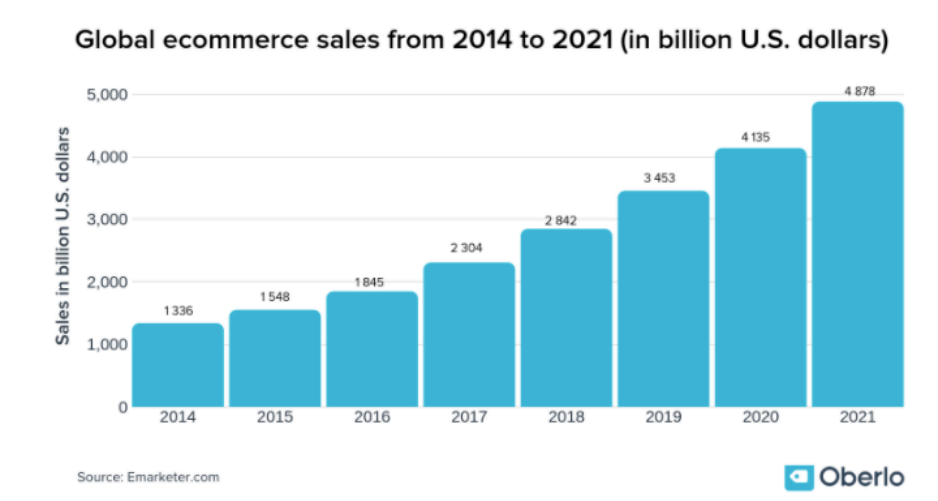
CONSUMER SEARCH AND PRICE COMPETITION IN THE DIGITAL MARKET

How are firms impacted by the consumer search behavior?
A case study of search strategies in U.S. online book retailing

Motivation



Traditional vs. Online shopping

Top Ecommerce companies: (by revenue)

1. Amazon – United States
2. Jingdong – China
3. Alibaba – China
4. Ebay – United States
5. Rakuten – Japan
6. B2W – Brazil
7. Zalando – Germany
8. Groupon – United States

Literature

- Estimation of consumer choice with search costs
  - Hong and Shum (2006)
  - Moraga-Gonz·lez and Wildenbeest (2006)
  - Honka (2014)
- Equilibrium online shopping model
  - Morgan (2001)
- Search theory to study online markets
  - Dinerstein, Einav, Levin, and Sundaresan (2017)

Contribution & Data

- Applying real-world dataset

  ComScore Web Behavior Database
  - Updated: November 2018
  - Access through WRDS
  - A sample of US internet users' internet browsing behavior, purchases, and demographics.

Column Name	Data Type	Description
machine_id	bigint	unique machine identifier
site_session_id	unsigned bigint	unique identifier for user's browsing session on a site
prod_category_id	int	unique identifier for category of product purchased
prod_name	varchar(500)	name of product purchased
prod_qty	int	number of product purchased
prod_totprice	numeric(12,2)	total price of product
basket_tot	numeric(12,2)	total price of all products purchased
event_date	varchar(8)	yyyymmdd
event_time	varchar(8)	hh:mm:ss (UTC)
domain_id	unsigned bigint	unique identifier for domain where product purchased

Contribution & Data (Continued)

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Theoretical model 1/2: Simultaneous Search

- Assuming the consumer believes that each store's price is an i.i.d from distribution F(p) with density f (p) and a consumer will determine the optimal number of stores k in her sample by minimizing the sum of the expected price and total search cost:

$$k(c) = \arg\min_{k} \int_{\underline{p}}^{\bar{p}} k \cdot p\left(1 - F(p)\right)^{k-1} f(p)\, dp + k \cdot c.$$

Theoretical model 2/2: Sequential Search

- optimal search solution

Given prices $p = (p_1, \dots, p_n)$ and prior values $v = (v_1, \dots, v_n)$, the (representative) consumer's optimal search strategy is as follows:

for each i, let z_i^* be the value such that $s_i = \int_{z_i^*}^{z_i} (1 - G_i(z_i)) d\, z_i$.

(i) Search order: the consumer visits the sellers in the descending order of $v_i + z_i^* - p_i$.

(ii) Stopping: let N be the set of sellers the consumer has visited so far. She stops, and takes the best available option by the point, if and only if

$$\max\left\{u_0, \max_{i \in N} v_i + z_i - p_i\right\} > \max_{j \notin N} v_j + z_j^* - p_j.$$

Method

Empirical Implications of Search Models

- *Recall behavior*
- *Price dependence*
- *Product differentiation*
- *Utility function*
- *Search cost elasticity*

How are companies affected by different customers' search method ?

- Effect on market share
- Effect on customer base
- Pricing strategies

Method (Continued)

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Computational tools & Analysis

- Hypothesis testing
- Discrete choice model
- Comparative statics
- PCA and factor analysis