Tracing the Base:

A Topographic Test to Detect Collusive Basing-Point Pricing

by

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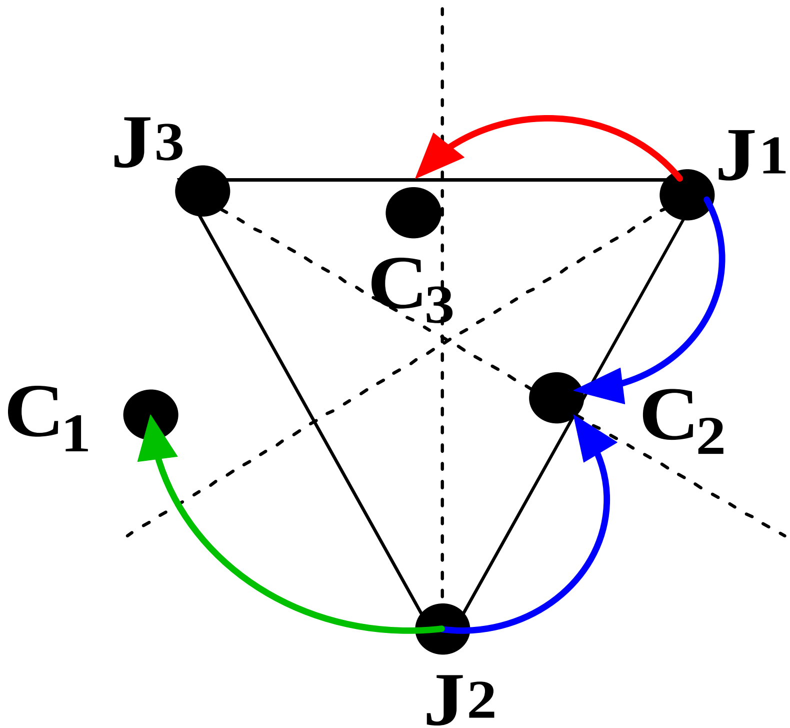
Outline

- Introduction
- Competitive and Collusive Base Locations
- Tracing the Base
- A Topographic Test
- Concluding Remarks

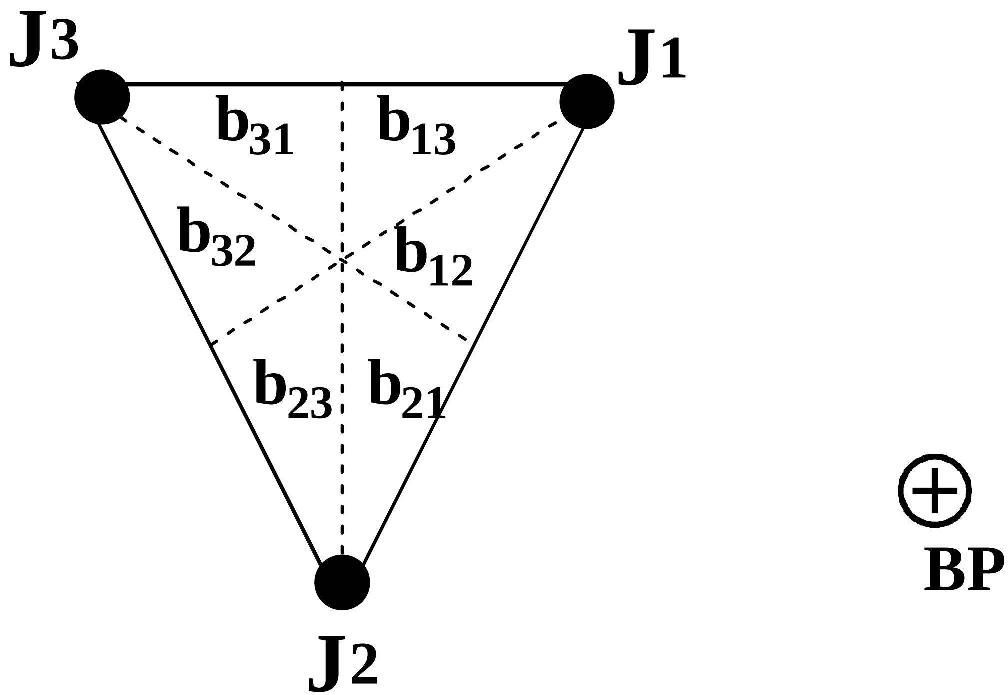
Introduction

- BPP: “Prices quoted to buyers include transportation costs calculated from a given point of origin (the base-point), no matter where the product is actually shipped from” (Porter, 2005)
- What Type of Industries?
  - Homogeneous Bulky Products
  - Costly Transportation
  - Examples: Cement, Steel, Oil.
- BPP: Collusion or Competition?

Competitive BPP with Three Firms



Collusive BPP with Three Firms



Tracing the Base

- Assuming linear bids:

$$p_i = cq_i + t(l_j - x_i)$$

- Known: price (p), quantity (q) and consumer location (x).
- To recover: costs (c and t) and the Base-Point (l) that is used.

Tracing the Base

- Coordinates (a, b)
- Distance follows from Pythagoras' Law:

$$(l_j - x_i)^2 = (a_j - a_i)^2 + (b_j - b_i)^2$$

- Substituting yields:

$$p_i = cq_i + t\sqrt{(a_j - a_i)^2 + (b_j - b_i)^2}$$

Tracing the Base

- Normalize transportation costs to one and rewriting yields:

$$a_j = a_1 \pm \sqrt{(p_1 - cq_1)^2 - (b_1 - b_j)^2}$$

$$a_j = a_2 \pm \sqrt{(p_2 - cq_2)^2 - (b_2 - b_j)^2}$$

$$a_j = a_3 \pm \sqrt{(p_3 - cq_3)^2 - (b_3 - b_j)^2}$$

- Solve numerically

Tracing the Base

- What happens if BPP is competitive?
- Apply algorithm for all pairs of three consumers
- Output: locations of firms
- Take weighted average in order to construct artificial candidate base, which is always situated in the convex hull.

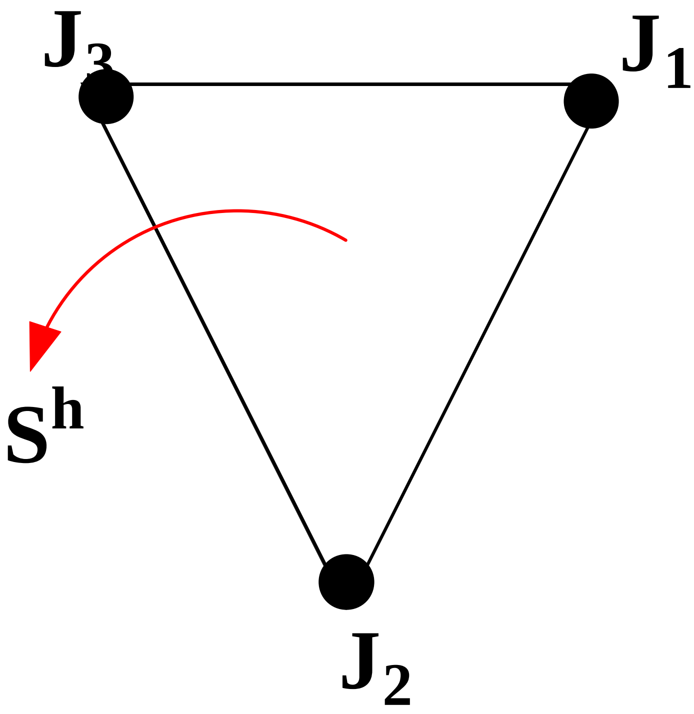
A Topographic Test

- Competitive BP: $(a^{BP}, b^{BP}) \pm 2 \times \sqrt{\frac{\sum_{k=1}^{K}(a^{BP} - a_k)^2 + \sum_{k=1}^{K}(b^{BP} - b_k)^2}{K}}$
- Collusive BP: (a^{BP}, b^{BP})
- CBP-Measure:

$$CBP = 1 - \frac{S^* \cap S^h}{S^h} \in [0,1]$$

- Collusion: CBP = 1
- Competition: CBP = [0,1)

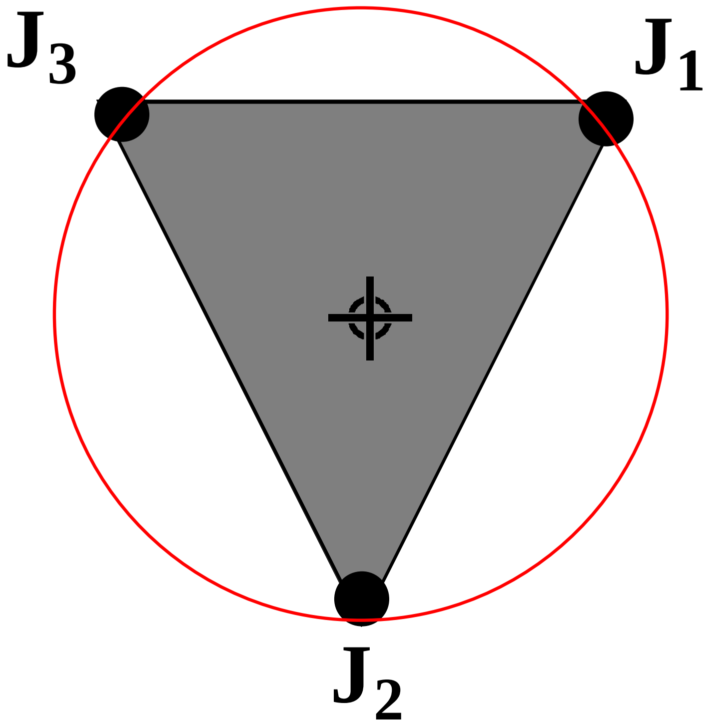
Collusive BPP



$$CBP = 1 - \frac{S^* \cap S^h}{S^h} = 1 - \frac{0}{S^h} =$$

$\oplus_{BP}$

Competitive BPP



$$CBP = 1 - \frac{S^* \cap S^h}{S^h} = 1 - \frac{S^h}{S^h} = 0$$

Concluding Remarks

- A Cartel Detection Method:
  - Industries that are *a priori* vulnerable to price conspiracies
  - Discriminates between competitive and collusive situations
  - Relatively cheap to implement (categories: G, Y, R)
  - Costly to beat
- Measurement errors
- Different bid structures
- Longitude, latitude and altitude
- A detection software