Before there was "New" Empirical IO

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Grad IO

Conjectural Variations

- If I change my quantity, why doesn't my rival?
- Biggest complaint about Cournot is that we hold quantities of competitors fixed
- Suppose we did not so that $\frac{\partial Q_i}{\partial q_i} = (1 + \frac{\partial Q_{-i}}{\partial q_i})$.
- Marginal Revenue becomes:

$$P + P'(Q) \cdot q_i \cdot \underbrace{\left(1 + \frac{\partial Q_{-i}}{\partial q_i}\right)}_{\theta_i}$$

- $\frac{\partial Q_{-i}}{\partial q_i} = -1$ or $\theta_i = 0$ corresponds to competition/Bertrand (aggregate Q is unchanged).
- $\frac{\partial Q_{-i}}{\partial q_i} = 0$ or $\theta_i = 1$ corresponds to the Cournot model.
- $\frac{\partial Q_{-i}}{\partial q_i} = N - 1$ or $\theta_i = N$ corresponds to the joint profit maximization
- This was great for applied theory, now I can nest all of the classic models (PC, monopoly, Cournot) with a single parameter.

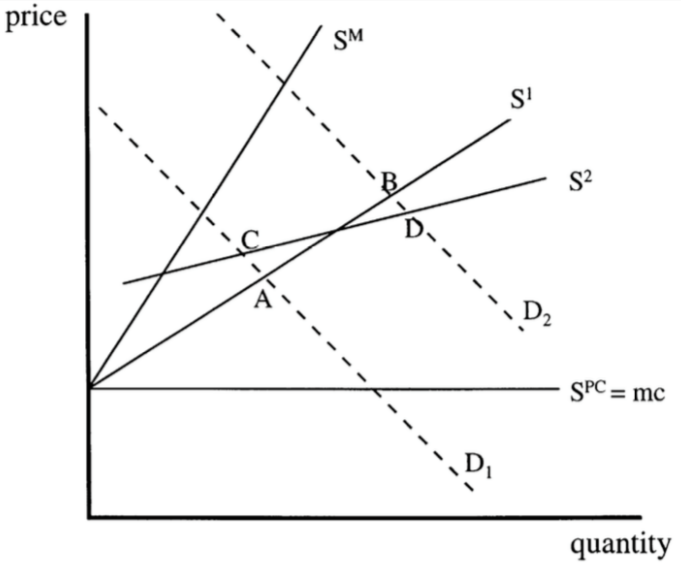
Conjectural Variations: Issues

- On one hand seems like more flexibility was a good thing.
- On the other hand with some θ_i we can justify nearly anything.
- Two questions
  1. Can we expect to recover θ_i from data?
  2. What about consistent conjectures (ie: suppose I require firms to actually want to respond in the way that I believe they will).

Consistent Conjectures

- Bresnahan (1981) posed the consistent conjectures hypothesis (one unique conjecture that satisfied all FOCs simultaneously).
- Large theory literature that followed [see Daughety (1985) or Lind(1992)] show Cournot $\theta_i = 0$ is the only consistent conjecture absent some knife-edge cases.
- This basically meant that CV approaches fell out of favor with game theorists by the late 1980s/early 1990s.
- Things are even more problematic for dynamic models.
- The approach persisted in empirical work until Corts (1999) [more on this later].

Can/Should we try and recover θ_i from data?



Testing S-C-P

Can we test for relationship between performance and market structure?

- Positive correlation between HHI and market power.
  - Usually easy to measure concentration (sort of)
  - Measuring Profits is tough:
    - Accounting profits: taxes and depreciation aren't really very close $P - MC$.
    - Tobin's Q
    - The Lerner index: $(P - MC)/P$
  - We don't usually get to observe MC in data.
    - Maybe we see something like total revenue or total variable cost and units sold.
    - Have to use unit values $(P - AVC)/P$ which is okay if $AVC \approx MC$ and our firm sells only a single product at a single P.
    - Trade data sometimes looks a bit like this today...

S-C-P paradigm and empirical work

Bain (1951)

- Census data was across industries but not firm-level data.
- Prices are hard to compare across industries (for obvious reasons)
- Profits/Markups are easier to measure and compare across industries
- Firms make profits was an important stylized fact at the time.

Why do we care?

- The whole basis for modern antitrust and regulation is based on the relationship between concentration and market power.

S-C-P regressions #1

$$y = \beta_0 + \beta_1 \cdot HHI + \gamma X + \varepsilon$$

- Using y as profit measure and each observation a different industry.
- Idea is that $\beta_1 > 0$ meant increased concentration meant higher profits (or prices).
- Lots of different X's (controlling for returns to scale, R&D, etc.): anything that shifts profits that isn't competition.
- We should probably worry that $E[\varepsilon|H, X] = 0$ or that factors might be correlated with both profitability and concentration in unobservable ways.
  - Is Google or Facebook or Apple highly profitable because of concentration?
- Structure, Prices, and Profits are likely simultaneously determined.

S-C-P regressions #2

$$y_{if} = \beta_0 + \beta_1 \cdot HHI_i + \beta_2 s_{if} + \gamma X_i + \varepsilon$$

- One critique (associated with Demsetz (1973) and the Chicago School) was the following
  - With firm level data if we include share of the firm s_{if} the coefficient on that β_2 was positive and significant but any effect on β_1 became insignificant.
  - Even when it looked like concentration led to high prices, it meant that share was correlated with high prices
  - Chicago School took this as vindication of idea that larger firms were more efficient, had lower costs, etc.
  - Of course this is also what would be predicted from a standard Cournot model...

S-C-P: Schmalensee 1989

A huge handbook chapter summarizing the early literature that collected stylized facts.

- Correlations among accounting profit measures are high but correlations between accounting measures and price-cost margins are low and results depend on which type of measure is used.
- Cross industry accounting rates of return are too low to reconcile with standard monopoly models.
- Accounting profitability differences among large firms are highly persistent
- Industry characteristics account for only 10-25% of cross sectional variation in accounting rates of return
- Recent revenue growth is positively correlated with profitability
- Relation between profitability and concentration is weak and effect is usually small. This relationship is not stable over time or industry and disappears with various controls.
- Measures of scale economies or capital requirements are positively correlation with industry-level accounting profits
- R&D is positively related to profits but effect varies with HHI.
- Profitability of largest firms is correlated with industry HHI not true for smaller firms.

S-C-P: What Happened?

- Hundreds of papers written looking at correlations between HHI and π or PCM.
- This literature has been dead for a while.
  - We moved on from descriptive correlations to causes.
  - We generally need more of a theory to ascertain causes.
  - Data on individual industries and firms has gotten much better over time.
- There are still lots of papers that try and infer causality from regressions like

$$\pi_{it} = \alpha + \gamma HHI_{it} + \beta X_{it} + \epsilon_{it}$$

- Mostly they will get rejected from journals if an IO economist sees it.
- Market structure is endogenous and there is no instrument for HHI.
- Supply and demand are determined simultaneously (so real problem is worse).

S-C-P: Macro Comeback?

Many of these old ideas are being "rediscovered" today.

- Use `COMPUSTAT` data on publicly traded firms.
  - Use 2/6-digit NAICS or SIC classification
  - Use revenues instead of quantities to compute HHI.
  - Use accounting profit measures (ROE,ROA, Revenues/Cost of Goods).
- Slightly better, use Manufacturing Census data.
- But what is a market? What are right measures of market power, profits, etc.?