THE EFFECT OF COMPETITION AND PRICE DISPERSION ON SEARCH BEHAVIOR

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Price dispersion: why do we care?

• Simple models of competitive markets for homogeneous products suggest that all-out competition among firms will lead to the so-called “law of one price”.

• Yet, empirical studies spanning more than four decades reveal that price dispersion is the rule rather than the exception and has significant distributional consequences.

• Hal Varian (1980): “the “law of one price” is no law at all”!

• Internet/mob apps have led to dramatic decline in consumer search costs; do we see more price convergence now?

• What is the effect of competition on price dispersion?

• Retail gasoline particular attention: competition vs. transparency facilitating collusive behaviour
Outline

1. Insights from economic theory

2. Evidence from empirical research

3. Competition and Price Dispersion: some new evidence
“Search-theoretic” models: consumers searching for the best price incur a positive cost of obtaining each additional price quote.

- Search costs consist of **consumers opportunity cost** of time in searching for lower prices (so-called “shoe-leather” costs), plus **other costs** associated with **obtaining price quotes** from competing firms (such as the incremental cost of phone calls used in acquiring price information from firms).

- Consumers in these environments weigh the cost of obtaining an additional price quote against the expected benefit of searching an additional firm.

“Information clearinghouse”: a subset of consumers gain access to a list of prices charged by all firms (e.g. newspaper, price comparison website or mob apps) and purchase at the lowest listed price.

- In the earliest models, equilibrium price dispersion stems from **ex ante** heterogeneities in consumers or firms.

- Latest models, **endogenizes** not only the decisions of firms and consumers to utilize the information clearinghouse, but also the fees charged by the “information gatekeeper” (owner of the clearinghouse) to consumers and to firms who wish to access or transmit price information.
1. There is not a “one-size-fits-all” model of equilibrium price dispersion, need to adjust to the market environment in question.

2. The distribution of prices is determined by the interaction of all market participants (firms, consumers, information gatekeepers), hence the level of price dispersion depends on the market structure.

3. Reductions of search costs may lead to either more or less price dispersion, depending on the market environment.

4. Also, depending on the market environment, increased competition can increase or decrease the level of dispersion.
Empirical Analysis of Price Dispersion

1. Value of Information
   \[ \text{VOI}_i = \overline{p_{m_i}} - p_{\text{min}} \]

2. Range
   \[ \text{Range}_i = p_{\text{max}} - p_{\text{min}} \]

3. Standard Deviation of Price
   \[ \text{Sdt}_{it} = \text{std}(p_{it}) \]

4. Two Step Model
   - Regress prices on characteristics
   - Use the squared residuals
1. Price dispersion is ubiquitous and persistent.
2. Theory is useful for understanding dispersion data and dispersion data is useful for discriminating among alternative theoretical models.
3. The relationship between price dispersion and economic primitives is often sensitive to the measure of price dispersion used.
4. Despite the widespread adoption of inventions (such as the automobile, the telephone, television, and the Internet), price dispersion is still the rule rather than the exception in homogeneous product markets.
What about the effect of competition?
Retail competition = firms located within a given geography
What is the right geographical market definition?
With no clear definition of market boundaries, researchers and policy makers define markets based on arbitrary distances across retail shops:
  • X-kilometer radius
  • X-kilometer distance (road structure)
  • X-minute drive time (road structure + geography)
➢ But firm location \textit{endogenous}! Entry literature in Industrial Organization
Competition, Price Dispersion and Search

Competition

Price Dispersion

Search
1. Insights from economic theory

2. Evidence from empirical research

3. Competition and Price Dispersion: some new evidence
This paper’s story:

- Exogenous variation in market size (Greek islands)
- Identify a significant and unexpected common cost shock (Jan 2017)
- Good control for local market conditions identifies the causal pass-through
- Measure the impact of competition on price dispersion
- Measure the impact of PD and competition on search

Our goal: combine exogenous variation and event study to disentangle the impact of PD and competition on search behaviour by consumers.
Data

- Daily station-level retail prices for all available gasoline products across Greek islands for 2016-2017 from the Ministry of Development & Competitiveness (e-prices.gr)

- Socio-economic (education, income, tourists etc) and geographic (size, distance from Piraeus/land) characteristics of each island from the Hellenic Statistical Authority

- Mobile and desktop app (fuelGR) making this info user friendly

- Key: isolated markets with captive consumers
Greek islands
App data (Agistri)
Excise duty tax evolution

\[ P_{retail} = (P_{refinery} + \text{taxes}\&\text{fees} + \text{margins})(1 + \text{VAT}) \]
Methodology

- Difference-in-Differences framework:
  \[ P_{kist} = \rho Tax_{kt} + \lambda_t + \lambda_{ks} + \varepsilon_{kist} \]
  for product \( k \), on island \( i \), in gas station \( s \), on day \( t \).
- Time window: 10-day \( \{\tau - 1, \tau + 10\} \)
- Controls: product-station FE, day (doy) FE
- Standard errors clustered at the station level
- **Identification**: control group (heating diesel) allows us to identify pass-through
Almost complete overall pass-through

Average Pass-through after 10 days = 82.5% (65% - 100%)
Tax shock increases Price Dispersion

All different measures of PD increase following the increase in prices.
Using 2016 data only: PD, however measured, is positively correlated with competition.
Search goes up only when prices change

Event study methodology where the event = first price change in each gas station after the tax increase.
Search responds to the actual price change and NOT to the public announcement.

Do people start searching after hearing the news OR when prices change?
To examine this question we look at the islands where the first price increase happens 2 or 3 days AFTER the tax announcement.

Event study methodology of search on the app on day indicators around the first ACTUAL price change that happens 2 or 3 days AFTER the tax announcement.
Price Dispersion exhibits a concave relationship with Search

Using 2017 data: PD, however measured, exhibits a concave relationship with search.

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Conclusions

✓ Disentangle the effect of Competition and Price Dispersion on consumer search behaviour in the “clean” environment of Greek islands.

✓ Tax shock → ↑ Prices → ↑ Price Dispersion → ↑ search

✓ Higher Competition leads to higher Price Dispersion

✓ Higher Price Dispersion leads to higher Search (linear in the event, concave for the whole year)
Competition and Prices

[Graphs showing price dispersion across different regions and the number of gas stations]


- Retail diesel price per gas station (Jan 2010) and retail heating price per gas station (Jan 2010) plotted against the number of gas stations.
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