Entry, Exit, Industry Dynamics

Short-Run - use price or quantity setting; each firm has a downward sloping demand curve; we know how to model this
Long-Run - if incumbent firms make positive profit, other firms want to enter
Bresnahan & Reiss - study what happens to firm behavior when firms enter


Previous Stuff - theory on imperfect competition (two extremes)
  Contestable Market Models - argue that a threat of entry curbs market power

Contribution - develop empirical model of entry for situations where price-cost margins aren’t observed; builds on Chamberlin (1933) and Panzar & Rosse (1987)
Entry Threshold - measure of the market size required to support a given number of firms
Result - ratio of entry thresholds provide scale-free measures of entry’s effect on market conduct

Theory -
  Demand - \( Q = d(Z, P)S(Y) \), where
    \( d(Z, P) \) is demand of representative consumer; \( P \) = market price
    \( S(Y) \) = number of consumers; \( Y \) & \( Z \) demographic variables affecting demand
  Assumption - specification assumes if number of consumers doubles, then demand doubles (at given price);
  Fixed Cost - \( F(W) \), where \( W \) = exogenous variables affecting costs
  Marginal Cost - \( MC(q, W) \), where \( q \) = firm output
  Assumption - firms have U-shaped average total cost

Assumptions -
  - Homogeneous product
  - Identical potential entrants
  - Identical incumbents in long-run (see graph)
    Monopolist - zero profit, but large price-cost margin \( (M_1) \); not efficient because \( M_1 > 0 \) (i.e., \( P > MC \))
    Perfect Competition - zero price-cost margin
  Trick - price-cost margin steady declines between monopoly and perfect competition... similar to output per firm rising steadily
  Monopoly - \( \pi_1(S_1) = [P_1 - AVC(q_1, W)]d(Z, P_1)S_1 - F = 0 \)
  Entry Threshold - need at least this many people to stay in business in the long-run:
    \[ S_1 = \frac{F}{[P_1 - AVC(q_1, W)]d(Z, P_1)} \]
2 Firms - harder to figure out the entry threshold; depends on how they compete (quantity, price, collusion, etc.)

Perfect Competition - \( S_\infty = \lim_{N\to\infty} S_N / N \) (not very useful for empirical work)

Change in Threshold - B&R go through developing formulas for \( S_N \) & \( S_{N+1} \), but we really don’t need that; "let's just imagine what's going to happen"

Ai's Version - \( \frac{S_N}{N} = \frac{S_{N+1}}{N+1} \Rightarrow \) same output per firm (∴ perfect competition)

B&R's Version - \( \frac{S_{N+1}}{S_N} = \) change in output per firm from new entrant

"scale-free measure of competition is bounded below by unity and increases with a steepening of the monopolist's demand curve"

Simulated Data - B&R use simulated data (using cost functions) to show as \( N \) increases both price-cost margins and \( \frac{S_{N+1}}{S_N} \) decrease at decreasing rate

Example: \( \frac{S_\infty}{S_4} = 1.05 \) so quadropolist serves 5% fewer customers than competitive firm

If \( \frac{S_{N+1}}{S_N} = 1.0 \), there is no change in output so B&R assume it's perfect competition

Data - 202 isolated local markets; tight restrictions on geography to ensure population is entire market and able to identify all relevant competitors (e.g., at least 20 miles from the nearest town of 1,000 people or more; exclude towns within 100 miles of a city of 100,000)

Size Classes - looking at 0, 1, 2, 3, 4, or ≥5 firms in the market

Industries - part of identifying relevant competitors requires narrowly defined product or service, but also wanted at least 10 observations in each size class; only found 5 industries: doctors, dentists, druggists, plumbers, and tire dealers

Model - uses market size variable \( S(Y) \) to predict the number of active firms

Rationality - contestable market condition: \( \pi_N > 0 \) and \( \pi_{N+1} < 0 \)

Profit - \( \pi_N = S(Y, \lambda)V_N(Z, W, \alpha, \beta) - F_N(W, \gamma) + \epsilon = \bar{\pi}_N + \epsilon \)

\( \lambda, \alpha, \beta, \gamma \) are profit function parameters

Error Assumption - \( \epsilon \sim N(0, \sigma^2) \) and doesn't change with \( N \) ("normal distribution that is independently distributed across markets and is independent of our observables. We also assume that \( \epsilon \) has zero mean and a constant variance and that each firm within a market has the same profit error. This last assumption presumes that successive entrants' profits differ only through the deterministic variables.")

Profit Assumption - \( \pi_1 \geq \pi_2 \geq \pi_3 \geq \pi_4 \geq \pi_5 \)

Ordered Probit Model - # firms is dependent variable

Likelihood Functions - \( \Phi(\cdot) = \) cumulative normal distribution function

No Firms - \( \Pr[\pi_1 < 0] = 1 - \Phi(\pi_1) \)

5 or More - \( \Pr[\pi_5 \geq 0] = \Phi(\pi_5) \)

# Firms - \( S(Y, \lambda) = \) town population (within 10 miles of center) + \( \lambda_1 \) nearby population + \( \lambda_2 \) positive growth + \( \lambda_3 \) negative growth + \( \lambda_4 \) commuters out of the county
**Profit per Customer** - \( V_N = \alpha_1 + X\beta - \sum_{n=2}^{N} \alpha_n \) (where \( X = [W, Z] \))

\( V_i = \alpha_1 + X\beta = \text{profit per customer for monopolist} \)

\( X \) uses county-level census data (per capital income, number of births, number of elderly residents)

\( \alpha_n = \text{fall in profit per customer when } n \text{ th firm enters} \)

**Fixed Cost** - \( F_N = \gamma_1 + \gamma_L W_L - \sum_{n=2}^{N} \gamma_n \)

\( F_i = \gamma_1 + \gamma_L W_L = \text{monopolist's fixed cost} \)

\( \gamma_n \) allows later entrants to have higher costs

\( \hat{\gamma}_1 + \hat{\gamma}_L \bar{W}_L - \sum_{n=2}^{N} \hat{\gamma}_n \)

**Entry Thresholds** - \( S_N = \frac{\hat{\gamma}_1 + \hat{\gamma}_L \bar{W}_L - \sum_{n=2}^{N} \hat{\gamma}_n}{\hat{\alpha}_1 + \hat{X}\hat{\beta} - \sum_{n=2}^{N} \hat{\alpha}_n} \) (not a linear model)

**Results** - 2\textsuperscript{nd} or 3\textsuperscript{rd} entrant brings majority of competition

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**Robustness Check** - reduce to size classes to 0, 1, 2, 3, ≥4 which increases the number of industries to 8; heating contractors & barbers have similar pattern; last industry is car dealerships which still have \( S_4/S_3 = 4/3 \) (excuse given is that fourth dealership is typically another GM dealer [introduces intrabrand competition; firm doesn't require as much demand])

**Prices** - also ran a regression on tire dealer prices; adding one firm or two results in price increase of $1.88; adding third, fourth or fifth firm lowers price by $1.80