Absentee Consumers, Search, Advertising, and Sticky Prices

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PRICE RIGIDITY

Sticky Prices - prices change less frequently than costs (or respond to cost changes with a lag)

Asymmetric – prices rise faster than they fall

Price Rigidity: Prices don't change in the short run

- Menu Costs
- Consumer antagnoism (Rottemberg)
- Search Theoretic (Tappata, Yang and Ye, Cabral and Fishman)

IDEA

Suppose prices have been high for some time, high enough to price low valuation customers out of the market. Then, if there is some cost to learning prices, they might reasonably stop searching – become absentee customers - just like an unemployed worker might eventually stop looking for work.

In that case it will only make sense to reduce prices if you also invest in informing consumers – i.e. advertise. Now, if advertising is costly, a seller might only want to make this investment if he's confident that costs are likely to stay low, at least for some time.

In my model, this confidence increases the longer the cost remains low.

MODEL

- Monopoly seller. Infinite time horizon. Discrete time.

- 2 costs, c_H and $c_L < c_H$

- Consumers: 2 types, search buyers and random buyers (non strategic or zero search cost).

- Proportion of random buyers is α, arbitrarily small.

  A random buyer lives one period, buys if the price $\leq V_R$, $\;V_R > c_H$

Search consumers:

- Infinitely lived
- unit demand per period
- utility from unit is V_0, $c_H > V_0 > c_L$
- To learn the current price, a consumer must either 'search' (visit store) or be informed by advertising. Search costs ω.
- Thus, if the current price isn't advertised, only search if you expect price is low enough to cover the search cost
- Consumers remember past prices that they actually observed (at least from the time of the last purchase). No information about costs.

Evolution of Costs

- There are two cost ‘states’: L (low) and H (high). State indicates 'long term' cost conditions.

- In the L state, $c = c_L$ with probability $\zeta > 0.5$ and $c = c_H$ with probability $1 - \zeta$,

- Similarly in H state, $c = c_H$ with probability $\zeta > 0.5$ and $c = c_L$ with probability $1 - \zeta$

- Cost state evolves as a markov chain, with persistence probability $\gamma > 0.5$.

Seller

- Seller knows s_{t-1} and c_t but not s_t.

- Thus, if $s_{t-1} = H$ and $c_t = c_L$, the low cost may be due either to a state change or may be just a temporary fluctuation.
  And similarly if $s_{t-1} = L$ and c_t.

- Advertising : costs A (fixed), reaches all consumers and commits seller to advertised price at current period

- Seller's strategy: price and advertising

Equilibrium

- If $\omega = 0$ or $A = 0$ and α is sufficiently small, the unique equilibrium prices are: V_0 when $c = c_L$

  and V_R when $c = c_H$

- Things are more complicated if $\omega > 0$ and $A > 0$, because consumer search decision depends on expectations about price. Thus many equilibria.

  Let $[H, c_i]$, $[L, c_i]$ $i = L, H$, denote cost 'conditions', where L, H is the state at *preceding* period.

- **Lemma**: In any equilibrium, if η and γ are sufficiently small, $p_t = V_R$ if $t \in [H, c_H]$

- **Proposition**: Consider equilibria in which search customers buy at $t \in [L, c_L]$. Then if A is large (relative to one period profit) and γ, η are sufficiently large (costs change infrequently), and if $p_{t-2} = p_{t-1} = V_R$, then $p_t =$ V_R if $t \in (H, c_L)$

Sketch of Proof

- If $p_{t-2} = p_{t-1} = V_R$, search customers don't search at period t.

- Therefore seller must advertise to sell to them. Given uncertainty about state change, if A is large, better to delay price change till better information is available

- Thus, downward price rigidity if cost changes are infrequent.

- What about upward rigidity? If price has been low and search customers have been buying, a price rise which might be temporary needn't cause them to stop searching. By contrast, in the case of price reduction, search customers are already out of the market and are unaware of it.

Constructing an Equilibrium

If A, γ, η and δ are sufficiently large, α and ω are sufficiently small, there exists $p_0, \quad c_L < p_0 < V_0 - 2\omega$ such that the following is an equilibrium:

Seller Strategy:

(i) If $t \in [H, c_H], \quad p_t = V_R$

(ii) if $t \in [L, c_L]$: $p_t = p_0$; if consumers dont search, advertise p_0

(iii) If $t \in [L, c_H]$: $p_t = \left\{ \begin{array}{c} V_R \quad \text{if } p_{t-1} = p_0 \\ p_0 \text{ if } p_{t-1} = V_R \text{ and} \\ \text{consumers search} \end{array} \right\}$

.

(iv) if $t \in (H, c_L)$: $p_t = \left\{ \begin{array}{cc} V_R \text{ if } & p_{t-1} = p_{t-2} = V_R \\ p_0 & \text{otherwise} \end{array} \right\}$

Consumer strategy:

Search if and only if :

$p_{t-1} \leq p_0$ or if $p_{t-1} = V_R$ and $p_{t-2} \leq p_0$.

Equilibrium Cycle:

- Advertise p_0 if $t \in [L, c_L]$ and consumers have stopped searching.

- Price continues to be p_0 as long as the cost is low.

- Price increases to V_0 when cost goes up.

- If $t-1 \in [L, c_H]$, $t \in [L, c_H]$ and consumers are still searching, $p_t = p_0$.

Thus prices are sticky downwards much more often than upwards.

Empirical Implication: Temporary Cost reductions lead to price hikes less often (never, in this model) than longer term reductions.

Model sans Advertising- Consumers learn unobserved past prices with one period lag.

Discussion of Assumptions

- Seller never observes s
- Markovian costs? No
- More costs, More consumer types