Distributional Consequences of Privacy Regulation

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Federal Trade Commission

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Media platforms offer tiered subscription menus

Many media platforms offer a premium ad-free subscription in addition to allowing consumers to watch content at a reduced or 0 price with advertising

- YouTube Premium
- Twitch Turbo
- Netflix
- Amazon

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- Well established that advertiser WTP depends on targeting
  - Johnson, Shriver, and Du (2020): Advertising revenue falls by 40% for users opting out of behavioral targeting

How does this relate to distributional consequences?

- Most users who opt out of advertising are high-income (Varian, Wallenberg, and Woroch 2005)
- Similar relationship between income and value for privacy (Johnson, Shriver, and Du 2020; Lin and Strulov-Shlain 2023)

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As a result:

1. High-income consumers buy ad-avoidance tier
2. Low-income consumers watch with ads
3. Privacy regulation reduces profitability of serving low-income consumers

Research question

How does privacy regulation affect the welfare of different consumers across the income spectrum?

Privacy Regulation is good for high-income and bad for low-income consumers

- Lower ad-price $\rightarrow$ lowers value of ad-viewing consumer relative to paid subscriber
- Ad-load goes up, premium price goes down
- Inframarginal ad-viewers hurt, premium subscribers benefit
- Both impacts strongest on middle income consumers

Model

Monopoly platform offers two products: ad-supported (A) with ad load a and premium (P) with price p; outside option O. Unit mass of consumers have utility given by:

$$U_A = V - \eta a$$
$$U_P = V - \alpha(\eta)p$$
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Marginal value of dollar $\alpha(\eta)$ is a decreasing function of marginal value of time η

$\alpha(\cdot)$ smooth and decreasing $\leftrightarrow$ wealthy consumers have low marginal value of money and high marginal value of time

Timing

Platform profits are

$$\pi = Q_A p_a a + Q_P p$$

where Q_A and Q_P are the masses of consumers who consume A and P, respectively

p_a = marginal profit of an eyeball; equivalently advertiser WTP for ads

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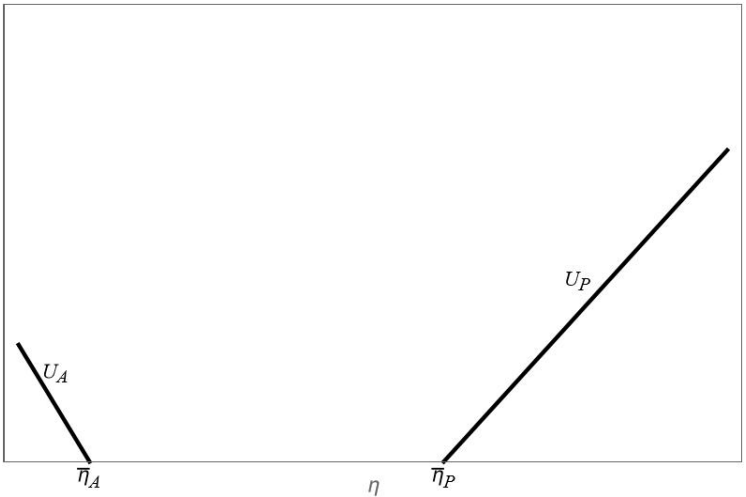
Timing:

1. Platform chooses a and p to maximize equilibrium profit
2. Consumers choose $j \in \{A, P, O\}$ to maximize utility

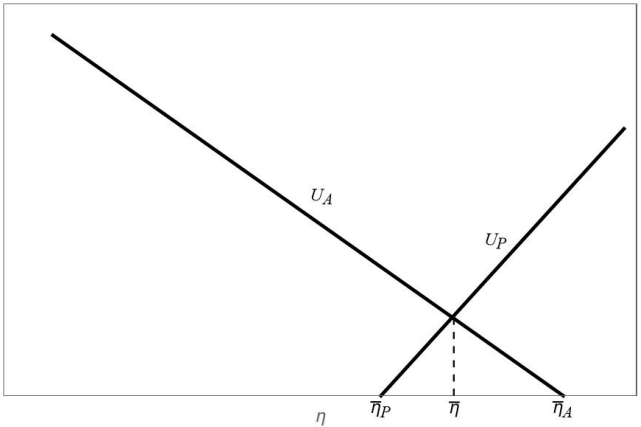
Poor consumers choose A and wealthy consumers choose P

Let $\bar{\eta}_A$ and $\bar{\eta}_P$ solve $V - \bar{\eta}_A a = 0$ and $V - \alpha(\bar{\eta}_P)p = 0$ for arbitrary a and p.



If $\bar{\eta}_A \geq \bar{\eta}_P$ no consumers prefer outside option

- Let $\bar{\eta}$ solve $V - \bar{\eta}a = V - \alpha(\bar{\eta})p$
- Consumers with $\eta = \bar{\eta}$ indifferent between A and P: $Q_A = F(\bar{\eta})$ and $Q_P = 1 - F(\bar{\eta})$.

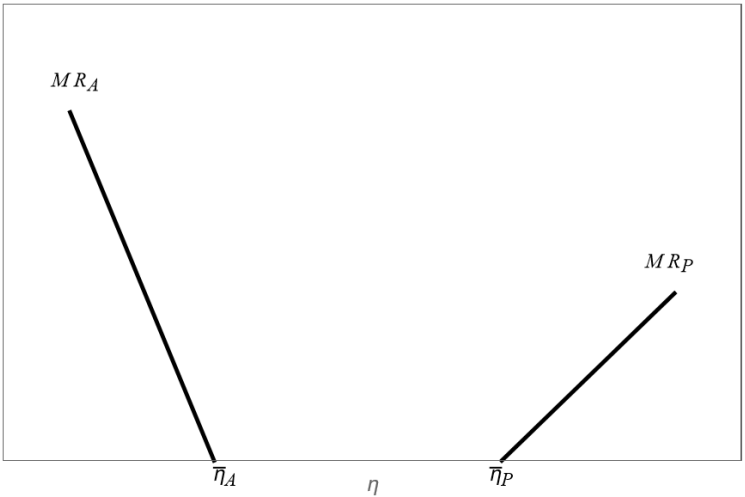


Assumptions

Three key assumptions:

1. $\frac{F(\eta)}{\eta}$ and $\frac{1-F(\eta)}{\alpha(\eta)}$ concave in η
   - Ensures concavity of profits
2. $p_a \in \left(\frac{\eta_L(f(\eta_L)\alpha(\eta_L)+\alpha'(\eta_L))}{f(\eta_L)\alpha(\eta_L)^2}, \frac{f(\eta_H)-\eta_H^2}{\alpha(\eta_H)(f(\eta_H)\eta_H-1)} \right)$
   - Ensures separating equilibrium, e.g., if p_a too small, platform only sells P because A not profitable

Assumption 2 means marginal revenue (inclusive of opportunity cost) positive for both products for some η



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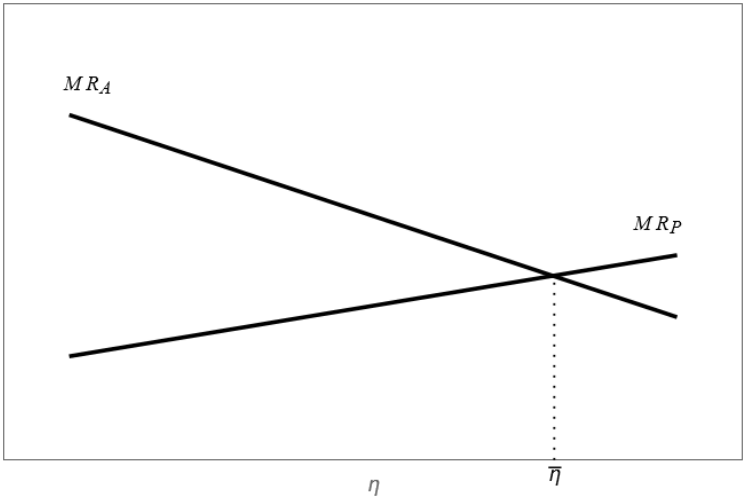
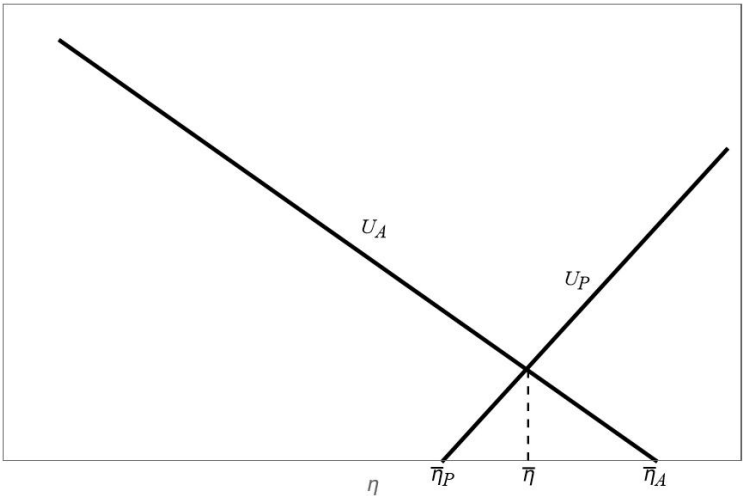
3. Either $\eta_H f(\eta_H) > 1$ or $\alpha(\eta_L)f(\eta_L) > -\alpha'(\eta_L)$
   - Ensures positive marginal revenues everywhere, so full coverage

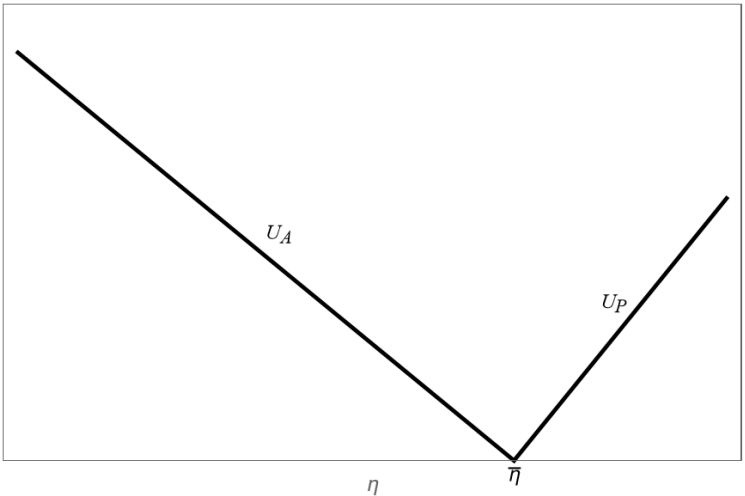
Assumption 3: visually



Giving positive utility at $\bar{\eta}$ leaves money on the table



Platform makes marginal consumer indifferent between A, P and O

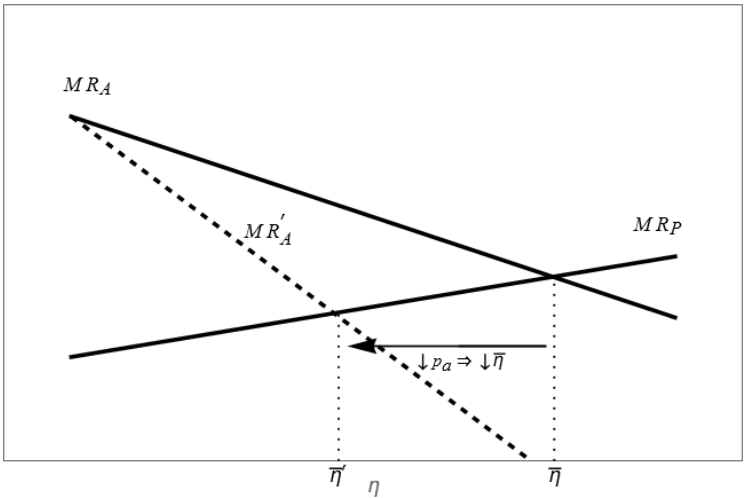


Key result

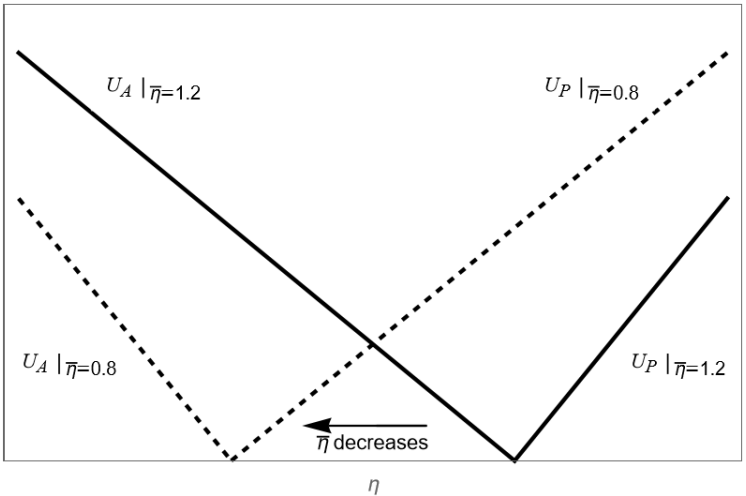
Under Assumptions 1-3:

1. There is a full-coverage separating equilibrium
2. An increase in privacy (decrease in p_a) yields a decrease in $\bar{\eta}$
3. An increase in privacy yields an increase in a and a decrease in p
4. An increase in privacy harms poorer consumers and benefits wealthier consumers

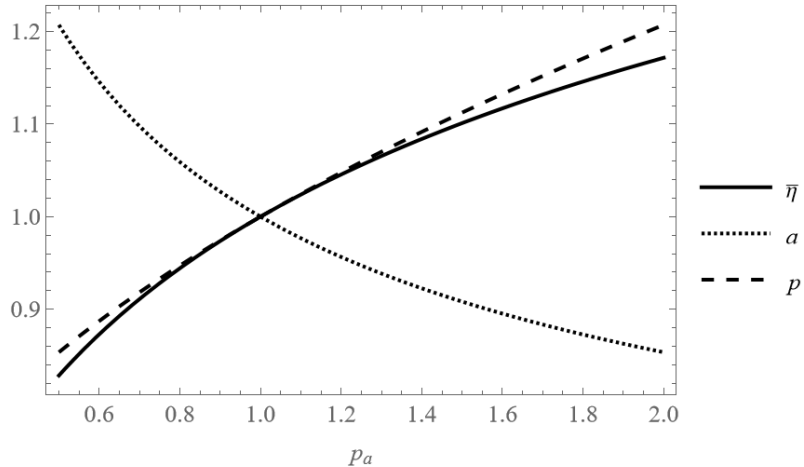
Decrease in p_a rotates MR_A down



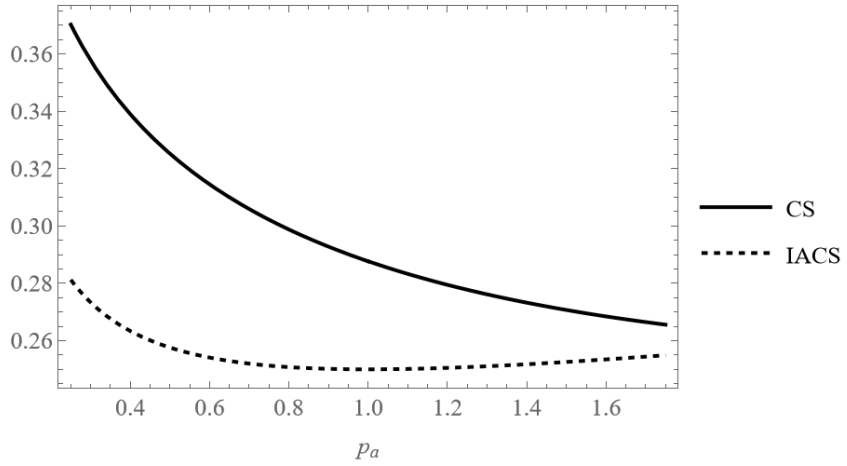
The welfare impact is highest on middle-income consumers



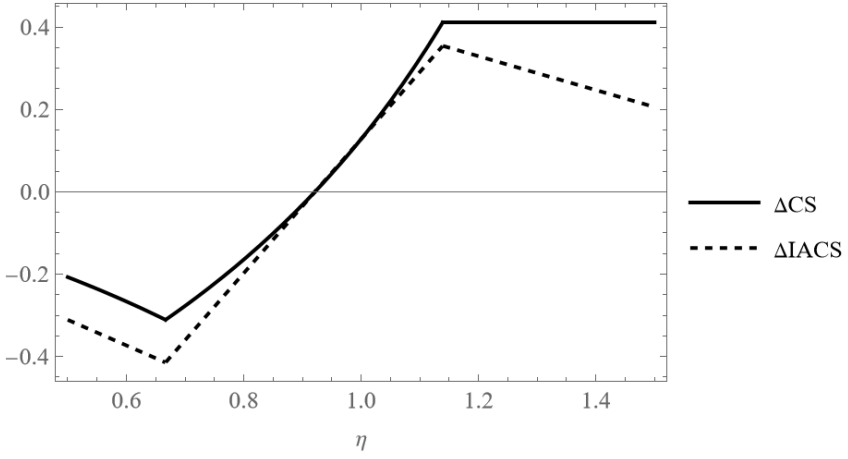
Numerical example



Inequality Adjusted CS can decrease



Middle income consumers most affected



Preferences for privacy

Model preference for privacy as $z(\theta)$ increasing function

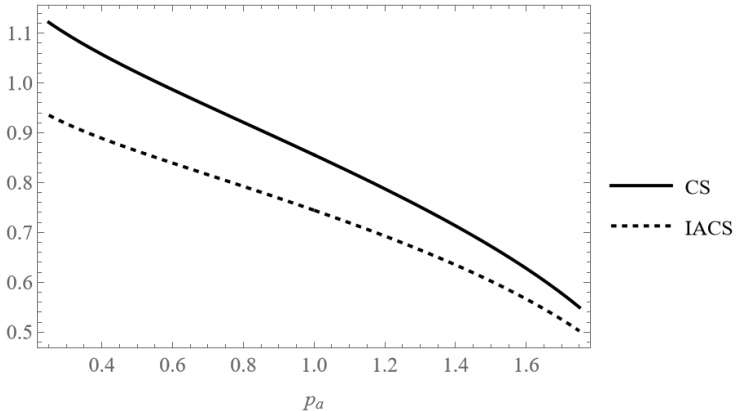
- $z(0) = 0$, $z'(\theta) > 0$
- Reduced form benefit of privacy regulation

Two forms of privacy preference:

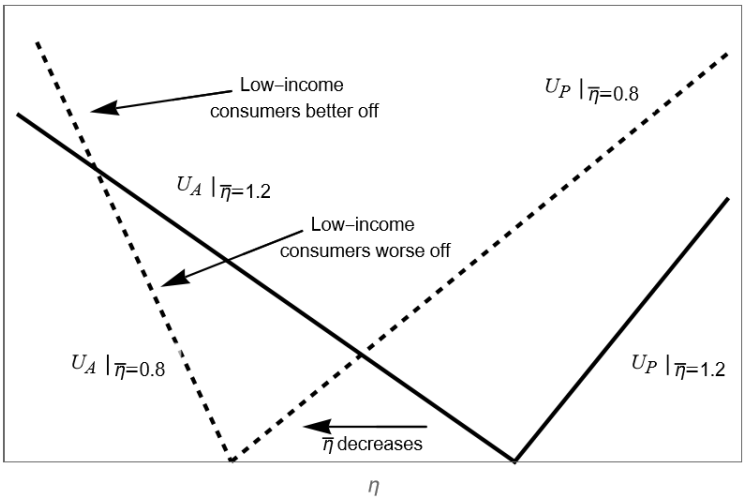
1. Intrinsic: I just don't like people having my data
   - $z(\theta)$ added to utility of all options
2. Instrumental: I don't like people *using* my data
   - $z(\theta)$ enters utility in A only

Intrinsic preferences exacerbate distributional effects

Empirical literature suggests positive correlation between $z(\theta)$ and η



Instrumental preferences mean lower-income consumers can benefit from privacy regulation



Extension: Heterogeneous value of eyeballs

Consider $p_a = p_a(\eta, \theta)$ where θ indexes privacy

- $\frac{\partial p_a}{\partial \theta} < 0$: privacy makes advertising less profitable
- $\frac{\partial p_a}{\partial \eta} > 0$: wealthier consumers are more profitable advertising targets

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Result: if $\frac{\partial^2 p_a}{\partial \theta \partial \eta} < 0$ [privacy reduces value of advertising to wealthiest consumers the most] then all of the main results go through

- Decreasing p_a has two effects:
  1. $\downarrow$opportunity cost of decreasing a to increase $\bar{\eta}$
  2. $\downarrow$relative valuation of ad-supported vs. premium viewer
- $\frac{\partial^2 p_a}{\partial \theta \partial \eta} < 0$ ensures 2 outweighs 1

Extension: What if the platform can offer a middle tier?

$$U_m = V - \eta a_m - \alpha(\eta) p_m$$

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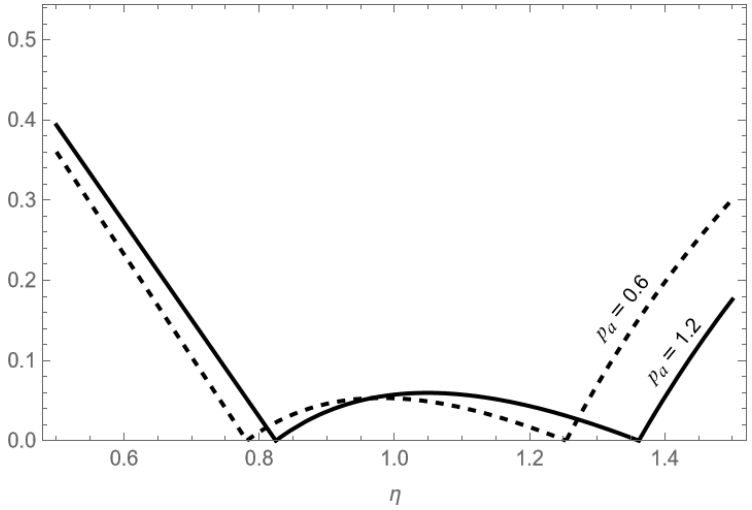
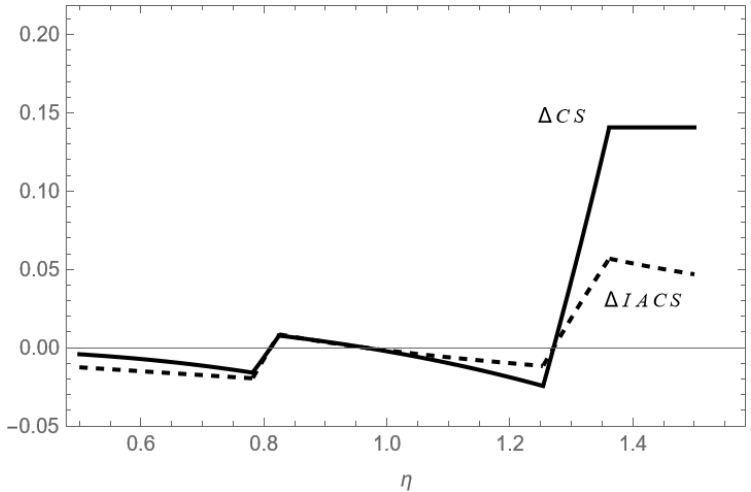
- If $\alpha()$ linear, then full value extraction
- Otherwise: Lower ads than free version, lower price than premium product.

Results carry through analogously



Welfare impact biggest for consumers near cutoffs, wealthiest consumers still best off



Conclusion

- Decrease in ad revenue leads to more ads and lower subscription price
- Harms low-income and benefits high-income consumers
- Effect largest in the middle of the income distribution
- Low-income consumers can benefit from privacy regulation if privacy preferences are instrumental
- Result robust to heterogeneous value of advertisers for consumers and richer menus