Agglomeration and the Location of Service Branches

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Research Questions

In a world where service is provided by firms, each having many branches:

- Where should a firm locate branches in order to maximize profits?
- What is the impact of switching costs on the decision?
Major Conclusions

• The firm should not locate branches adjacent to its own, since it will gain no revenue and decrease its profits

• The firm should locate adjacent to a competitor, or in a distance, depending on prices and switching costs

• Clusters are formed in specified conditions
The Model

Two stage model

The market is represented by a line of length $1[0, 1]$

Customers and service branches are located along the line

Consumers are distributed uniformly along the line. A consumer is located at $x$ ($0 < x < 1$)

The branches belong to two firms ($H, I$). \{A, B, C, ..\} letters designating the location of branches on the line \{a, b, c,..\}, the respective distance from the origin. For example $HA, HB, IA, IB$

The branches offer substitute goods (services)
Branches of different firms charge different prices \((P_H, P_L)\).

Branches belonging to the same firm charge the same price.

Demand is perfectly inelastic.

Consumers are myopic.

No capacity constraints apply to branches.

Marginal cost in each firm is constant.

When the total costs in two branches are equal, the customers adopt the closer branch.

Customers don’t move-in or move-out of the market.
patronize a branch which minimizes his costs

Total costs of getting service in: $HA$

$CS_{HA} = P_H + t||x-a$

:Where

Price per service $-P_H$

Travel cost - $t||x-a$

Total costs of getting service in $IB$

$CS_{IB} = P_I + t||x-b$
The Consumer’s Choice

The consumer compares the costs and chooses the less expensive branch

\[ CS_{HA} = P_H + t||x-a \]
\[ CS_{IB} = P_I + t||x-b \]

Market area

The borders of the area from where customers [ ] : patronize a branch

Market share

The size of the market area: upper bound less lower bound: \( \Psi \)
Calculating Market Areas

Total Costs

Distance

$P_I$

$P_H$

HA

IB

1

a

b
Proposition 1

The market has branches from two different firms if the prices hold

\[ P_I - t(b-a) \leq P_H \leq P_I + t(b-a) \]
Determining the Market Area

The market area is determined by the consumer located at \( z \) that is indifferent between the branches

\[
CS_{HA} = P_H + t(z-a) = P_I + t(b-z) = CS_{IB}
\]

\[
z = (a+b)/2 + (P_I - P_H)/2t
\]

;[The market areas :\([0, z] , [z, 1]\)

The market shares: \( \Psi_{HA} = z, \Psi_{IB}; = 1-z \)
Firm H introduces a branch

**The consumer** incurs non-negative switching costs (S.C, S) moving between firms, and no S.C moving without changing the firm

Consumers look for the branch where the cost of service is lowest

**The firm:** The market share retained by firm H in the second period can increase or remain unchanged
Scenarios Examined

The analysis is done comparing three alternative scenarios regarding location next to the competitor’s branches:

Introducing $HD$ between $IB$ and the edge

Introducing $HF$ between $IA$ and $IB$

Introducing $HG$ between $HA$ and $IB$
Introducing a branch between the firm’s branch and the edge, or between two of the firm’s branches will not change the firm’s market share, but will decrease its profits. These scenarios are disregarded
Figure 3: Determining the Market Area of Branch $HD$: $P_I = P_H + S$
Figure 3: Determining the Market Area of Branch *HD*: $P_I > P_H + S$
Figure 3: Determining the Market Area of Branch $HD$: $P_H + S > P_I$
Conclusions: $P_H + S = P_I$

- A firm introducing a branch should locate it adjacent to its competitor’s branches,

- The result is a cluster of branches, agglomeration
Conclusions: $P_H + S < P_I$

- if the branch is located adjacent to the competitor’s, the firm pushes the competitor from the market. The long-run result consolidation of firms

- The branch can be located in a distance and will still gain all the market share
Conclusions: $P_H + S > P_I$

- If the branch is located adjacent to the competitor’s, the firm gains no market share.
- The branch must be located in a distance in order to gain a market share.
• Location counts!
• If you disregard it, your market share will not be maximal.
• Switching costs should be minimal!
• As the switching costs increase it is more difficult for the branch to gain a market share
Number of Banking Branches per Statistical Unit

Haifa, Israel
Switching Costs

The costs incurred in switching a firm. In the first period the consumer purchased the products of firm $H$. In the second period he moves to firm $I$.

*Exogenous Switching Costs*—costs incurred by the consumer. Example - switching a provider of a computer or a broker

*Endogenous Switching Costs*—costs incurred by the producer. Example - frequent flier programs
Types of Switching Costs

Transaction Costs

Learning Costs / Start Up Costs

Psychological Costs of Switching or Non Economic Brand Loyalty

Artificial / Contractual
References on Switching Costs

- Farrell and Shapiro (1988)
- Caminal and Matutes (1990)
- Schlesinger and Schulenburg (1991)
- Beggs and Klemperer (1992)
- Nilssen (1992)
- Padilla (1995)
- To (1996)
Proposition 2

Closing a branch between the firm’s branch and the edge, will not change the firm’s market share, but will increase its profits. The adjacent branch will gain all the customers.
Proposition 3

The market share gained by the adjacent branches due to the closure of an intermediary branch, is independent of its location and equals \((b-a)/2\).
Conclusions from Propositions 2-3

If a firm closes a branch adjacent to its incumbent branches, the market share of firm $H$ remains unchanged, and closing the branch increases the firm’s profits.
Closing Branch HE in the Edge Adjacent to a Competitor’s Branch (IB)
Proposition 4

A firm closing a branch in an edge adjacent to a competitor’s branch will lose customers as a function of price charged, switching costs, and location.

The firm’s market share is:
Proposition 5

The market share of a firm closing a branch between two branches belonging to a competitor, depends on prices, switching costs and location:

\[
\Psi_H(x \in HF) = \frac{b-a + P_i - P_H}{2 - I \cdot t(e-b)}
\]

\[
H - \hat{S} < P \implies \frac{(b-a)}{2 - I \cdot t(e-b)} + \frac{P_i - P_H - f - c + S}{2 - I \cdot t(e-b)}
\]

\[
H - \hat{S} \geq P \implies \frac{(b-a)}{2} + \frac{P_i - P_H - e - f + S}{2 - I \cdot t(e-b)}
\]
Proposition 6

The market share of a firm closing a branch between two branches - one belonging to a competitor and one to the same firm - depends on prices, switching costs and location. The branch’s market share is:

\[
\frac{(b-g)l}{2} + \left( P_l + S - P_H \right) l \left( 1 - \frac{\dot{e} t(e-b)}{2} + \frac{\dot{e} (b-a)}{2} \right) \\
I - \dot{e} t(e-b) + S \\
\Psi_H(x \in HG) = \dot{e}
\]
Closing Branch HE in the Edge Adjacent to a Competitor’s Branch (IB), SC apply

Total Costs

$P_i + (x-b) + S$

$P_i + S$

$P_i$

$P_h$

HA IB HE
Branch HD charges the same as the other branches. Its market area is:

\[ \left( \frac{a+d}{2}, \frac{b+d}{2} \right) \]

Its market share \((b-a)/2\), independent of the branch’s location. When the branch is closed, no loss to the firm.