Vertical Integration and Consumer Choice: Evidence from a Field Experiment

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Scrutiny of Content Curation by Vertically-Integrated Digital Platforms

EU regulation: Article 6 of DMA

"*The **gatekeeper shall not treat more favorably**, in ranking and related indexing and crawling, services and products offered by the gatekeeper itself than similar services or products of a third party. The gatekeeper shall apply transparent, fair, and non-discriminatory conditions to such ranking.*"

US enforcement: FTC complaint against Amazon

"*A third-party seller noticed that **Amazon was giving preferential treatment to its own products** and complained to Amazon about the effect on the customer experience. The seller wrote that it appears Amazon brands and 1P offerings are given priority placement.*"

Digital Services Act & Digital Markets Act
New landmark rules for online platforms in the EU.

#DigitalServicesAct #DigitalMarketsAct #DigitalEU

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FTC Sues Amazon for Illegally Maintaining Monopoly Power

Amazon's ongoing pattern of illegal conduct blocks competition, allowing it to wield monopoly power to inflate prices, degrade quality, and stifle innovation for consumers and businesses

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Scrutiny focuses on consumer-facing practices.

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Contrast with Offline World

Private labels are standard in many offline retailers:

- ~20% of products sold:
  - (Dube '22)

- Pro-competitive:
  - (e.g., Newmark '88, Scott Morton & Zettelmeyer '04)

- Increase in store loyalty:
  - (Ailawadi et al. '08);

- Ubiquitous "self-preferencing:"
  - (e.g., Bronnenberg et al. '15, '20, '22)

Research Question

Does the presence of vertically-integrated products offered by digital platforms benefit or harm consumers?

Four mechanisms:

- Assortment (variety and positioning);
- Search effort on platform;
- Substitution to other online platforms / retailers;
- Competitive effects on prices of substitute products.

Research Question / Methodology

Does the presence of vertically-integrated products offered by digital platforms benefit or harm consumers?

Field experiment:

- Recruit participants to install web extension that hides Amazon brands during incentivized + organic browsing;

- Reduced-form experimental + survey evidence on three margins;

- Structural model for fourth margin + alternative product positioning.

Research Question / Methodology / Results

Does the presence of vertically-integrated products offered by digital platforms benefit or harm consumers?

We find that in the absence of Amazon brands:

- Users find *observably* quite similar products without changes to search effort or substitution to other retailers;

- Unobserved component is important: consumer surplus falls by 5.4% (only 10% is due to price adjustments);

- Heterogeneity in consumer preferences helps explain why demoting Amazon brands in search results would not improve consumer welfare.

Outline:

Study Design

Reduced-Form Evidence

Model & Estimation

Counterfactuals

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Study Design

Recruited over 1,500 participants for an IRB-approved study of online shopping:

- Used Facebook ads with the assistance of a marketing agency;
- Selected frequent Amazon shoppers in the US, over 18 years old, who use Chrome;
- Recruitment period: June-October 2023.

Would you like to help us understand online shopping behavior? We are a team of Harvard and Boston University researchers who study e-commerce and its value to consumers like you. We want to understand consumer shopping and how it is affected by the choices that e-commerce platforms make.

By fully completing this study, you will earn at least $30 and up to $180 if you also win lotteries throughout the study. We will ask you to complete two surveys: one now, which will take about 40 minutes to complete, and one in 8 weeks, which will take about 10 minutes. For the 8-week study period, we will also ask you to install a browser extension and to share information about your online shopping.

Click below if you want to know more and discover if you qualify!

Study Design

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- Recruitment period: June-October 2023.

Participants installed a custom browser extension (webmunk.org):
- Tracks detailed clickstream and html data;
- Prompts users to complete tasks;
- Can manipulate browsing experience.

Webmunk

Identifier
37490360

Last Upload
Never

Please complete these tasks to get paid.

- Complete intake survey

- Upload your Amazon order history

Tasks will be removed after confirmation of completion.

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Experimental design: Participants were randomized into three groups:
1. Control: no manipulation, just tracking;
2. Hide Amazon: Amazon brands are hidden;
3. Hide Random: A random set of products are hidden.

"Hide Amazon" Treatment

Control

Hide Amazon

"Hide Random" Treatment

Control

Hide Random

Study Timeline

Milestone 1
Today
- Install Webmunk
- Share Amazon Order History
- Complete Wishlist Survey

At completion: $15 gift card and 1 in 3 chance of winning an extra $50.

Milestone 2
In 8 weeks
- Update Amazon Order History
- Complete Outtake Survey
- Uninstall Webmunk

At completion: $15 gift card and 1 in 100 chance of winning an extra $100.

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Wishlist Survey: Incentivized Shopping Task

- Add 6 products to a Webmunk wishlist:
  - Health
  - Paper products
  - Household items
  - Apparel
  - Electronics
  - Personal care → "placebo" category.

- Incentive: 1 in 3 chance of receiving
  - A selected product at price p, and
  - Gift card for $50 - p.

Please select one product that you would like to purchase in each of the following categories:

Personal Care (Select one):

Nail clippers

Toothpaste

Deodorant

Comb / brush

Electronics (Select one):

Monitor cable (HDMI, USB-c)

Batteries

Extension cord

Phone charger

Wishlist Shared with Us

··· More

Search this list   Filter & Sort ⌄

MRS. MEYER'S CLEAN DAY Liquid Laundry Detergent, Biodegradable Formula Infused with Essential Oils, Birchwood, 64 Fl oz (Pack of 2)
by MRS. MEYER'S CLEAN DAY (Health and Beauty)
★★★★☆ ⌄ 181
$35.58 ✓prime Today 5 PM - 10 PM
Price dropped 13% (was $40.98 when added to List)

Item added December 13, 2023
Add to Cart
Move ⌄
Add comment, quantity & priority

Josie Maran Whipped Argan Oil Face Butter - Anti Aging Face Cream & Redness Reducing Skin Care - Hydrating Daily Moisturizer with Shea Butter - Vegan & Cruelty-Free Formula - Unscented (50 ml)
by Josie Maran (Health and Beauty)
★★★★☆ ⌄ 7,816
$45.00 FREE delivery for Prime members
Size : 1.7 Fl Oz (Pack of 1) | Scent : Unscented

Item added December 13, 2023
Add to Cart
Move ⌄
Add comment, quantity & priority

WBM Care Bamboo Toilet Tissue, Strong & Flexible 3-Ply, All Natural Tree Free and Septic Safe Paper Towels, 200 Sheets Each Roll, Total 6000 Sheets, 30 Rolls
by WBM Care (Office Product)
★★★☆☆ ⌄ 82
$43.15 ✓prime
Price dropped 3% (was $44.67 when added to List)

Item added December 13, 2023
Add to Cart
Move ⌄
Add comment, quantity & priority

Theory Women's Tiny Tee
by Theory (Apparel)
★★★☆☆ ⌄ 18
$45.10 ✓prime
Size : Small | Color : Baby Blue

Item added December 13, 2023
Add to Cart
Move ⌄
Add comment, quantity & priority

Clear Power 50 ft Heavy Duty Outdoor Extension Cord 14/3 SJTW with Lighted Locking Connector, Yellow, Water & Weather Resistant, Flame Retardant, 3 Prong Grounded Plug, DCOC-0130-DC
by Clear Power (Electronics)
★★★★☆ ⌄ 289
$49.99 ✓prime Overnight 4 AM - 8 AM
Save 20% with coupon
Size : 50 ft | Color : Yellow

Item added December 13, 2023
Add to Cart
Move ⌄
Add comment, quantity & priority

Isinis Model 33 38 30 83 Large Root Boar Bristles Black Handle Premium Boar Bristle Hair Brush - Pneumatic hairbrush, 11 Rows, L 8.8in
by ISINIS (Health and Beauty)
★★★★☆ ⌄ 163
$44.95 ✓prime FREE One-Day

Item added December 13, 2023
Add to Cart
Move ⌄
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Selected Categories
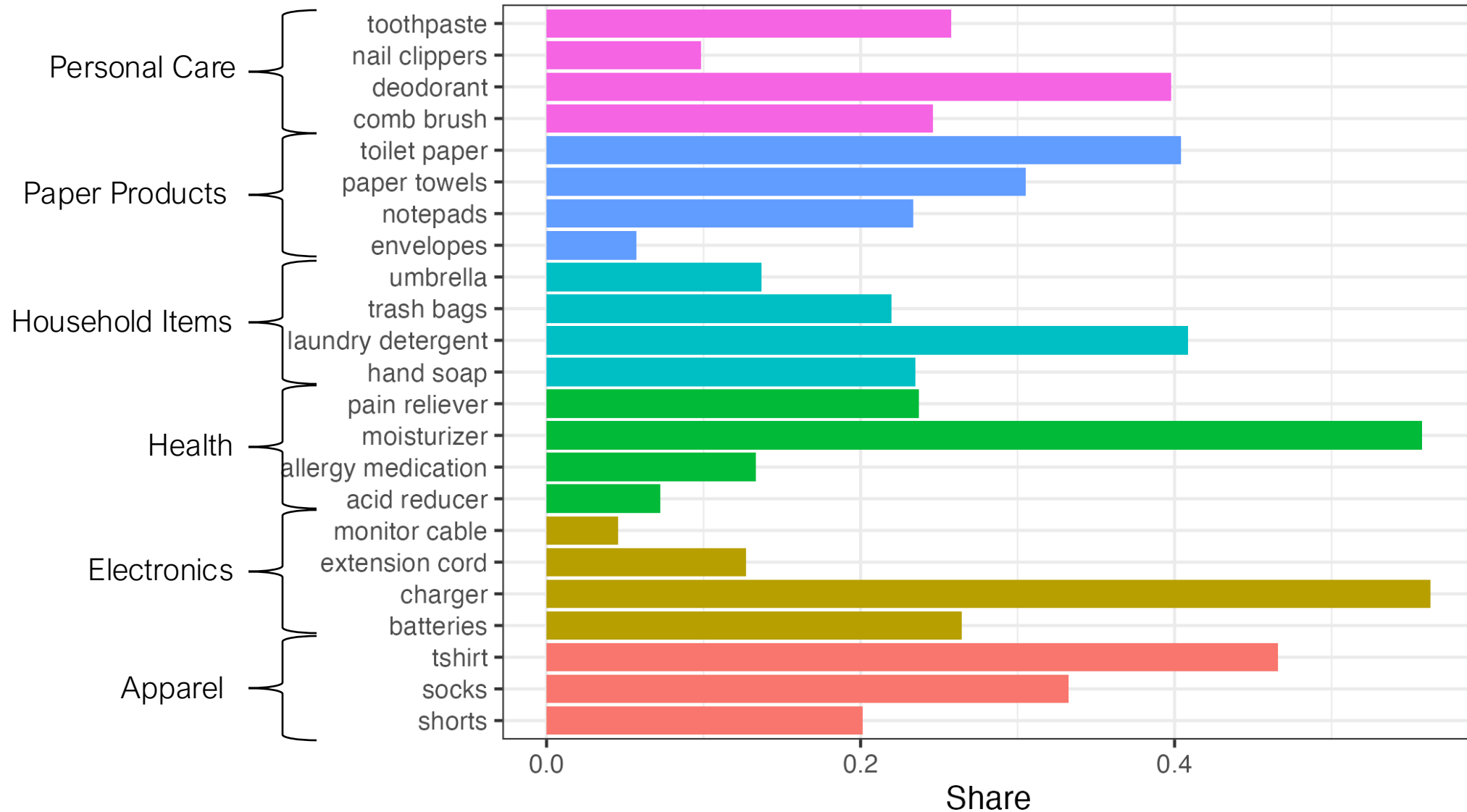
Study Population

- 1,579 participants qualify and complete incentivized shopping task:
  - Validate participants through their Amazon order histories.

- Participants approximate US demographics reasonably well:
  - Geographic location across states, household size, income, race/ethnicity.
  - Key exception: 78% female (vs. outside estimate of Amazon shoppers: 75%).
  - Average age: 44 years old.

- Demographics, attrition, and extension tracking are balanced across treatment groups.

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<u>Reduced-Form Evidence</u>

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Effect of Removing Amazon Brands

Reduced-form evidence on following margins:
- Characteristics of the selected products;
- Search effort;
- Propensity to use Amazon again;
- Product ratings (after receiving the product).

Multiple comparison groups ensuring robust results:
- <u>Amazon hide vs. Control for categories with Amazon brands;</u>
- Amazon hide vs. Random hide for categories with Amazon brands;
- Diff-in-diff with personal care category (no Amazon brands).

Pre-Registered Specification

$$Y_{ic} = \beta\ Amazon\ Hide_{ic} + \gamma_c + \epsilon_{ic}$$

- Y_{ic}: outcome of interest for participant *i* in product category *c.*
- Category fixed effects.
- Standard errors clustered at user level (unit of treatment assignment).
- Powered to detect 5% effect on price.
- Only categories with Amazon brands (ie, no personal care).

"Amazon Hide" Reduces Amazon Brands Among Selected Products...

	Amazon Brand (1)
Hide Amazon	-0.077***
	(0.007)
R^2	0.086
Observations	5,350
Mean of Y	0.094
Category FE	Yes

... Substitute Products are Fairly Comparable, Except for Ratings

	Amazon Brand (1)	Price (2)	Ratings (3)	Stars (4)	Fast Delivery (5)	Prime Eligible (6)	Major Brand (7)	Sponsored (8)
Hide Amazon	-0.077***	-0.628	-8,981.483***	-0.001	-0.053**	-0.024	0.039**	0.006
	(0.007)	(0.395)	(1,646.103)	(0.006)	(0.020)	(0.024)	(0.012)	(0.014)
R^2	0.086	0.109	0.114	0.201	0.061	0.011	0.287	0.058
Observations	5,350	5,280	5,238	5,238	5,350	5,350	5,350	5,350
Mean of Y	0.094	21.106	27718.064	4.604	0.455	0.743	0.434	0.275
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Reduced-Form Evidence

When Amazon brands are removed:
- Consumers substitute towards fairly similar products along observable dimensions;

No other effects:
- Search effort (number of products inspected or search URLs);
- Propensity to use Amazon again (survey + organic behavior during 8-week tracking);
- Product ratings (survey after receiving the product).

Consistent with stated preferences:
- Consumers value Amazon brands 2-7% less than identical non-Amazon brands *(with large heterogeneity);*
- Consumers value price, delivery, ratings more than brand or seller.

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Towards Consumer Welfare

Reduced form holds constant intermediary's search results ranking and sellers' prices to an equilibrium where Amazon brands exist.

What would happen to prices and consumer welfare if Amazon brands were removed or their position in search results changed?

Demand

Consumers make a discrete choice over products they find while searching.

For each product category in the incentivized shopping task:

- Consideration set is given by all products in search results, product pages (including product variants and alternative recommendations), and the chosen product:
  - We abstract away from details of search process or sequence of products found;
  - Motivated by null results on search behavior.
- Outside option is fixed:
  - Motivated by null results on substitution to other retailers.

Demand

For a given search (subscript omitted), consumer *i*'s utility for product *j* in category *c*:

$$u_{ij} = \alpha_{ic}p_j + \beta_i \boldsymbol{x}_j + \zeta_i amazon_j + \gamma \boldsymbol{r_j} + \xi_{ij} + \epsilon_{ij}$$

- Product characteristics (in addition to price and amazon brand dummy):
  - Stars, log(reviews), major brand, Prime eligible, fast delivery, sponsored;
  - Product positioning dummies (e.g., in search results, in product pages);
  - Rank:
    - Displayed (for causal effect of rank).
    - Assigned (for unobserved quality correlated with rank).

- Preferences can vary by demographics:
  - Income, children, Prime subscriber, prior Amazon brand purchases + two unobs. demographics.

- Consumers can choose outside option with $u_{i0} = 0$ (more later);

- Standard mixed logit choice probabilities.

Supply

Multi-product brands (e.g., Amazon, Duracell) set prices to maximize profits separately for each search:

- Firms treat consumer demographics as unobserved:
  - No search-specific prices on Amazon;
  - Treat each possible search as drawn at random.
- Employ assumption to recover marginal costs and when conducting counterfactuals.

For search ranks, we assume that when products are removed, remaining products slide up to fill in the missing search result slots:

- Mirrors the behavior of our web extension;
- We do not model the platform's ranking policy:
  - In theory, ranks could depend on prices;
  - But: Amazon's existing ranking strategies will determine whether we find that removing or demoting Amazon brands is beneficial or not.

Estimation

Maximum likelihood estimator:

- Conditional on the vector of demand parameters, we construct choice probabilities for each consumer and product in choice set.
- Construct sum of log likelihood for selected products as objective function.

To address limitations in our experimental data, we introduce two constraints:

- No price instrument $\rightarrow$ calibrate mean elasticity to -5, which is based on survey-based estimates of seller margins, while allowing for unobserved quality correlated with price:

$$\xi_{ij} = \lambda p_j + \eta_j \text{ where } \eta_j \sim N(0, \sigma).$$

- No outside option in our experiment $\rightarrow$ calibrate inside share to 0.53, matching the share of URL visits to Amazon vs. other retailers during our observational period.

Estimates – Demand

Variable	Mean (1)	Interactions with Demographics						
		ln(Income) (2)	Children (3)	Prime Subs. (4)	Prior AB (5)	No History (6)	Unobs. 1 (7)	Unobs. 2 (8)
Price	-0.2674 (0.0028)	0.0002 (0.0016)	0.0031 (0.0029)	0.0150 (0.0037)	0.0033 (0.0031)	-0.0126 (0.0050)	0.0011 (0.0009)	-
Stars	0.3862 (0.0649)	0.0002 (0.0090)	-0.0135 (0.0165)	-0.2096 (0.0228)	-0.0319 (0.0178)	0.1070 (0.0274)	-	-
Amazon Brand	-0.0222 (0.0628)	-0.0406 (0.0682)	0.3334 (0.1236)	-0.3026 (0.1477)	0.3497 (0.1516)	0.4705 (0.2044)	-	0.0751 (0.0552)
Major Brand	0.1585 (0.0332)	-	-	-	-	-	-	0.0209 (0.0255)
ln(Reviews)	0.0204 (0.0062)	-	-	-	-	-	-	-
Prime	0.7735 (0.0498)	-	-	0.6418 (0.1195)	-	-	-	-
Fast Delivery	0.0532 (0.0294)	-	-	-	-	-	-	-
Sponsored	-0.5684 (0.0319)	-	-	-	-	-	-	-
ln(Rank Realized)	-0.5904 (0.1736)	-	-	-	-	-	-	-
ln(Rank Assigned)	-0.5782 (0.1737)	-	-	-	-	-	-	-

Notes: product positioning dummies and price×meta-category interactions are not displayed. Parameters for ξ are λ = 0.287 and σ = 0.117.

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Is Rank Correlated with Estimates?
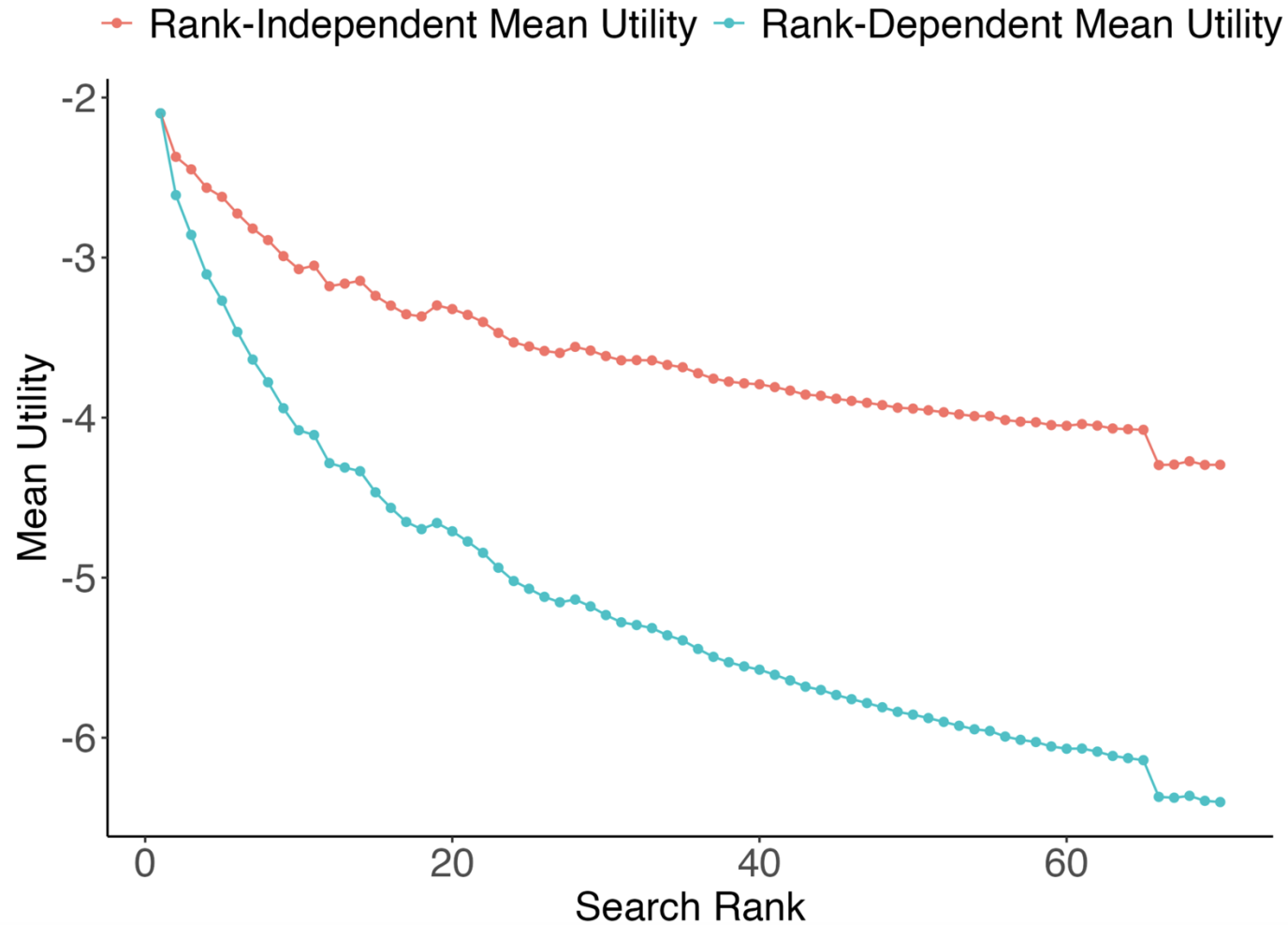
Estimates – Supply

Variable	Mean	Percentiles				
		10th	25th	50th	75th	90th
Price ($)	18.75	7.99	11.88	16.99	23.99	32.00
Marginal Cost ($)	14.67	3.88	7.48	13.17	20.19	28.15
Own-Price Elasticity	-5.14	-8.80	-6.71	-4.70	-3.18	-2.14

- Average margin $4.08 (22%).
- Marginal costs of Amazon brands are $3.69 lower.
- Estimates reflect searches from the consumers in our control group.
- We integrate over the distribution of consumer demographics.
- Specification check:
  - For ASINs with multiple observations (across searches/consumers), the median std. dev. of marginal costs is $0.54.

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Counterfactuals

Counterfactuals

- Scenarios (using control group):
  1. Baseline;
  2. Remove Amazon brands;
  3. Remove Amazon brands, holding prices fixed;
  4. Remove random products;
  5. Demote Amazon brands in search results.

- Calculate consumer surplus by integrating over the demographics of all consumers in the control group across the searches where Amazon brands are present:
  - Exclude placebo categories, where effects are near-zero by design;
  - 5.4% of products in this sample are Amazon brands.

Counterfactuals 1-4

Scenario	Consumer Surplus ($)	% Change in CS	% Change in Prices	Inside Share
Baseline	3.23	—	—	0.529
Remove Amazon	3.06	-5.39	0.20	0.507
Remove Amazon (No Price Adj.)	3.08	-4.79	0.00	0.509
Remove Random	3.14	-3.00	-0.06	0.517

- Removing Amazon brands would reduce consumer surplus by 5.4%:
  - Equilibrium price increases account for 11 percent of the decline;
  - Price effects are larger for higher-ranked products;
  - Small shift toward the outside option;
  - Removing random products has 56% of the impact.

- Large heterogeneity across categories.

Category-Level Effects

(a) Remove Amazon Products
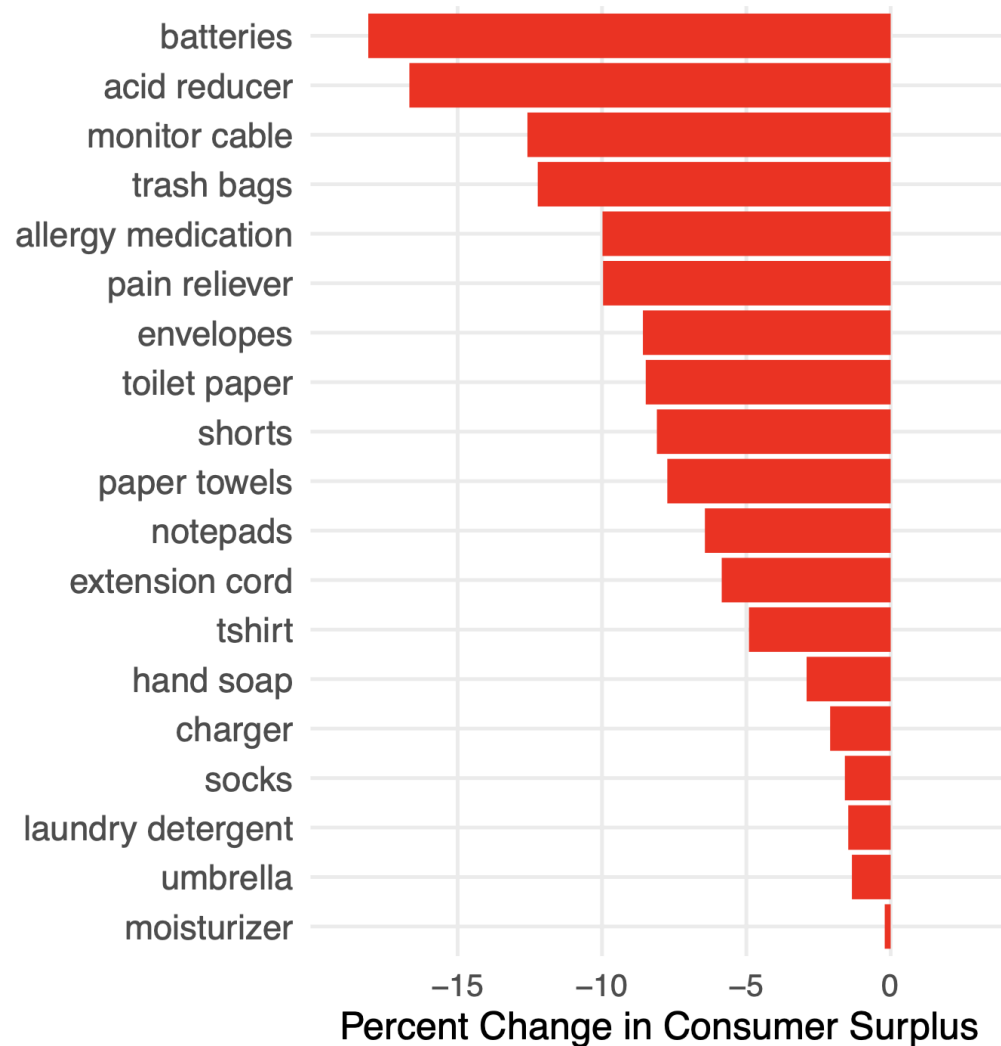
(b) Remove Random Products
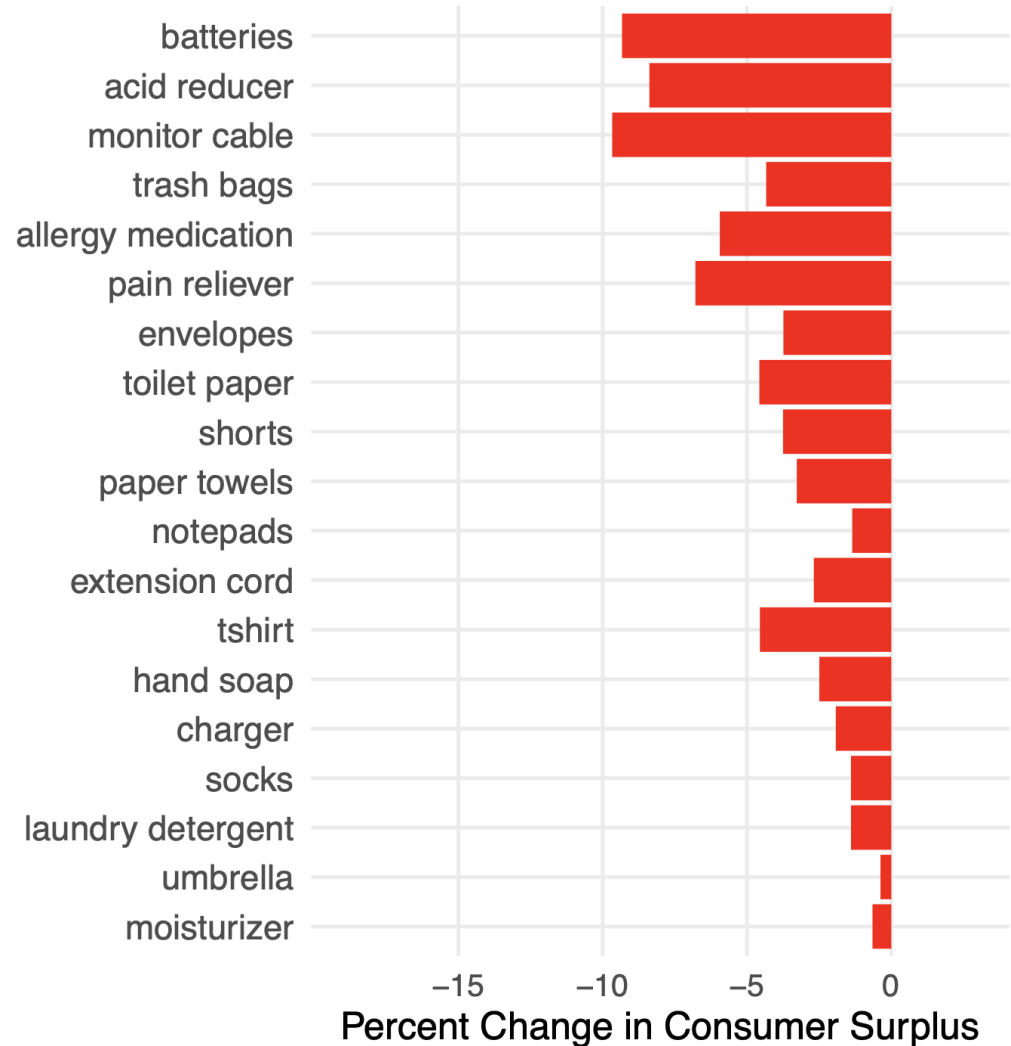
Category-Level Effects

(a) Difference in Consumer Surplus Impact

(b) Mean Utility: Amazon vs. Other Brands

Demote Amazon Brands in Search

- In Farronato, Fradkin, and MacKay (2023 AEA P&P):
  - Amazon products are ranked higher than observably similar products;
  - Positioning could be explained by greater unobserved quality.

- We now have estimated unobserved product quality:
  - Still, Amazon brands appear to be ranked higher, even controlling for mean product utility.

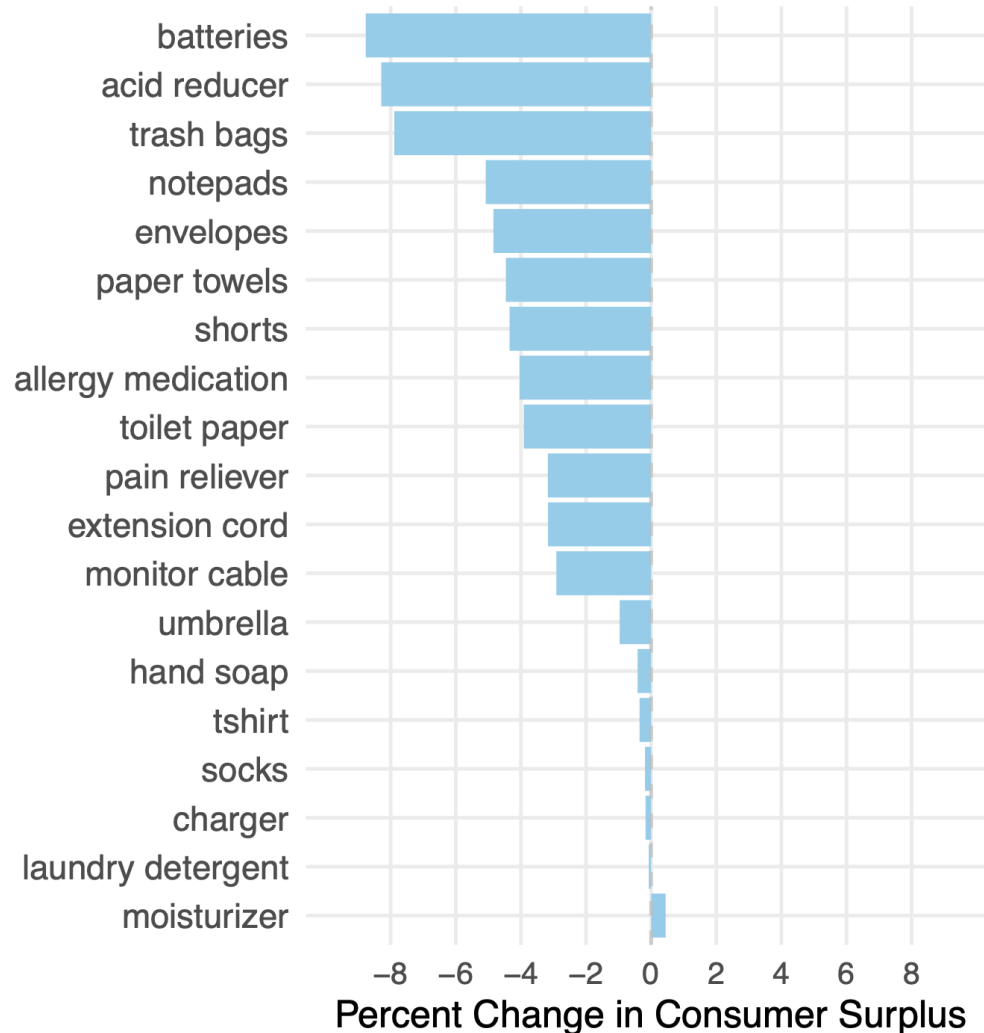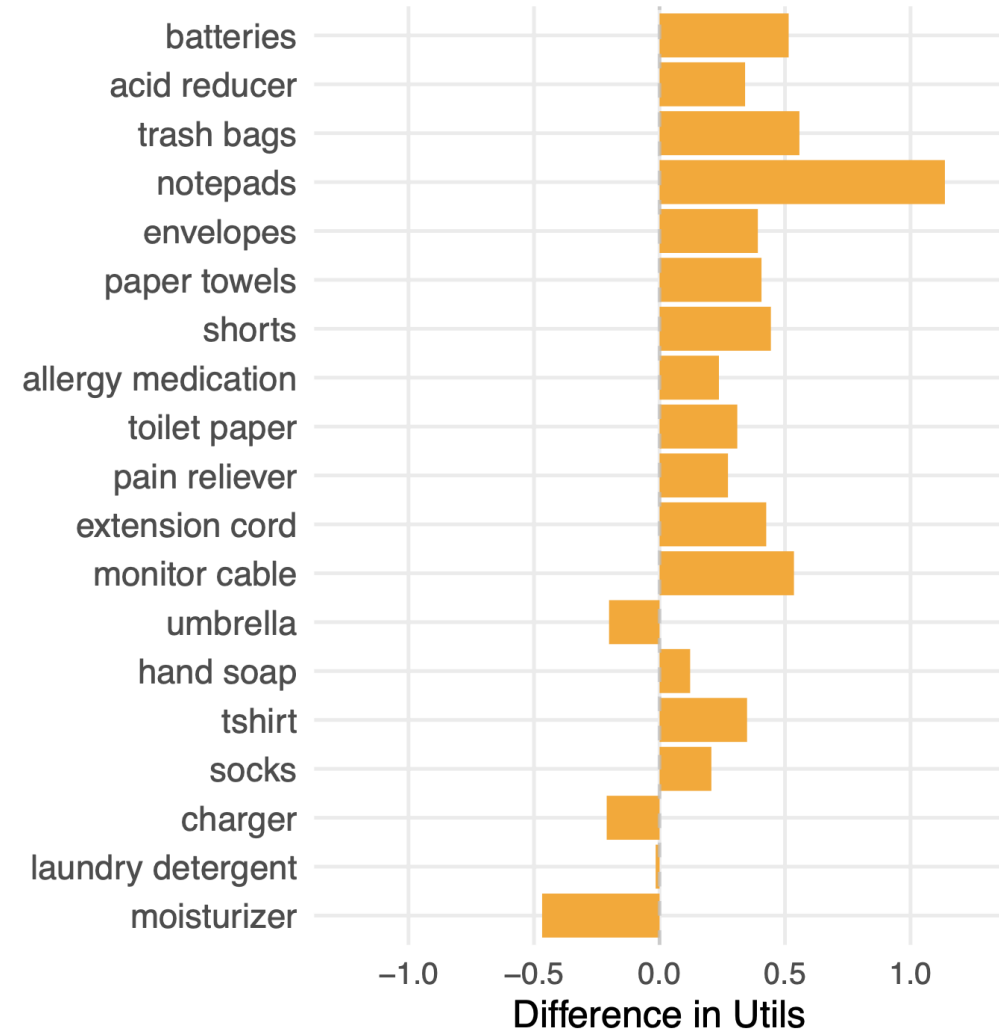|	Mean Utility Only (1)	Observables (2)	Mean Utility + Amazon Brand (3)	Mean Utility Only (4)	Observables (5)	Mean Utility + Amazon Brand (6)
Rank-Ind. Mean Utility	-18.207*** (0.549)		-18.162*** (0.549)	-21.665*** (0.642)		-21.632*** (0.641)
Amazon Brand		-7.104*** (0.248)	-3.373*** (0.207)		-5.944*** (0.294)	-4.965*** (0.209)
R²	0.548	0.463	0.548	0.634	0.450	0.635
Observations	1,626,189	1,626,189	1,626,189	1,239,477	1,239,477	1,239,477
Sponsored Results	Incl.	Incl.	Incl.	Excl.	Excl.	Excl.
Mean of Y	33.822	33.822	33.822	38.053	38.053	38.053
Participant-Search FE	Yes	Yes	Yes	Yes	Yes	Yes

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- Counterfactual: Demote Amazon products by 5 positions in search ranking, so that they have (on average) equivalent rankings as observably similar products:
  - Consumer surplus decreases by 0.26%;
  - Robust to demoting by any position between 1 and 7.

Demoting Amazon Brands

(a) Remove Amazon Products
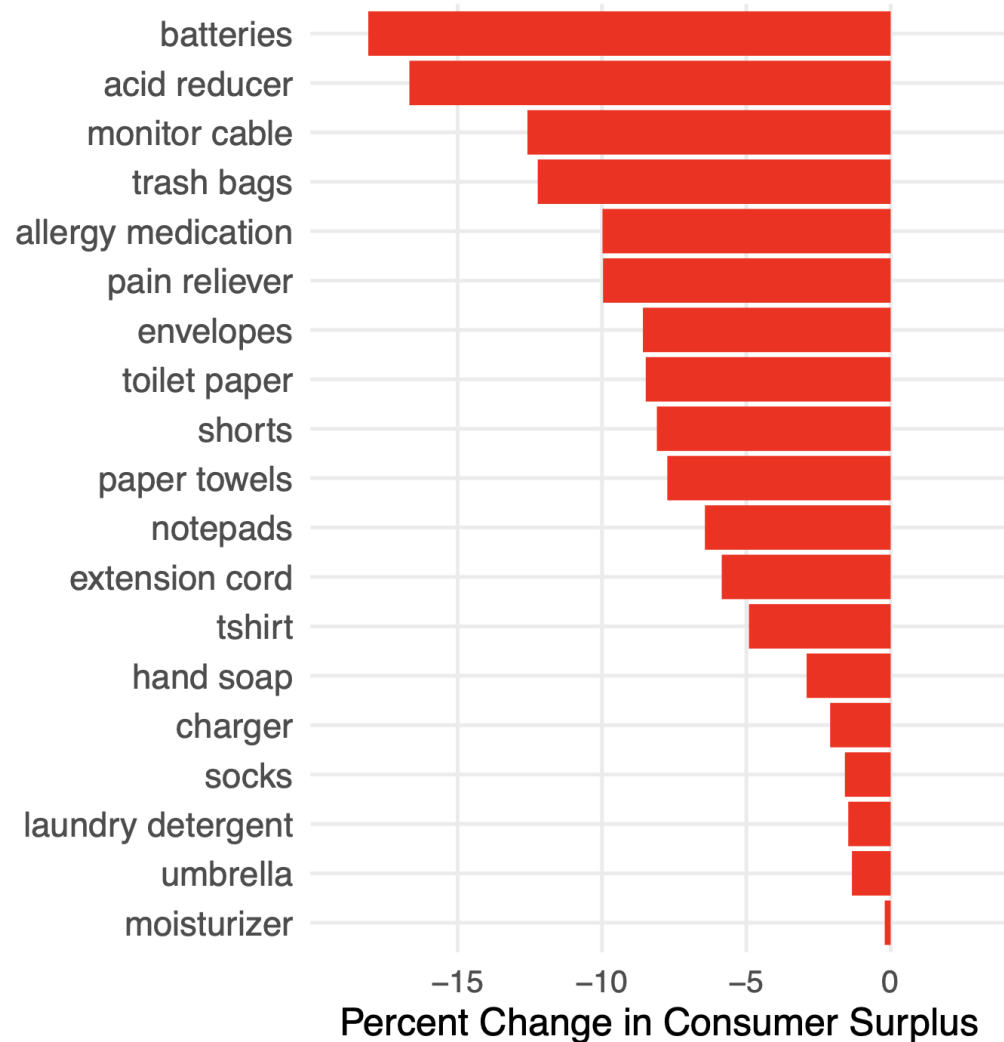
(b) Demote by Five Slots
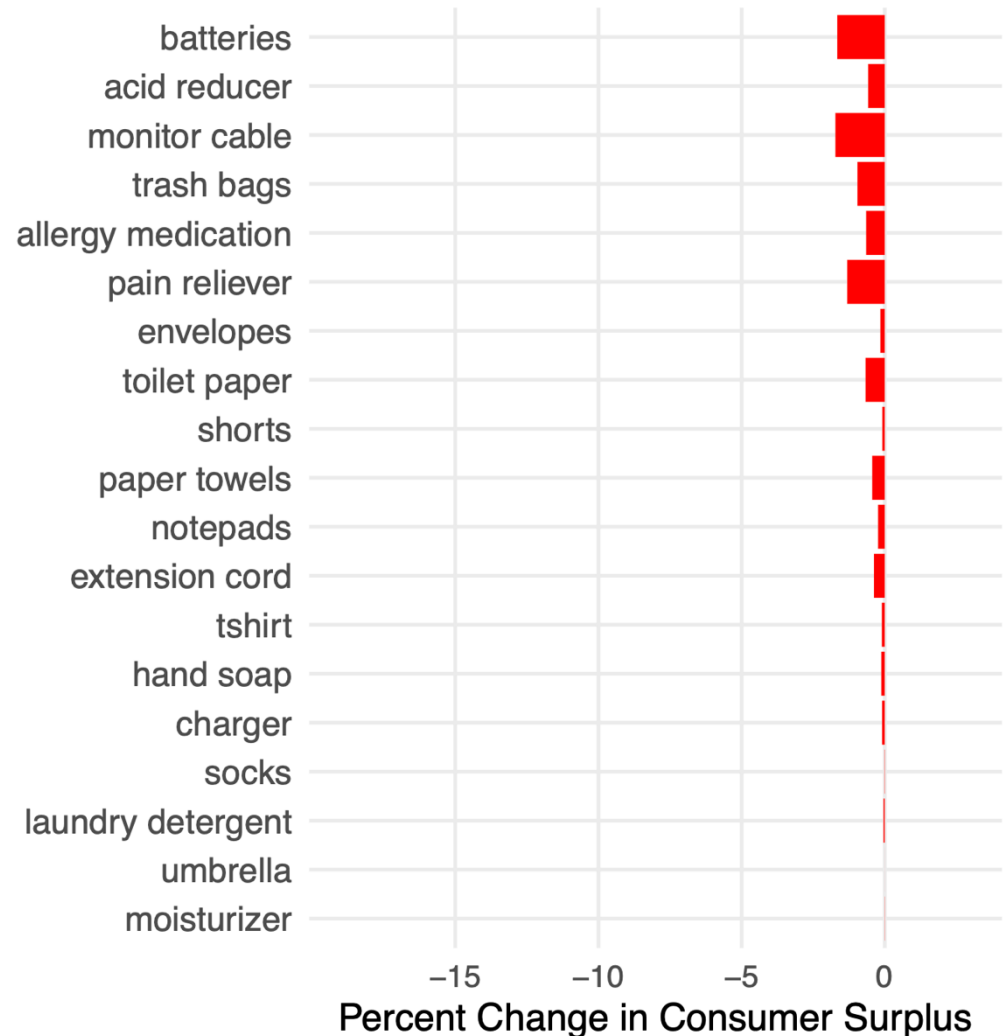
Conclusions

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We explore the effects of removing Amazon brands from the choice set of consumers using a field experiment. We measure effects across four channels:

- Participants have ample choices in categories where Amazon brands are present, so substitutes are observably quite similar;
- No change in search effort on platform;
- No change in traffic to other retailers;
- Only slight increase in prices of substitute products.

Yet, unobserved quality and preference heterogeneity make Amazon brands valuable:

- Consumer surplus would decrease by 5.4% without Amazon brands;
- Demoting Amazon brands would not increase consumer surplus (in fact, small reduction).

Conclusions

These are short-run effects:
- Consumer behavior along various margins, such as search and cross-platform behavior, may take longer than our study timeline to adjust;
- Counterfactuals allow prices to adjust, but not other product characteristics, seller costs, advertising, or innovation;
- We do not account for product entry; though the categories we study tend to be well-established product categories with many alternatives.

Findings highlight tradeoffs when regulating vertical integration on platforms:
- Blanket restrictions on private labels are likely to reduce consumer surplus;
- Existing ranking policies do not seem to prioritize Amazon brands to the detriment of consumers (and reduced-form approaches may mislead into finding "self-preferencing");
- Large heterogeneous effects across categories.

Thank you.

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