

AMAZON VS. WALMART HOLIDAY PRICING COMPETITION

A Continuous-Strategy Game Analysis



BACKGROUND



- Every holiday season, Amazon and Walmart engage in **price competition** to capture rising consumer demand in electronics. While deep discounts attract shoppers, they also squeeze margins in an already low-profit category.
 - We model this interaction as a **continuous-strategy game** in which each retailer chooses a discount between 0–100%. Because both firms compete for the same consumers, one retailer's price cut immediately shapes the other's optimal response, creating a cycle of matching or undercutting.
- Final price is determined by how much each undercut: $Price (P) = gross\ price * (1 - discount)$

OUR MAIN GOALS

➤ **Goals 1**

Derive each firm's best-response function

➤ **Goals 2**

Solve for the Nash equilibrium, and compare it with the higher-profit collusive outcome.

➤ **Goals 3**

Analyze a sequential version of the game to evaluate how timing affects results and whether a first-mover or second-mover advantage emerges.



ASSUMPTIONS

We use a Smart TV as the representative product for holiday pricing.

- We calibrate demand sensitivity using midpoint estimates from prior empirical studies on TV pricing and holiday retail promotions.
- Amazon and Walmart face symmetric demand conditions since they sell close substitutes to the same holiday shoppers, making their price sensitivities effectively equal.
- No cost differences across firms, allowing the analysis to focus purely on strategic pricing behavior.



01 Base parameters

- Base price (P) = \$500
- Marginal cost (C) = \$200
- Baseline demand (Q) = 100,000 units

02 Demand Responsiveness

- Own discount sensitivity
(α): = 400,000
- Cross discount sensitivity
(β): = 120,000

03 Midpoint elasticity estimates

- Own elasticity midpoint = 4
- Cross elasticity midpoint = 1.2

- A deeper discount increases your demand (α effect)
- But your competitor's discount pulls customers away (β effect)

DEMAND & PROFIT STRUCTURE



Demand depends on both retailers' discounts:

- Amazon: $Q_A = Q + \alpha d_A - \beta d_W$
- Walmart: $Q_W = Q + \alpha d_W - \beta d_A$

Profit formula for each firm:

- $\pi = (\text{Price after discount} - \text{cost}) \times \text{quantity sold}$

Where: d_A, d_W = Amazon/Walmart discount levels



BEST RESPONSE & NASH EQUILIBRIUM

Best Response from profit maximization:

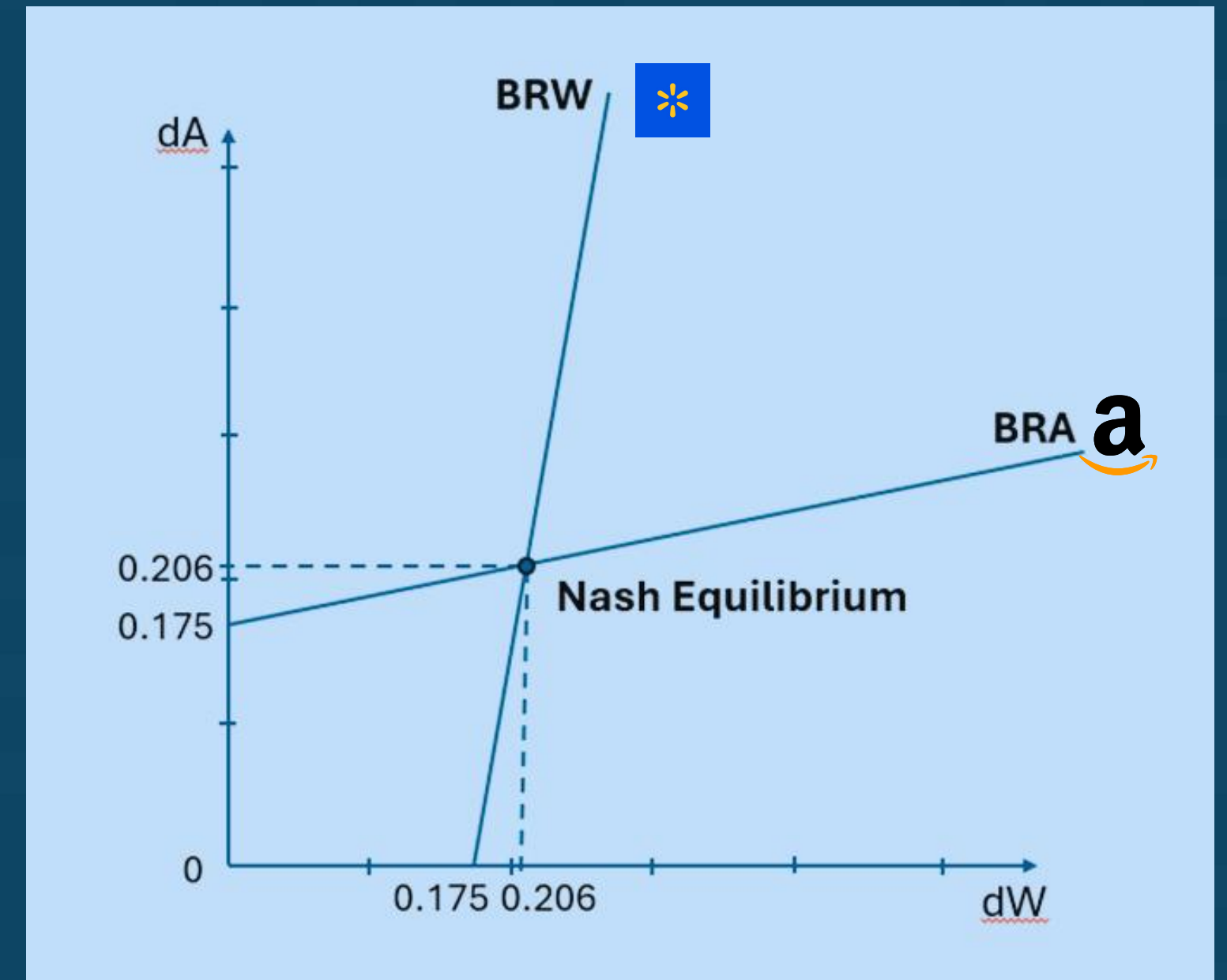
- **Amazon BR:** $dA = 0.175 + 0.15 dW$
- **Walmart BR:** $dW = 0.175 + 0.15 dA$

Solving the two best-response functions:

- **Nash equilibrium discount:** 20.6% for both

Market outcomes at equilibrium:

- Price drops to \$397 | Profit per firm: \$31.06M
- Quantity increases to 157,680 units



When one firm cuts deeper, the other's best response is to cut as well, creating a holiday **“race to the bottom.”** Neither firm prefers such a low price, but raising prices unilaterally would lose customers, so both remain locked into the 20.6% discount.

COLLUSIVE OUTCOME

If Amazon and Walmart jointly maximized total profit:

- Optimal discount: 12.1%
- Price: \$440
- Profit per firm: \$32.13M

Implications:

- Collusion yields ~\$1.07M more profit per firm compared to Nash.

But in reality:

- Collusion is illegal,
- Retail competition is intense,
- And consumer expectations for deals make collusion unstable.



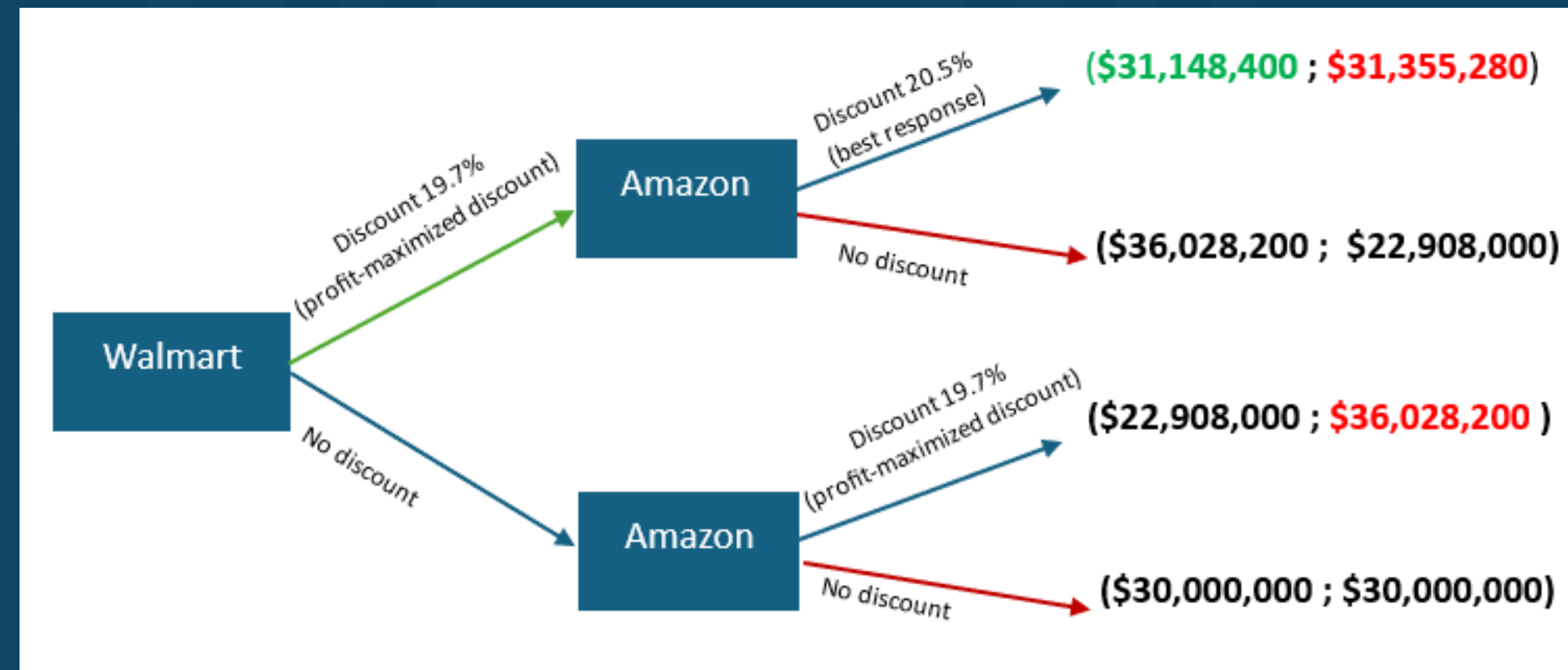
SEQUENTIAL GAME (WALMART MOVES FIRST)

Assume Walmart chooses its discount first;
Amazon reacts using BR function.

Results:

- Walmart chooses 19.7%
- Amazon responds with 20.5%

Profits: Amazon slightly higher (\$31.36M)
than Walmart (\$31.15M)



- The follower gains a small advantage because it tailors its discount to the leader's choice.
- But this advantage comes only by cutting prices even further.

CONCLUSION & LESSONS LEARNT



- The model shows that holiday pricing competition inevitably drives Amazon and Walmart into deep, margin-eroding discounts:
- Their best responses reinforce each other in a race to the bottom, and even when one firm moves first, the strong incentive to undercut persists, offering only a small follower advantage while keeping both firms locked into aggressive discounting.

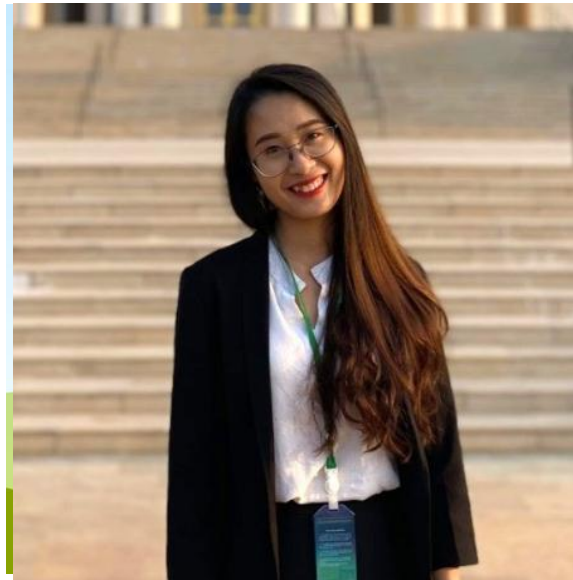
Lessons Learnt

- Aggressive holiday discounting is an expected outcome of highly elastic demand and interdependent pricing, not a strategic mistake.
- Timing or sequencing has little impact, meaning the market remains structurally prone to deep discounts, thin margins, and increasingly early promotions.

MEET OUR TEAM



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THANK YOU
