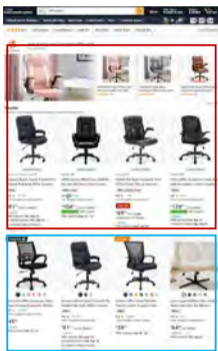# The Welfare Effects of Sponsored Product Advertising

Chuan Yu
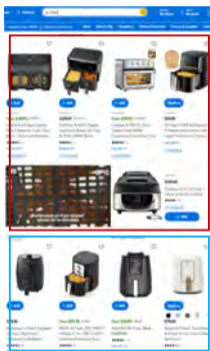
October 2024

Sponsored Product Advertising
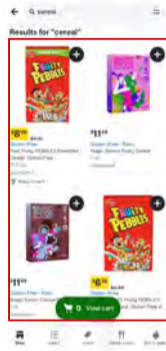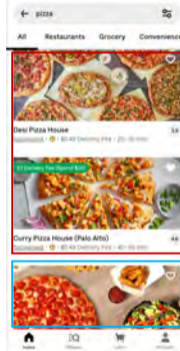
Amazon.com	Walmart.com	Instacart	UberEats

▶ Sponsored products ad auction. Organic products platform's algorithm

▶ All products pay a percentage of price as commissions for each unit sold

Motivation

▶ Many retail platforms have seen substantial growth in ad revenues

	Amazon	Walmart	Instacart	UberEats
Ad Revenues in 2023 (billion)	$46.9	$3.4	$0.9	$0.7
Year-to-Year Change	24%	28%	18%	30%

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▶ Federal Trade Commission sued Amazon in 2023

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Outline

Data

- ▶ **Scraped search results** of 3,237 high-traffic keywords on Amazon, collected six times a day for two months in 2022 ⇒ over one million searches
    - ▶ Observe sponsored and organic results on the first page
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- **Median, lowest, and highest bids** of auction winners for each keyword

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- ▶ Market: one keyword with the highest search volume in a product space

Model: Timeline

 Platform selects **a commission rate** to maximize its objective

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$\downarrow$

 Sellers set **prices** and submit **bids** to maximize expected profits

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Consumers make purchase decisions under **search frictions**

Model: Stage 3, Consumers

▶ Consumer i's utility of purchasing product j on day t follows:

$$u_{ijt} = \underbrace{\phi_j}_{\text{product FE}} + \underbrace{\psi_t}_{\text{day FE}} - \alpha \underbrace{p_{jt}}_{\text{price}} + \underbrace{\xi_{jt}}_{\text{unobserved shock}} + \underbrace{\epsilon_{ijt}}_{\text{T1EV}}$$

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▶ **Consumers consider only the top n products in search results**

▶ Market shares depend on product ranks and prevalence of different consumers

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   ▶ Sellers bid for probabilities of winning each sponsored position

▶ Equilibrium: no seller can increase expected profits by changing its price or bid

Model: Stage 1, Platform

▶ Platform sets an average commission rate τ to maximize a linear combination of **commissions**, **ad revenues**, **consumer surplus**, and **seller profits**

$$\max_{\tau} \quad \underbrace{COM(\tau)}_{\text{commissions}} + \underbrace{AD(\tau)}_{\text{ad revenues}} + \mu(\underbrace{CS(\tau)}_{\text{consumer surplus}} + \underbrace{PS(\tau)}_{\text{seller profits}})$$

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▶ The commission fee can represent various monetization methods that act as **substitutes** for ad revenues, e.g., storage & shipping fees paid by sellers

  ▶ Fees ↑ ⇒ sellers' WTP for sponsored positions ↓ ⇒ ad revenues ↓

Outline
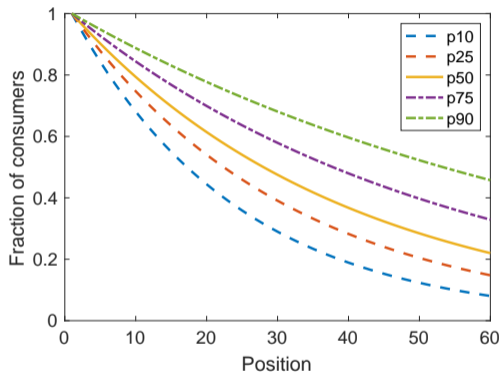
Estimation: Demand

▶ For a median consumer, the 28th page position is the upper limit she considers

Estimation: Demand
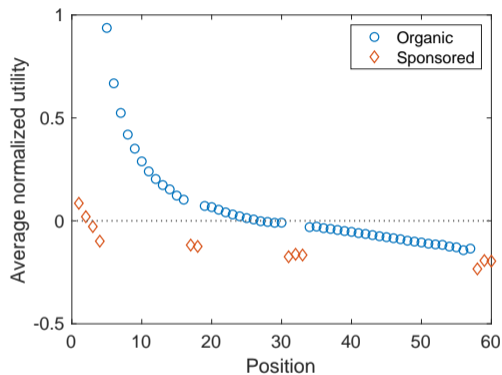
- ▶ Organic ranks are reasonably correlated with consumer preferences
- ▶ Sponsored products on average deliver lower utility to consumers

Estimation: Supply
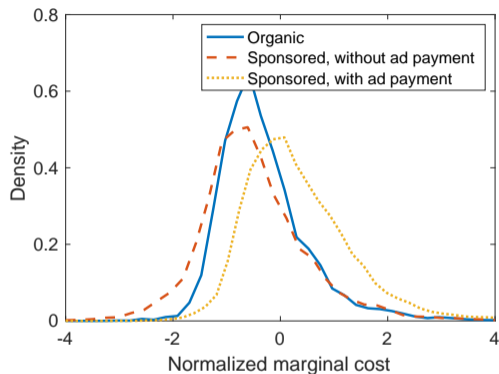
- ▶ Top sponsored products have 0.17 SD lower average marginal costs
- ▶ Ad payment reverses this cost advantage

Estimation: Platform
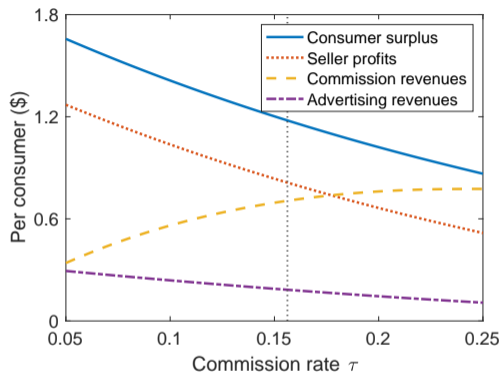
- Amazon puts a weight of 0.12 on the welfare of consumers and sellers relative to its short-term revenues

Outline

Counterfactual: Aggregate Welfare Effects, Fixed Commission Rate
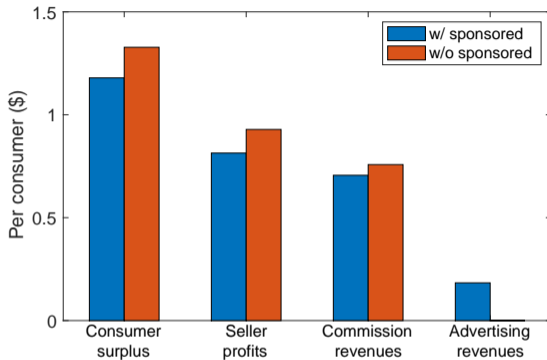
- Under a fixed commission rate, removing advertising **increases consumer surplus by 13% and seller profits by 14%**, and decreases platform revenues by 15%
  - Sponsored products deliver lower average utility
  - Ad payment reverses the cost advantage of sponsored products

Counterfactual: Optimal Commission Rate Without Sponsored Positions
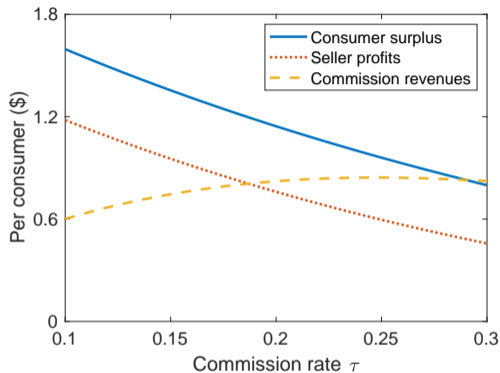
- **Platform's objective is maximized at $\tau = 20.3\%$** (current rate: 15.6%)
- Lower commission rate $\rightarrow$ higher seller margins $\rightarrow$ higher bids $\rightarrow$ higher ad revenues

# Counterfactual: Aggregate Welfare Effects, Endogenous Commission Rates
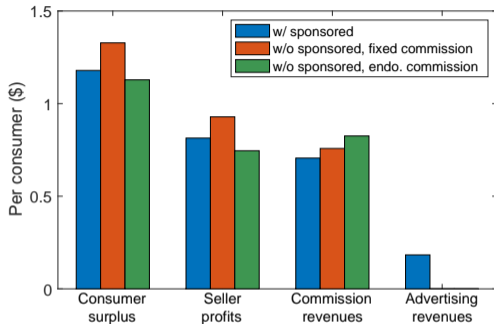

▶ Under endogenous commission rates, removing advertising **decreases consumer surplus by 4% and seller profits by 8%**, and decreases platform revenues by 7%

# Counterfactual: Aggregate Welfare Effects, Endogenous Commission Rates
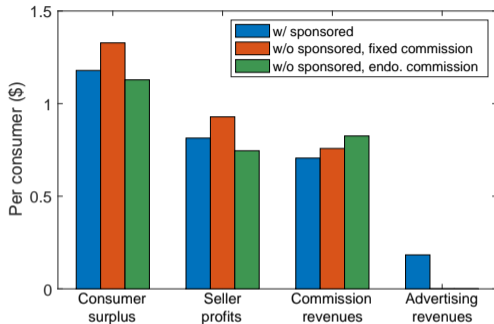
- Under endogenous commission rates, removing advertising **decreases consumer surplus by 4% and seller profits by 8%**, and decreases platform revenues by 7%

- Auctions allow Amazon to price discriminate against sellers
    - High-quality, high-cost organic: lower commission rate
    - Low-quality, low-cost sponsored: higher effective commission rate

Counterfactual: Alternative Numbers of Sponsored Positions

Consumer Surplus — Seller Profits — Platform Objective
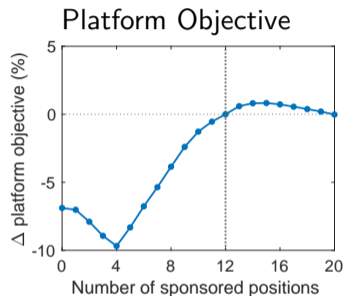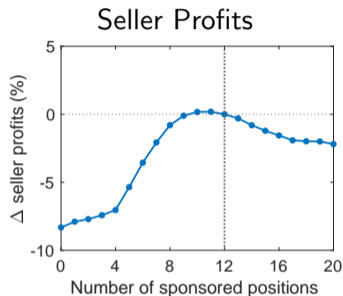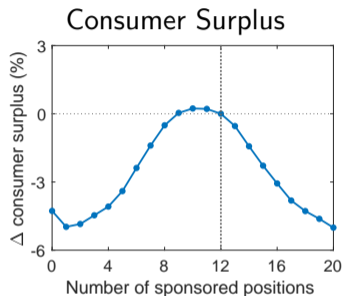
▶ Vary the number of sponsored positions by (1) removing from bottom to top and (2) adding more in the middle

▶ **Consumer- or seller-optimal number of sponsored positions is lower than the platform-optimal number**

Counterfactual: Varying Platform Weight μ
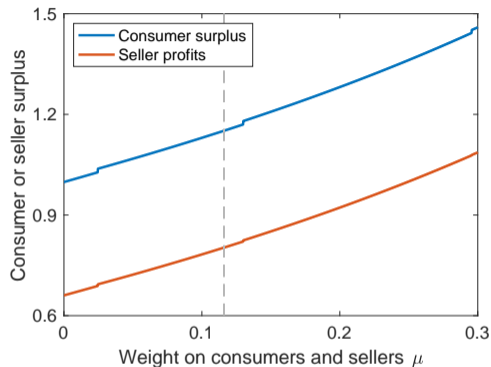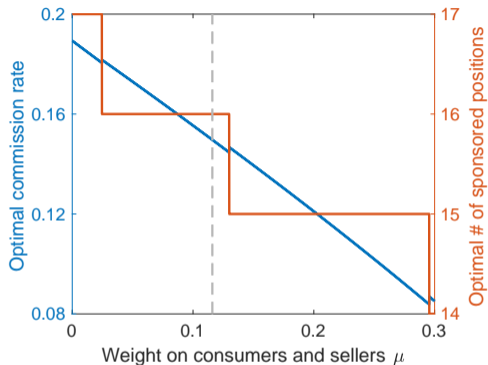
▶ Vary the weight μ on the welfare of consumers and sellers $COM + AD + \mu(CS + PS)$

▶ Could measure the effects of increased platform competition

Conclusion

▶ When regulating platforms with access to multiple revenue streams, it is important to account for the platform's response

▶ Sponsored product advertising on Amazon benefits consumers and sellers on average by incentivizing a lower commission rate

▶ A cap on total sponsored positions or more competition among platforms could benefit consumers and sellers