The Welfare Consequences of Regulating Amazon

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UW Foster

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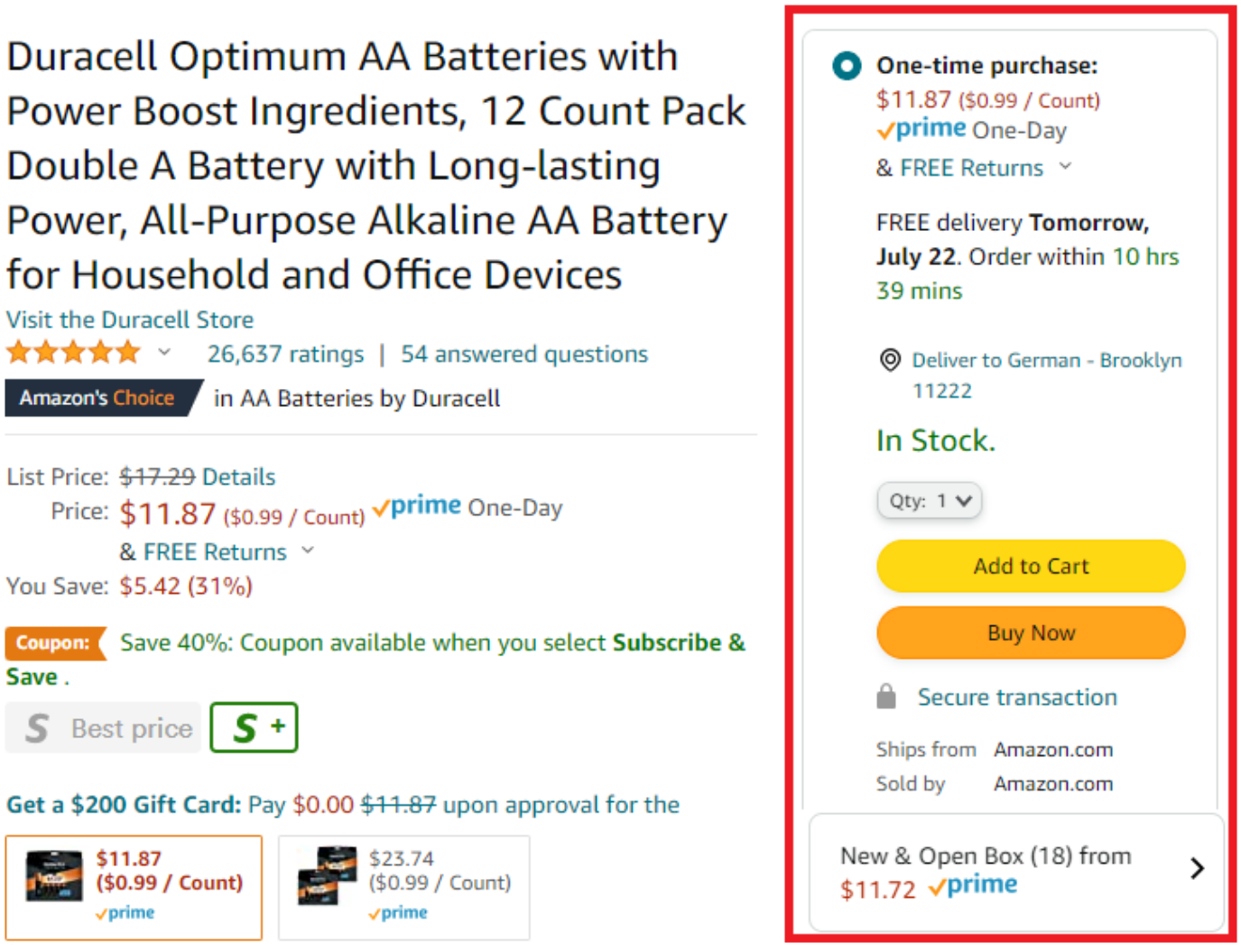
Many papers on BuyBox: same product, many sellers



(Lee and Mussolff, 2021; Raval, 2022; Lam, 2021)

This paper: many products in same category

Duracell Coppertop AA Batteries 28 Count Pack Double A Battery with Long-Lasting Power for Household...

28 Count (Pack of 1)

★★★★★ ˇ 24,831

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32 Count (Pack of 1)

★★★★★ ˇ 49,196

$20.14 ($0.63/Count)

$19.13 with Subscribe & Save discount

Extra $2.00 off when you subscribe

✓prime FREE One-Day

Duracell Optimum AA Batteries, 28 Count Pack Double A Battery with Long-Lasting Power Alkaline AA...

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Amazon Basics AA 1.5 Volt Performance Alkaline Batteries - Pack of 20

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✓prime FREE Delivery **Sat, Jul 23**

This paper: many products in same category, across selling methods

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- Emprical IO model with
  - Substitute products
  - Marketplace + reselling vertical relationships
  - Endogenous prices and fees
  - Dynamic investment incentives

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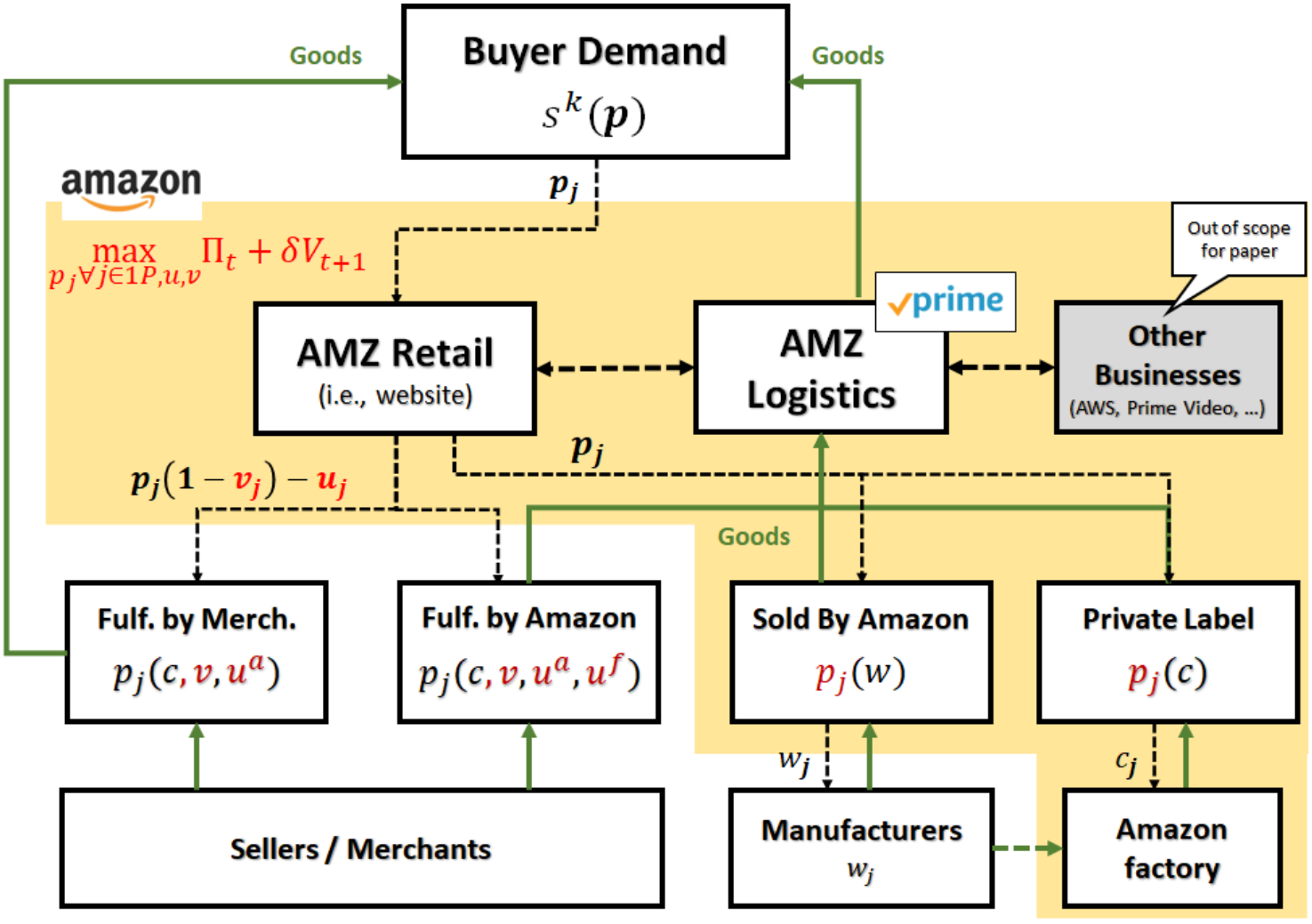
  - Dynamic investment incentives
- Estimate model for ~150 categories
- Run counterfactuals

Overview of model



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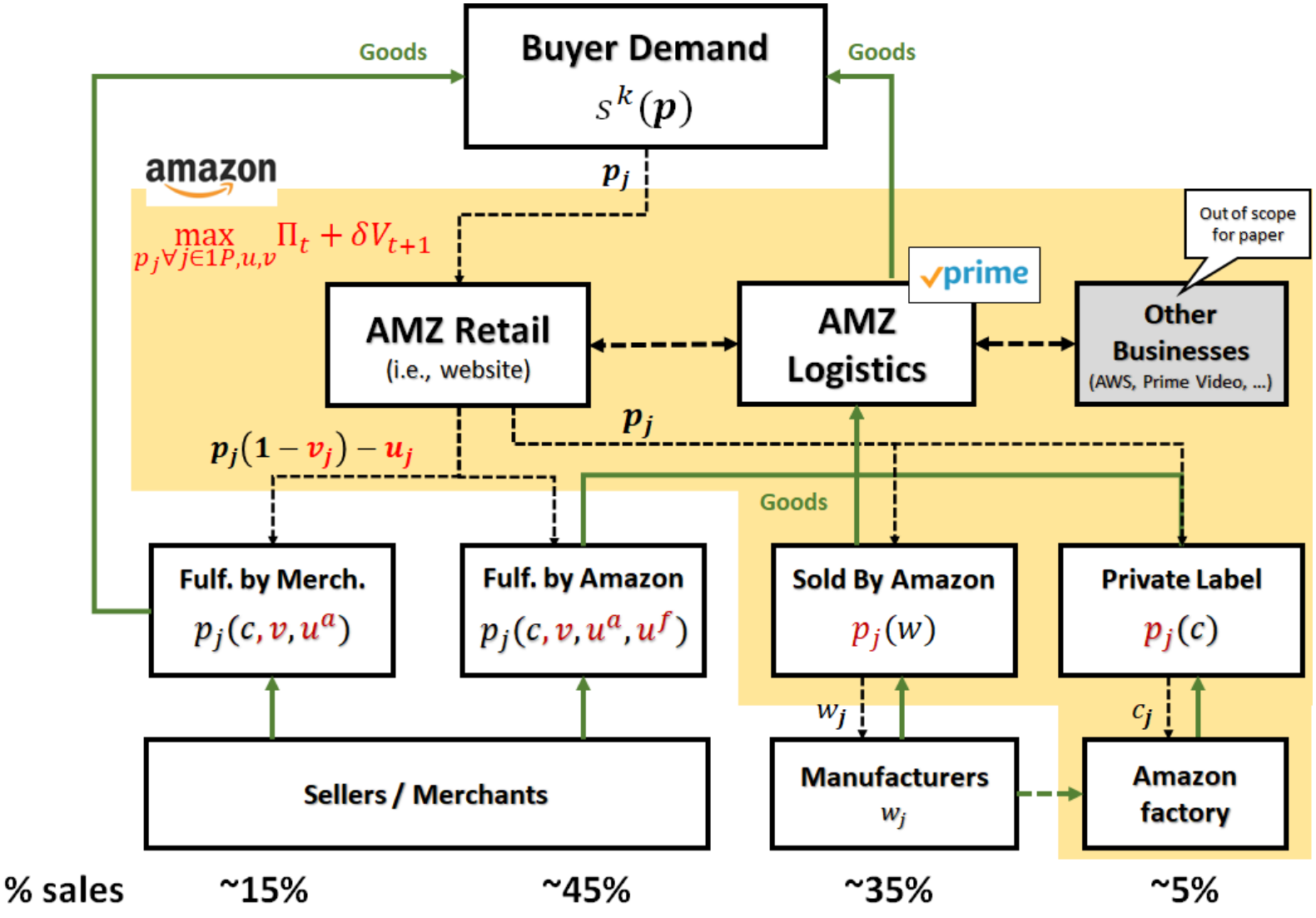

Dynamic Investment Incentives

Platform sets policy variables f to maximize long run value:

$$\max_{\boldsymbol{f}} V(\boldsymbol{\Theta}, \boldsymbol{f}) = \Pi(\boldsymbol{\Theta}, \boldsymbol{f}) + \delta \tilde{V}(\boldsymbol{\Theta}, \boldsymbol{f})$$

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If continuation values (and entry) depend only on CS, SS:

$$\frac{\partial \Pi}{\partial f_m} + \underbrace{\delta \frac{\partial \tilde{V}}{\partial N^b} \frac{\partial N^b}{\partial CS}}_{\gamma^c} \frac{\partial CS}{\partial f_m} + \underbrace{\delta \frac{\partial \tilde{V}}{\partial N^s} \frac{\partial N^s}{\partial SS}}_{\gamma^s} \frac{\partial SS}{\partial f_m} = 0$$

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γ^c, γ^s are state-dependent "incentive compatibility constraints":

$$\max_{\boldsymbol{f}} V(\boldsymbol{\Theta}, \boldsymbol{f}) = \Pi(\boldsymbol{\Theta}, \boldsymbol{f}) + \gamma^c CS(\boldsymbol{\Theta}, \boldsymbol{f}) + \gamma^s SS(\boldsymbol{\Theta}, \boldsymbol{f})$$

Amazon Problem

$$\max_{\boldsymbol{p_j} \forall j \in 1P, \tau^{\boldsymbol{v}}, \tau^{\boldsymbol{u}}} \quad \sum_{j \in 1P} \left(p_j - \hat{w}_j\right) s_j(\boldsymbol{p}) \qquad \text{(reseller)}$$

$$+ \sum_{l \in 3P} [u_l s_l(\boldsymbol{p}) + v_l p_l s_l(\boldsymbol{p})] \qquad \text{(marketplace)}$$

$$+ \gamma^c CS(\boldsymbol{p}) + \gamma^s SS(\boldsymbol{p}) \qquad \text{(investment)}$$

where

- $j \in \{1P, 3P\}$ taken from data
- $v = \tau^v \boldsymbol{V}$ and $\boldsymbol{u} = \tau^u \boldsymbol{U}$ follow observed fee policies

Key trade-offs

Price-setting FoC:

$$
\begin{aligned}
0 \quad &= s_j(\boldsymbol{p}) + \textstyle\sum_{j \in 1P} (p_k - \hat{w}_k) \frac{\partial s_k}{\partial p_j} && \text{(reseller)} \\
&+ \textstyle\sum_{l \in 3P} \left(u_l \frac{\partial s_m}{\partial p_j} + v_l p_l \frac{\partial s_l}{\partial p_j} \right) && \text{(marketplace)} \\
&+ \gamma^c \frac{\partial CS(\boldsymbol{p})}{\partial p_j} + \gamma^s \frac{\partial SS(\boldsymbol{p})}{\partial p_j} && \text{(investment)}
\end{aligned}
$$

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$$+ \gamma^c \frac{\partial CS(\boldsymbol{p})}{\partial p_j} + \gamma^s \frac{\partial SS(\boldsymbol{p})}{\partial p_j} \qquad \text{(investment)}$$

Fee-setting FoCs:

- Similar forces as above...
- ...but depend on (i) seller pass-through and (ii) fee structure

Data and sample

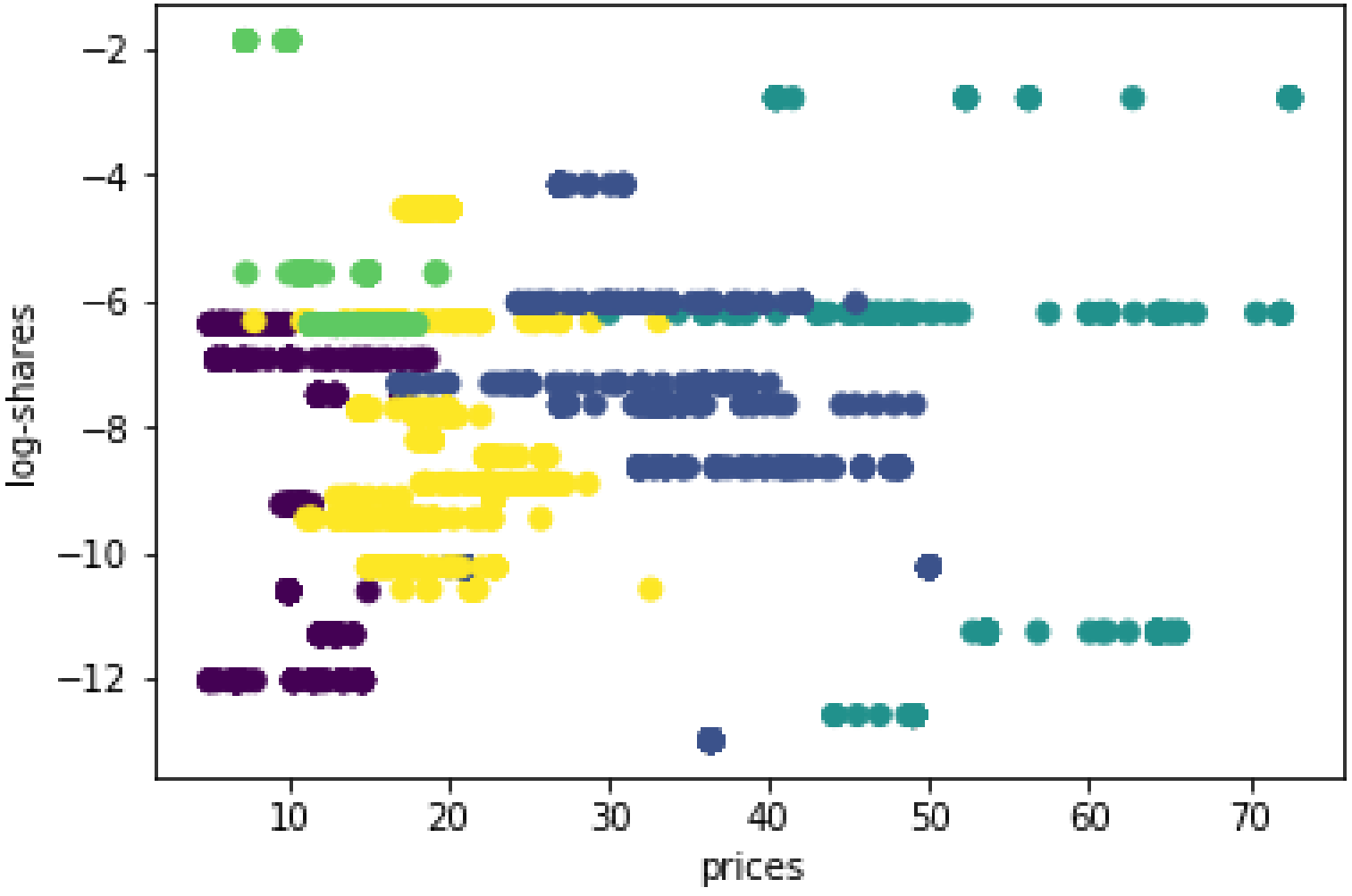
Data

- Product-level data from Keepa.com
- Estimates of sales quantities from sales rank (AMZScout)
- Fee history hand-collected from AMZ disclosures
- AMZ share = avg(category-level retail,e-commerce shares)

Sample

- ~150 subcategories exposed to Δv in 2019
- Food, Health and Baby products with prices < ~$15

Step 1: Assign products to nests (Almagro and Manresa, 2021)



Step 2: Estimate demand parameters

$$\ln s_{jt} - \ln s_{0t} = \alpha_t p_{jt} + \zeta 1\{Prime_{jt}\} + \boldsymbol{x}'_{\boldsymbol{j(s)t}}\beta - \sigma' \ln\left(\boldsymbol{s_{j|gt}}\right) + \mu_{\boldsymbol{j}} + \mu_{\boldsymbol{t}} + \xi_{jt}$$

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	(1)	(2)	(3)	(4)	(5)
Prices	-0.02	-0.24	-0.21	-0.22	-0.22
Prime	-0.14	0.31	0.28	0.21	0.32
log(rating)	-1.14	0.07	0.05	0.02	0.02
log(sell. rating)	-0.10	0.04	0.02	0.01	0.02
log(# sell. reviews)	-0.02	0.06	0.05	0.02	0.03
$\bar{\sigma}$	0.87	0.80	0.81	0.66	0.54
Obs.	19038	19038	19038	19038	19038
Method	OLS	IVGMM	IVGMM	IVGMM	IVGMM
Prod FE	Y	Y	Y	Y	Y
Seller FE Ins	N	N	Y	Y	Y
Nest params	N	N	N	Y	Y
Time FE	N	N	N	N	Y

Step 3: Estimate supply parameters

		All subcategories	
Parameter		$\gamma^j = 0$	
Elasticities	ε_{own}	-5.85	
	Outside div, θ	0.33	
	Aggregate ε	**-1.45**	
Inv. Incentives	γ^c	0	
	γ^s	0	
Fees	**Avg. ad val fee**	0.23	
	Avg. unit fee	2.35	
	Total fee rate	**0.38**	

Step 3: Estimate supply parameters

Parameter		All subcategories		
		$\gamma^j = 0$	**Mean**	**Median**
Elasticities	ε_{own}	-5.85	-5.50	-4.90
	Outside div, θ	0.33	0.32	0.29
	Aggregate ε	**-1.45**	**-1.30**	**-1.17**
Inv. Incentives	γ^c	0	1.04	1.11
	γ^s	0	0.39	0.20
Fees	**Avg. ad val fee**	0.23	0.12	0.12
	Avg. unit fee	2.35	1.70	1.33
	Total fee rate	**0.38**	**0.23**	**0.22**

Sample Counterfactual: Structural Separation

		Base	Struc. Sep
Fees	**Avg. ad val fee**	**0.22**	**0.20**
	Avg. unit fee	**0.65**	**1.83**
	Total fee rate	0.24	0.29
Mark-ups	**3P mark-up**	0.31	0.31
	WH mark-up	0.53	0.61
	1P mark-up	**0.39**	**0.28**
Share	**Total share**	0.31	0.28
	% 1P	0.38	0.47
	% FbA	0.40	0.36
△Surplus	**Consumers**		-0.62
	Sellers		-0.04
	Manufacturers		**0.08**
	Amazon		-0.04
	Total		-0.62

Other counterfactuals

		$\gamma^j = 0$	Struc. Sep	Ban 1P	Comp. Fulf.
	Consumers	-1.98	-0.19	-0.03	0.15
	Sellers	-0.11	-0.06	0.11	0.00
△Surplus	**Manufacturers**	-0.08	0.04	-0.14	0.00
	Amazon	0.20	0.00	0.04	-0.07
	Total	-1.97	-0.21	-0.01	0.08

More to come!

Conclusion

1. Interventions induce an endogenous response of fees

2. Interventions have important distributional consequences

3. Hybrid business models are not *a priori* harmful
   - Given estimated γ's, gains from internalization >> foreclosure incentives
   - If γ's decline further, separations may increase welfare

4. Consumers value Prime and product variety

5. Bundling of Prime with Fulfilment+Advertising is key to Amazon's business

Thank you!

References

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