Spatial Economics—Introduction

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Welcome to Spatial Economics

- Time: 1st class on Tuesday
- Google Classroom (Code: v5cjw47(情報), mvqmkdv(工), qonfv7t(経済・院), qwnfcqv(経済・学部))
    - Please register in v5cjw47
    - All movies and homeworks are provided here

The lecturer

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- Url: http://www.se.is.tohoku.ac.jp/~zeng/index.html
- Lab: Room 403, GSIS building
- Office Hour: Tuesday 4:30-6:00 or reserved by mails
- Major: Spatial Economics, Conflict Resolution
- Aspiration: Teaching knowledge worldwide applicable and fostering regional specialists with international viewpoints

Lecture plan

	Date	Content
1st	10/3	Introduction
2rd	10/10	The Dixit-Stiglitz CES model
3th	10/17	The home market effects
4th	10/24	2-factor models
5th	11/7	Mathematica usage
6th	11/14	Quasi-linear models
7th	11/21	Heterogeneity models
8th	11/28	Gravity model I
9th	12/5	Gravity model II
10th	12/12	Welfare analysis
11th	12/19	Non-CES equilibrium analysis
12th	12/26	Equilibrium vs. optimum
13th	1/9	Core-periphery models
14th	1/16	Continuous space
15th	1/23	Applications etc.

Textbook

Japanese version

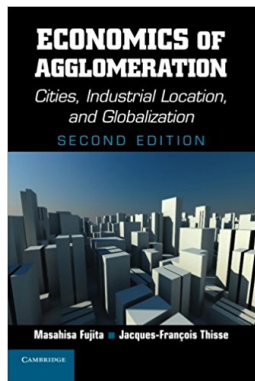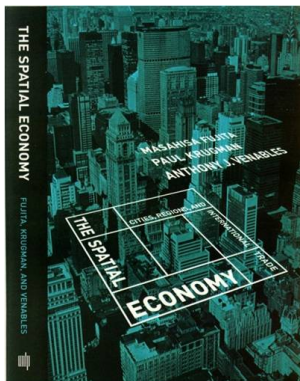- 曽道智・高塚創 (2016). 空間経済学, 東洋経済新報社。3240円。Available in UNIV. COOP.
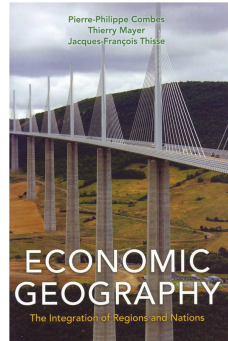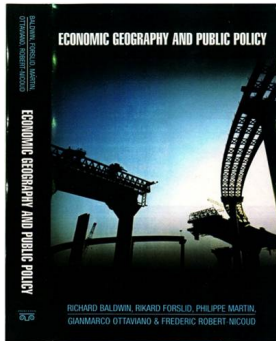
Chinese Version

- 曽道智・高塚創 (2018). 空間経済学. 北京大学出版社.

Representative books

- Fujita, M., Krugman P and Venables A., The Spatial Economy, MIT Press, 1999.
- Fujita, M. and Thisse, J.-F., Economics of Agglomeration (2nd Edition), Cambridge University Press, 2013.

More books

- R. E. Baldwin, R. Forslid, P. Martin, G. Ottaviano, F. Robert-Nicoud, Economic Geography and Public Policy, Princeton University Press, 2003.
- P.-P. Combes, T. Mayer, J.-F. Thisse, Economic Geography: The Integration of Regions and Nations, Princeton University Press, 2008.

空間経済学

佐藤泰裕・田渕隆俊・山本和博 著

■ 佐藤泰裕, 田渕隆俊, 山本和博, 2011. 空間経済学. 有斐閣。

■ Journal of Economic Geography, Journal of Urban Economics, Journal of International Economics, Regional Science and Urban Economics, Journal of Regional Science, etc.

What is Spatial Economics?

Why some economic phenomena occur in specific places?

- interesting economic phenomena
    - Agglomeration of labor and/or firms. Location theory.
    - High wages/productivity
    - Special industries
    - Exporter of manufactured goods
    - A high tax rate, a high minimum wages
- places
    - country, international trade
    - region, regional economics
    - city, urban economics

How firms choose locations?

Questionnaire for firms (Ministry of Economy, Trade, and Industry, 経済産業省, 2006)

- labor costs
    - cheap wages in developing countries
- market size
    - a big market in Japan
    - a big country has a large market
- technology and information
    - Market needs, Customer response support
    - stay in Japan

How households choose locations?

30% Japanese pop. in Tokyo

- high wages
  - Nominal wages increase 10% when city pop. is doubled
- congestion, commuting costs, high housing price
  - In total, a decrease of 7-12%
- a lot of varieties
  - various concerts
  - meeting interesting people
  - an important topic in recent decades.

Theory of Spatial Economics

Microeconomics: competitive equilibrium

- perfect competition
- supply=demand

Question

Can competitive price mechanism explain the endogenous formation of agglomeration?

- Isard and Hicks: some particular effects of τ
- Arrow and Debreu: differentiated goods by locations, convexity

Starrett: Spatial Impossibility Theorem

No competitive equilibrium with positive trade costs exists if the space is homogeneous

Agglomeration forces

- First nature
    - The space is not homogeneous
    - Perfect competition
- Second nature
    - Agglomeration occurs even in a homogeneous space
    - Imperfect competition, increasing returns to scale
- Orange: peel + flesh
- trade
    - advantage of technology and resources
    - advantage of a large market

Research framework

- Silly assumptions
    - Peeling oranges
- New Trade Theory
    - Started in the end of 70s
    - Home-market effect, HME
    - Rapidly developed recently, 90% in this lecture
- New Economic Geography
    - Started in 90s
    - Core-Periphery
    - How two symmetric regions are developed to a core and a periphery

https://en.wikipedia.org/wiki/David_Ricardo

David Ricardo

Comparative advantage

- an economy's ability to produce goods and services at a lower cost
- opportunity cost
- Increase their productivities by concentrating on their advantageous products

David Ricardo

- 1772.4.19, London, England
- Sephardic Jews of Portuguese origin, relocated from Dutch
- Took a job at his father's stockbroking firm at 14
- Eloped with his wife, a Quaker (Unitarianism) at 21. Dropped out of Cambridge Univ., traded stocks and bonds, made the bulk of his fortune

- successful speculation, retiring from business in 1814 (age 42)
- Principles of Political Economy and Taxation (1817), Chap. 7, comp. adv.
- politician since 1819, supporting free trade
- died on 1823.9.11. leaving 75 million pound
- against Corn Laws (1815-1846)

One more reason: Heckscher-Ohlin

Two countries have the same technology and consumers have the same preferences

- Before trade
    - the relative price of capital-intensive good X is lower in the capital-abundant Home. Home has a comparative advantage in X
    - Labor-abundant Foreign has a comparative advantage in labor-intensive Y
- Each country exports the commodity which uses its abundant factor intensively: Home exports X and imports Y, Foreign imports X and exports Y

Eli Heckscher
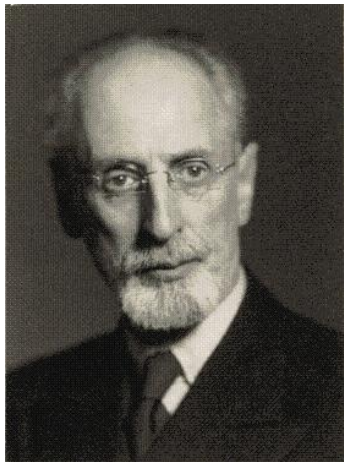
https://en.wikipedia.org/wiki/
Eli_Heckscher

- 1879.11.24, Stockholm, Sweden
- 1909-1929 Stockholm School of Economics (founder)
- 1929-1945 Institute for Economic and Business History Research (founder)
- died 1952.12.23 in Stockholm
- published 1148 papers/books
- son Gunnar Heckscher (Politician, leader of Swedish Moderate Party)
- grandson Sten Heckscher, a Social Democratic politician

https://en.wikipedia.org/wiki/
Bertil_Ohlin

- 1899.4.23, Stockholm
- 1919 master, Stockholm School of Economics
- 1923, master, Harvard Univ.
- 1924, Ph.D, Stockholm Univ.
- 1930-1965, Prof. of Stockholm Sch. of Econ.
- 1944-1967, leader of People's Party
- 1944-5 Minister for Trade
- President of the Nordic Council 1959, 1964
- 1977, Nobel prize
- died 1979.8.3 in Stockholm

Leontief

Who is Wassily Leontief?

- 1905-1999. Born in Munich (Germany), move to St. Petersburg (Russia) in 1924, got master degree from University of Leningrad

- Contributed to the 1st Chinese railway construction in 1929 as an adviser.

- Move to US in 1931

- Nobel Prize in Econ. in 1973

- Input-output tables

https://en.wikipedia.org/wiki/
Wassily_Leontief

Leontief Paradox I

- Leontief (1953): to test the Heckscher-Ohlin Theory by US data
- calculate the amount of labor and capital by the 1947 input-output table of the US economy
- What happens if a million dollars' worth of imports is replaced by the domestic production?

	exports	import replacements
capital ($, 1947 prices)	2550780	3091339
labor (man years)	182.313	170.004
capital/labor	13991.21	18184.92

- the US was the most capital abundant country in the world by any criterion.
- the US exported labor-intensive goods and imported capital-intensive goods

Leontief Paradox II

- The contradiction to the H-O theory took the profession by surprise. Leontief paradox
- Any problems in data?
  - Swerling (1953): 1947 was not a typical year: the postwar disorganization of production overseas was not corrected
- Leontief (1956) repeated the test by the 1951 data

	exports	import replacements
capital ($, 1951 prices)	2,256,800	2,303,400
labor (man years)	174	168
capital/labor	12970.11	13710.71

- US imports were still more capital-intensive than US exports
- Baldwin (1971) repeated by the 1962 US trade data

Leontief Paradox III

|	exports	import replacements
capital ($, 1962 prices)	1,876,000	2,132,000
labor (man years)	131	119
capital/labor	14,320.61	17,915.97

- The paradox continued

- M. Tatemoto and S. Ichimura, 1959. Factor Proportions and Foreign Trade: The Case of Japan, Review of Economics and Statistics 41, 442-446.

    - Japan was a labor-abundant country, but exported capital-intensive goods and imported labor-intensive goods.
    - Japan's overall trade pattern was inconsistent with the H-O theory

- Wolfgang F. Stolper and Karl Roskamp, 1961. Input-Output Table for East Germany, with Applications to Foreign Trade. Bulletin of the Oxford Institute of Statistics, 23, 379-392.

Leontief Paradox IV

- East Germany's exports were capital-intensive. About 3/4 of its trade was with the communist bloc, and East Germany was capital abundant relative to its trading partners.
- No Paradox.

- D. F. Wahl, 1961. Capital and Labor Requirements for Canada's Foreign Trade. Canadian Journal of Economics and Political Science 27, 349-358.
    - Canadian exports were capital-intensive. Most of Canadian trade was with the US.
    - Paradox Exists.
- R. Bharadwaj, 1962. Factor Proportions and the Structure of India-U.S. Trade. Indian Economic Journal 10, 105-116.)
    - India's exports were labor-intensive. However, Indian exports to the US were capital-intensive.

Why? Factor intensity reversal

- Bagicha S. Minhas (1962): The Homohypallagic Production Function, Factor-Intensity Reversals and Heckscher-Ohlin Theorem, Journal of Political Economy 70(2), 138-156.
- agriculture is labor-intensive in India but capital-intensive in US
  - inevitable paradox
- Minhas (1963) from 24 industries in 19 countries, found factor intensity reversals only in 5 countries

Agriculture
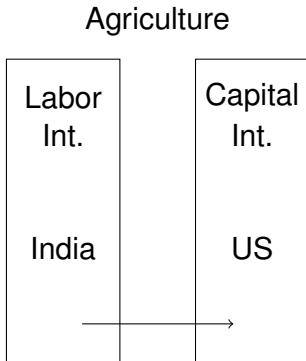
- Moroney (1967): much less emp. importance, albeit theo. interesting

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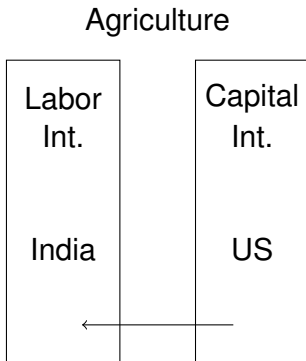
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Other reasons

- U.S. Tariff structure
- Natural resources
- Different skill level
- ...

Why? Demand Bias

Demand Reversal, a hypothesis of consumption structure

- Stefan Valavanis-Vail, 1954. Leontief's Scarce Factor Paradox, Journal of Political Economy Vol. 62(6), 523-528.

- The paradox can be explained if the US had a strong consumption bias toward the capital-intensive goods.

- Switzerland consumes more Chocolate, Japan consumes more seafood, ...

- H.S. Houthakker, 1957. An International Comparison of Household Expenditure Patterns, Commemorating the Centenary of Engel's Law. Econometrica Vol. 25, 532-551.

- 40 surveys, 30 countries

- Engel's law is confirmed

- as income rises, the proportion of income spent on food falls

Demard is important!

Valavanis-Vail, 1954, pp.524-525

Even if technologies and tastes both differ, but it happens that each country has a strong preference for the products of its own relatively abundant factor, home production may fail short of home demand, and we may find each country exporting the product of its scarce, and not of its abundant, factor.

- the demand for capital-intensive goods in the US was too large
- the demand for labor-intensive goods in other (developing) countries

Real world—Mobile phone

Quiz

Chinese like mobile phone.
China: a net exporter? importer?

- export of mobile phone
  `http://www.worldstopexports.com/`
  `cellphone-imports-by-country/`
- China: 125.4 billion $ in 2019. 6.9% in the world
- import of mobile phone
  `http://www.worldstopexports.com/`
  `cellphone-imports-by-country/`
- China: #60, only 0.43815 billion $

during 2019.

1. China: US$125.4 billion (46.9% of exported cellphones)
2. Vietnam: $35.5 billion (13.3%)
3. Hong Kong: $30.7 billion (11.5%)
4. Netherlands: $14.6 billion (5.5%)
5. United States: $10.1 billion (3.8%)
6. Czech Republic: $6.7 billion (2.5%)
7. Germany: $5.1 billion (1.9%)
8. South Korea: $4.74 billion (1.8%)
9. Singapore: $4.69 billion (1.8%)
10. Austria: $4 billion (1.5%)
11. Slovakia: $3.8 billion (1.4%)
12. India: $3.2 billion (1.2%)
13. Sweden: $2.3 billion (0.9%)
14. Luxembourg: $1.7 billion (0.6%)
15. United Kingdom: $1.5 billion (0.6%)

By value, the listed 15 countries shipped 95.1% of global cellphone exports in 2019.

Among the top exporters, the fastest-growing

cellphones)

2. Hong Kong: $37 billion (13.1%)
3. Japan: $15.44 billion (5.5%)
4. Netherlands: $15.37 billion (5.4%)
5. Germany: $11.5 billion (4.1%)
6. United Arab Emirates: $11 billion (3.9%)
7. United Kingdom: $10.6 billion (3.8%)
8. Czech Republic: $7.1 billion (2.5%)
9. France: $6.3 billion (2.2%)
10. Russia: $5.85 billion (2.1%)
11. Canada: $5.83 billion (2.1%)
12. Mexico: $5.2 billion (1.8%)
13. Saudi Arabia: $5.1 billion (1.8%)
14. Singapore: $5 billion (1.8%)
15. Austria: $4.9 billion (1.7%)

Among the above countries, the fastest-growing markets for cellphones since 2015 were: Czech Republic (up 103.4%), Russia (up 77.7%), United

Real world—Drugs

- Costinot, Donaldson, Kyle, Williams (2019)
- The more we die, the more we sell? A simple test of the home-market effect
- Famotidine: peptic ulcers & gastroesophageal reflux
- high incidence rates of peptic ulcers in J.
- Mortality from digestive disorders in J. ≈ **2×** average


`https://www.qlife.jp/`

- J. export of drugs targeting digestive disorders: 10.35% of world sales
- Ave: 4.54% of world sales for other diseases
- a net importer in the pharmaceutical sector as a whole

Burenstam Linder, 1961, p.87

An Essay on Trade and Transformation. New York: John Wiley and Sons.

- It is a necessary, but not a sufficient, condition that a product be consumed (or invested) in the home country for this product to be a potential export product.
- like Valavanis-Vail, the consumer demand is important
- Unlike Valavanis-Vail, a country exports a product for which this country has a large demand
- Due to some kind of externality, the production becomes easy if the demand is large. Some kind of advantage.
- The more similar the demand structures of countries, the more they will trade with one another
- not easy to establish a model

Krugman

- In the case of bilateral trade, goods are differentiated. Intra-industry trade.
- Recently, intra-industry trade is more than inter-industry trade
- Establish a general equiliruim model to deal with scale economy, monopolistic competition, and trade costs.
- I came to bury Burenstam Linder, not to praise him. (Krugman, 2009)

https://upload.wikimedia.
org/wikipedia/
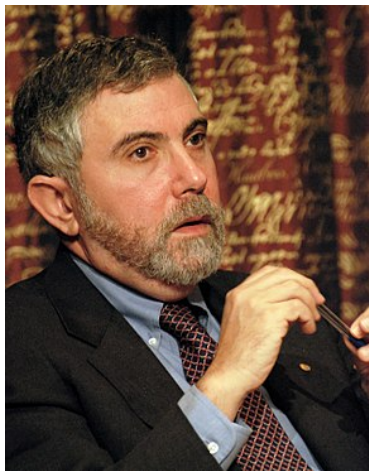
Transportation costs

- Traditional trade theory: either **0** or ∞
- Iceberg transportation
    - Before Christ, the Roman Empire liked cold wine. Moved ice from the Alps
    - In the 16th century, the Mughal Empire in India moved ice from the Himalayas
    - Samuelson
    - von Thünen
- Trade freeness
- Linear transportation cost

Paul Anthony Samuelson

https://policonomics.com/
paul-samuelson/

- 1915.5.15-2009.12.13
- Nobel prize, 1970
- considered mathematics to be the "natural language" for economists

Homework

- What do you expect from this course?
- Write down your comments on the Nobel prize speech of Krugman:

Krugman, P., 2008. The increasing returns revolution in trade and geography. Nobel prize lecture.

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https://www.nobelprize.org/uploads/2018/06/krugman_
lecture.pdf
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