Optimal Information Disclosure and Market Outcomes (Hopenhayn & Saeedi, 2022)

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13 February 2023

Clarification

This paper previously circulated as the first half of a working paper named "Optimal Ratings and Market Outcomes". Its second half is forthcoming as "Optimal Coarse Ratings".

Outline

Introduction

Motivation

- Markets with asymmetric information (around quality)
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- **A: It depends!**
  - ... on the convexity of the supply function (and elasticity of demand)

Example

Which disclosure is better?

Vintage Seiko 5 Automatic Day-Date 17 Jewels Cal.7009 Men's Wrist Watch...
Refurbished · Seiko 5 · Leather

$34.99
Buy It Now
Free International Shipping
from India
Free returns
Last one

SEIKO LORD MATIC vintage watch men's silver manual winding working Japan
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1 bid · **2h 36m**
+$12.95 shipping estimate
from United Kingdom

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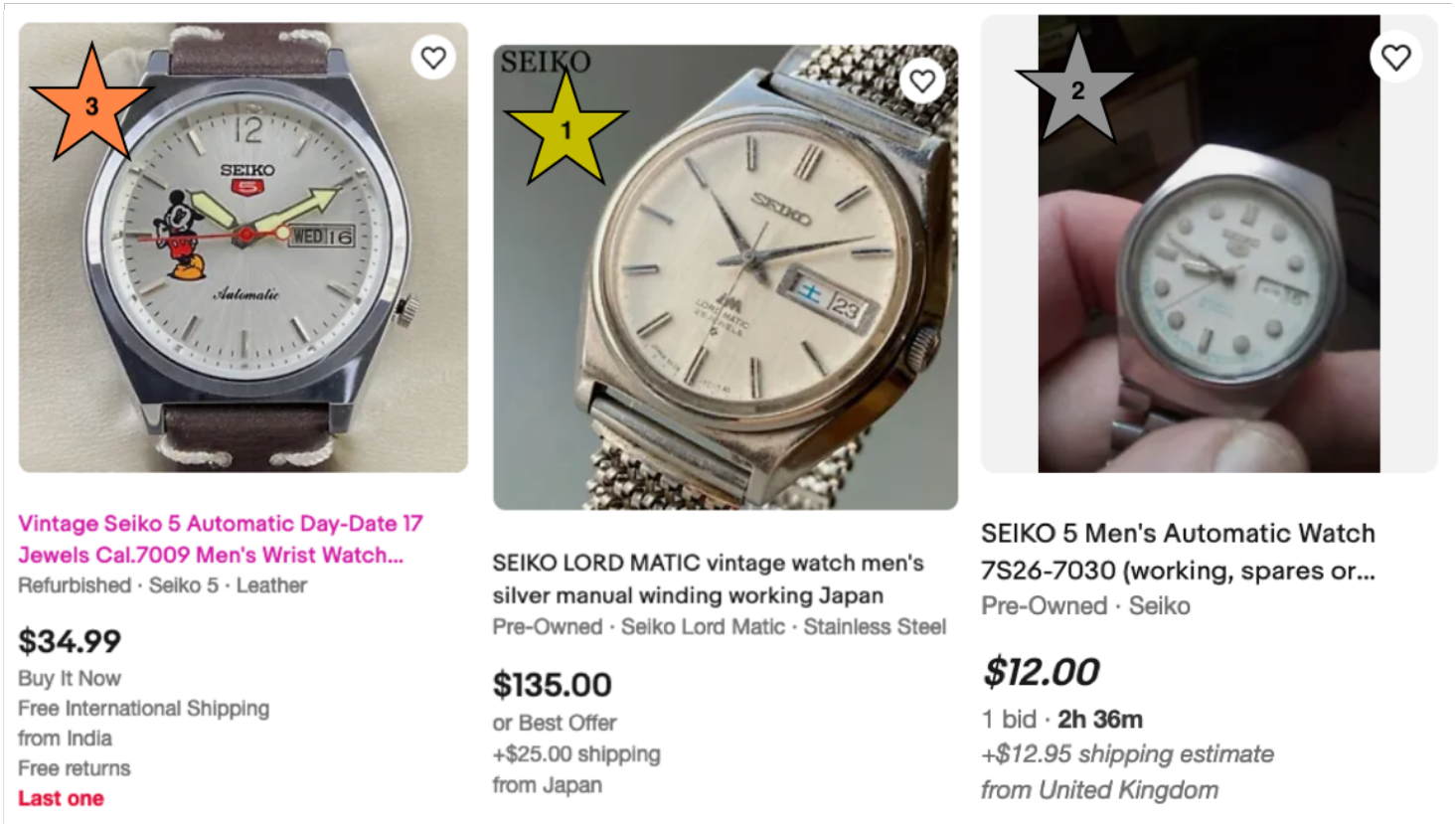

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- **Certification** and quality disclosure:
- **Empirical** work:

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  - Bergemann and Pesendorfer (2007), Board (2009): private value auction, bidders may be worse off with more info (depending on N)
  - Hoppe et al (2011), Romanyuk and Smolin (2019): matching framework; CS lower with better info (even market failure)
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- **Certification** and quality disclosure:
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  - Ostrovsky and Schwarz (2010): colleges strategical about students' quality
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- **Empirical** work:
  - Saeedi (2019): positive signaling value for the eBay certification
  - Fan et al (2013): sellers lower prices to move up on reputation

This paper!

- Model:
  - Multiple sellers, multiple buyers, one market designer (e.g.: eBay)
  - Goods only differ on quality level, unknown to the buyers
  - Market designer disclose information to buyers
  - Competitive market with **elastic supply**

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- Q&A:
  1. **How does $\uparrow$ information impact welfare, CS, Π?**
     - Prices more correlated to true quality $\Rightarrow \uparrow$ Quality & Welfare
     - Supply convex (concave) $\Rightarrow \uparrow (\downarrow)$ Total Output & CS

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- Q&A:
  1. **How does ↑ information impact welfare, CS, Π?**
     - Prices more correlated to true quality ⇒ ↑ Quality & Welfare
     - Supply convex (concave) ⇒ ↑ (↓) Total Output & CS
  2. **Which is the optimal information disclosure policy?**
     - If CS and Π weighted equally: full disclosure.
     - If not, it depends (pooling regions ↑ with asymmetry on weights)

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- Timing:
  1. information about firm qualities is provided by the planner
  2. based on this info, consumers form **common** posteriors $G(z)$ about each firm's exp. quality z
  3. perfectly competitive eq. prices are determined in the market

Equilibrium

Definition. An (interior) **equilibrium**, given $G(z)$ posterior expected qualities, is given by prices $p(z) = P(Q) + z$, where total quantity $Q = \int S(p(z))dG(z)$.

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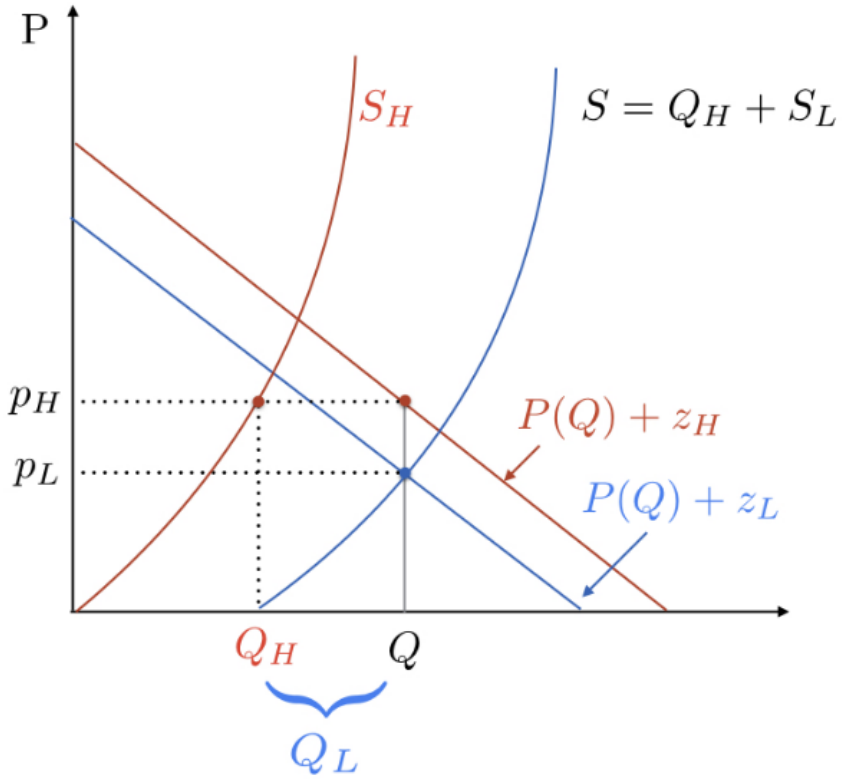
Case of two categories: L, H.



Main Conclusion

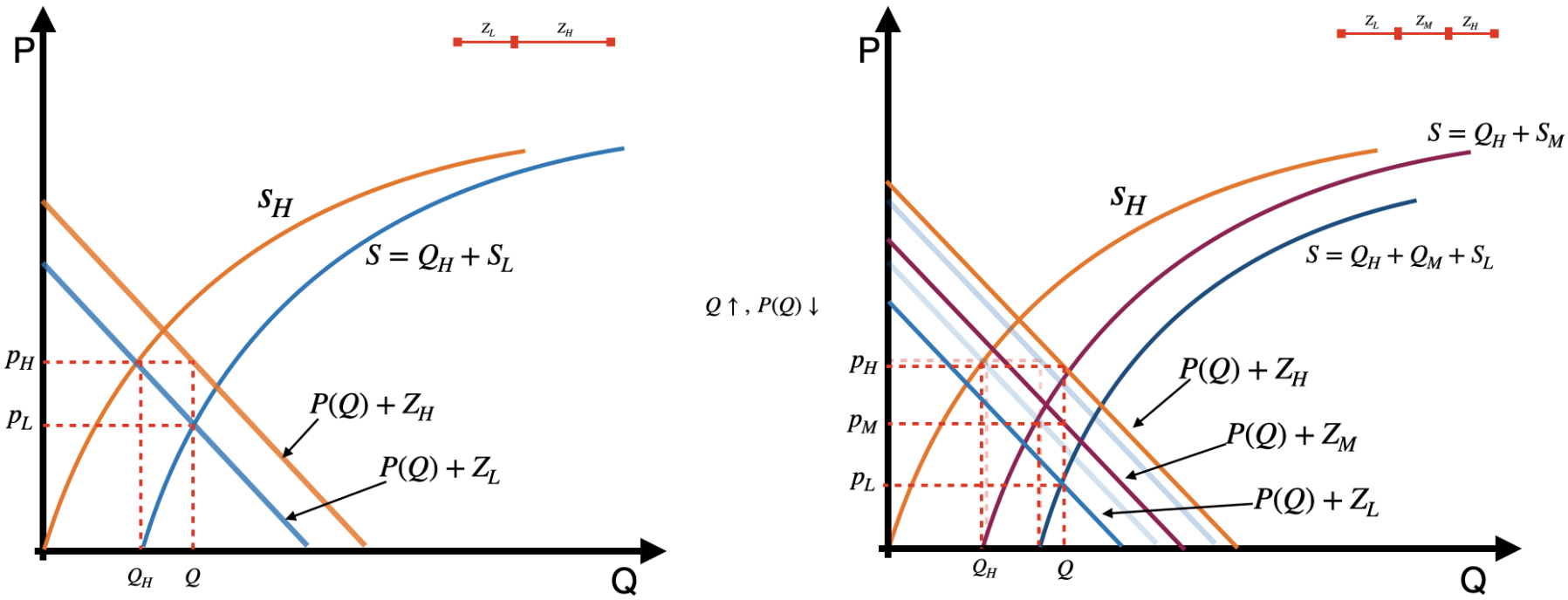
Impact of Improved Information

$\hat{\mathbf{G}}$ is an improved information of G, provided it is a mean-preserving spread of G. The impact of the improved information $\hat{\mathbf{G}}$ will be:

- It increases (decreases) total output, thus consumer surplus, if the supply function is convex (concave).
- Producer surplus increases if the total output doesn't increase.
- Total surplus increases(Original Info $\in$ Improved Info).

Remark: Better information always increases the total welfare, while the impact on consumer surplus and producer surplus depends on the convexity of the supply function.

Impact of Improved Information-Convex Supply.



Z_L,Z_M,Z_H are mean values of respective segments on the quality interval. More segmentation represents improved information.

Optimal Information Disclosure–Simple Case

Simple Model

- Each firm inelastically supplies $\hat{q}$ with cost $c > 0$, and information disclosure will exclude those producers below quality z^*. The supply of the goods will be:

$$Q(z) = (1 - F(z^*))\hat{q}$$

The expected quality above z^* will be $M(z^*)$. Take the equilibrium price form $P(Q(z^*)) + M(z^*)$ in above analysis.

Optimal Information Disclosure– Simple Case

Optimal Threshold: $z^c < z^p < z^f$

1. Pooling upwards for Consumer: $P(Q(z^c)) + M(z^c) = c$
2. Full revealing for Equal-Weight planner: $P(Q(z^p)) + z^p = c$
3. Pooling downwards for firm: $P(Q(z^f)) + P'(Q(z^f))Q(z^p) + z^f = c$

Intuition-Two Opposing Force

- CS increases with Q. Consumers want to pool upward to bring the lower-quality firms into participation, thus increasing the total quantity.
- In contrast, firms want to pool downward to exclude some firms around the margin to achieve higher prices and lower quantities.

Optimal Information Disclosure – General case

- $z \sim F(z)$
- $\mathbf{g}$ is the set of all garblings of $F(z)$
- $\gamma \in [0, 1]$

Planner's problem:

$$max_{G \in \mathbf{g}}(1-\gamma) \int \pi(P(\hat{Q}(G)+x))dG(x) + \gamma \int_0^{\hat{Q}(G)} (P(q) - P(\hat{Q}(G)))dq$$

subject to (demand-supply equilibrium condition):

$$\hat{Q}(G) = \int S(P(\hat{Q}(G)) + x)dG(x)$$

Optimal Information Disclosure – General case

Full disclosure

- $\gamma = 1/2$, $\gamma < 1/2$ and S is concave, $\gamma > 1/2$ and S is convex, or demand is infinitely elastic.

Fully disclosure up to a threshold z^*, and pooling upwards

- $\gamma > 1/2$, and S''/S' is decreasing.
- $\gamma < 1/2$, and S''/S' is increasing.

Pooling up to a threshold z^*, and fully disclosure upwards

- $\gamma > 1/2$, and S''/S' is increasing.
- $\gamma < 1/2$, and S''/S' is decreasing.

Conclusion

Main Insight

- **Equal-weighted planner's perspective**: Improved information increases total surplus– Full disclosure is Optimal.
- **Unequal-weighted planner's perspective**: Optimal Information disclosure pattern depends on the convexity of the supply function and the size of γ.

Criticism

- Heavily relies on the liner consumer utility in price: it assumes the equilibrium price increase linearly with quality, which is unplausible in reality.
- Constant marginal disutility of price also puts strong restrictions on the demand side.