New Economic Geography (NEG)

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Abstract

The home-market effect (HME) is the result of the interaction between increasing returns to scale at the plant level and transportation costs. With factor mobility, market sizes are endogenous. NEG formalizes the idea that tiny initial differences may grow very large as the restult of the interaction between the HME and factor mobility.

1 The home-market effect

1.1 One firm (monopolist)

Let me illustrate the basic idea in the simplest possible set-up:

- Two segmented markets endowed with L_1 and L_2 consumers. Without loss of generality, assume $L_1 > L_2$.
- A single firm (monopolist).
- IRS at plant level: firm has to chose plant location.
- Transportation costs τ across regions.

Profit maximisation. Markets are segmented so that firm sets independent prices across the two markets so as to maximise operating profits:

$$\max_{p_j} \pi_{ij} \equiv L_j \left(p_j - \beta\tau_{ij}\right) D\left(p_j\right),$$

where β is the constant marginal constant, $\tau_{ij} \geq 1$ is the iceberg transportation cost for shipping the good from region i (the plant's location) to market j (with $i, j \in \{1, 2\}$), $D(p_j)$ is individual demand (we assume the usual conditions on $D(\cdot)$ so that the profit maximisation problem has a unique, interior solution). Let $\varepsilon(p_j) \equiv -p_j D'(p_j) / D(p_j)$. Thus, in the market equilibrium,

$$\pi^*_{ij} = \frac{L_j}{\varepsilon^* - 1} D^*,$$

where $\varepsilon^* \equiv \varepsilon\left(p_j^*\right) > 1$, $D^* \equiv D\left(p_j^*\right)$ and p_j^* is the solution to $p_j^*\left(1 - 1/\varepsilon^*\right) = \beta\tau_{ij}$. Of course, higher transportation costs reduce profits.

Spatial equilibrium. The firm chooses the location i that maximises the sum of its operating profits, $\pi_i^* \equiv \pi_{i1}^* + \pi_{i2}^*$. Crossing regional borders is costly so that $\tau_{ij} > \tau_{ii}$ for $i \neq j$. Thus, is it straightforward and intuitive to see that the firm sets its plant in proximity to the largest market. This is the *market access* effect.

1.2 Monopolistic competition

The same logic operates when there are multiple imperfectly competitive firms producing under IRS at the plant level. In that case, the larger region attracts a more than proportional share of plants. To see this, consider n plants operating under monopolistic competition à la Dixit-Stiglitz-Spence. In this case profits are

$$\pi_{ij}^* = \frac{1}{\sigma}\frac{\phi_{ij}E_j}{n_j + n_i\phi_{ij}},$$

where $\phi_{ij} \equiv \tau_{ij}^{1-\sigma} \in [0,1]$ is trade freeness, $\sigma > 1$ is the elasticity of substitution among varieties and E denotes expenditure on the differentiated product. The spatial equilibrium is the no-arbitrage condition

$$\left(\pi_i^* - \pi_j^*\right)\left(n_i - n_j\right) \geq 0.$$

For simplicity, consider the following trade-cost structure: $\phi_{ii} = 1$ and $\phi_{ij} = \phi < 1$ for $i \neq j$. As a result, we get

$$s_n = s_E + \frac{2\phi}{1-\phi}\left(s_E - \frac{1}{2}\right),$$

where $s_n \equiv n_1/\left(n_1 + n_2\right)$ and $s_E \equiv E_1/\left(E_1 + E_2\right)$.Three results are noteworthy:

1. HME: the larger region attracts a more-than-proportional share of IRS plants and thus ends up *exporting* the differentiated good.

2. HME magnification: this effect is stronger, the higher ϕ (the lower τ).

3. Core-periphery: when ϕ is low enough, then all plants are in the larger region (region 1):

$$n_2 = 0 \Leftrightarrow \phi \geq \phi_{CP} \equiv \frac{E_2}{E_1}.$$

2 New economic geography

Krugman's 1991 idea is to endogenize E_j. Specifically, when firms move plants around, they also shift demand and supply. They shift demand for final goods (in moving plants firms move workers and expenditure). In Venables (1996) and Krugman and Venables (1995), firms buy each other's output as intermediate inputs so that shifting plants also shifts demand for, and supply of, intermediates; here, *supplier* access also plays a role in the location decision of firms. In Baldwin (1999), E_j is endogenous to capital accumulation (i.e. growth).

2.1 Agglomeration and dispersion forces

The model displays agglomeration forces (the result of the interaction between factor mobility and the HME) and dispersion forces and the location equilibrium depends on which force dominates the other.

- **Agglomeration force I**: large regions attract firms and workers, which makes them even larger.
- **Agglomeration force II**: regions endowed with many firms and workers are cheaper places to produce, attracting yet more firms and workers (this effect is not present in Baldwin 1999).
- **Dispersion force**: markets endowed with many firms are more crowded and competition there is tougher (Ottaviano, Tabuchi and Thisse 2002)

2.2 Spatial equilibriums

Such models typically display several equilibriums. In the symmetric two-region model, the typical configuration is (see Robert-Nicoud 2005 for a formal proof):

- For $\phi < \phi_S$ (*sustain* point), the dispersion force dominantes and only the symmetric equilibrium is stable (this configuration is known as *dispersion*).
- For $\phi > \phi_B$ (*break* point), the agglomeration forces dominate and all plants cluster in a single region (this configuration is known as *agglomeration* or *core-periphery*).
- For $\phi \in (\phi_S, \phi_B)$ both the core-periphery and the dispersion equilibriums exist and are stable. Two additional interior, asymmetric equilibriums also exist but they are unstable.

2.3 Follow-up literature

- Many authors have added dispersion and agglomeration forces unrelated to market and supplier access to these models (e.g. Krugman and Venables 1995). Predictably, these forces dominate and shape the spatial equilibrium when trade/transportation costs are close to zero ($\phi \to 1$).

- Several authors have used other functional forms (Ottaviano et al. 2002, Pflüger 2004) and shown that the first two aforementioned properties of the spatial equilibriums are to a large extent robust to the choice of functional form. Robert-Nicoud (2005) shows how and why a wide class of NEG models are *isomorphic* despite assuming different functional forms.

- The normative properties of NEG models are studied formally in Charlot, Gaigné, Robert-Nicoud and Thisse (2006) and several follow-up papers. Unlike their positive properties, their normative ones are very sensitive to functional forms.