

# Inventory Availability Strategy for a Luxury Brand Supply Chain Facing Snobbish and Strategic Consumers

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# Abstract: Model Description

- A profit-maximizing monopolistic luxury brand that produces and sells a product facing consumer demand is stochastic →  
Newsvendor Model
- *Snobbish consumers* value exclusivity of the product. Their utility decreases as the expected number of consumers that purchase the product.
- Consumer incurs a fix purchasing cost for patronizing the firm. This cost is irretrievable regardless of whether the consumer has successfully acquired the product or not.
- *Strategic consumers* know that the product may not be available when they visit the firm. Thus, they make store visiting decisions based on the predicted probability of buying the product.

# Abstract: Model Description

- fill rate to represent the product buying probability
- Consumer Utility

$$U(q, p) = \{v + \lambda[\alpha - \beta S(q)] - p\} \theta(q) - t$$

# Abstract: Main Assumptions

- Optimal production and pricing strategies of a luxury brand manufacturer.
- First, prestige-seeking (snobbish) behavior → utility decreases as more consumers consume the product.
- Second, forward-looking (strategic) behavior → make shop visit decisions based on the predicted probability of buying the product.
- Third, the manufacturer's production policy is unobservable to the consumers → rational expectation framework, i.e., *RE-equilibrium*.

# Abstract: Main Results

- Preliminary research question is: (1) *How do snobbish and strategic consumers' needs for product exclusivity and high buying probability interact in affecting consumers' buying behavior and the firm's production policy?*
- ➔ consumers are indifferent between increased product buying probability and decreased product exclusivity.

# Abstract: Main Results

Consumers buying decision may be inexact → adversely affect the firm's efficiency: (2) *Can the firm formulate practical mitigation strategies to steer the game participants to reach equilibrium outcomes that are better than those for the base case scenario?*

First, *Availability Guarantee Strategy with Rain-checks (AGS)*, the firm applies the rain-checks policy as a means to direct the game participants so as to increase the product availability.

# Abstract: Main Results

- Second, *Limited Edition Strategy with Commitment by Consumer Returns (LES)*, the firm commits to increase product exclusiveness and use the consumer returns policy as a proxy for the commitment strategy.
- Third, *Product Line Extension Strategy (PLES)*, the firm applies the product line extension as a means to guide the game participants to simultaneously increase product availability and product exclusivity.

# Related Literature

Production and pricing policies of a luxury product manufacturer facing consumers exhibiting both forward-looking (strategic) and prestige-seeking (snobbish) behaviors.

Strategic consumers

- supply and demand mismatch
- consumer incurs an unrecoverable purchasing cost when visiting the firm.
- forward-looking (strategic) consumers



# Related Literature

## Second, Snobbishness

- impacts of social factors on consumption.
- Leibenstein (1950) studied the impacts of social factors on consumer behaviors and defined external effects on consumers' utility. In particular, he defined the *Snob Effect* as the desire of people to be exclusive.
- Literature: Operations and Supply Chain Management, Marketing, Economics.

# RE-Equilibriums in the Base System

Assumptions:

- Firm's production quantity unobservable to the consumers
- Consumers' reservation price is unobservable to the firm.
- All the participants of the game form rational expectations (RE) of the related variables of interest → The firm bases its decision on the perceived expected reservation price and consumers choose the reservation price based on the perceived expected sale quantity

# RE-Equilibriums in the Base System

- The RE-equilibrium (equilibrium based on Rational Expectation) of the game between a consumer and the firm satisfies:
  - **Condition 1.** *Given a belief of the firm's expected sale quantity, the consumer will visit the firm if the price is no higher than the reservation price .*
  - **Condition 2.** *Given a belief of consumer's reservation price, the firm sets the price as the perceived reservation price. The firm produces a quantity based on the price.*
  - **Condition 3.** *The game participants' beliefs are rational.*

# Lemma 1: RE-equilibrium of the base system

Lemma 1(i) : Highly snobbish consumers could obstruct the firm from attaining the equilibrium. Especially when the purchasing cost  $t$  is relatively high.

Lemma 1(ii): Consumers' reservation price is maximized at the production quantity at which the *positive marginal effect* (buying probability increase) = *negative marginal effect* (exclusivity decrease)

Lemma 1(iii): Given a relatively high purchasing effect, highly snobbish consumers are willing to pay a higher price due to a lower expected sale quantity.

# Lemma 1: RE-equilibrium of the base system

Lemma 1(iv) : The firm improve its profit by intentionally creating product scarcity and increasing product price through procuring the product from an expensive source with a higher marginal cost  $c$ .

Example, prestigious brands, such as Timbuk2, procure their products from high-cost supply sources to signal to consumers that the firm is committed to supplying exclusive products with extremely high product rarity values

# Mitigation Strategies: Availability Guarantee Strategy with Rain-checks Policy

- Firm promises that the consumers will acquire the desired product when they visit the firm; otherwise, the firm will provide compensation to the disappointed consumers.
- Before the selling season, the firm produces a production quantity  $q$  of inventory using the normal production mode. The firm reserve  $Q-q$  units of expedite production capacity. Any unused capacity will incur a unit over-booking penalty. After demand realization, if the actual demand  $y$  is greater than  $q$ , the firm offers up to  $Q-q$  rain-checked units and uses the expedited production mode to produce the rain-checked units with a cost higher than the normal production mode.

# Proposition 1

- Proposition 1(i): the firm offers rain-checks only if the overbooking penalty is relatively low and the normal production cost is relatively high.
- When the normal production cost is relatively low or when the overbooking penalty is relatively high, the firm is better off by not offering an expensive rain-checks unit.
- Proposition 1(iii) the firm's profit is higher with the rain-checks system if and only if consumers are weakly snobbish, the purchasing effort is relatively high, and the firm maintains relatively low product availability.

# Mitigation Strategy: Limited Edition Strategy with Commitment by Consumer Returns

- Given the option of returning the unwanted product, each consumer compares two possible outcomes → product consumption and return.
- If the consumer chooses to consume the product, his utility is the *ex post* valuation net of price.
- If he chooses to return the product, a refund is obtained.
- The consumer observes the sale quantity, price and, and return refund and evaluates the value of the product. He determines whether if he should return the product or keep it.



# Proposition 2

- Proposition 2: The consumer returns policy may serve as a substitute for the limited edition strategy, enabling the firm to earn a high profit when the consumers are highly snobbish, the purchasing cost is sufficiently small, and the production quantity is relatively large.
- Such consumers prefer the firm to limit its product availability and maintain high exclusivity. Facing consumers' need for a rare and prestigious product, the firm designs the returns policy as a self-imposed restriction, to promise to deliver an exclusive limited-edition product to the snobbish consumers.

# Mitigation Strategies: Availability Guarantee Strategy with Rain-checks Policy

- The firm adds a new product line and that the aggregate market demand is unaffected by the newly added product line.
- Identical intrinsic value.
- The consumers are aware of the fact that the firm provides two products before visiting the firm, but they do not know which product they will buy.
- After visiting the firm and examining the products, the consumers choose one of the two products.
- Once the consumers have set their mind on one of the two products, they will not change their mind and purchase the other product even if the first choice is unavailable → attributed to consumers' snobbish behavior.

# Proposition 3

- Proposition 3: Added new line cannibalizes half of the aggregate market demand and increases the product rarity value by reducing the expected sale quantity of each product. Moreover, the product buying probability of the line extension system is even higher than that of the traditional system. Consequently, the product buying probability and exclusivity both increased, which enables the firm to earn a higher profit.