1.

Burdett and Judd

"Equilibrium Price Dispersion"

① identical, rational agents on both sides

vs.

② consumers know distribution of prices and search at a cost. Some consumers must have zero incremental search cost. Nonsequential or multiple quotations

Noisy Sequential

Stigler — optimal consumer search, but firms are not optimally pricing.

Diamond — If consumers search sequentially and have search cost $c > 0$, all firms choose the monopoly price or reservation value. If c is paid for the first search as well, market collapses.

Model

N firms μ customers per firm

r marginal cost

$F(p)$ dist. of prices prob.(price $\leq p$)

p^* reservation value

profit $\pi(p)$ really, $\pi(p; \overset{\text{other prices}}{p_{-f}}, \text{search rule})$

$r \leq p \leq p^*$

Assume for now that search rule is: observe n prices and purchase at lowest price if less than $\tilde{p}$ (willingness to pay). Otherwise, keep searching.

$$\left(\langle q_n \rangle_{n=1}^{\infty}, \tilde{p} \right)$$

q_n probability that a consumer observes n prices (n is random)

Def. A firm equilibrium is $(F(\cdot), \pi)$ where $\pi(p) = \pi$ $\forall p$ in support of F

$\pi(p) \leq \pi$ $\forall p$.

[$F(\cdot)$ results from mixed strategies of firms] lemma 1 If $q_1 \neq 1$, either $F(\cdot)$ is continuous with connected support or concentrated at r.

proof If $F(\cdot)$ has a discontinuity, lower the price slightly and beat all firms at the mass point. Positive probability of being in competition $q_1 \neq 1$, so deviation is profitable unless concentrated at r.

If $F(\cdot)$ is constant between p_1 and p_2, firm charging p_1 should raise price ∎

(1) $$\pi(p) = (p-r)\mu \sum_{k=1}^{\infty} q_k \, K \left(1-F(p)\right)^{k-1} \quad \text{if } p \leq \hat{p}$$

your firm getting searched is proportional to k

prob. k searches

prob. other k-1 have higher prices

lemma 2 p. 960

3 possible firm equilibria: ① monopoly with $q_1 = 1$, ② C.E. with $q_1 = 0$, or $0 < q_1 < 1$ and $\tilde{p} = r$, and ③ dispersed price eq. $0 < q_1 < 1$, $\tilde{p} > r$

<u>nonsequential search</u> suppose there is a resource cost and a time cost (mailing letters)
cost of n quotes is cn

$$E(\text{cost}) = cn + \int_0^\infty n\, p\, (1-F(p))^{n-1}\, dF(p)$$

binomial term $\binom{n}{1}$

lowest price (price paid)

other prices higher

<u>convex</u> function of n with unique minimum
either n^* minimizes cost, or n^* and n^*+1 both minimize cost.

willingness to pay is p^*

$\boxed{\text{Definition of Eq. pp 961-2}}$

<u>Thm 1</u> p. 962 Always monopoly eq., never CE.

<u>Thm 2</u> p. 962

5.

Claim 1 $\quad q_1 + q_2 = 1 \quad q_1 > 0$

If all consumers search more than once, firms will set $p = r$, but consumers would search once. Either $q_1 = 1$ or searching 1 or 2 times minimizes cost.

$\therefore \quad q_1 \equiv q \qquad q_2 \equiv 1 - q$

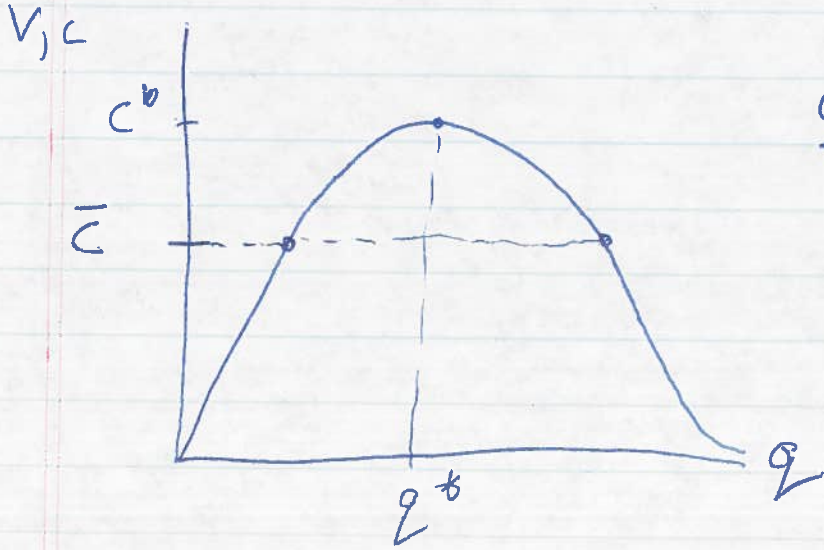
Claim 2 $\quad$ (a) follows from (iii)

(b) solves for $F^q(p)$

(c) $\underline{p}(q)$ occurs when $F^q(p) = 0$

$V(q)$ expected reduction in purchasing price from observing 2 quotes instead of 1.

Consumers are indifferent when $V(q) = \overline{c}$



Claim 3 can actually calculate $V(q)$

Noisy Search

pay c $\qquad$ q_k : prob. seeing k quotes in one search.

willingness to pay: $\quad \tilde{p} = \min(p^*, z)$

where z is the cutoff price that minimizes the expected cost of purchasing 1 unit.

$J(\cdot)$ dist. of lowest price

$$J(p) = \sum_{k=1}^{\infty} q_k \underbrace{\left(1 - (1-F(p))^k\right)}_{\text{at least one price (the lowest) lower than } p}$$

k prices higher than p

def. of z: $\qquad c = \int_0^z (z-p)\, dJ(p)$

- No firm will set a price higher than $\tilde{p}$, so no consumer will face a price above $\tilde{p}$. Therefore, search once.

Just like previous section, except $\langle q_n \rangle_1^\infty$ are exogenous.

$q_1 = 1$ monopoly equil. (Diamond)

$q_1 = 0$ C.E. $p = r$

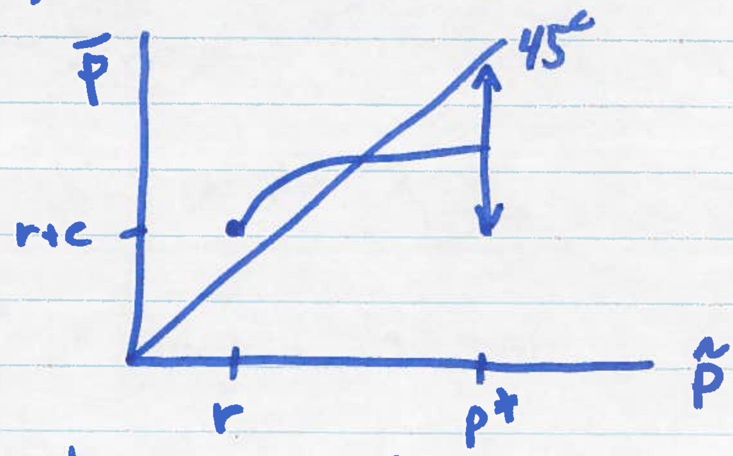
<u>$0 < q_1 < 1$</u> Lemma 2 $\Rightarrow$ unique dispersed price eq. for given $\tilde{p}$.

$\tilde{p} \longrightarrow$ firm equil. $\longrightarrow$ actual w.to pay $\bar{p}(\tilde{p})$

look for fixed point, $\bar{p}(\tilde{p}) = \tilde{p}$

$\bar{p}(r) = r + c$

$\bar{p}(p^*) \leq p^*$



$\bar{p}$ is continuous, so must cross 45° line.

Thm 4

- Dispersed prices are an equilibrium, long-run phenomenon. Does not rely on heterogeneity.
- Prescott Model