GEOGRAPHICAL ECONOMICS "B"

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GEOGRAPHICAL ECONOMICS "B"

week 2

Geography and economics – basic models

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1 Foundations of Geographical Economics

Topics for today

- Geography and transport costs – old and new economic geography
- Topics for today: *9 remarks on economic geography*
- More: Von Thünen (1826) model
- BGM Chapter 2 + some additional readings

1.1 Old and New Economic Geography

'First' and 'second nature' geography

- First (nature) and second (human beings' actions) nature
- First nature geography – hills, valleys, rivers
  - Uneven distribution
  - Different climates
  - Different degrees of accessibility
  - Different endowments of factors of production
  - Uneven distribution of economic activities in the early stages of history (until the Industrial Revolution)
- Second nature geography – cities and roads
  - The outcome of human beings' actions
  - Economic history: the importance of finding safe and cheap ways to ship around raw materials
- Second nature is the research focus of Geographical Economics, first nature is treated as a control variable

Old Economic Geography

- Von Thünen's (1826) land use and rent;
- Central Place Theory – Christaller (1933) / Lösch (1940);
- Theory of Regional Development – Isard (1956);
- Theory of the system of cities (urban economics) – Henderson (1974).

Questions

- Focus on transport costs
- Key question: spatial distribution of production activities – why this is so
- Location problem of a given firm
- How are firms' locational decisions intertwined (e.g. industry, city)

1.2 Important remarks

Literature

- Gianmarco I P Ottaviano & Jacques-Francois Thisse, 2005. "New economic geography: what about the N?," Environment and Planning A, Pion Ltd, London, vol. 37(10), pages 1707-1725, October.
- Anthony J. Venables (2005): New Economic Geography, Palgrave Dictionary of Economics

1. 'Minisum' location problem

- Fermat, early in the 17th century
- Weber (1909): locating a plant in the Euclidean plane by minimizing the weighted sum of distances from the actors
  - Input = seller
  - Output = buyer
  - Weight = quantity * transport cost
- Simpler model: network with nodes and connections
  - Graph theory: any market is a vertex of the network and the possible connections between them are the edges
  - Positive weight (market, consumers, etc.) = attractive (agglomeration) forces
  - Negative weight (congestion) = repulsive (dispersion) forces
  - Any vertex which is not a market is a node

1. 'Minisum' location problem

- Graph/Network (cont)
  - There always exists an optimal solution to the location problem
  - If the possible locations are restricted to a finite set of points, the solution will have a discontinuous nature.
  - Optimal decision depends on the shape of the network.
- If there exists a 'dominant market' (a point such that its weight is not lower than the sum of the weights of all the other points), then such point is the solution.
  1. Several firms have the same solution - metropolitan area
  2. Some stability (inertia)
- Broader question: where and how much plants?
  - Sakashita (1967), microeconomic approach. In case of transport costs the firm always chooses to set up at one of the two endpoints, that is either close to the factors of production or nearby the market.

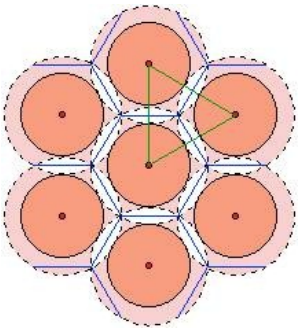
Remark #1: Firms' locational behavior is either sluggish or catastrophic.

A small digression: planning spaces

- Christaller (1933) and Lösch (1940)
- **Assumptions**
  1. Homogeneous plane: (flat land, evenly distributed population and resources)
  2. Identical transport possibilities in every direction
  3. Transport costs are (directly) proportional to the distance
  4. Profit / utility maximization
  5. No specialization
- **Localization**
  - The market is big enough to be worth producing goods
  - However, consumers do not want to travel too much
  - e.g. hair-dresser

Christaller model

- The most effective way of provision: a central place (the city) surrounded by six equidistant smaller cities, which together form a hexagon

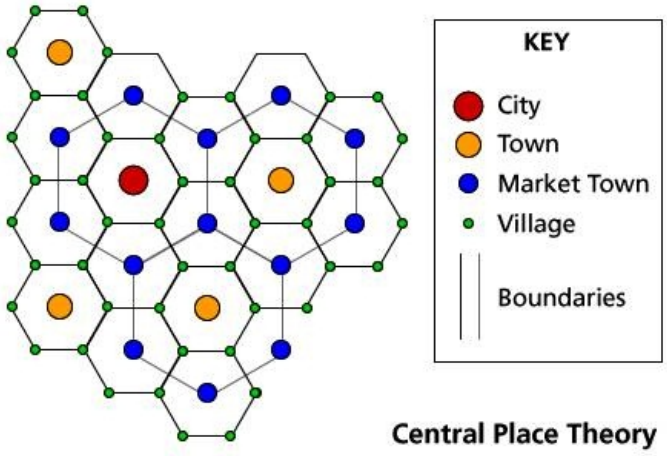


A small digression: planning spaces

- National planning considerations
- Hierarchy of cities
- The economy can support a big city and many small locations.
  - Village – hair-dresser
  - City – hair-dresser and car broker
- Criticism: without micro-foundations
- Example: central place theory in a Dutch polder (in the book (2.2.2)) - one large city + a lot of small cities
- Reality is similar to the projections

Christaller model 2

- Central Place Theory - an example



2. Increasing returns and transport costs

- Increasing return to scale (IRS)
- Non-divisible goods (people, house, machine, plant, etc.)
- But: Transport costs
- Delta/Mesopotamia, 20 miles between the villages

Remark #2: Proximity vs scale – Firm location weighs transport cost savings from proximity to customers and suppliers against production cost savings from large scale plants.

1.3 Perfect competition vs transport costs

3. Perfect competition vs transport costs

- The location of an industry
- There is no monopoly, lots of actors, similar preferences...
- **Starrett (1978) model**
- Two cities A and B,
  - Technologies and preferences are the same
  - Transport costs
- Production: one firm (y output), one consumer (x labour)
  - Consumption: consumer (y and one unit of land), firm (x and one unit of land)
  - Price: p_A, wage: w_A, rent: R_A
  - Land rents go to the consumer
- Competitive market - price-taker actors (they do not take into account the change of prices - the results of their migration)

3. Perfect competition vs transport costs
Model - Introduction

- Case1: $A >= 2$ (agglomeration)
  - Firm and consumer are in A, B is empty
  - $R_A > 0$, $R_B = 0$
  - When R_A is not too high relative to transport costs, this configuration is a perfectly competitive equilibrium
- Case2: $A < 2$ (dispersion)
  - e.g. firm in A, consumer in B
  - $R_A > 0$, $R_B > 0$
  - This configuration (with some positive transportation cost between locations A and B) is not a perfectly competitive equilibrium, that is either the firm (increasing its profits) or the consumer (decreasing her net expenditure) has an incentive to move.

3. Perfect competition vs transport costs – Result
Result

- A competitive equilibrium, when it exists, must be such that both agents co-locate, which is the case of agglomeration.

Remark #3: Spatial Impossibility Theorem – Assume an economy with a finite number of locations and a finite number of consumers and firms.If space is homogeneous, transport is costly and preferences are locally nonsatiated, then there is no competitive equilibrium involving transportation.

3. Perfect competition vs transport costs – Consequences
Consequences

- If economic activities are perfectly divisible, each activity can operate as an autarchy = competitive equilibrium
- However, once economic activities are not perfectly divisible, or there is increasing return to scale, they have an address and the transport costs do appear.
- Therefore, the simple assumptions and the pure competitive model are not enough…
- *Three important alterative approach:*
  1. Local externalities (Marshall)
  2. Heterogeneity of space (von Thünen) + international trade (Heckscher-Ohlin)
  3. Imperfectly competitive markets (Krugman)

1.4 Solutions to the Starret problem

4. Marshall – Externalities

- Marshall 1890, 1920
- Second nature is explained by mutually reinforcing external effects
  1. IRS at the firm level
  2. Specialized labor force, new ideas, human capital
  3. Specialized services
  4. Infrastructure
- Hoover (1936)
  1. Localization economies: external to firms but internal to an industry (2), (3)
  2. Urbanization economies: external to industries (2) ,(3), (4)
- Literature: Rosenthal and Strange (2004) *in* Handbook

4. Marshall – Externalities

- Demand
- What are cities good for? – Ed Gleaser
  - http://www.thedailyshow.com/watch/mon-february-14-2011/edward-glaeser
- Love of variety (Spence)
- Provision of services

Remark #4: Under perfect competition, industry location can be explained in terms of localized production or consumption externalities.

5. The role of marketplace

- Firms and consumers meet at a centrally located marketplace
- This breaks the homogeneity of space
- Exogenous center = anchor

1.5 Von Thünen model

5. The role of marketplace

- **Von Thünen (1826) model**
- Assumptions
  - Simple, homogenous space
  - One city, marketplace – trading
  - Surrounding area – agricultural activities
  - Transport costs
- Production
  - Various products
  - Different prices and transport costs

5. The role of marketplace

- Equilibrium
  - Every farmer wants to settle down near the city to reach lower transport costs
  - Land prices are higher close to the city
  - Different products are at different distances from the city
  - Farmer: trade-off (transport cost vs land rent)
- *More on this model next week*

Remark #5: Under perfect competition, industry location can be explained in terms of geographical accessibility to given markets for goods and factors.

6. International trade: Technology

- Dimensionless countries (Ohlin)

A. **Comparative advantage** (Ricardo)

- Localized knowledge, embodied in the skills of the local population
- Different technological alternatives (different production function)

Remark #6: Under perfect competition, industry location can be explained in terms of localized technological knowledge.

7. International trade – factor endowments

B. **Factor endowments**
Heckscher (1918), Ohlin (1933)

- Natural resources and more generally the factors of production are unevenly distributed across countries
- International immobility – different relative factor prices
- Specialization: a country specializes in the production of the goods that are relatively intensive in its relatively abundant resources

Remark #7: Under perfect competition, industry location can be explained by the uneven distribution of primary production factors.

8. Spatial competition

Firms are not price-takers

Hotelling (1929) model

Remark #8: Under imperfect competition, industry location can be explained in terms of the search for privileged access to customers and the desire to relax competitive pressures by other firms.

9. Myrdal and circular causation

- People rather move to places where there are lots of possibilities. Larger markets also attract firms, as they find there relatively more potential labor force.
- Explanation of regional inequalities (Myrdal 1957)
- Historical accident – followed by success
- Manufacturing Belt (Rust Belt) – where the market is large, but effects sustain and reinforce each other (Harris 1954)
- Self-fulfilling expectations

Remark #9: Firms and households locational choices sustain each other. As a result, the location of industry can sometimes be explained as the result of historical accidents.

Literature

- Alonso, W. (1964), Location and Land Use. Cambridge, Mass: Harvard University Press.
- Thünen, von J.H. (1826), Der Isolierte Staat in Beziehung auf Landschaft und Nationalökonomie. Trans. By C.M. Wartenberg (1966) Von Thünen's Isolated State. Oxford: Pergamon Press.
- Vreeker, R., H.L.F. de Groot & E.T. Verhoef (2004), Urban Multifunctional Land Use: Theoretical and Empirical Insights on Economies of Scale, Scope and Diversity, Built Environment, 30 (4), pp. 289-307.