Geographical Economics

Course 2: Core and Periphery

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2. The existence of EofS claims for imperfect competition.

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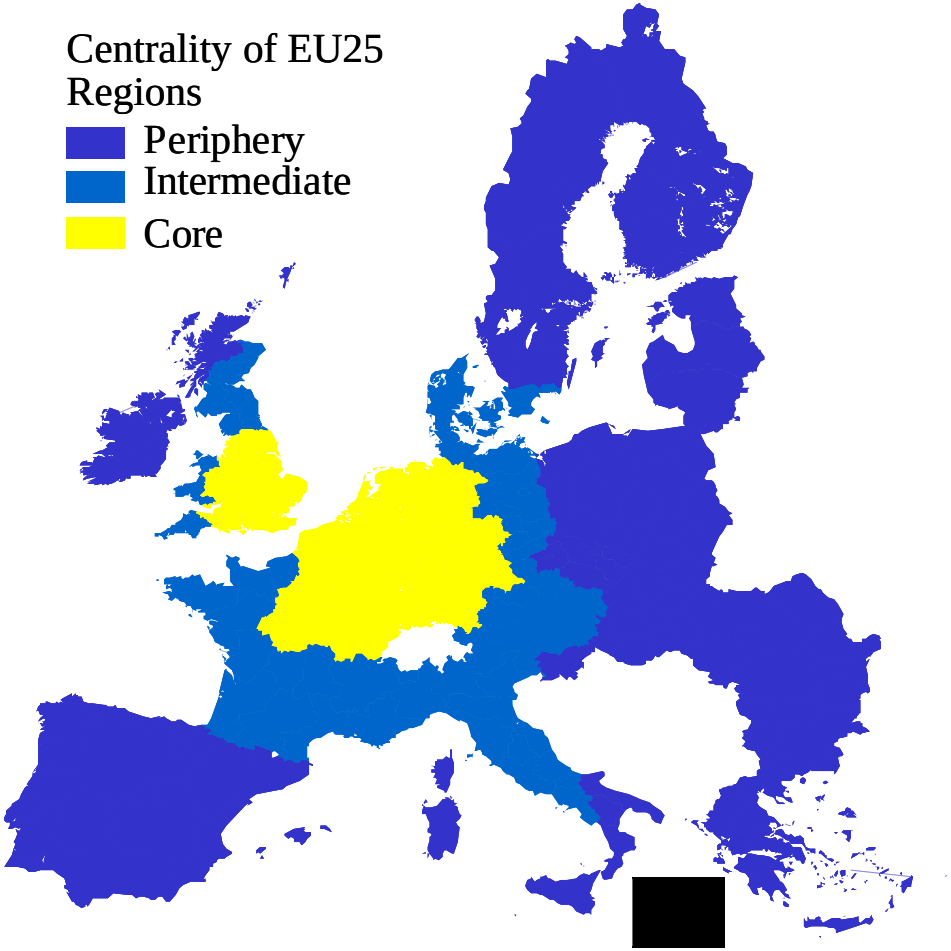
- We develop a theoretical framework suitable to admit the EofS in firm location decisions.
- This theoretical setting will allow to underpin the interpretation of the formation of a core-periphery structure.

Core-Periphery structure: an example

The European Union is a classical example to figure out the existence of a core-periphery structure



Our question

We deal with a firm location decision problem in case of
- Two regions (N; S)
- Two activities (Agriculture and Manufacturing). Manufacturing is mobile
- Two types of workers/consumers: Farmers (f)(immobile); Manufacturing workers (mw) (mobile; they follow firm location).

Our question: numerical example

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3. Sales in South: $0(mw) + 2(f) = 2$
4. Conclusion: North is definitely a better location

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Let us consider that the demand for a variety of manufacturing is 10 (4 for mw and 6 for f)

1. Case B: 25% firms in North (1mw (North)); 75% firms in South(3 mw (South)); 2f (South) + 4f (North). Then,

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3. If a firm locate in South: 4 (sending to mw in North)+4(selling to f in North)= 8
4. Conclusion: for any (positive) level of transport cost ($t > 0$), if all existing firms are located in North, the new firm should locate in North as well to minimize its transport costs.

Setting:monopolistic competition

- From J. Tirole (1988):

  Monopolistic competition was introduced by Chamberlin (1933) to formalize the following industry configuration:

  1. A quite large number N of firms,

  2. Each firm faces a downward-sloping demand

  3. A price charged by a firm has only a negligible effect on the demand addressed to other firms (namely: absence of cross-effects).

Definition of the problem

In the standard framework there has been a conventional wisdom according to which monopolistic competition yields too many firms (from a social viewpoint) or the existing firms produce too little to exploit the economies of scale.

Novelty

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- In equilibrium, we experience a situation in which we tend to include too few products.
- Business stealing: by introducing a new product, a firm steals consumers from other firms. Then, firms that have positive profits loose income from these diverted consumers. Therefore, firms may tend to produce (and introduce) too many products.

Consequences

This contribution had an extremely huge impact on the economic scenario because:

- It impulsed the new trade theory
- It has been the principal theoretical foundation of the modern economic geography
- It has been the foundation of all macro models that not follow the perfect competitive setting (namely, when one needs to model the love for variety).

Complementary issues

- The original version of the model was formalized for a continuos setting. This is the proper setting to consider the negligible effect issues....Finally the ultimate version was settle in the discrete setting.
- The authors introduced the device of *the extreme large number of firms N* to meet those requirements.
- However, the continuous version has been retrieved in more recent times.

- For sake of simplicity, we will work on the original discrete version published in the AER.

Building blocks

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- Two-step procedure
- Setting: there is a fixed number of workers/consumers (L). Workers supply their unit of time to work in one of accessible activities.

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- We usually take $p^{a} = 1$. Numeraire good.

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Looking at the composite good:

$$M = \left[\sum_{i=0}^{N} m_i^{\rho} \right]^{\frac{1}{\rho}}, 0 < \rho < 1.$$

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- number of goods (N); monopolistic competition
- ρ elasticity of substitution

Building blocks

Results of the maximization process: optimal consumption of the numeral good

$$A = (1 - \mu) Y$$

- and concerning the composite good:

$$\max \left[\sum_{i=0}^{N} m_i^{\rho} \right]^{\frac{1}{\rho}}$$

$$st \quad : \quad \mu Y - \sum_{i=0}^{N} p_i m_i = 0$$

Building blocks

$$\frac{m_i^{\rho-1}}{m_j^{\rho-1}} = \frac{p_i}{p_j}$$

$$m_i = \frac{p_j^{\frac{1}{1-\rho}}}{\sum_{i=0}^{N} p_i^{\frac{\rho}{\rho-1}}} \mu Y$$

This last result is obtained by replacing the first result into the budget constraint knowing that the spending devoted to the manufacturing good is μY.

Supply side

Production function:

$$l_i = f + cq_i$$

Profit function:

$$\pi_i = p_i q_i - w_i l_i$$

Plugging in and solving $(\pi_i = 0)$:

$$p_i \rho = cw_i \Longrightarrow p_i = \frac{cw_i}{\rho}$$

Prices are a mark-up over marginal costs and this mark-up is constant; it relates on the degree of sostituability of manufacturing goods.

Supply side

It is common to introduce the following change:

$$\rho = \frac{\sigma - 1}{\sigma}$$

and the previous condition turns out to be:

$$p_i = \left(\frac{\sigma}{\sigma - 1} \right) cw_i$$

and, finally,plugging in the price equation into the profit one, and imposing the zero profit condition, we get:

$$q_i = \frac{f\rho}{(1-\rho)c} \text{ or } q^* = \frac{f(\sigma - 1)}{c}$$

The quantity produced by each firm (at equilibrium) is constant !!

Other results

- At the equilibrium,the costant-quantity per variety implies that wages in manufacturing are identical across varieties in each country.
- The number of workers hired in each firm turns to be constant:

$$l^* = f + cq^* = f\sigma$$

- Assuming that $L = L_A + L_M$, the optimal number of varieties (firms) is

$$L_M = l^* N \Longrightarrow N^* = \frac{L_M}{f\sigma}$$

Opening to trade

Now, we are referring to the seminal paper by Krugman (JPE, 1991).

- **Opening to trade implies thinking of mobility of workers and firms**; consumers can buy varieties also from abroad or from the other region.

$$P_h = \left[n_h p_h^{1-\sigma} + n_f \left(\frac{p_f}{\tau} \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}};$$

$$P_f = \left[n_h \left(\frac{p_n}{\tau} \right)^{1-\sigma} + n_f p_f^{1-\sigma} \right]^{\frac{1}{1-\sigma}}.$$

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Opening to trade

- Real wages:

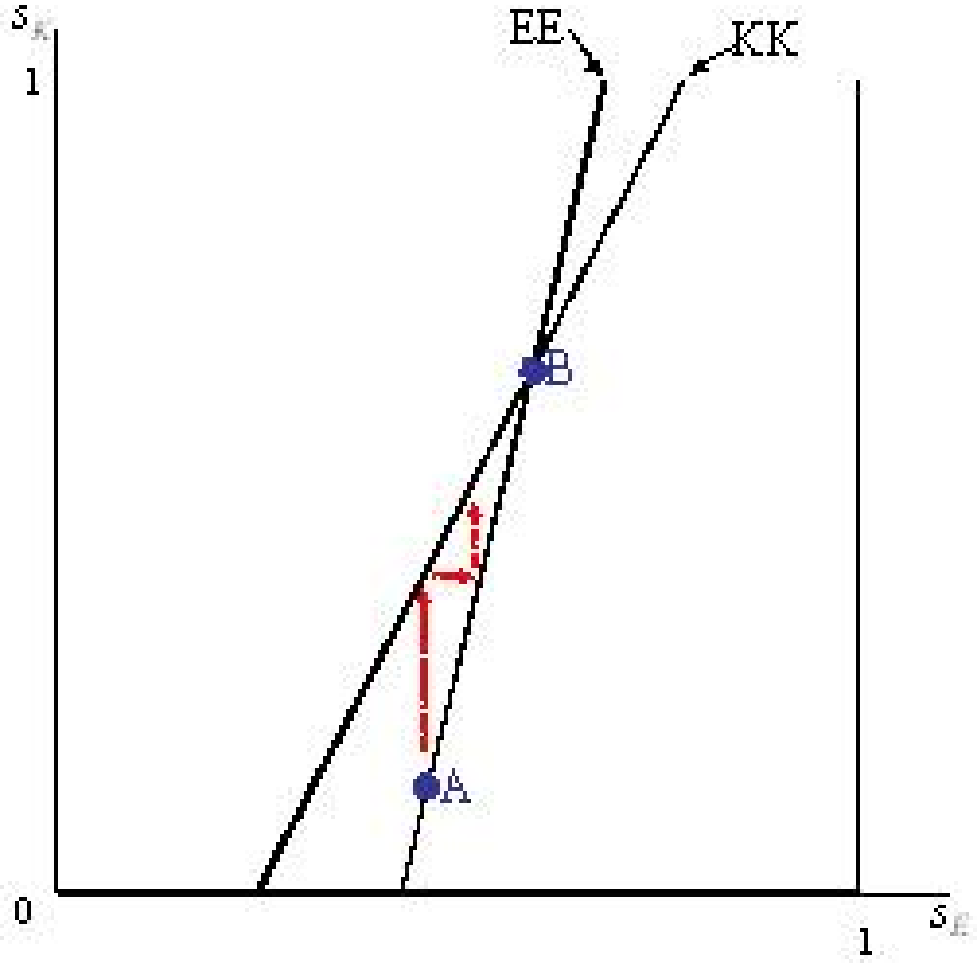
$$\varpi = w_h P_h^{-\mu}; \varpi^* = w_f P_f^{-\mu}$$

Definition

Differences in real wages are the source of workers' mobility and determine the creation of a CORE-PERIPHERY patterns.

Core-Periphery structure

Let us consider the EE-KK framework as described in Baldwin et al. (2003)



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1. Transport costs increases/decreases,
2. The periphery experiences an important increase in the population size.
3. Under the hp at point 2: where would a firm locate, now ???

Core-Periphery structure: other results

- The rise and fall of local agglomerations (Puga, EER, 1999). Worker mobility; farmer immobility and firms immobility allows for creating agglomerations in pre-selected areas. Transport costs control for the intensity of the process.

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- Agglomerations still very attactive because consumers are there....there is the market !!

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- The **HOME MARKET EFFECT**
- The large region ends up with large market for manufacturing goods (as a combination of transport costs and economies of scale) that can be sold (in the "large" market of the region) without incurring in transport costs. Then, *this region becomes exporter of the goods for which it has a large local market.*

Core-Periphery structure: other developments

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- Extending the setting to more than 2 places: it implies to introduce more than one type of transport costs (regional and international, for instance). However, the effect of the size of the international transport costs matter more than the regional one in creating agglomerations (Monfort & Nicolini, (JUE, 2000); Paluzie (PRS, 2001).

Main references

- A. K. Dixit and J. E. Stiglitz (1977) "Monopolistic Competition and Optimum Product Diversity" *American Economic Review*, Vol. 67, No. 3, pp. 297-308.

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