2}$$

Demand side: Budget constraint

- Optimal spending on food and manufactures?
  $U = F^{1-\delta} M^{\delta}$, $F + IM = Y$
- $L = F^{1-\delta} M^{\delta} + \kappa(Y - (F + IM))$
- First-order Conditions (FOC): $\partial L/\partial F, \partial L/\partial M$
  $(1-\delta)F^{-\delta} M^{\delta} = \kappa$ and $\delta F^{1-\delta} M^{\delta-1} = \kappa I$
- Taking the ratio of the two first-order conditions: $IM = \frac{\delta}{1-\delta} F$
- Substituting this in budget constraint:
  $Y = F + IM = F + \frac{\delta}{1-\delta} F$
  thus $F = (1-\delta)Y$ and $IM = \delta Y$
- Consumers spend a fraction, δ, of income on manufactures and a fraction, $1-\delta$, of income on food

Demand side: Utility

Dixit, A - J. Stiglitz 1977 "Monopolistic competition, and the optimum product diversity", AER (top 20),

- Varieties are symmetrical in terms of consumer preferences and to a certain extent they are substitutes.
- The only arguments of the utility function are the consumption of the N varieties:
- Love-of-variety: ρ
- If $\rho \simeq 1$, the varieties are perfect substitutes and only the total amount of consumption matters.
- If ρ decreases, the utility, arising from the ability of consuming more varieties, will increase.
- A (positive) externality is derived from diverseness.

Demand side

Manufacturing market, budget constraint, share of income spending on manufactures δY, p_i = the price of variety i

$$\sum_{i=1}^{N} p_i c_i = \delta Y \tag{3}$$

- Optimally allocate spending *among* the different varieties of manufactures
- Provided that $\epsilon := 1/(1-\rho)$ the optimal quantity of variety i is determined by the demand function:
- $c_i = p_i^{-\epsilon} I^{\epsilon-1} \delta Y$

Demand effects:

- The demand for variety i is given by: $c_i = p_i^{-\epsilon} I^{\epsilon-1} \delta Y$, which appears to be influenced by:
- (1) the income δY spent on manufactures (proportional), (2) the price p_i of good i, (3) some parameter ϵ, (4) the price index I
- What is the connection between the quantity demanded and the price?
- We know, that $I^{\epsilon-1} \delta Y = const$
- As a result of optimization: constant elasticity of substitution (CES) – $(-\partial c_i / \partial p_i)(p_1 / c_1) = \epsilon$

Demand function and ϵ – Figure 1

The higher the ϵ, the more rapidly falls the demand for a variety as a result of a small price increase

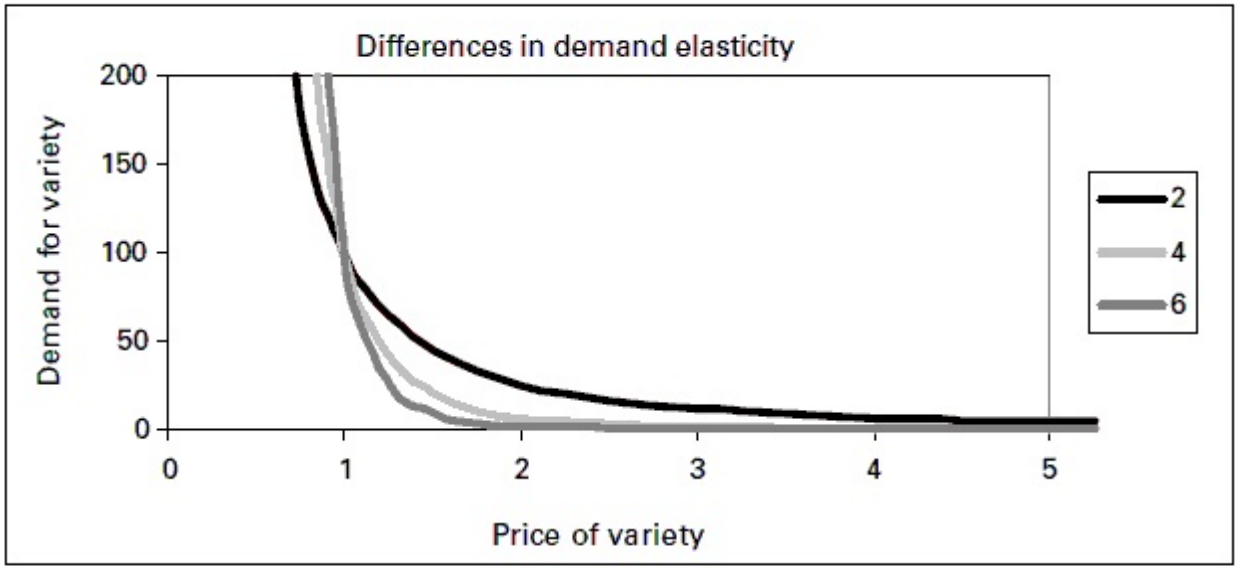

Figure 3.2 Dependence of demand for a variety of manufactures on price and ε
Note: Demand given by $c_1 = 100\ p_1^{-\varepsilon}$; the value of ε varies (2, 4, and 6).

Price index

- $c_i = p_i^{-\epsilon} I^{\epsilon-1} \delta Y = \left(\frac{p_i}{I}\right)^{-\epsilon} \frac{\delta Y}{I}$
  - The demand for a given variety depends on the average price level, that is on the average of the prices of the other varieties = substitutes
  - In other words, the quantity demanded hinges on the relative price and the relative income.
  - Price index I – utility derived from the consumption of manufactures (one unit of consumption bundle) = consumption-based price index
  - I, i.e. the utility depends positively on the number of varieties:

Key terms

- Monopolistic competition
- Marginal rate of substitution between products
- CES utility
- Love-of-variety

Basics

- **BGM Chapter 3.5**
- **Supply side**: two sectors
- Total labor force: L
- Manufacturing industry: γL, Food sector: $(1-\gamma)L$ s.t. $0 < \gamma < 1$
- **Agriculture**: constant return to scale , competitive market
- The price of food equals one, and all other varieties are expressed in this product.
- Production function: $F = (1-\gamma)L$
- as $p_F = 1$ and $MPL = 1 \Rightarrow w_F = 1$

Industry

- **Industry**: increasing return to scale, imperfect competition
- **Manufactures** are *symmetrical*:
  - Each variety has the same technology
  - Different varieties are produced by different firms (the firm with the largest sales can always outbid a potential competitor)
- Economies of scale (l_i is the amount of labor necessary to produce x_i of variety i)

$$l_i = \alpha + \beta x_i \tag{4}$$

- FC: α and MC: β
- = Increasing internal economies of scale

Industry: products

- Each variety is produced by a single firm - monopolist behavior
- But: each firm takes the price-setting behavior of other firms as given
- Thus there is no strategic behavior: if firm i increases its price, it does not assume that the other firms react.
- The firm also ignores the effect of changing its own price on the price index I of manufactures
- Symmetrical firms that produce x unit of output, using l unit of labor and paying wage rate W will earn profits π:

$$\pi = px - Wl = px - W(\alpha + \beta x) \tag{5}$$

- Recall that the demand for x: $x = p^{-\epsilon} con$ where $con = I^{-\epsilon} \delta Y$
- Then $\pi = p^{1-\epsilon} con - W(\alpha + \beta p^{-\epsilon} con)$
- The price is determined by profit maximization:

$$p = \beta W / (1 - 1/\epsilon) = \beta W / \rho \tag{6}$$

Price setting

$$p = \beta W / (1 - 1/\epsilon) = \beta W / \rho \qquad (7)$$

- Constant margin (price – marginal cost = mark-up), as βW denotes the marginal cost
- If $\epsilon = 5$ the mark-up is 20%
- Why the mark-up is 'necessary'?
- In order to recuperate the fixed costs of labor
- Constant $\epsilon \rightarrow$ constant mark-up (does not depend on the quantity produced)

Profit and the equilibrium output

- Suppose, that the profits are positive (economic profit). Then it is worth setting up a firm and beginning to produce a new variety.
- Consumers: if $N \uparrow$ then $x_i \downarrow$ and $\pi_i \downarrow$ – i.e. if N is large enough, $\pi_i = 0$
- Using this and the formula of profit-maximizing price, the optimal level of output per firm:

$$x = \frac{\alpha(\epsilon - 1)}{\beta} \tag{8}$$

- The output per firm is fixed in equilibrium - it depends only on exogenous parameters
- Size of the economy = number of varieties (as x_i is fixed)
- Economies of scale, AC/MC(I), is now $\frac{\epsilon}{\epsilon - 1}$
- For a high value of ϵ (similar products, substitutes) this measure of scale economies is low.