Optimal Multi-Product Pricing and Design

By Simon Loetscher and Ellen Muir
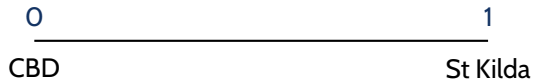
Discussion by Mitchell Watt

December 4, 2025

Melbourne IO Workshop
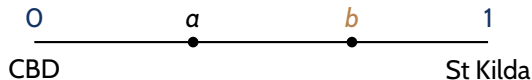
Key Takeaways

Model: Monopolist selling horizontally differentiated products, with consumers located on a Hotelling line.

0   1

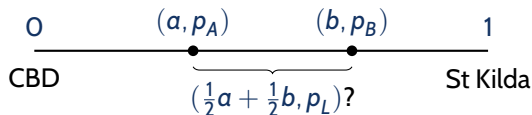CBD   St Kilda

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0 & (a, p_A) \quad (b, p_B) & 1 \\
\text{CBD} & \underbrace{\quad\quad\quad\quad\quad}_{(\frac{1}{2}a + \frac{1}{2}b, p_L)?} & \text{St Kilda}
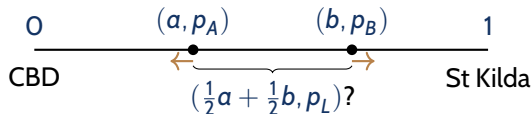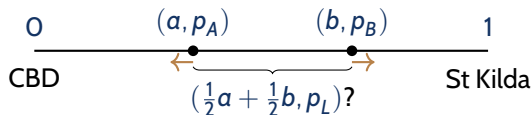\end{array}
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Main results:

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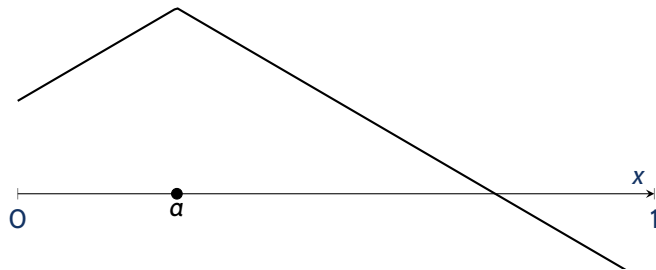& (\tfrac{1}{2}a + \tfrac{1}{2}b, p_L)? &
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2. The opaque product incentivizes **overdifferentiation.**

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$$O \qquad (a, p_A) \qquad\qquad (b, p_B) \qquad 1$$

CBD $\qquad\qquad \left(\frac{1}{2}a + \frac{1}{2}b, p_L\right)? \qquad$ St Kilda

Key questions: where does the monopolist set up shop? What menu does the monopolist offer?

Main results:

1. A monopolist offering differentiated products optimally also offers a single **opaque** product: a 50/50 lottery over the two **pure** goods.
2. The opaque product incentivizes **overdifferentiation.**
3. A merger combining sellers of pure products enables the opaque product, generating **additional anticompetitive effects**.
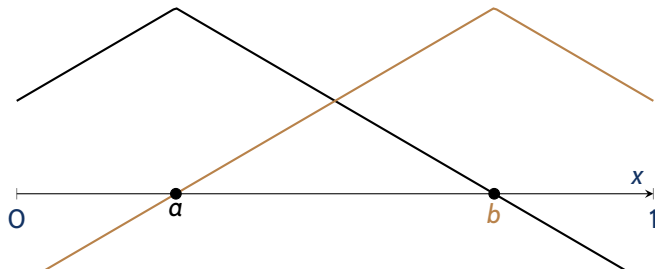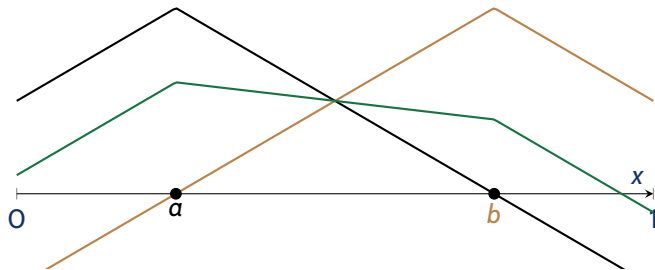
Graphical Intuition

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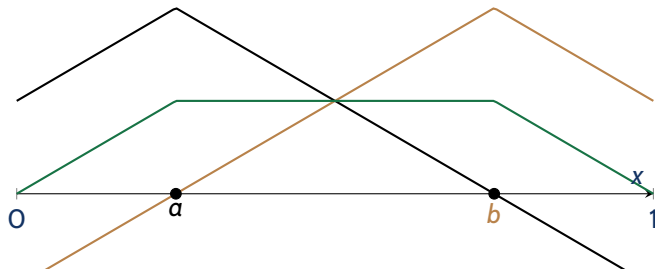Gross utility of Hotel a

Graphical Intuition

Gross utility of Hotel a and Hotel b (suppose $v_A = v_B$)
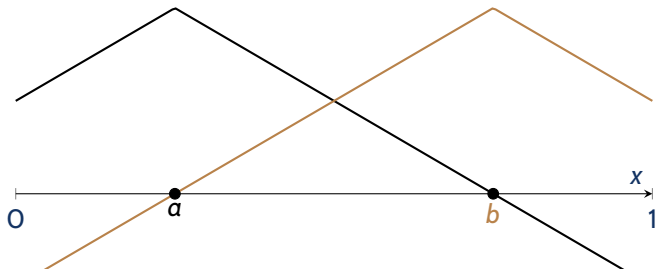
Graphical Intuition

Gross utility of 60/40 lottery over *a* and *b*
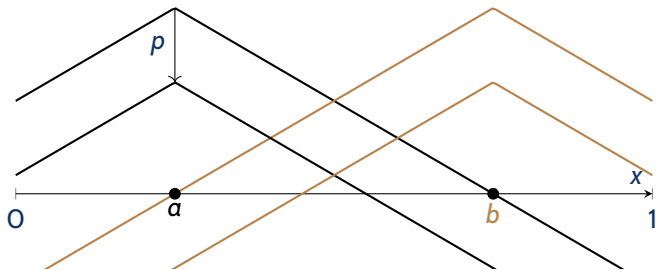
Graphical Intuition

Gross utility of 50/50 lottery over *a* and *b*

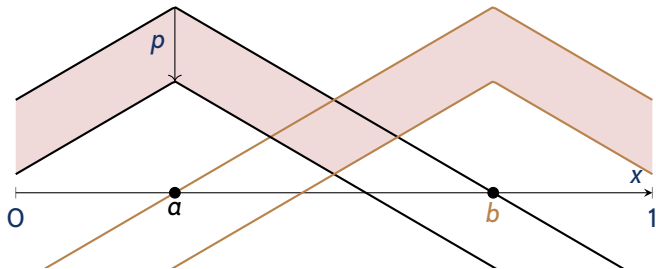# Optimal Pricing of Pure Products at Fixed Locations

Suppose locations a and b are fixed.

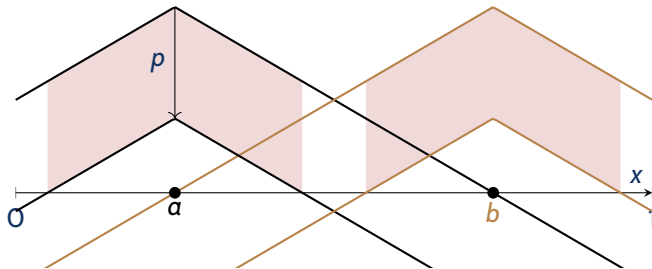# Optimal Pricing of Pure Products at Fixed Locations

Adding a price reduces the gross utility $\rightsquigarrow$ net utility.

Optimal Pricing of Pure Products at Fixed Locations
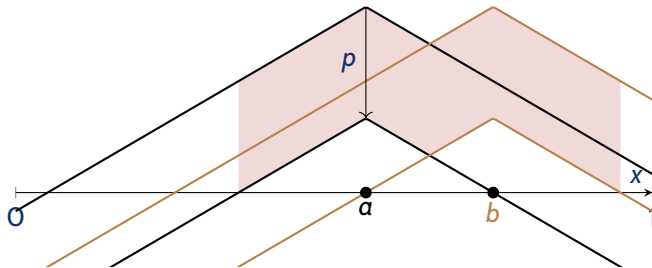

Monopolist captures difference.

Optimal Pricing of Pure Products at Fixed Locations

For higher prices, monopolist faces standard tradeoff of demand vs. price.

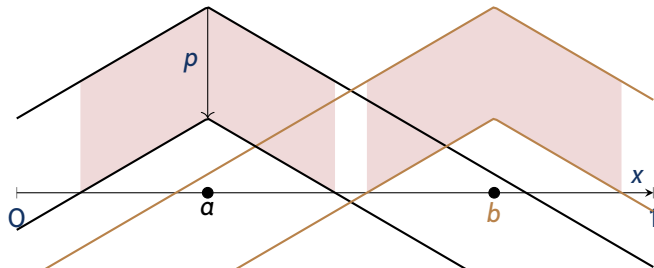$$MR = \text{demand} \times \delta p - 2p \times \delta p$$

Optimal Pricing of Pure Products at Fixed Locations

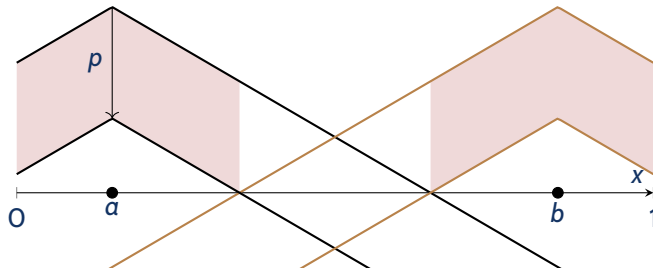If a and b are fixed and close, optimal pricing may involve overlap, changing tradeoff

$$MR_A = \text{demand} \times \delta p_A - \underbrace{p_A \times \delta p_A}_{\text{consumers not buying}} - \underbrace{(p_A - p_B)\delta p}_{\text{consumers switching to B}}$$
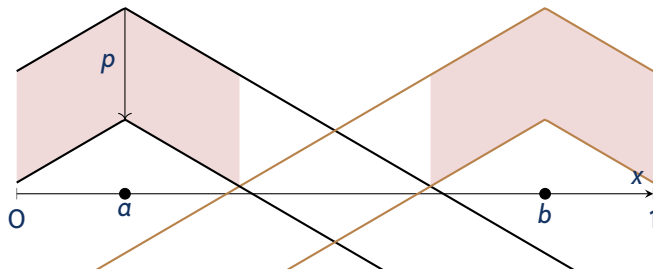
Optimal Placement Given Prices

Monopolist prefers to avoid overlap. There may be many optimal placements.

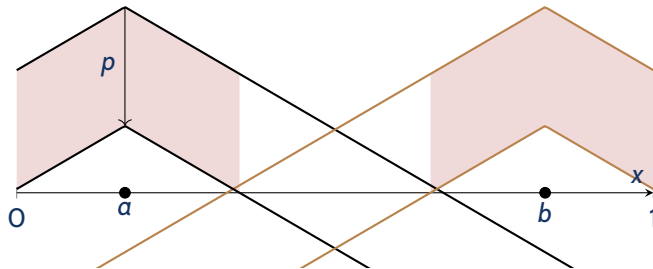# Optimal Placement and Pricing of Pure Products

Monopolist also prefers to avoid extreme locations with $U(0) > 0$ or $U(1) > 0$.
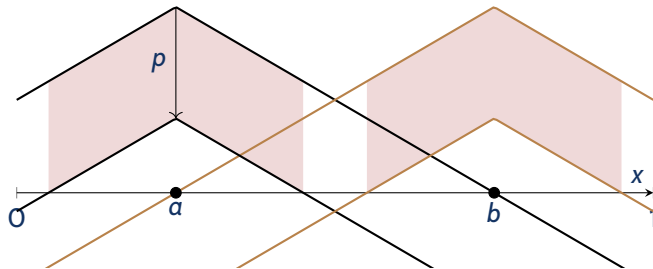
Optimal Placement and Pricing of Pure Products

In that case, she can always move *a* and *b* in a little...

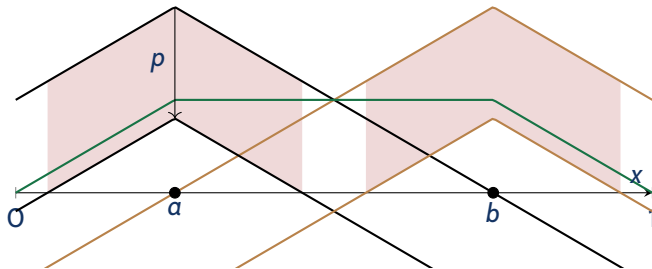# Optimal Placement and Pricing of Pure Products

while increasing price to create same demand $\rightsquigarrow$ higher profit.
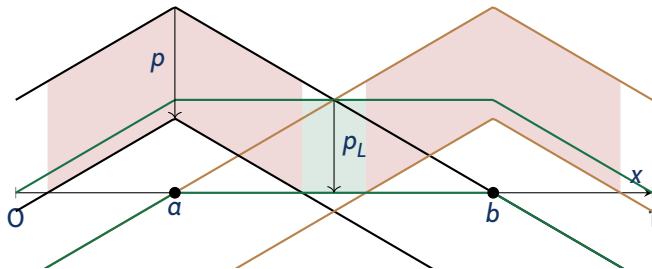
Optimal Pure Product Mechanism

Putting this together, optimal pure product structure always gives zero utility at types 0, 1, and some intermediate type(s).

Opaque Products
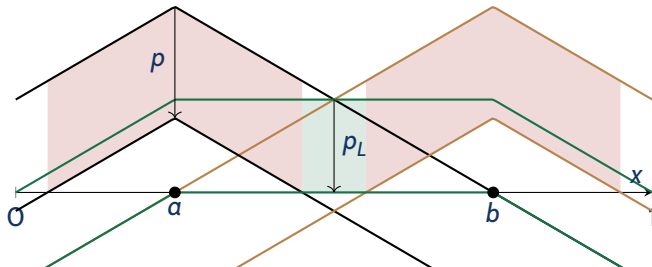

Let's consider adding a 50-50 lottery.

Opaque Products

Can find a price p_L leaving utility of hinterland types unchanged $\rightsquigarrow$ no cannibalization.

Opaque Products

This creates an incentive to increase price of pure products:

$$MR_A = \text{demand} \times \delta p - p_A \times \delta p - \underbrace{(p_A - p_L)\delta_P}_{\text{previously } p_A \delta_P}$$

Opaque Products

It also creates an incentive to move *a* and *b* outward, to avoid lottery overlap:

$$-\frac{\partial \Pi}{\partial a} = \underbrace{p_A}_{\text{extra revenue on left}} + \underbrace{(p_L - p_A)}_{\text{lower revenue on right}} = p_L.$$

Why are opaque products always 50-50?

Given any lottery that is not 50-50...

Why are opaque products always 50-50?

We can find a 50-50 lottery with a higher price such that each buyer pays more ⤳ higher profits.

Free disposal

With free disposal, consumers can dispose of goods with negative gross utility.

Free disposal

Complications can arise.

Policy Implications

Policy Implications

Australian Competition & Consumer Commission (ACCC)
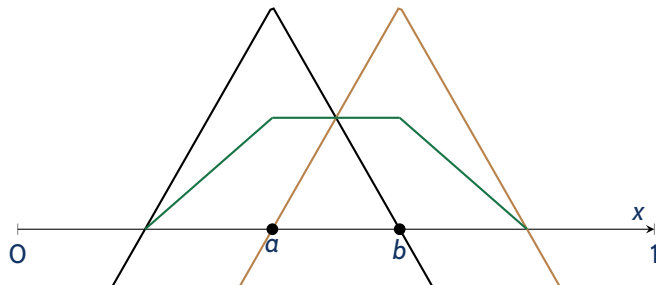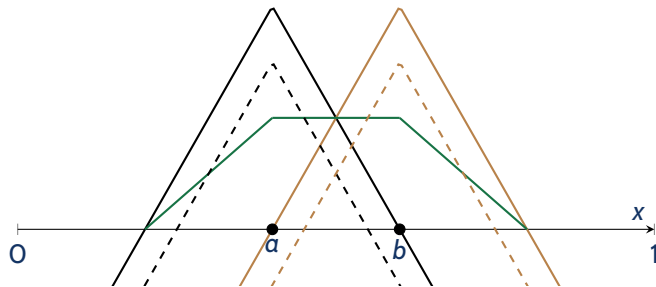
Merger assessment guidelines

June 2025

Substantial Lessening of Competition

"Firms that supply products that are close substitutes will typically have high diversion ratios. ... The higher the diversion ratios between 2 firms, the more closely they compete, and the more competition that will be lost if they were to merge. ... In some cases, diversion ratios between the merger parties may be relatively low but competition from the target may have an oversized impact on competition; for example, if it is a discounter, or drives product or business model innovation."

Disney and Hulu

Horizontal preferences for entertainment programming (e.g., family vs. prestige content)

Post-merger (2019), Disney introduces "Hulu on Disney" bundle with ad-supported content at a lower price ($9.99 / month).

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Post-merger, stand-alone Disney premium (ad-free) bundles increase significantly in price:

► **Disney+ Premium (US):**
  – 2019–2023: $10.99 → $13.99
  – 2023–2024: $13.99 → $17.99
► **Hulu (Ad–Free):**
  – 2019–2023: $12.99 → $14.99
  – 2023–2024: $14.99 → $17.99

Q   Got a Tip?   Newsletters   U.S. Edition ⌄   *VARIETY*

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Disney+, Hulu Are Hiking Prices Again Next Month

By Todd Spangler ⌄

Future Directions

Future Directions

- **Conflation**: how do firms determine 'boundaries' of goods?
  - In some markets (e.g., digital display advertising), opaqueness is the default.
  - The firm must pay costs to separate into pure products.
  - What is the optimal mechanism in that case?
- **Media polarization**: how do newspapers determine their "slant"? What is the effect of aggregators?
- Relationship to **"sludge"** (á la Thaler and Sunstein).

Thanks!