DISCUSSION OF "PERSONALIZED PRICING, NETWORK EFFECTS, AND CORPORATE SOCIAL RESPONSIBILITY"

BY YAN XIONG AND LIYAN YANG

Discussant: Si Cheng (Syracuse University)

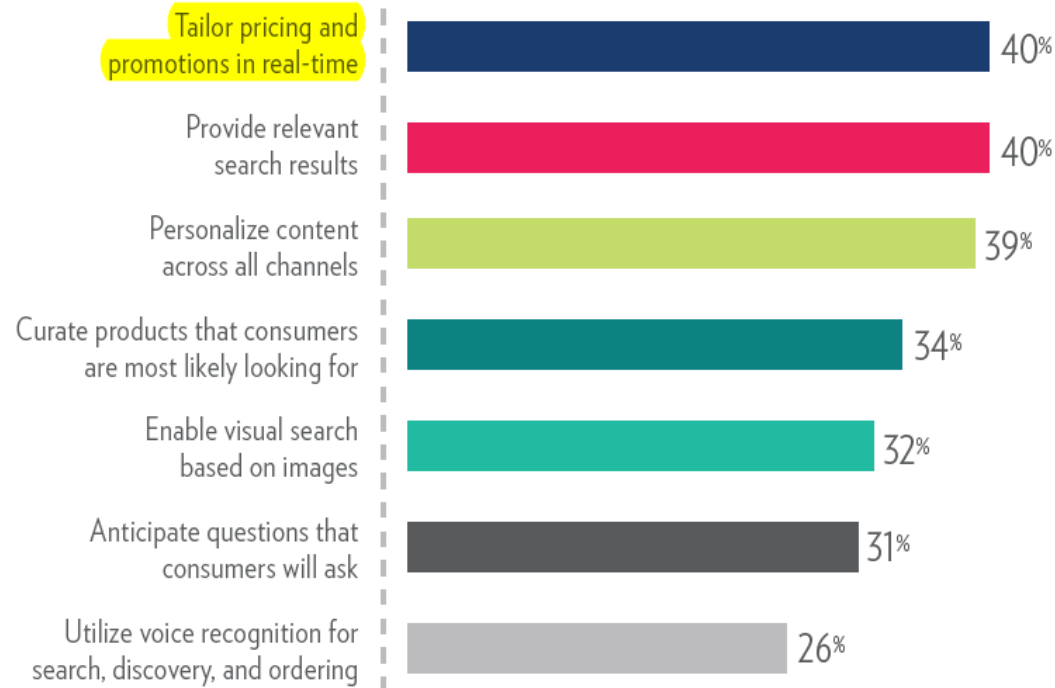ABFER 10th Annual Conference, May 2023

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Network Effects

- Network products are more valuable when more people use them.
- Classic examples:
  - Telephone, fax machine
  - Operating system: Microsoft Windows
- Contemporary examples:
  - Messaging apps: WhatsApp, WeChat, Telegram
  - Social media: Facebook, Twitter, LinkedIn, Instagram
  - E-Commerce: Amazon, eBay, Alibaba
  - Rideshare: Uber, Lyft

Personalized Pricing

HOW BRANDS CURRENTLY USE AI TO PERSONALIZE THE CONSUMER EXPERIENCE

Among retailers that have adopted AI for at least one application

| Application	Percentage
Tailor pricing and promotions in real-time	40%
Provide relevant search results	40%
Personalize content across all channels	39%
Curate products that consumers are most likely looking for	34%
Enable visual search based on images	32%
Anticipate questions that consumers will ask	31%
Utilize voice recognition for search, discovery, and ordering	26%

Source: Deloitte and Salesforce (2018), Consumer Experience in the Retail Renaissance

# Personalized Pricing

- Staples.com shows a discounted price if the customer is close to rival stores (Valentino-DeVries et al., 2012, *Wall Street Journal*).

- Uber charges higher fares to travelers staying at more expensive hotels, after controlling for airport origination, distance, and duration (Chang et al., 2022, *Journal of Law and Economics*).

- Regulatory concerns about commercial uses of consumer data: General Data Protection Regulation (GDPR), California Consumer Privacy Act (CCPA)
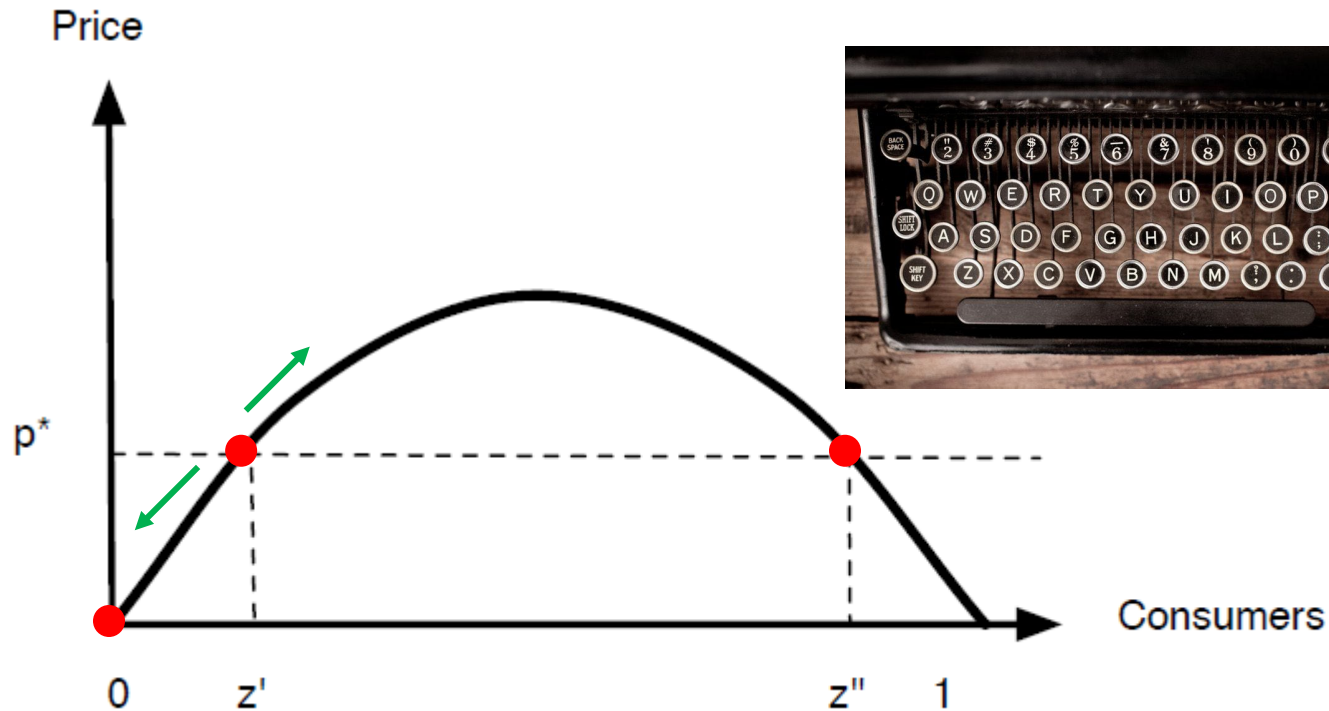
Demand Curve Without Network Effects
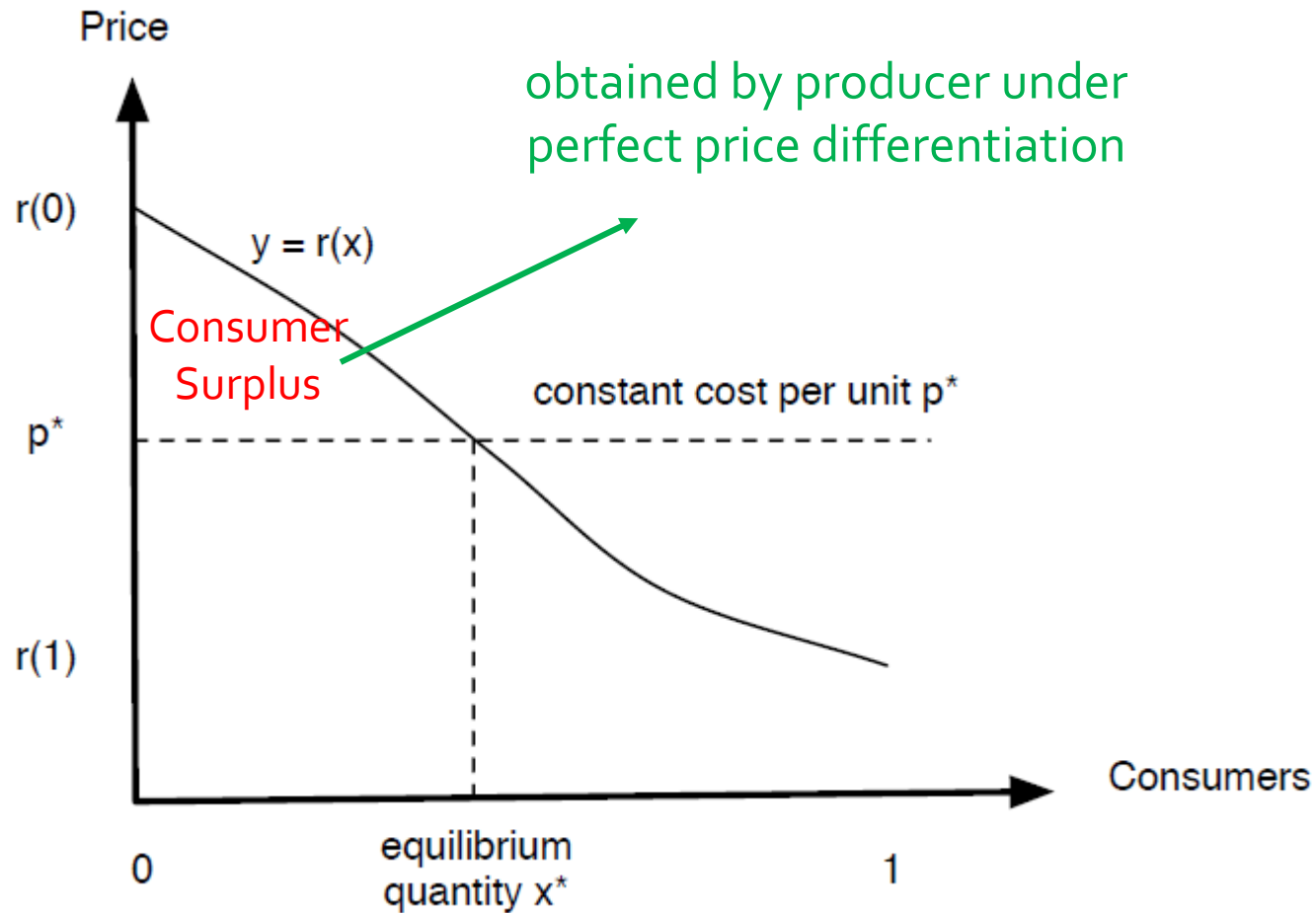
Demand Curve With Network Effects
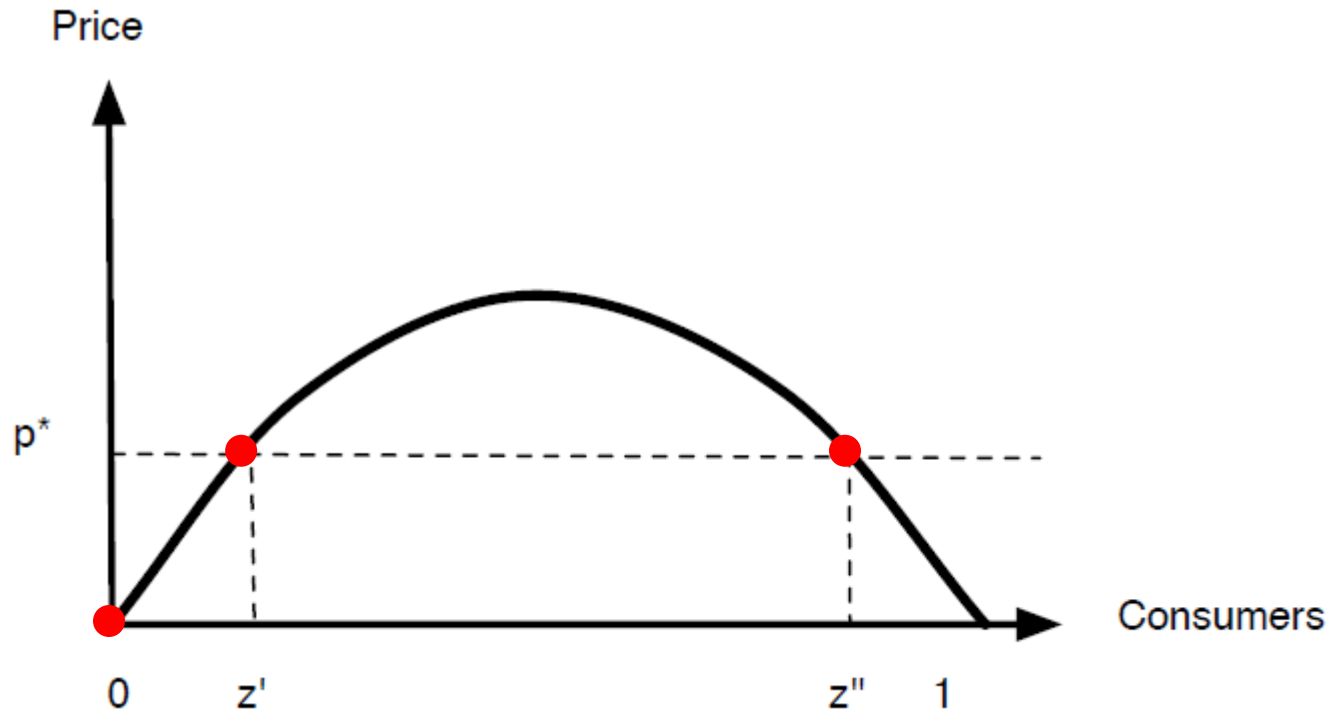
- Consumer's intrinsic value + network value (↑ with number of users)
- Initially upward sloping: the network value dominates
- Multiple Equilibria

Demand Curve With Network Effects

- Non-adoption equilibrium: stable
- Middle equilibrium: tipping point; cold-start problem
- High equilibrium: stable; "winner-take-all" market

Demand Curve With Network Effects
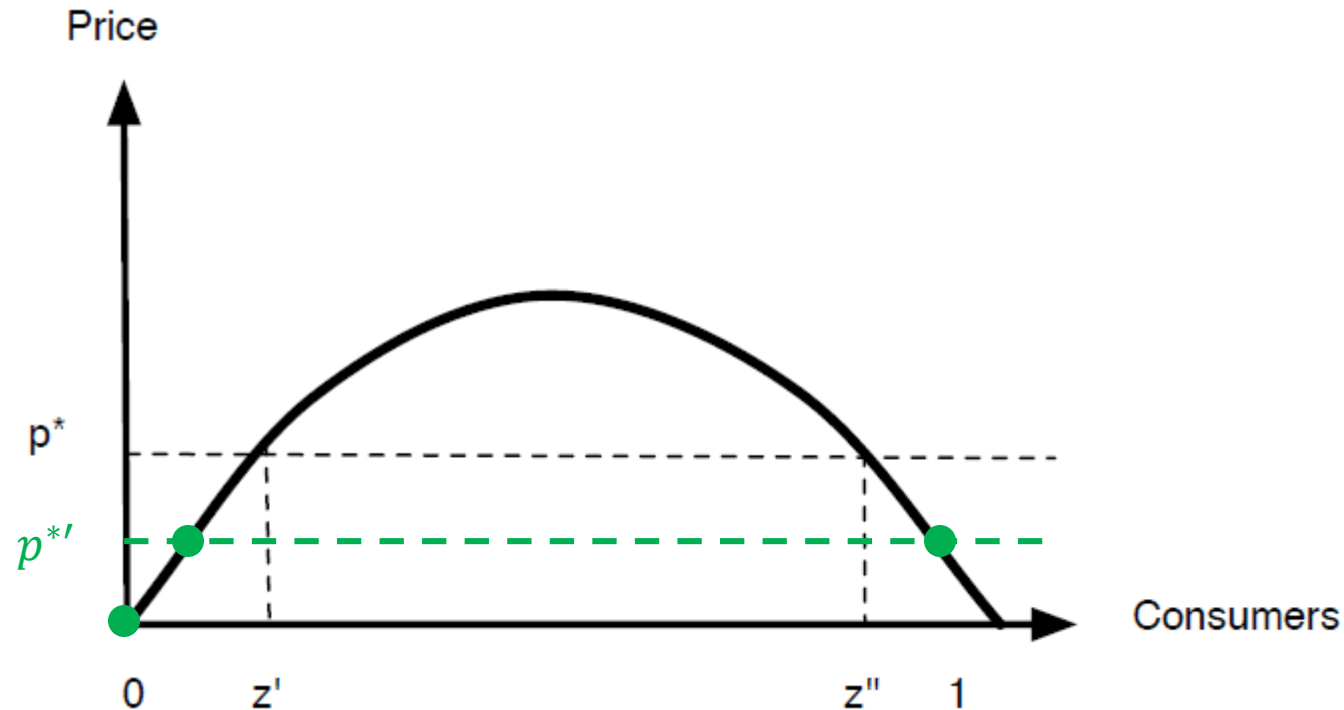
- Firms have incentives to lower price: a tipping point that is easier to pass; initial losses and raise price later, e.g., free trials, first-time user discount

Summary

- Research Question: how network effects and personalized pricing affect firm behavior, i.e., corporate social responsibility (CSR) choice?

- Network effects: consumer's utility = intrinsic value + network value

- Personalized pricing: each consumer can only observe her own price but need to predict the purchase behavior of others → coordination problem, alleviated by CSR

Summary

- Findings: a profit-maximizing firm would optimally commit to being socially responsible for consumers.
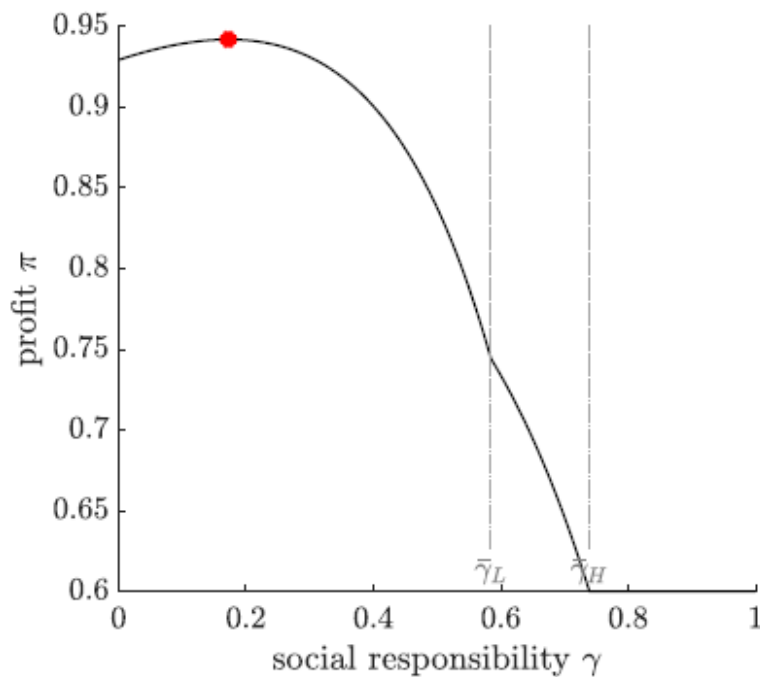
Doing Well
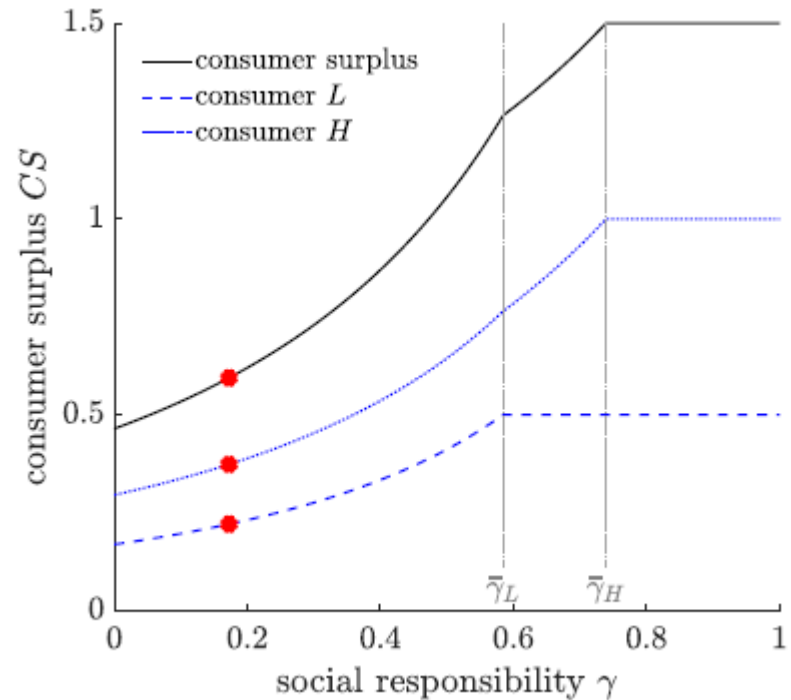
Doing Good

Comments

- Timely research on an important question, interesting results and novel insights
- My discussion:
  - Link to the pricing practice in network economy
  - Extensions

Pricing Practice in Network Economy

- This paper: under network effects and personalized pricing, firm always commits to CSR in equilibrium.

- Maximize $\Pi = \pi + \textcolor{red}{\gamma} \cdot CS, \textcolor{red}{\gamma^* > 0}$

- Despite a general CSR/ESG adoption, why we don't see many firms make credible commitments about $\gamma \rightarrow$ lower price?

  - Social indicators in Uber 2023 ESG report: driver and courier well-being; safety; workforce diversity

Pricing Practice in Network Economy

- Price/profit caps often apply to uniform pricing or non-network goods.

COMPANIES

China's Xiaomi caps hardware profit margin at 5% indefinitely

Any extra money will be passed to users via 'reasonable' means, says CEO

CVS Health Launches Reduced Rx Savings Program to Give Patients Access to More Affordable Medications

March 16, 2017 | Prescription Savings   Download ↓   Share ⌁

Novo Nordisk to participate in the program, helping to make insulin more affordable

Competition

- This paper: one monopolistic firm
- While network effects naturally lead to the dominance of one product, it is less obvious for digital products.
  - Uber and Lyft
  - WhatsApp and WeChat
  - Zoom and Microsoft Teams
- What if we move from monopoly to duopoly?
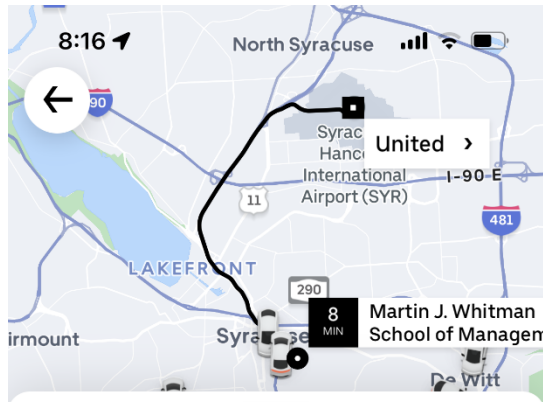
Competition

- This paper: two consumers , consumer i's utility

$$\mathcal{U}_i = v_i + \lambda \cdot \mathbb{1}(\text{consumer } j \text{ makes a purchase}),$$

- Sometimes, network value affects participation (download Uber), not necessarily purchasing (take the ride).

Purchasing: Intrinsic Value ≥ Price

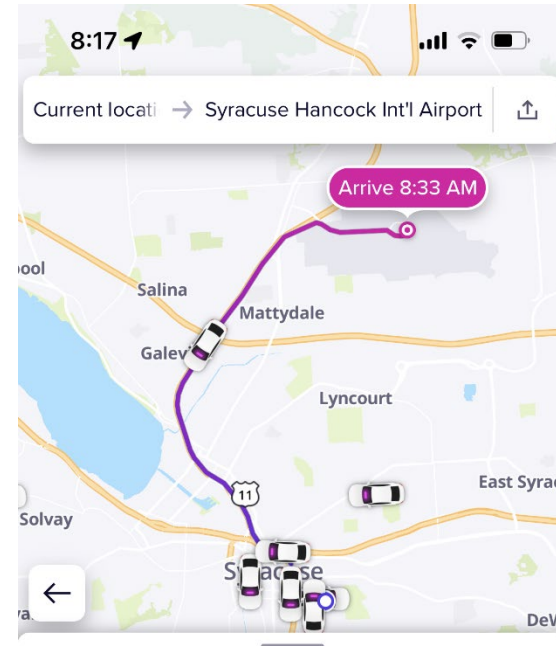# Transparent Group-Based Pricing

- Perfect price differentiation (charge the maximum possible price) could be hard to implement.
  - Imperfect knowledge, privacy and data policies
- Firms may only identify consumers' willingness to pay based on coarse segmentations.
- One common practice is to vary prices across services provided.
  - LinkedIn: Free and Premium
  - Uber: Uber X, XL, Comfort, Share, Black, Green, …
  - Netflix: Standard, Standard with ads, Basic, Premium

Transparent Group-Based Pricing

- Example: Netflix standard plan (no-ads)
  - Consumer L: indifferent to ads, low intrinsic value
  - Consumer H: wants to avoid ads, high intrinsic value
- Resembles the transparent pricing setting in the paper (two consumers)
  - Firms benefit from price heterogeneity (maximize profit) and price transparency (coordinate consumers).
  - Optimal choice for a profit-maximizing firm
  - Optimal CSR = 0

Transparent Group-Based Pricing

- $\pi^T > \pi^* > \pi^U$

- Under transparent group-based pricing, what is the optimal CSR?
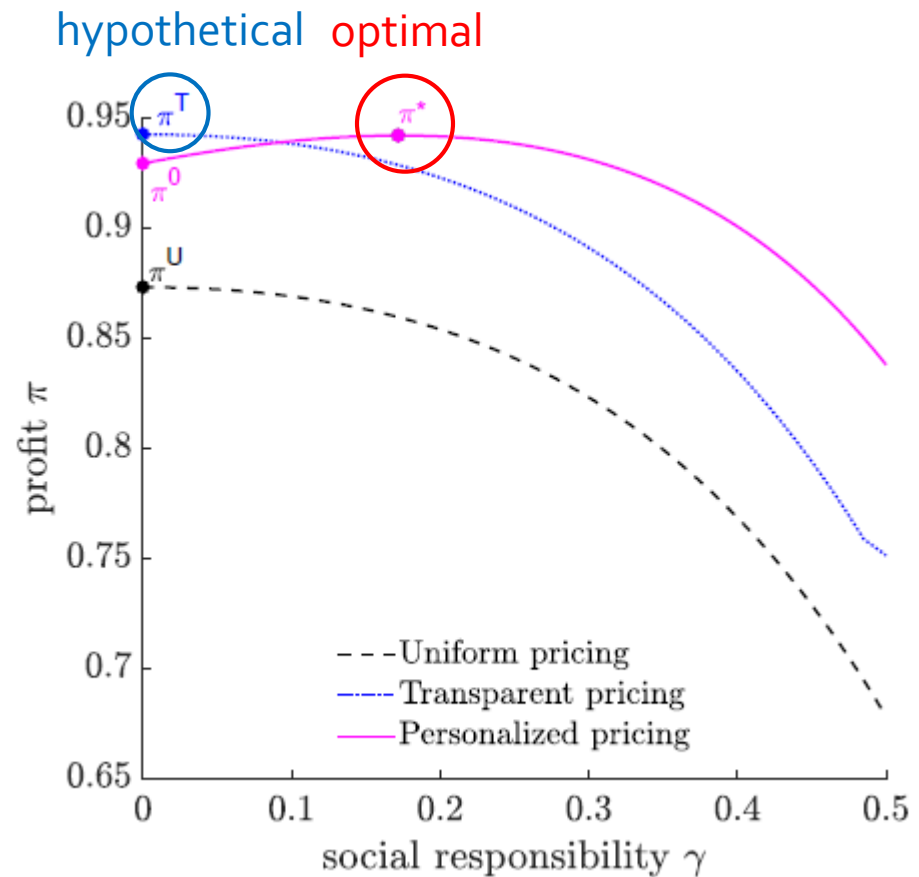
Extensions

- This paper: consumer i's utility

$$\mathcal{U}_i = v_i + \lambda \cdot \mathbb{1}(\text{consumer } j \text{ makes a purchase}),$$

- CSR could directly increase consumer's intrinsic value and allow to charge higher prices→ firms commit to CSR, not necessarily by lowering price.

  - 2023 Consumer Sustainability Survey by Blue Yonder: 69% are willing to pay more for sustainable products, and most are willing to pay 5% more.

- Consumers with high intrinsic value might also have high network value.

Extensions

- This paper: consumer i's utility

$$\mathcal{U}_i = v_i + \lambda \cdot \mathbb{1}(\text{consumer } j \text{ makes a purchase}),$$

- λ is fixed across all consumers.

- The strength of influence could vary (λ_{ij}): Key Opinion Leaders (KOLs) and influencers

- If firm can exploit the positive effect of influencers' usage (observable to the rest of the consumers), does it alleviate the coordination problem?

Extensions

- How does the firm behavior change over time? Recall the "tipping point"
- What if we allow firms to generate revenue from other sources, e.g., digital advertising?
  - Many network products are free: Facebook, Instagram, TikTok
  - Uniform pricing (offer for free in the extreme) could be optimal (optimal CSR = 0).

What I Learned…

- Provides a rationale for the notion of "doing well by doing good."

- A very promising paper with a clear practical relevance.

- My wish list as an empiricist:
  - Competition, participation vs. purchasing
  - Transparent group-based pricing
  - Other CSR and network features