

# **Location economics analysis on urban hierarchy, attractiveness of region, and spatial social welfare function**

**Daisuke Nakamura**, Department of International Liberal Arts, Fukuoka Women's University

## *Executive summary*

Attractiveness of region can be measured by social welfare function within the framework of spatial economics. The long-run sustainable regional growth requires attractiveness of region to keep the centripetal force of local population and economic activity, and this paper particularly focuses on the region where spatial exclusion caused by the organization of transportation network has already been observed. While the relevant studies of this subject separately investigate the economic behavior of household, firm, and local government, we attempt to integrate them into a single framework as a unit of regional economic agent to reveal their mutual relationships to each other. The integrated framework needs to develop a spatial social welfare function which includes the accessibility or the notion of market and supply areas of goods and services that should vary with the order of urban hierarchical system.

Since some difficulties dealing with social welfare function are recognized, this paper provides specific considerations to avoid these problems. First, the objective of economic activity is assumed to follow the law of nature. For instance, it can be assumed that clean water and air are apparently better than polluted water and air. This is because the clean water and air can be easily polluted, while it is much more difficult to be clean them once these are polluted. Besides, clean water and air are better for not only environment but also our health and purifying costs than polluted water and air. Second, economic agents are completely separated to different or completely opposite direction of decision-making. In other words, it is not necessary to find a unique point where all economic agents maximize their objectives. For instance, households as residents desire clean environment, while producers need to pollute some air and water during their processing stages. Third, the local government may be expected to lead to a situation which both agents' objectives (residents' utilities and producers' profits) meet at an agreement through compensate payments to each other as long as the property rights are well established. In addition, an inclusion of spatial term varies the results with examining area or region. If residents desire to live in clean environment, they are better to select rural areas. Similarly, if producers need to enlarge their production scale, it is better for them to locate at non rural areas.

Also, this paper studies an alternative spatial formation as a widely-cooperative regional affiliation to enhance the attractiveness of region in rural areas which could be useful for countries where total national population and the extent of economic growth are constantly diminishing. The final concern is given to how to coordinate the widely-cooperative regional affiliation, exploring possibilities to adopt this specific framework to regional economic forecasting models.

## 1 Background

- Spatial consumer exclusion
- Regional hierarchical attributes
- Supply areas and market areas
- Attractiveness of region
- Social welfare function
- Network of transportation
- Widely-cooperative regional affiliation

## 2 Location model

Economic behavior of household, firm, and local government within a single framework as a unit of regional economic agent to reveal their mutual relationships to each other:

- Hierarchical urban system
- Externality
- Economic infrastructure elements
- Social infrastructure elements
- Accessibility
- Spatial social welfare function

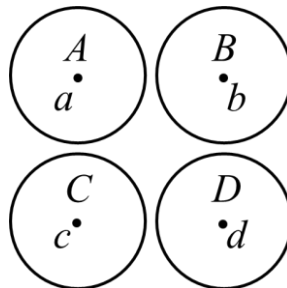


Fig. 1 Neighbor regions independently organized

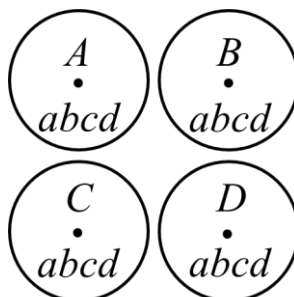
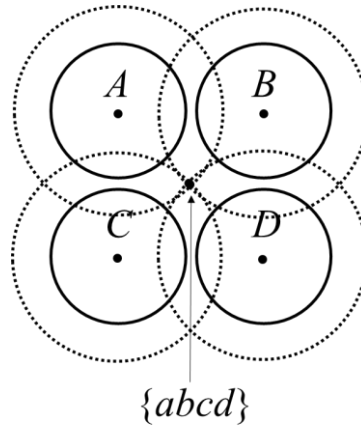


Fig. 2 Perfectly independent spatial system

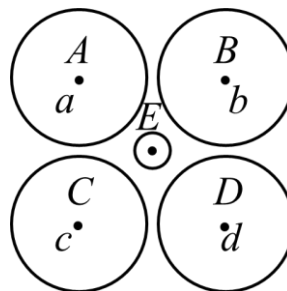
### 3 An application

How rural regions enhance their attractiveness in the long run under severely restricted conditions:

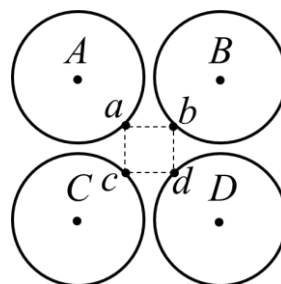
- An alternative spatial formation
- Point of supply and critical isodapane
- Relocation to non-central places
- Central-place system and transportation network



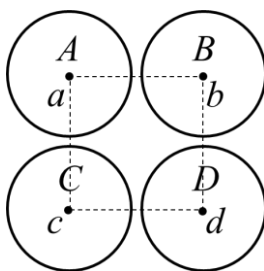
**Fig. 3 Accessible scenario and critical isodapanes**



**Fig. 4 Central node E exists**



**Fig. 5 Four regions sharing facilities (scenario 1)**



**Fig. 6 Four regions sharing facilities (scenario 2)**

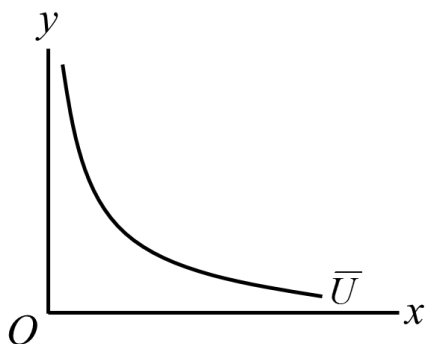
#### 4 Spatial policy

How the widely-cooperative regional affiliation can be coordinated:

- Feasible if its advantage is greater than disadvantage
- Cost-benefit outcome of the local governments
- Also important to evaluate advantages to their local residents and producers
- Accessibility on intraregional and interregional segments
- Cost saving as well as energy saving that contributes to environmental sustainability
- Potential problematic issues can be solved by subsidiary payments in Isard (1975)

#### 5 Further avenues

- Possibilities to regional economic forecasting
- Sustainable regional development and attractiveness of region
- Regional exclusively advantageous factors



**Fig. 7 Substitution effect**

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