Competitive Franchising

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Motivation

What happens when firms compete using both prices and franchise (or product) locations?

- How does Wendy’s compete against Burger King? Coke vs. Pepsi?

How much profit can firms extract in equilibrium by exploiting endogenous spatial/product-specific heterogeneity?
Infeasible to address both endogenous pricing and multiple franchise location in standard ‘Hotelling’ models.
- Must account for possible asymmetric locations, and hence pricing.
- Would deliver the wrong “economic prediction” that pricing is sensitive to the precise location details of every franchise.
- In practice, what is relevant for the location of Wendy’s franchises are the location of other Wendy’s franchises.
- Uniform pricing across Wendy’s franchises in a given locale.

We develop an analytically tractable model that delivers these features.
- Explicit characterization of the profit consequences of endogenous spatial heterogeneity.
Results

- Zero profits. Firms fail to exploit endogenous spatial heterogeneity.
  - Competition for market share leads to over-provision of franchises.
- Robust to asymmetries (different production costs, different franchise development costs, discrete preference for one good).
  - One firm makes zero profit.
- Only with the addition of a non-contestable heterogeneity do both firms extract positive net profits.
  - But, contestable heterogeneity reduces firm profits below their levels when consumer heterogeneity is solely non-contestable.
Our Approach

Firm A’s spatial circle

Firm B’s spatial circle

Figure: Consumer $c$ receives a location shock, $d_j^c$, for each firm, A and B. Shocks are uncorrelated so points on one circle are uncorrelated with points on the other circle. $l_{ji}$ is the location of firm $j$’s $i$th franchise location.
Independent tastes of product varieties - How you and I perceive the relative merits of Coke and Diet Coke may be different even though we both prefer Pepsi to Diet Pepsi.

Mathematically, what we exploit is that a preference for Diet Coke reveals nothing about the intensity of preference for Diet Pepsi (even though it may reveal a preference of Diet Pepsi to Pepsi).
Discrete Model - Firms

- Two firms, $A$ and $B$, provide a homogeneous product.
- Each firm $i$ is associated with its own spatial circle of length $L$.
- Measure 1 of consumers, uniformly distributed around each circle.
- Constant marginal cost normalized to 0.
- The cost of establishing a franchise is $F$.
- Strategy for firm $j$ - $S_j$ consists of the number of franchises to establish and each franchise’s location and price.
- Firms maximize profit.
Consumers receive utility $V$ from the purchase of the good.

- Constant per unit cost $T$ of travel.
- Consumers receive firm specific location shocks, $d_A, d_B$.
- Location shocks are uncorrelated across firms.
- Consumers maximize utility.
Timing

First  Firms simultaneously choose the number of franchises, and the price and location of each franchise.

Second  Consumers receive location shocks and choose where to purchase the good.

Equilibrium concept is sub-game perfection.
**Step 1** Show that given any network of the other firm, it is a best response for a firm to space its franchises equidistantly and charge the same price at each franchise location.

**Step 2** Examine a representative franchise and characterize equilibrium.
Isolated vs. Connected Franchises.

- A franchise is **isolated** if it does not compete against its own firm franchises for market share.
  - A marginal consumer indifferent between two franchises of firm 1 strictly prefers with probability 1 to patronize a firm 2 franchise.
  - They only compete for customers against the other firm.
- A franchise is **connected** if it competes for customers with both its adjacent own firm franchises, in addition to competing against the other firm.
  - A marginal consumer indifferent between two franchises of firm 1 prefers with probability strictly less than one to patronize a firm 2 franchise.
Lemma

In firm j’s best response, either all franchises are isolated or all franchises are connected.

Why? Otherwise a firm can increase its market share at fixed prices by bringing its isolated franchises marginally closer together and spreading its other franchises marginally further apart.

- The market share of its isolated franchises remains unchanged because these franchises do not compete against each other for customers.
- The market shares of the remaining franchises grow because they compete less aggressively with their neighboring own firm franchises.
Lemma

Suppose firm j’s best response has only isolated franchises. Then firm j’s best response features identical pricing at each franchise and equal market shares.

Lemma

Suppose firm j’s best response has only connected franchises. Then firm j’s best response spaces franchises at equal distances and sets identical prices.

Model delivers key empirical regularities. Prices are independent of the competing firms particular network structure.

- As a corollary of these lemmas we can restrict attention to franchise profiles with uniform price and equidistant spacing.
We now treat the number of firms as a continuous variable - as $L$ gets large this approximation approaches the outcome for an integer number of firms.

- $n_j$ is now the franchise concentration of firm $j$.
- $d_j$ is now the distance from the representative franchise of firm $j$. 
$d_B$  Distance from firm $B$ representative franchise.

Distance from firm $A$ representative franchise.

\[ d_B = d_A + p_A - p_B \]
We assume $n_A > n_B$ so $L/(2n_A) < L/(2n_B)$. 

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\frac{L}{2n_B} 
\]
We assume $p_A > p_B$. 

\[
\frac{L}{2n_B} \quad \frac{L}{2n_A} \\
\]

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d_B \quad d_A \\
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p_A - p_B T \\
\]
$d_B(d_A)$ is the firm $B$ distance shock that makes a consumer indifferent between the two firms.

$$d_B(d_A) = d_A + \frac{p_A - p_B}{T}$$
$d_B(d_A) = d_A + \frac{p_A - p_B}{T}$

$Y_A$ - total demand for firm A’s product.

$Y_B$ - total demand for firm B’s product.
Lemma

If one firm’s price is greater than the other firm’s price then market share for the first firm is greater then market share for the second firm and the second firm’s franchises are isolated in equilibrium.

- For one firm to be able to charge a higher price than the other in equilibrium consumers must be compensated for this by a ‘closer’ store.
- Define the firm with smaller market share as the disadvantaged firm.
Proposition

_In the unique pure strategy equilibrium firms make zero profits._
Zero profit

Proposition

In the unique pure strategy equilibrium firms make zero profits.

Why does a disadvantaged firm make zero profits?

- A disadvantaged firm franchises are isolated.
- Franchise concentration only effects total demand in proportion.
- ‘Constant returns to scale’ technology in franchise reproduction - positive average profits imply positive marginal profits.
Zero profit

Proposition

*In the unique pure strategy equilibrium firms make zero profits.*

Why does an advantaged firm make zero profits?

- If not, the disadvantaged firm has a profitable deviation - imitate the advantaged firm’s strategy.
Zero profit

Proposition

*In the unique pure strategy equilibrium firms make zero profits.*

Why do two symmetric firms make zero profits?

- Each firm has an incentive to increase franchise concentration marginally.
  - ‘Constant returns to scale’ in franchise reproduction means increasing franchise concentration is a positive first order effect.
  - The market share lost per franchise from increasing size slightly is arbitrarily small and second order.
Social Planner’s Problem

- Social planner sets franchise density (restricted to be equal across firms) to maximize total surplus.
- Firms set prices.
- Consumers decide where to shop.
The socially optimal concentration of franchises is less than the competitive concentration.

- In the competitive equilibrium firms use franchise concentration to compete for market share. The result is over-provision.
- Social planner internalizes this externality.
We now relax the symmetrical properties of the economic environment to allow for

1. Firm specific heterogeneity in costs of establishing franchises, $F_A \neq F_B$.
2. Firm specific marginal costs of production, $c_i \geq 0$.
3. Consumers with preferences for one firm’s product: consumers derive a common utility $V + a$ from firm A’s product and $V$ from firm B, where $a$ could be positive or negative.
4. Firm specific heterogeneity in the dimensions of a firm’s spatial environment, $L_A \neq L_B$. 
Proposition

At least one firm earns zero profit in equilibrium.

- Why? At least one firm will have isolated franchises.
- If firm B is disadvantaged ($F_B \geq F_A$, $c_B \geq c_A$, $L_B \geq L_A$, $a \geq 0$ with one strict) then firm B earns zero profits.
  - Obtain optimal strategy and profit of advantaged firm from best response to this.
What is crucial for zero profit?

- Consumer heterogeneity must only exist along endogenous contestable spatial dimensions.
- To show this we add an exogenous non-contestable taste variable $z$ for each consumer to the model.
  - Interpretation: some consumers have an ex ante preference for Wendy’s over Burger King.
  - Consumer taste is $U \sim [-m, m]$
  - Consumer will patronize firm A iff

$$V + \frac{z}{2} - p_A - Td_A \geq V - \frac{z}{2} - p_B - Td_B$$
In the model with contestable and non-contestable consumer heterogeneity firms makes positive profits in equilibrium.

Why positive profits now?

- As with purely contestable heterogeneity, the conditional probability that a consumer with an extreme distant shock for firm $j$ and no preference for one firm over the other, i.e., $d_j = L/(2n)$ and $z = 0$, purchases from firm $j$ is zero.

- But now a consumer with an extreme location shock has no taste preference for one firm over the other only in expectation.

- When a firm reduces its franchise concentration then not all consumers who previously patronized this franchise switch firms.

- The intrafranchise competition for each franchise is positive reducing the incentive to increase franchise concentration.
Endogenous contestable spatial dimension HURTS firms

**Proposition**

*Firms earn larger profits when the only source of consumer heterogeneity is a non-contestable taste dimension than when there is also consumer heterogeneity along a contestable spatial dimension.*

In the presence of contestable heterogeneity, firms fail to exploit non-contestable heterogeneity fully.

- When non-contestable heterogeneity is small, loss in marginal profit is greatest relative to an environment with no contestable heterogeneity.
- When non-contestable heterogeneity is large, the total accumulated profit loss equals the total franchise establishment cost.
Conclusion

- Model delivers empirical regularities on franchise pricing and location.
- Firms fail to exploit endogenous heterogeneity in consumer preferences induced by spatial location.
- Firms over-provide franchises from a social perspective, competing away the rents associated with consumer heterogeneity.
- Both firms earn strictly positive profits only when there is a second non-contestable taste source of heterogeneity that firms can exploit.
- But endogenous franchise provision drives profits BELOW what they would be were there no spatial competition.