

Problem Set #1

Econ 815

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My research interests lie in the area of retail operations, with some of it also being at the intersection of marketing and operations management. More specifically, my work focuses on consumer returns in the context of online retail. A primary difference between traditional brick-and-mortar retailers and online retailers is that the former allow for consumers to physically assess the characteristics of a product prior to purchase. With online retail, consumers are often having to make educated guesses about whether product characteristics truly match their valuations. For example, consider a consumer trying to purchase a piece of footwear – at a physical store, she gets to try on this article before committing to purchasing it. Characteristics such as size, comfort, texture, etc are evaluated before the purchase is made. On the other hand, when ordering this same product online, the consumer is unable to resolve uncertainty related to the aforementioned characteristics. While product descriptions and pictures might allow for consumers to ascertain characteristics such as color and design, there are experience characteristics like size and comfort that require the consumer to physically assess the product.

In order to allow consumers to better resolve this uncertainty, online retailers have begun to offer free returns. This entails a complete refund of the price of the product to the consumer and the retailer providing free return shipping. While this proves to be a boon for consumers, retailers need to be wary of such policies since they can hurt profits. Further, dealing with returns proves to be excessively complicated. Estimating the quantity, assessing the quality, and liquidating returns prove to be very challenging for online retailers. With consumers relying heavily on relaxed return policies, but such policies posing a unique set of problems, retailers need to be able to balance their return policies.

Prior work in both marketing and operations management has focused on which return policies are “optimal” for retailers (Davis et al., 1995; Hess et al., 1996; Su, 2009; Altug and Aydinliyim, 2016). While academic prescriptions have been to offer partial refunds, the proportion of retailers offering free returns hasn’t reduced. This gap between academic prescriptions and practice has led my advisors and I to study how retailers can make the best with free returns. More specifically, we focus on the consumer practice of *bracketing*, which has become prevalent because of the existence of free return policies. Bracketing is the consumer strategy of ordering multiple versions of a product with the intention of returning some of them. This allows for consumers to resolve uncertainty regarding product characteristics. Our work focuses specifically on consumer bracketing to resolve uncertainty regarding the size of apparel products. Consumers have an expectation of which size of a product will fit them, but “bracket” by ordering one size above and one size below to reduce their risk of ordering the wrong size. Free return policies allow the consumer to do so without having to bear any additional monetary cost (except for the period during which they wait to receive a refund for the returned sizes). Through our analysis, we show that

this seemingly deleterious practice of bracketing can actually lead to higher profits for the retailer. This is dependent on the likelihood of consumers ordering the right size on a single order (i.e., when they do not bracket), the hassle cost the consumer bears when returning the product (traveling to the post office to drop off the package, mental hassle, etc), and the reverse logistics cost that the retailer bears when dealing with these returns.

Here is an equation from our working paper ([Balaram et al., 2019](#)):

$$\Pi_B = (p - k) \underbrace{\int_{v^*}^1 1 dv}_{\text{Mass that keeps}} - k \underbrace{\int_0^{v^*} 1 dv}_{\text{Mass that returns}} = -k + p - p^2 \quad (1)$$

And here is a figure from the paper:

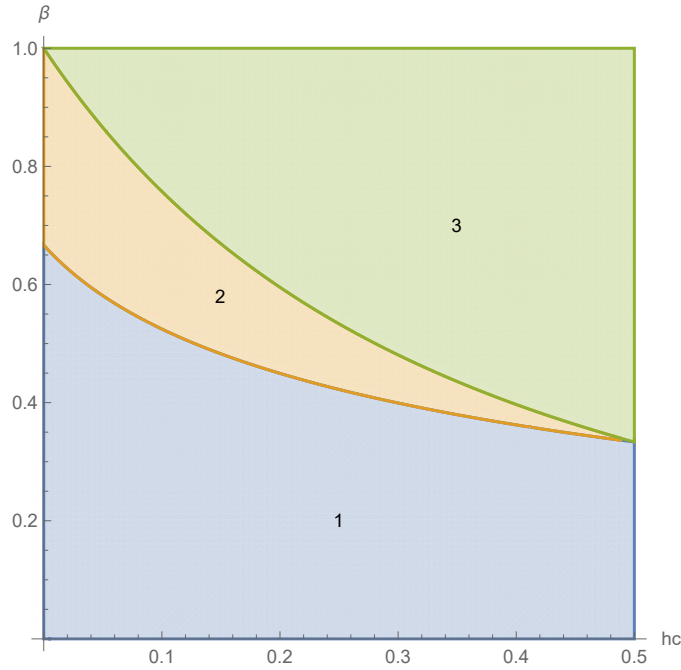


Figure 1: Optimal consumer actions based on match probability β and hassle cost hc . In region 1, consumers bracket if $p \leq p_{1B}$ and do not buy if $p > p_{1B}$. In region 2, consumers bracket if $p \leq p_1$, buy single if $p_1 < p \leq p_{1S}$ and do not buy if $p > p_{1S}$. In region 3, consumers buy single if $p \leq p_{1S}$ and do not buy if $p > p_{1S}$.

References

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