Market segmentation through information

Matthew Elliott  
Cambridge

Andrea Galeotti  
LBS

Andrew Koh  
MIT

Wenhao Li  
Penn State

February 24, 2022

Alumni Talk
Big data and internet platforms

- Internet platforms collect vast amounts of consumer data
- Use that data to target advertisements
- Which can include discounts
- Is this a problem?
Regulatory view

Economic reasoning suggests that differential pricing, whether online or offline, can benefit both buyers and sellers, as described above. Thus, we should be cautious about proposals to regulate online pricing—particularly if we believe that online markets are particularly competitive.

Council of Economic Advisors’ (CEA) 2015 report on big data and price discrimination.

Similar quotes from other antitrust regulators
Data enabled price discrimination

- Discrimination is an emotive word, but price discrimination can be good for consumers.

- Two standard benchmarks are when competing firms have no information versus perfect information.

- Under perfect information outcomes are efficient—typically not the case with no information.

How should we think about grouping consumers in such ways?
Data enabled price discrimination

- Discrimination is an emotive word, but price discrimination can be good for consumers.

- Two standard benchmarks are when competing firms have no information versus perfect information.

- Under perfect information outcomes are efficient—typically not the case with no information.

- However, information can be used by internet platforms in more subtle ways than this.

- For example, Google’s Privacy Sandbox algorithmically groups users into flocks:
  - Based on platforms’ information about consumers.
  - Platform discloses only the group an individual belongs to advertisers.

- How should we think about grouping consumers in such ways?
Example: The power of information

- **Science Museum (SM)**
  - Annie’s values: $8 for SM, $2 for NHM
  - Bob's values: $6.5 for SM, $3.5 for NHM

- **Natural History Museum (NHM)**
  - Chloe’s values: $3.5 for SM, $6.5 for NHM
  - Denzil’s values: $2 for product SM, $8 for product NHM

- Prices:
  - $8 for product SM
  - $8 for product NHM

Competitions lead to discounted prices.
Example: The power of information

![Graph showing producer surplus and consumer surplus with a point labeled No information at the intersection of the axes.]

- **Producer surplus**
- **Consumer surplus**

The graph illustrates the concept of producer surplus and consumer surplus in an economic context. Each consumer in its own flock tends to have high values, while some consumers might not be interested in the product at all. This scenario is explored under two types of information: Partial Information (type II) and Full Information (type I).

- **Partial Information (type II):** Consumers are more information-sensitive, leading to higher producer surplus and consumer surplus.
- **Full Information (type I):** Consumers are less information-sensitive, resulting in lower producer surplus and consumer surplus.

The graph highlights the importance of information in market dynamics, emphasizing how different levels of information can affect economic outcomes such as surplus.
Example: The power of information

Full Information: Each consumer in its own flock

Annie’s values:
$8 for SM
$2 for NHM

Chloe’s values:
$3.5 for SM
$6.5 for NHM

Bob’s values:
$6.5 for SM
$3.5 for NHM

Denzil’s values:
$2 for SM
$8 for NHM

Price=$8

Science Museum (SM)

Natural History Museum (NHM)
Example: The power of information

Annie’s values:
- $8 for SM
- $2 for NHM

Bob’s values:
- $6.5 for SM
- $3.5 for NHM

Chloe’s values:
- $3.5 for SM
- $6.5 for NHM

Denzil’s values:
- $2 for SM
- $8 for NHM

Competitions leads to discounted prices:
- $6 for SM
- $0 for NHM
- $3 for SM
- $0 for NHM
- $3 for SM
- $0 for NHM
- $6 for NHM

Price=$8

Science Museum (SM)

Natural History Museum (NHM)
Example: The power of information

- Annie's values: $8 for SM, $2 for NHM
- Bob's values: $6.5 for SM, $3.5 for NHM
- Chloe's values: $3.5 for SM, $6.5 for NHM

Now prices target just the high value consumers in a flock:

- Annie's values: $8 for SM, $2 for NHM
- Bob's values: $6.5 for SM, $3.5 for NHM
- Chloe's values: $3.5 for SM, $6.5 for NHM

Partial Information: Two flocks (type II)

Now firms choose to compete for consumers:

- Annie's values: $8 for SM, $2 for NHM
- Bob's values: $6.5 for SM, $3.5 for NHM
- Chloe's values: $3.5 for SM, $6.5 for NHM
- Denzil's values: $2 for product SM, $8 for product NHM

Competitions lead to discounted prices:

- Consumer surplus: 16
- Producer surplus: 29

Information: Each consumer in its own flock

Price=$8

Science

Museum (SM)

Natural History

Museum (NHM)
Example: The power of information

Partial Information: Two flocks (type I)
Example: The power of information

Annie’s values:
- $8 for SM
- $2 for NHM

Chloe’s values:
- $3.5 for SM
- $6.5 for NHM

Bob’s values:
- $6.5 for SM
- $3.5 for NHM

Denzil’s values:
- $2 for SM
- $8 for NHM

Now prices target just the high value consumers in a flock:

- $8 for SM
- $6.5 for NHM
- $6.5 for SM
- $8 for NHM

Price=$8
Science Museum (SM)

Price=$8
Natural History Museum (NHM)
Example: The power of information

- Full information: Price=$8
- No information: Price=$8

Producer surplus
Consumer surplus

Flocks Type I
Flocks Type II

Bob's values:
- $6.5 for SM
- $3.5 for NHM

Annie's values:
- $8 for SM
- $2 for NHM

Chloe's values:
- $3.5 for SM
- $6.5 for NHM

Denzil's values:
- $6 for NHM
- $3 for SM
- $0 for NHM
- $0 for SM
- $3 for NHM
- $6 for NHM

Competitions lead to discounted prices:
Now firms choose to target just the high value consumers in a flock:

Now prices target just the high value consumers in a flock:
Example: The power of information

Partial Information: Two flocks (type II)

Annie’s values:
- $8 for SM
- $2 for NHM

Chloe’s values:
- $3.5 for SM
- $6.5 for NHM

Bob’s values:
- $6.5 for SM
- $3.5 for NHM

Denzil’s values:
- $2 for SM
- $8 for NHM

Price=$8

Science Museum (SM)

Natural History Museum (NHM)
Example: The power of information

Annie’s values: 
- $8 for SM
- $2 for NHM

Bob’s values: 
- $6.5 for SM
- $3.5 for NHM

Chloe’s values: 
- $3.5 for SM
- $6.5 for NHM

Denzil’s values: 
- $2 for SM
- $8 for NHM

Now firms choose to compete for consumers:

- Science Museum (SM): $3 for SM, $0 for NHM
- Natural History Museum (NHM): $0 for SM, $3 for NHM

Price=$8

Consumer surplus
Producer surplus
$16
$29
$0
$29
$0
$18
$17
$12

Full information
Partial Information: Two flocks (type II)
No information
Flocks Type I
Flocks Type II

Now prices target just the high value consumers in a flock:
Example: The power of information

- **Flocks Type I**
- **Flocks Type II**
- **No information**
- **Full information**
General result: The power of information

- Consumer surplus
- Producer surplus

No information

Full information

Firm optimal outcome

Consumer optimal outcome
Flocks: The devil is in the detail

Flocks to benefit firms:

- Annie’s values:
  - $8 for SM
  - $2 for NHM
- Chloe’s values:
  - $3.5 for SM
  - $6.5 for NHM
- Bob’s values:
  - $6.5 for SM
  - $3.5 for NHM
- Denzil’s values:
  - $2 for SM
  - $8 for NHM

Partial Information:
- Two flocks (type I)

Maximizes producer surplus

- Groups customers with different preferred products
- Incentivizes niche pricing strategies

Flocks to benefit consumers:

- Annie’s values:
  - $8 for SM
  - $2 for NHM
- Chloe’s values:
  - $3.5 for SM
  - $6.5 for NHM
- Bob’s values:
  - $6.5 for SM
  - $3.5 for NHM
- Denzil’s values:
  - $2 for SM
  - $8 for NHM

Partial Information:
- Two flocks (type II)

Maximizes consumer surplus

- Groups customers with same preferred product
- Incentivizes mass pricing strategies