

“Showrooming” and the Competition between Store and Online Retailers

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Abstract

Customers often evaluate products at brick-and-mortar stores to identify their “best fit” product, but end up buying this product not at the store but at a competing online retailer to take advantage of lower prices. This free-riding behavior by customers is referred to as “showrooming.” We analyze three strategies to counter the effect of showrooming that may improve profits for the brick-and-mortar stores: (a) price matching, (b) making product matching harder between the brick-and-mortar store and the online retailer, and (c) charging customers for showrooming. We show that only the last two strategies may improve profits of the brick-and-mortar stores. We also present an analysis to illustrate when a particular strategy, (b) or (c), does better than the other.

Keywords: retailing, showrooming, retail competition, pricing, game theory, competitive strategy.

1 Introduction

In the context of multichannel retail, it is well known that customers may use one channel to research products but buy in another. For example, customers may use the online channel for product research but buy at a brick-and-mortar (BM, henceforth) store (Verhoef et al. 2007), or, conversely use the BM store for research but purchase online (van Baal and Dach 2005, Kucuk and Maddux 2010). Neslin and Shankar (2009) point out that *competitive research shoppers* are those customers who search in one channel but buy in a different channel of a competing firm. For example, customers may use Target’s BM stores to evaluate products but then purchase at Amazon’s website if it sells the selected product at a lower price.

Customers benefit from using the BM store to evaluate products because many product attributes are non digital in nature and are difficult to assess online (Lal and Sarvary 1999). Obviously, this shopping technique results in the BM store losing potential customers. Some of the recent media

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articles (Bosman 2011, Zimmerman 2012) document that this trend, referred to as “showrooming,” is on the rise. In particular, Bosman quotes the market research findings of Codex which reports, based on a one month sample of book purchasers, that 24% of those who bought books from an online retailer saw the book first in a BM store. Similar to books, showrooming is now being practiced by a significant fraction of customers in several other product categories, and this could potentially have an adverse effect on the profitability of BM stores. Bosman addresses showrooming as it applies to books, and Zimmerman discusses its impact on Target, a retailer of clothes, toys and many other products.

Existing literature has studied the impact of customers who benefit from informational services provided by a retailer and then purchase from a different retailer who does not provide these services but offers the product at a lower price. For example, Telser (1960), Mathewson and Winter (1984) and Carlton and Chevalier (2001) point out that such free-riding behavior by customers has a detrimental effect on profits of manufacturers who supply these retailers. To deal with these problems, they also examine several types of vertical restraints, such as price floors imposed by manufacturers on the retailers and limiting of distribution. Singley and Williams (1995) use survey data to show that not only manufacturers but also service providing retailers are seeking fixes to the free riding problem. On the other hand, some previous research shows that free riding may, in fact, be profit improving. Shin (2007) suggests that free-riding may reduce price competition and therefore helps the retailer who provides informational services. Wu et al. (2004) and Kuksov and Lin (2009) suggest that such services may help create differentiation between competing retailers, leading to an enhancement of their profits.

Overall, it appears from literature that the impact of free riding on the directionality of profit change depends upon the specific context. Therefore, the first research question we examine is whether profits of BM stores decline due to showrooming in the context of multi-channel retail competition. We find that this is indeed the case. The reason is that showrooming has opposing effects on the pricing incentives of the BM store and the online retailer. The online retailer would

like to take advantage of the extra traffic from showrooming by raising its price, while the BM store would want to regain the lost traffic by reducing its price. It turns out that the price reduction incentive of the BM store dominates the price increase incentive of the online retailer. Therefore, the overall impact is an intensification of competition and consequent loss of profits.

Our primary focus in this paper, however, is on exploring strategies that can be employed by a BM store to protect its profits when customers engage in showrooming - a question that is currently much debated in the industry (Datko 2012). Based on this article, we identify the following three strategies that industry experts and managers are considering to contain showrooming.

- BM store matches the prices set by the online retailer. This eliminates the price advantage to customers from practicing showrooming.
- BM store implements strategies so that the product identified by customers as their best fit product after evaluating at the BM store cannot be found easily at the online retailer, thus dissuading them from engaging in showrooming. The BM store may do this by managing a distinct assortment of products that cannot be found at the online retailer. Such a strategy may be particularly applicable if BM stores utilize their local knowledge to focus on product assortments that cater to local tastes (e.g. Talley 2012a and Keenan 2012). BM stores can also bargain for exclusive supply contracts. Datko (2012) mentions that Target is discussing such a possibility with its suppliers. Another way is to make product comparisons difficult across the BM store and the online retailer. For example, Best-Buy and Costco have created their own bar codes of products to make it harder to compare products by scanning bar codes using smartphones to check for availability at the online retailer through mobile apps (Schifrin 2012).
- BM stores charge those customers who visit their premises, but do not make a purchase. This imposes a penalty on customers to employ showrooming and hence would serve to dissuade the practice. There is some evidence that specialty ski retailers are already utilizing this approach (Bita 2011). Many retailers like Costco already issue paid subscription cards to customers which

they must have to enter its premises. Another way to impose a cost of visiting the premises is by charging a parking fee. The obvious downside of these approaches is that customers who visit the BM store to buy products are also penalized and this may dissuade them from visiting the BM stores. However, this problem can be easily solved by giving discounts or reward points, or reimbursing the parking fee when customers make a purchase. Restaurants and some retailers already use this practice.

While all of these strategies can potentially reduce showrooming, they also alter the incentives of the online retailer who may react to these strategies by changing its price. Hence, in equilibrium, these strategies may or may not be profit improving for the BM store. We therefore use a game-theoretic model to study these strategies allowing both the BM store and the online retailer to be strategic.

We first analyze the impact of a *price-matching commitment* by the BM store. The extant literature on price matching has underscored its collusive effect (Hay 1982). Price matching entails a credible commitment to match any competitor's prices. So competitors can raise prices without fear of being undercut. The result is reduced competition. Yet, as demonstrated by Chen et al. (2001), price matching can also increase competition. Both of these effects on competition are pertinent to our model as well. On the one hand, a price-matching commitment by the BM store has an anticompetitive effect because of its credible commitment not to undercut prices. On the other hand, price matching ensures that customers do not purchase online simply to obtain lower prices (i.e., they do not practice showrooming). Hence, the online retailer loses market share it would otherwise have captured and so has an incentive to deviate from equilibrium pricing in order to acquire more customers. That dynamic motivates our examination of whether price matching can improve a BM store's profits in the case of showrooming customers. Our analysis reveals that such price matching commitment does not improve its profits when customers engage in showrooming.

Next, we investigate the impact of making *product matching harder* between a BM store and its

competing online retailer. Customers cannot benefit from showrooming if the product they identified on visiting the BM store cannot be found at the online retailer. This benefits the BM store, because, in such a scenario, it does not have to compete as intensely on prices with the online retailer. We find that this strategy does improve a BM store's profits on products with predominantly digital attributes and those with relatively higher customer valuations.

Finally, we focus on a strategy that *imposes a cost* on the customers who visit the BM store for product evaluation but not on those who buy. As already described, this could be implemented by a parking fee that is reimbursed when a purchase is made, a practice that many restaurants already engage in. This mechanism directly extracts surplus from showrooming customers but does not intensify price competition between the BM store and the online retailer. We find that this strategy also improves profits on products with predominantly digital attributes and those with relatively higher customer valuations.

Since the profit improvement for the BM store from adopting the second and the third strategies is for similar types of products, we compare both these strategies. This comparison reveals that imposing a cost on the customers is better than making product matching harder when the product has relatively low digital attributes and relatively low valuations.

The rest of the paper is organized as follows. In Section 2, we present a formal model that captures customer purchasing behavior when they engage in showrooming. This is followed in Section 3 with an analysis that compares profit under this model with the benchmark case when customers do not engage in showrooming. In Section 4, we analyze the effect on profits of the BM store when it offers a price-matching commitment, or makes product matching harder with its online competitor, or imposes a cost on the customers to visit the BM store. We also offer a comparative analysis of the strategies that are effective in improving the BM store's profits. Finally, Section 5 provides a summary and other concluding remarks. All proofs are available on request from the authors.

2 Model

2.1 Customers

We assume that each customer buys one unit of the product which has both digital and non-digital attributes. A visit to the BM store allows a customer to evaluate both digital and non-digital attributes of each product in the assortment in order to select the one product that best fits their unique needs. All customers receive utility v from their best-fit product. Customers who evaluate the product assortment only at the online retailer are unable to accurately assess the non-digital product attributes, and so the product they select may not be the best-fit one. Therefore, each customer's expected utility from a product selected online is δv , where $\delta < 1$. This setting is in line with some empirical evidence discussed in Chiang et al. (2003). The values of δ and v are known to both customers and firms.

Empirical evidence presented in Konus et al. (2008) suggests that customers are heterogeneous in their channel preference. They find three categories of customers: (a) those who prefer the BM store, (b) those who are multichannel customers and can use both channels, and, (c) those who have some preference for alternative channels. Keen et al. (2004), Knox (2005), and Kushwaha (2007) report similar findings in their empirical studies. Neslin and Shankar (2009) also discuss existence of customer segments with differential preferences of channels while discussing future directions of work in multi-channel research. Further, Goolsbee (2001) reports results of a Forrester survey which found that when prices are equal, 68% of computer buyers prefer to buy from local retailers while 32% of them would purchase from an Internet retailer. In an analytical paper, Pan et al. (2002) also model heterogeneous multi-channel preference of customers. This approach to capturing customer preference is concomitant with the recommendation by Thomadsen et al. (2011), who point out that specificity of modeling assumptions facilitates answering concrete questions about a particular institutional setup.

Accordingly, we assume that customers incur different costs when using either of the two retail

channels. Further, these costs are different for each customer. We capture this by assuming customers to be uniformly distributed on the standard Hotelling line between 0 and 1, where a customer's index $x \in [0, 1]$ is proportional to her cost of visiting the BM store. Forman et al. (2009) empirically establish the existence of these costs. Once at the BM store location, however, purchasing the product there takes little effort, and so we assume that that this is costless for the customers. On the other hand, visiting the website of the online retailer is virtually costless since a customer can do that without much effort and time commitment. Hence, we assume that customers do not incur any cost of visiting the website. However, if the customers purchases at the website, she must now wait for delivery and may incur a cognitive cost depending on her level of trust in online transactions (Bart et al. 2005 present empirical evidence for such costs). We assume that the cost of purchasing online for a customer with index x is proportional to $1 - x$. We use t as the proportionality constant to scale the costs. Each customer's costs are private information to that customer.

2.2 Retailers

There are two retailers: the BM store and the online retailer. They are represented by the subscripts s (store) and o (online), respectively. To begin with, we assume that both retailers carry the same assortment of products. We will relax this assumption when we consider the BM store's strategy of making product matching harder to mitigate the reduction in profits due to showrooming. The price of each product in the assortment is set at p_s and p_o by the respective retailers. This setup captures a common situation in which all products in a particular category, for example casual shirts, are by and large priced the same even though they differ in sizes and designs. Each customer prefers a different shirt based on her size and tastes. We assume that prices are common knowledge among firms and customers. We normalize the marginal product costs to be zero for both retailers.

2.3 Game Structure

The game proceeds in three stages and Figure 1 illustrates stages 1 and 2 of a customer's decision process.

- At Stage 0, each retailer announces its prices, which are observed by its competitor and by all customers.

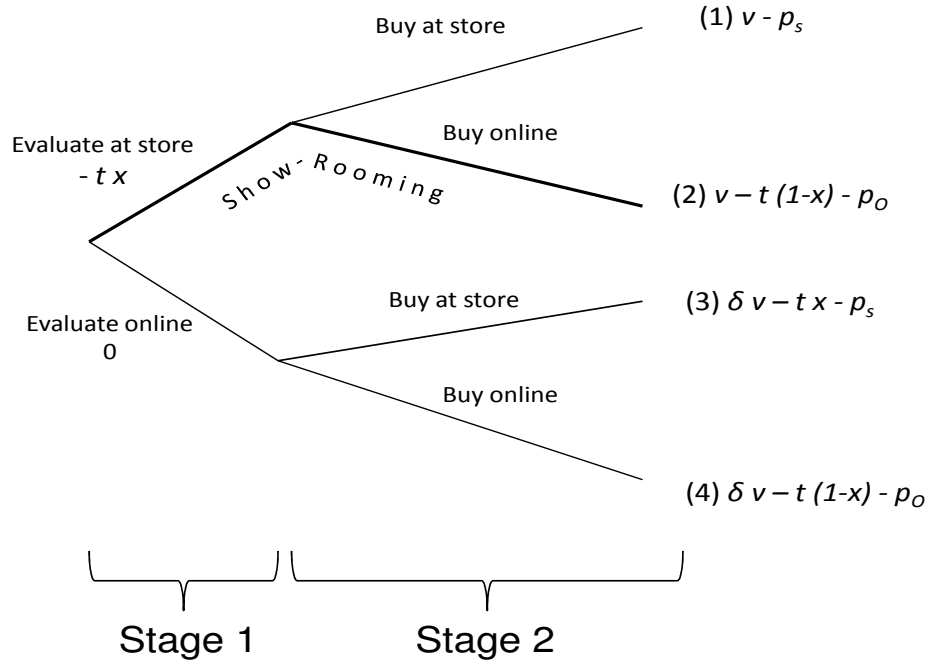


Figure 1: Decision tree for customers

- At Stage 1, customers collect information about product attributes. Since it is costless to visit the online retailer's website, they may decide to do so to get some idea about their options. They may then decide to also *visit* the BM store to further evaluate the product assortment and identify the product they want to buy. A customer with index x incurs a cost of tx if she visits the BM store. This allows her to identify her best-fit product, which yields a gross expected utility v . Visiting only the online retailer's website to evaluate the product assortment is costless but yields a reduced gross expected utility of δv , since the customer may be unable to identify her best-fit product. Thus, her ex-ante expected valuation from selecting the product online is lesser than her expected valuation when she chooses the product after visiting the

BM store. Customers decide whether or not to visit the BM store by comparing the expected value to be derived from such a visit with the expected value when she decides not to visit.

3. At Stage 2, customers decide the channel at which to *complete* the purchase. A customer who visits the BM store to evaluate products can buy from there at no additional cost. In this case, the customer's net expected utility is $v - tx - p_s$, since she has already incurred the cost of visiting the store in Stage 1. Alternatively, a customer can purchase at the online retailer after first identifying her best-fit product at the BM store. This approach entails a cost of tx to visit the BM store in Stage 1 followed by an additional cost of $t(1 - x)$ to purchase at the online retailer, since the customer must now wait for delivery and may have less trust for online transactions. Hence, a customer's net expected utility in this case is $v - t - p_o$. Customers who choose this option are the ones who do showrooming. Finally, a customer may not visit the BM store at all and use the online retailer for both product evaluation and purchase. Her net expected utility under this scenario is $\delta v - t(1 - x) - p_o$. Note that outcome (3) in Figure 1 depicts the case when a customer evaluates online and then buys at the BM store without evaluating there. This gives a net expected utility of $\delta v - tx - p_s$ to the customer which is less than $v - tx - p_s$, the net expected utility when a customer evaluates and buys a product at the BM store. Hence, a rational customer will never exercise this option.

3 Analysis of the Game

Customers may exercise one of the following three options: (a) evaluate and buy at the BM store, (b) evaluate at the BM store but purchase online (showrooming), and (c) evaluate and buy at the online retailer. All customers who exercise the same option constitute a market segment. Note that the ex-ante surplus from exercising the first option is decreasing in x , that of the second option is independent of x , and that of the third option is increasing in x . Hence, customers exercising the first to the third option must be positioned from left to right on the Hotelling line. This arrangement is depicted in Figure 2 where the customer surpluses from exercising options (a), (b), and (c) are

depicted by the lines P, S, and O, respectively. It is also possible that not all segments exist. This is because an option that provides lower surplus to all customers compared to other options will not be exercised by anyone. For example, it is possible that the lines P and O cross each other above the horizontal line S. This implies that option (b) will not be exercised by anyone. These considerations yield several possible arrangements of customer segments, each representing a particular market configuration, and we analyze the equilibrium for each one of these.

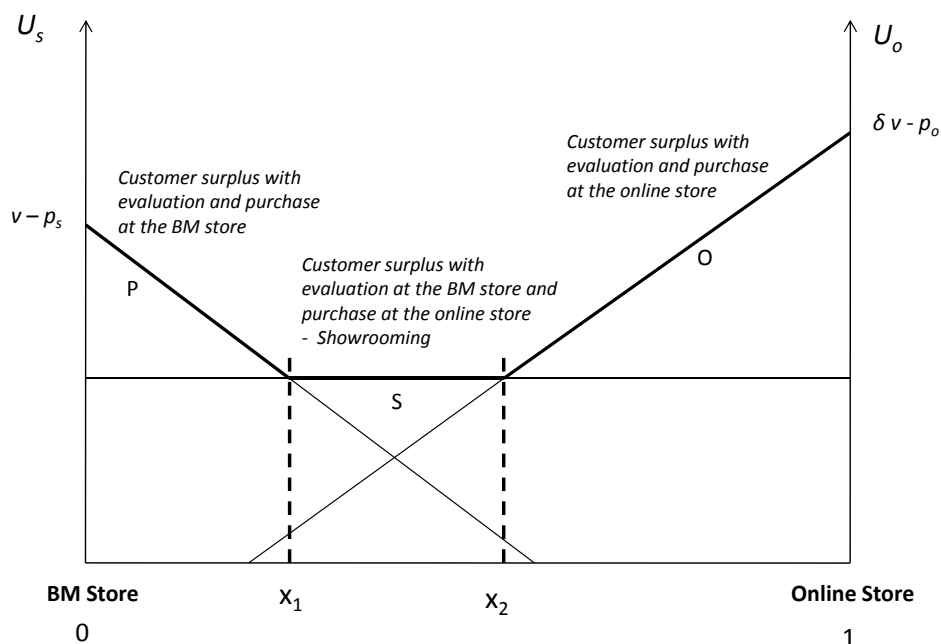


Figure 2: Customer surplus in the competitive showrooming equilibrium

We now present some arguments that reduce the number of market configurations to be analyzed. First, observe that if segment (a) does not exist, then there are no BM store customers, and so this store makes zero profits. For the leftmost customer on the Hotelling line, the surplus from exercising option (a) is $v - p_s$, from option (b) is $v - t - p_o$, and from option (c) is $\delta v - t - p_o$. Thus option (b) is always better than option (c) for this customer. If the BM store sets a positive price $p_s = p_o + t - \epsilon$, where ϵ is positive and vanishingly small, the surplus from the option (a) is better than option (b)

for this customer and she will purchase from the BM store. This means that in equilibrium, there must always be some customers who exercise option (a). Hence, we consider only those market configurations that include this segment.

Second, we assume that the online retailer will always attract some customers who do not engage in showrooming. As a result, the customer at the rightmost end of the Hotelling line secures a higher surplus from exercising option (c) than from option (b). This leads to the requirement $v < \frac{t}{1-\delta}$, and if this is satisfied, the customer segment who exercises option (c) must also exist. Hence, we further restrict our analysis to market configurations that also include this segment. Thus, we have two configurations, one consisting of only segments (a) and (c); and another (the showrooming configuration) that includes all three segments. The showrooming customers may have either a positive surplus, or zero surplus. Finally, it may also be the case that the market is not fully covered, i.e., not all customers purchase. This is the local monopoly equilibrium in which, with respect to the Hotelling line, segment (a) of customers are on the left, non-purchasers are in the middle, and segment (c) of customers are on the right. In summary, there are four market configurations that need to be studied. Finally, we also assume $v > t$, which ensures that all customers in the market have a positive value from purchasing their best fit product from both retailers. Hence, the market will always be covered unless the retailers strategically set their prices high enough to exclude some customers.

We start by analyzing the case with all three segments. Let the index of the customer who is indifferent between choosing options (a) and (b) be x_1 , and let that of the customer who is indifferent between options (b) and (c) be x_2 . We first analyze the case where the showrooming customers get a zero surplus. Henceforth, the superscript $*$ represents the equilibrium values of a particular variable. In this case, setting $v - t - p_o^* = 0$ yields $p_o^* = v - t$. The profit function of the BM store is $p_s x_1$, and therefore optimizing this function with respect to store price gives $p_s^* = \frac{v}{2}$. This equilibrium is special because even though the markets of the BM store and the online retailer are contiguous, there is no competitive effect. This is easily seen when we observe that the BM store's price in this equilibrium

equals the monopoly price, giving monopoly profits to the BM store. Hence, showrooming in this equilibrium is clearly not a problem.

We now focus on the situation when the showrooming customers get a positive surplus, implying a competitive equilibrium. The profit function for the BM store is $p_s x_1$ and that of the online retailer is $p_o(1 - x_1)$. The corresponding Nash equilibrium prices are $p_s^* = \frac{2t}{3}$ and $p_o^* = \frac{t}{3}$. For consistency of customer behavior, we need $x_2^* > x_1^*$ and $v - t - p_o^* > 0$. These inequalities yield the conditions $v > \frac{2t}{3(1-\delta)}$ and $v > \frac{4t}{3}$, respectively.

To ensure the stability of this equilibrium, we need to verify that the retailers have no incentive to deviate from the equilibrium prices. The analysis above ensures that such deviation confers no advantages provided the market configuration, and hence the demand pattern seen by the two retailers remains the same. Yet, for instance, given the equilibrium price of the BM store, it is possible that the online retailer sets a price that differs from its equilibrium price to enforce a market configuration other than the three-segment one that we assumed when evaluating the equilibrium prices. Such price setting would change the demand pattern, and therefore could enable profitable deviation for the online retailer. In general, both retailers can either lower or raise their prices from the competitive showrooming equilibrium prices in order to enforce a market configuration different from that in this equilibrium. We now exhaustively consider all the different market configurations that may result due to deviations from the equilibrium prices by the BM store and the online retailer. A summary of possible deviations is provided in Table 1. This table depicts the main types of deviations without the limiting situations.

	Raise Price	Drop Price
BM store	No profitable deviation is possible	(i) No showrooming customers (ii) Online store exits the market
Online store	(iii) Both stores have local monopoly (iv) No showrooming customers	(v) BM store exits the market

Table 1: Possible deviations from the competitive showrooming equilibrium

Figure 3(a) depicts the situation when the BM store reduces its prices below its equilibrium price,

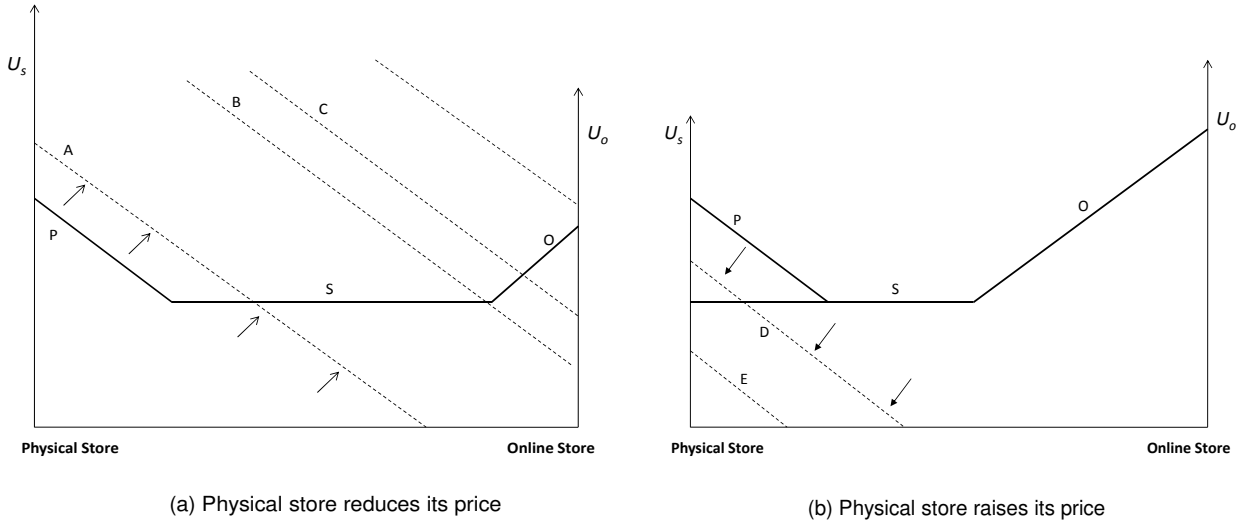


Figure 3: Customer surpluses when BM store changes its price from the equilibrium price

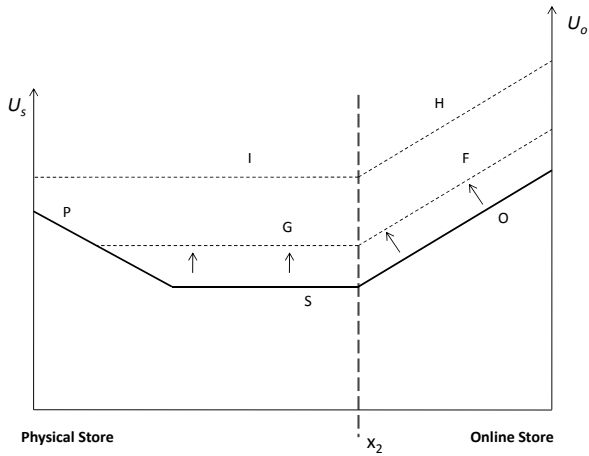
while price of the online retailer is at its equilibrium level. This does not affect the placement of lines S and O, but shifts the Line P upwards. When Line P shifts to A, the market configuration consists of all the three segments as in the competitive equilibrium. Since the best price for the BM store with this configuration is already captured by the equilibrium price, change in price to this extent is never profit enhancing for the BM store. On further reducing the BM store price, Line P may shift as far up as C. Since lines C and O cross each other over Line S, option (b) becomes inferior for all customers. Thus the market configuration is no longer the same as in the equilibrium and consists of only two customer segments that exercise either option (a) or option (c). The optimal price for the BM store in this new market configuration may fetch it a higher profit. Hence, we analyze this case further to see whether profits of the BM store improve by dropping its price. The situation where Line P shifts to B is a limiting case of the above situation and we analyze this situation as well. Finally, Line P may shift up to be so high such that customer surplus by exercising option (a) is always better than by exercising options (b) or (c). Thus, the online retailer does not get any customers. This configuration is also different from the equilibrium configuration, and we analyze this case to check whether this type of deviation is profit enhancing for the BM store.

Figure 3(b) captures the situation when the BM store increases its price above the equilibrium price, while price of the online retailer is at its equilibrium level. This does not affect the placement of lines S and O, but shifts the Line P downwards. When it shifts to D, the configuration is the same as in the equilibrium, and so there can be no improvement in profits for the BM store. However, when it shifts down to E, the market configuration is different from that in the equilibrium as the BM store gets no customers, resulting in zero profits. Clearly, price deviation of this type is never profitable for the store.

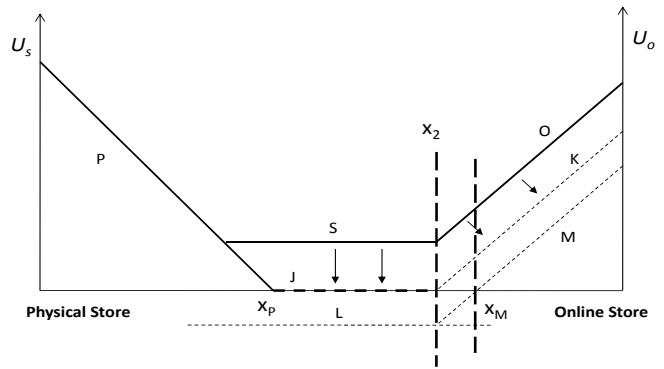
Figure 4(a) considers the case when only the online retailer drops its price below the equilibrium level. This does not shift the placement of Line P, but results in lines S and O to shift upwards. The position of the indifferent customer, x_2 , between options (b) and (c) is found by solving $v - t - p_o = \delta v - t(1 - x) - p_o$ for x . It is seen that the position of this indifferent customer is independent of p_o . When S and O shift to G and F, respectively, the market configuration is the same as in the equilibrium and so price change to this extent can not improve profits for the online retailer. However, if S and O shift as far as I and H, respectively, the online retailer captures all the market, thus resulting in a market configuration different from that in equilibrium. Hence, we need to analyze this case further to verify whether profits of the online retailer improve by dropping its price where it just captures the whole market.

Figures 4(b) and 4(c) represent the situation when the online retailer increases its price above the equilibrium level. Let x_P represent the customer who gets zero surplus from exercising option (a), and, as before, x_2 is the indifferent customer between options (b) and (c). This case can be split up into two subcases: one, when $x_2 > x_P$ (Figure 4(b)) and second, when $x_2 < x_P$ (Figure 4(c)). Raising of the online retailer's price does not effect placement of Line P, but lines S and O shift down.

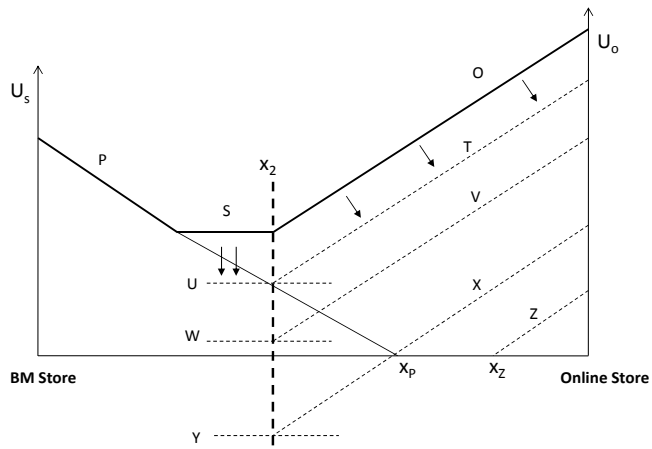
In Figure 4(b), when S and O shift down to L and M, respectively, the showrooming customers (option (b)) get a negative surplus and so we have the situation that the BM store gets all customers between 0 and x_P . Let x_M represent the customer who gets zero surplus from exercising option (c),



(a) Online store reduces its price



(b) Online store raises its price and x_2 is to the right of x_p



(c) Online store raises its price and x_2 is to the left of x_p

Figure 4: Customer surpluses when online retailer changes its price from the equilibrium price

and the online retailer gets all customers between x_M and 1. Customers between x_P and x_M do not buy. This market configuration is different from the equilibrium and we analyze this situation to verify whether profits of the online retailer increase by raising its price enough to enforce this type of deviation. When the lines S and O move down to J and K, respectively, we get the limiting case where the showrooming customers get zero surplus. We examine this case too along similar lines.

In Figure 4(c), when S and O shift down to W and V, respectively, all customers get a higher surplus by exercising options (a) or (c) compared to (b). Hence, no one showrooms and this market configuration is different from that of the equilibrium. There are two limiting cases of this situation: one, when S and O shift to U and T, respectively, so that the customer indifferent between options (a) and (c) is also indifferent to option (b), and second, when S and O shift to Y and X, respectively, so that the customer indifferent between options (a) and (c) gets a zero surplus. We need to analyze these two cases as well. Finally, when T shifts down to Z and S to below Y, the market is not fully covered and the BM store gets customers between 0 and x_P , while the online retailer gets customers between x_Z and 1, where x_Z represents the customer who gets zero surplus by exercising option (c). No customer between x_P and x_Z makes a purchase. This last situation is similar to the market uncovered situation discussed in the context of Figure 4(b).

In all, we analyze ten possible deviations from the competitive showrooming equilibrium market configuration. Some of these deviations cannot improve the profit of the firm that deviates and are, therefore, ruled out. The others may improve the profit of the deviating firm under certain conditions. Accounting for all these deviations, we arrive at the parameter conditions in which the competitive showrooming equilibrium holds.

Finally, we analyze the pure strategy price equilibrium under the other three possible market configurations in order to determine whether there is any overlap in the parameter ranges for the equilibria under those configurations and the parameter range for the competitive showrooming market configuration. This is important to verify whether this equilibrium is the unique one in the parameter range it exists. We find that indeed this is the case. The full details of this equilibrium

are presented in our first result below.

Proposition 1 *A competitive equilibrium under which some customers practice showrooming exists in the parameter space defined below:*

(a) *If $\delta \leq \frac{1}{4}$, then this equilibrium does not exist.*

(b) *If $\frac{1}{4} < \delta \leq \bar{\delta}$, then this equilibrium exists in the range $\frac{4t}{3} \leq v < \frac{t}{1-\delta}$.*

(c) *If $\bar{\delta} < \delta \leq \hat{\delta}$, then this equilibrium exists for $\frac{4t}{3} \leq v \leq \bar{v}$ and $\hat{v} \leq v < \frac{t}{1-\delta}$.*

(d) *If $\hat{\delta} < \delta \leq \frac{1}{2}$, then this equilibrium exists for $\frac{4t}{3} \leq v \leq \bar{v}$ and $\frac{(5-2\sqrt{2})t}{3(1-\delta)} \leq v < \frac{t}{1-\delta}$.*

(e) *If $\delta > \frac{1}{2}$, then this equilibrium exists in the range $\frac{(5-2\sqrt{2})t}{3(1-\delta)} \leq v < \frac{t}{1-\delta}$.*

where $\bar{\delta} = \frac{2(1+\sqrt{26})}{25}$, $\hat{\delta} = \frac{3(1+5\sqrt{2})}{49}$, $\bar{v} = \frac{(5(2+\delta)-\sqrt{(-4+\delta(-4+25\delta))})t}{6(1+\delta)}$ and $\hat{v} = \frac{(5(2+\delta)+\sqrt{(-4+\delta(-4+25\delta))})t}{6(1+\delta)}$.

We now study the benchmark case when customers do not engage in showrooming even if it provides them with higher surpluses. This case represents the situation when customers are assumed to be less sophisticated and did not separate their evaluation and purchase decisions across the physical and the online channels. Such a situation may arise when customers did not have access to devices such as smartphones and ubiquitous wireless connectivity. Thus, they either evaluate and purchase at the BM store or do so at the online retailer. In other words, a customer can exercise either option (a), or option (c). In a competitive situation, the markets of the two retailers must be contiguous, and therefore we find the indifferent customer, x_b , by solving $v-tx-p_s = \delta v-t(1-x)-p_o$. The profit functions of the BM store and the online retailer can be written as $p_s x_b$ and $p_o(1-x_b)$, respectively, and the corresponding Nash equilibrium prices of store and online retailers are $p_s^* = t + \frac{v(1-\delta)}{3}$ and $p_o^* = t - \frac{v(1-\delta)}{3}$. For consistency of customer behavior, the surplus of the indifferent customer must be non-negative. This imposes the requirement $v > \frac{3t}{1+\delta}$. We analyze deviations from this equilibrium (henceforth, competitive benchmark equilibrium) as well. By comparing profits of

the BM store in the benchmark case with its profits in the competitive showrooming equilibrium, we obtain the following result.

Proposition 2 *The competitive benchmark equilibrium exists for $v > \frac{3t}{1+\delta}$. The BM store earns higher profits in the competitive benchmark equilibrium compared to the competitive showrooming equilibrium in the entire parameter range they co-exist.*

Proposition 2 is of interest because it shows that, in the context of multichannel retail, showrooming *reduces* the profits of the BM store. In a similar situation of competition between full-service and discount retailers, where customers utilize the full-service store when evaluating products before purchasing in the discount store, Shin (2007) finds the opposite result namely, that, free-riding on the full-service store *increases* its profits. The reason is that at a particular set of prices, the discount retailer gets more customers when they do showrooming. Thus, it has an incentive to raise its price to benefit from the “additional” traffic, resulting in softening of price competition and the consequent higher profits for the full-service store.

However, showrooming by customers results in the BM store losing some market share. Therefore, it has an incentive to reduce its price to acquire customers. Price reduction by the BM store induces the online retailer to also reduce its price. The resulting prices in equilibrium reflect the net outcome of the incentive of the online retailer to increase its price and the incentive of the BM store to drop its price. Of course, the extent of these incentives depend upon the benchmark prices in absence of showrooming. Thus, if the benchmark prices are low, the online retailer’s price increase incentive will tend to dominate the BM store’s price reduction incentive. On the other hand, if the benchmark prices are high, the BM store’s incentive will tend to dominate the online retailer’s incentive. Shin (2007) assumes that a given customer’s shopping costs are the same across the two firms because both stores (i.e., the full-service and the discount store) employ the same channel: a BM outlet. The differentiation between competitors in his model is because a customer must necessarily visit the full-service retailer in order to resolve the uncertainty about whether or not the product is a good

match to her needs. When this uncertainty lessens, the differentiation between the two retailers reduces leading to increasing price competition which finally culminates in Bertrand competition with zero profits for both firms.

In our setting of multichannel competition, however, even in the absence of uncertainty (as δ becomes 1), Bertrand competition is avoided because a customer's intrinsic preference for one of the channels differentiates the two retailers. Thus, the benchmark situation in our context allows for lower competition and relatively higher prices than in the context modeled in Shin (2007). Hence, the BM store's incentive dominates in our model, leading to stiffer competition and lower profits with showrooming, while the discount retailer's incentive dominates in Shin's setting and leads to relaxation of competition and higher profits with showrooming.

The finding that profits of the BM stores reduce due to showrooming is in line with the current discussions in the trade press (Datko 2012) and helps provide some face validity to our model. Second, this finding also illustrates the importance of carefully modeling the nuances of multichannel retail to analyze competition. Finally, this proposition also shows that the BM store's survival requires that it adopt profit-improving strategies.

One possibility for the BM store to improve profits is by creating a situation so that customers do not get any relative advantage by evaluating at the BM store, i.e., they get the valuation of δv by evaluating at the BM store, just as they do at the online retailer. They may be able to do this by eliminating services like trial rooms for apparel, and keeping products in a packed condition so that it is not possible to evaluate them properly. This makes the two retailers equally matched, eliminating the incentive for showrooming, and would result in the BM store earning the higher benchmark profit (as long as δ is high enough and the market remains covered). However, we do not see any evidence of such a strategy being discussed by the BM stores. There may be two reasons for this. First, any BM store who takes the lead in adopting such a strategy may not be able to effectively compete with *other* BM stores. Second, there is a danger of a long-term loss of customer goodwill, which may damage the brand of the BM store. Hence, we do not consider this strategy,

but we evaluate three other strategies that are currently being considered by the BM stores (Datko 2012).

4 Strategies to Improve Profits of the BM Store

The purpose of this section is to analyze strategies that may improve profits of the BM store in the parameter range specified by Proposition 1 where competitive showrooming is an equilibrium. An outcome of the analysis in the previous section is that customers extract more surplus by engaging in showrooming, leading to lower profits for the BM store. A useful strategy would allow the BM store to extract some of that lost surplus without intensifying price competition to an extent that makes the strategy ineffective. Such strategies typically should have the effect of reducing the numbers of showrooming customers, which will reduce the price cutting incentive of the BM store, thus relaxing competition.

We first consider a price matching commitment by the BM store which fully eliminates the reason for showrooming as there is no price advantage to be gained from purchasing at the online retailer. Then, we study the impact of making product matching harder between the BM store and the online retailer. An outcome of this strategy is that some customers who evaluate at the BM store do not find their chosen product at the online retailer and so may not do showrooming. Finally, imposing a cost on the customers to showroom by, for example, imposing an upfront subscription fee for store entry will also reduce the incidence of showrooming. Thus, *prima-facie* it appears that all these three strategies can potentially be effective in relaxing competition and improving profits of the BM store, provided the corresponding equilibrium is stable.

4.1 Price Matching Commitment by the BM Store

Here we study the impact of a credible commitment by the BM store to match the prices set by the online retailer. Such a commitment can be made credible in many ways, including prominent display signs in the store that proclaim this policy as well as public announcement of the price matching policy in press releases or on the store's own website. It is easy to see that, in the face

of such a commitment, showrooming will disappear because customers no longer get a lower price by purchasing online. Let p_m denote the common price (i.e., the price set by the online retailer and matched by its BM competitor). Then the surplus from showrooming is $v - t - p_m$ and the surplus from evaluating and purchasing from the BM store is $v - tx - p_m$, which exceeds the showrooming surplus for any customer with index $x < 1$.

Therefore, customers will either evaluate and purchase at the store, or evaluate and purchase online. Equating the customer surplus from these two options (surplus expressions are introduced in Section 2), we get the index of the indifferent customer $x_m^* = \frac{t+v(1-\delta)}{2t}$. Our assumption of an upper bound $v < \frac{t}{1-\delta}$ ensures that x_m^* takes an internal value, i.e., a value between 0 and 1. Thus, irrespective of the price set by the online retailer, it gets a market share of $1 - x_m^*$, provided the individual rationality condition of customers is satisfied. If the online retailer sets its monopoly price of $\frac{\delta v}{2}$, it will cover a market of size $\frac{\delta v}{2t}$. Since, $1 - x_m^* < \frac{\delta v}{2t}$, the online retailer cannot set its monopoly price. Thus, in order to maximize its profits, the online retailer sets p_m^* so as to extract the full surplus from the indifferent customer. Thus, $\delta v - t(1 - x_m^*) - p_m^* = 0$ implies that $p_m^* = \frac{v(1+\delta)-t}{2}$. Since $v > t$, p_m^* has a positive value. We now use the equilibrium values of p_m^* and x_m^* to obtain the equilibrium profit for the BM store which turns out to be $\frac{(v+\delta v-t)(v+t-\delta v)}{4t}$.

Under the parameter conditions for the competitive showrooming equilibrium, i.e., when $\delta > \frac{1}{4}$, $p_m^* > \frac{2t}{3}$. Thus, the equilibrium prices for both retailers are higher than their equilibrium prices in the competitive showrooming equilibrium because of the collusive effect of price matching commitment. However, the price of the online retailer increases more than that of the BM store resulting in the BM store gaining market share. An increase in prices as well as the market share increases the profits of the BM store provided this equilibrium is stable. Note that a credible price matching commitment by the BM store implies that it cannot deviate from the price set by the online retailer. However, the online retailer can undercut its equilibrium price in order to regain its lost showrooming customers. In our next result, we account for this possibility and report on whether price matching commitment strategy can improve the BM store's profits under the parameter conditions where the competitive

showrooming equilibrium exists.

Proposition 3 *A price matching commitment by the BM store results in an equilibrium that does not exist under the parameter conditions where the competitive showrooming equilibrium exists. Hence, this strategy cannot improve profits for the BM store.*

The above outcome happens because the incentives of the online retailer to undercut its price results in instability of the equilibrium over the parameter range in which the competitive showrooming equilibrium exists. The reason is price matching commitment by the BM store results in a collusive situation with both competitors setting high prices. At these prices, the online retailer loses market share compared to the competitive showrooming equilibrium. This loss of market share by the online retailer implies that the indifferent customer is closer to the online retailer. Therefore, the additional cost she must incur to showroom after evaluating the product at the BM store, is relatively lower. Thus, a small price reduction by the online retailer may re-induce some customers to showroom and increase its market share. Further, the high price regime implies that the revenue gained by acquiring the indifferent customer is substantial, leading to a high incentive to undercut prices. Clearly, the incentive to deviate decreases as the price p_m^* is lowered since then the benefit from gaining the indifferent customer is also lesser. We note that p_m^* reduces as v reduces and so one can expect this equilibrium to be stable for low values of v . It turns out that the range of values of v for which the price matching equilibrium is stable, is low enough to be non-overlapping with the range of v -values over which the competitive showrooming equilibrium exists.

4.2 Making Product Matching Difficult between the BM Store and the Online Retailer

In this section, we consider the impact on profits of the BM store when it adopts strategies to make product matching harder between the BM store and the online retailer. There can be different ways and means to create this situation. Best-Buy and Costco created their own bar codes of products to make it harder to compare products by scanning bar codes using smartphones to check for availability at the online retailer through mobile apps (Schifrin 2012). Another way could be to keep a product

assortment that caters to local tastes and may not be available online. Keenan (2012) discusses the initiative by Utah county BM stores to stock apparel like sleeved dresses and longer shorts and skirts even in summers because that is more in line with the local values of modesty. Talley (2012a) reports that one of the reasons Macy’s is doing much better than its competitors Kohl’s and J. C. Penny’s is because three years ago it adopted a policy to cater to local tastes at the store level. These strategies create a possibility that the best-fit product identified by a customer after evaluating at the BM store may not be available at the online retailer. We use a to denote the probability that the customer’s best fit product identified in the BM store is available and can be identified at the online retailer. If $a = 1$, then there is no problem in finding and matching the products between the BM store and the online retailer. As product matching gets more difficult, the probability a reduces.

If a matching product cannot be identified, a customer’s expected valuation from an online purchase is δv , instead of v . Thus, of the customers who evaluate at the BM store, only a fraction a enjoy the expected value v from buying online, while the fraction $1 - a$ get the expected value δv . As a reduces, the benefit of showrooming is, therefore, lower, leading to reduction in the numbers of customers who practice it. This, in turn, causes a reduction in the price cutting incentives of the BM store and may thus relax competition and lead to improved profits.

As in Section 2, customers follow a two stage process to make their decision. These stages are illustrated in Figure 5.

Consider the decisions at Stage 2 of a customer who visits the BM store for product evaluation in Stage 1. After the best fit product is identified, this customer must decide to either buy at the BM store itself, or to order online. How does the customer know whether the product she identified is available online? We assume that either a customer already knows the assortment at the online retailer through a previous costless visit to the website of that retailer, or she has access to handheld devices like smartphones which allows her to ascertain the product availability while at the premises of the BM store. With probability $(1 - a)$, this customer is unable to find her best-fit product in the online retailer after completing her evaluation at the BM store. In such a situation, she can buy

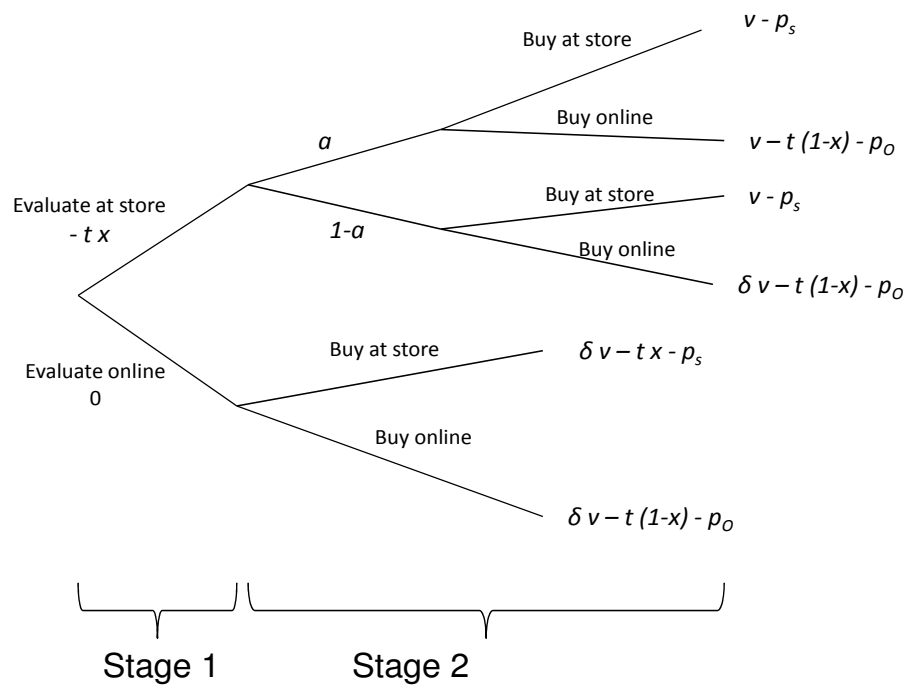


Figure 5: Decision tree for customers when product matching is difficult across the BM store and the online retailer

from the BM store without incurring any additional shopping cost because she is already there and the cost of store visit is a sunk cost at this stage. Her surplus from exercising this option is $v - p_s$. Alternatively, she can buy a product from the online retailer, although her expected utility from doing so is less than that if she purchased from the BM store because the product she purchases online may not be her best-fit. Exercising this latter option also requires the customer to incur an additional shopping cost for transacting through the website and then waiting for product delivery. Hence, a customer will exercise this option, which provides a utility of $\delta v - t(1 - x) - p_o$, only if online prices are lower than store prices. We use x_n to denote the customer who is indifferent between purchasing from a BM store and an online retailer. Then, customers to the left of x_n will purchase from the BM store and those to the right of x_n will purchase online. With probability a , a customer succeeds in finding her best-fit product at the online retailer after evaluating products at the BM store. As before, she can buy from the BM store and obtain a surplus of $v - p_s$, or she can buy from the online retailer and obtain a surplus of $v - t(1 - x) - p_o$. Using x_f to denote the customer who is indifferent between purchasing online and from the BM store, we can see that customers to the left of x_f will purchase from the BM store whereas those to the right will purchase online. It is easy to show that, for any set of prices p_s and p_o , x_f must be smaller than x_n .

Now, consider the decisions at Stage 2 of a customer who visits the online retailer for product evaluation in Stage 1. Such a customer can either purchase at the BM store or the online retailer. However, if she decides to purchase at the BM store, she must expend the cost of travel to that store. Once she does that, she can always improve her surplus by identifying her best fit product at no further cost and buying that product, rather than purchasing based on her product evaluation at the online retailer. Thus, this branch of the decision tree is never possible. Such a customer can, of course, complete her purchase at the online retailer to get a surplus of $\delta v - t(1 - x) - p_o$.

In Stage 1, a customer decides to visit either the BM store or the online retailer for product evaluation based on her ex-ante utilities from exercising these options. The ex-ante utility for customers to evaluate online is $\delta v - t(1 - x) - p_o$, while that for evaluating at the BM store depends upon where

the purchase will happen ex-post. Let x_v denote the location of the customer who is indifferent between these two options. Customers to the left of x_v visit the BM store for product evaluation whereas customers to the right evaluate and purchase via the online channel. This means that three different configurations are possible: (i) $x_v < x_f < x_n$, (ii) $x_f < x_v < x_n$, and (iii) $x_f < x_n < x_v$. We now discuss the third case as an example to explain the implication of the configuration on customer choices. Of all customers who choose to evaluate at the BM store, a fraction a find their best fit product at the online retailer and the indifferent customer among them will purchase at the online retailer (since, $x_f < x_v$), whereas a fraction $1 - a$ do not find their best fit product at the online retailer and the indifferent customer among them will still purchase at the online retailer (since $x_n < x_v$). Thus, the indifferent customer's ex-ante utility from evaluating at the BM store is $(av + (1 - a)\delta v - t - p_o)$. Now, we can find x_v by equating the surpluses from these two options, write the corresponding profit functions and determine the Nash equilibrium prices. We need a consistency check to ensure that, at the equilibrium prices, the conditions assumed in the case holds, i.e., $x_f^* < x_n^* < x_v^*$. The variables with the * superscript represent their corresponding equilibrium values.

We are interested in a particular equilibrium only if it exists in a parameter range that overlaps with the competitive showrooming equilibrium specified in Proposition 1. Analysis of the three cases indicates that (i) and (iii) are not viable in equilibrium, leaving (ii) as the only configuration of interest. As earlier, we examine the stability of this equilibrium by considering such price deviations by each of the retailers that change the demand pattern which may improve profits of the deviating firm. The analysis is quite long, and so, for the sake of brevity, we provide these details in the Appendix. Comparison of the equilibrium profits for the BM store under configuration (ii) (referred to as the “product matching difficult” equilibrium, henceforth) with its profits under the competitive showrooming equilibrium is provided in our next result.

Proposition 4 *The BM store's profits under the “product matching difficult” equilibrium are given by $\frac{((3-a)t + (1-a)(1-\delta)v)^2}{9(2-a)t}$. These profits are higher than its profits under the competitive showrooming equilibrium for the entire parameter range where this equilibrium exists. This range is a subset of the*

parameter space where the competitive showrooming equilibrium exists.

This proposition indicates that, unlike a price matching commitment, making product matching difficult may increase the BM store’s profits in a parameter range coincident with the competitive showrooming equilibrium. To study the parameter spaces in which the product matching difficult equilibrium is stable, we illustrate this equilibrium in Figure 6 for different values of δ , a and v at $t = 0.5$. The shaded part in each of these figures shows the range of v at a particular value of a for which the result in Proposition 4 applies. At $a = 1$, the product identified at the BM store can always be matched at the online retailer. In this situation, there is no difference between the competitive showrooming equilibrium and the product matching difficult equilibrium. Also, note that the derivative of the profit function with respect to a is negative. Thus, the product matching difficult equilibrium gives strictly better profits to the BM store as a reduces. Note that the shaded parts of the subfigures in Figure 6 show the parameter range where the product matching difficult equilibrium improves the BM store’s profits. The widest parameter range of v is when $a = 1$ and decreases as a reduces. This is because although the BM store’s profits improve as a reduces, the product matching equilibrium is stable over a smaller parameter range of v , where v has relatively high values.

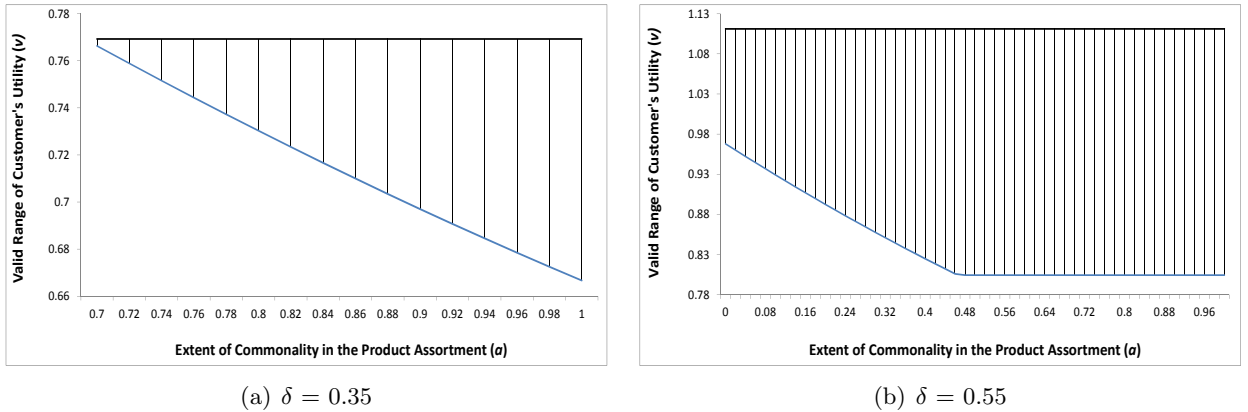


Figure 6: Parameter range where product matching difficult equilibrium improves profits of the BM store

This observation can be explained as follows. As a reduces, the fraction of customers who get their best fit product from showrooming reduces. In addition, for a given value of δ , the benefit from getting the best fit product at the online retailer, $(1 - \delta)v$, becomes smaller as v reduces. As v reduces, the customer utility from purchasing the product also reduces, leading the BM store to reduce its price. If the online retailer wants to offer a high value proposition for showrooming customers, it must also reduce its price. However, this reduces the revenues it gets from its direct customers (customers who don't showroom and evaluate and purchase at the online retailer). This loss of revenue has a more substantial impact on the profits of the online retailer and so it prefers to raise its price¹. Consequently, the section of customers who showroom shrinks, further reducing the importance of this segment for the online retailer. If v is small enough, the online retailer prefers to abandon the showrooming segment altogether and instead focuses on extracting surplus from the direct customer segment by deviating to a higher price than its equilibrium price. Thus, the product matching difficult equilibrium is not stable at low values of v .

By comparing across these figures, we also see that the decrement in the range of v as a reduces is decreasing with δ . Thus, Figure 6(a) shows that at $\delta = 0.35$, the product matching difficult equilibrium cannot improve the BM store's profits for any range of v when a is below 0.7. However, when $\delta = 0.55$ in Figure 6(b), we see that the product matching difficult equilibrium is effective in improving profits for the entire range of a (from 0 to 1). Hence, we learn that as δ increases, the BM store can improve its profits by making product matching difficult for products with a wider range of valuation. The reason for this is that for a given value of a and v , as δ decreases, the benefit from getting the best fit product at the online retailer, $(1 - \delta)v$, increases. Thus, the differentiation between the BM store and the online retailer increases and the BM store responds by raising its price. In response, the online retailer decreases its price to focus on generating revenues from the showrooming customer segment. As prices are lowered, the online retailer has an increased incentive to deviate to a higher price than its equilibrium price and serve only the direct customer segment.

¹ $p_s^* = \frac{(3-a)t+(1-a)(1-\delta)v}{3}$ and $p_o^* = \frac{(3-2a)t-(1-a)(1-\delta)v}{3}$, for details please see Appendix

Hence, this equilibrium is not stable at low values of δ .

4.3 Charging the Customers for Showrooming

If the BM store uses a mechanism to charge the customers who come to its premises but do not buy, then there will be a disincentive for showrooming and the market leakage effect from the BM store to the online retailer will be contained. This benefit will reduce the price cutting incentive for the the BM store, and consequently relax competition. Of course, the applicability of such a mechanism will depend on whether the BM store can differentiate between customers who buy vis-a-vis those who simply make a visit to evaluate products. This suggests use of an upfront membership fee, a parking fee, or a facilities usage fee. All of these mechanisms impose a cost on customers for visiting the BM store for product evaluation. The BM store can refund the charge to customers who purchase the product, thus avoiding a disincentive for store buyers. An example of this kind of arrangement is restaurants who use common parking facilities but refund the parking fee to their customers. Another example is provided by Bitá (2011) who reports that ski retailers in Australia are charging shoppers for trying on skis, and these charges are reimbursed if they buy from the store.

We now develop a model to capture the effect of the charge on customers for showrooming. The setup is very similar to the model described in Section 2, the only difference being that the BM store announces a parking fee, or a subscription fee of f , even before Stage 0 discussed in Section 2. The reason for introducing this additional stage is that user charges are typically announced once a year and so there is not much flexibility in changing these prices unlike product prices which can be changed frequently. Since the BM store may not fully control charges like a parking fee (if, for example, the parking lot is shared between many stores), we take f as an exogenously fixed parameter. This allows us to find the whole range of values of f for which this equilibrium serves to increase the BM store's profits. Of course, if the store has sufficient freedom in setting these charges, it will fix f high enough to ensure that no one showrooms. Henceforth, we assume that the store does not have the freedom to set the fee to be so high and determine the equilibrium where some

customers continue to showroom even after imposition of this fee.

After the fee is announced, as in Section 2, the retailers announce product prices, customers decide which channel to use for product evaluation and then the channel for product purchase. We want to determine equilibrium profits for the BM store when there are some customers who practice showrooming even with the parking fee in place. As earlier, the showrooming customers may get a positive surplus, or zero surplus. We start by analyzing the earlier situation. The position of the customer who is indifferent between purchasing at the BM store and showrooming (call x_1) is obtained by solving $v - tx - p_s = v - t - f - p_o$ for x , and the one indifferent between showrooming and purchasing at the online retailer without evaluating at the BM store (call x_2) is obtained by solving $v - t - f - p_o = \delta v - t(1 - x) - p_o$ for x . The profit functions of the BM store and the online retailer can now be written as $\pi_s = p_s x_1 + f(x_2 - x_1)$ and $\pi_o = p_o(1 - x_1)$, respectively. The Nash equilibrium prices for the BM store and online retailer turn out to be $p_s^* = \frac{2t}{3} + f$ and $p_o^* = \frac{t}{3}$. This yields equilibrium profits of $\frac{4t^2 - 9f(f - (1 - \delta)v)}{9t}$ for the BM store. Henceforth, we refer to this equilibrium as the “showrooming fee” equilibrium.

We now verify various consistency conditions, such as equilibrium value of x_2 is greater than that of x_1 , and that the showrooming surplus is positive. These conditions provide some bounds on the parameters. We also verify the validity of this equilibrium by considering all possible price deviations by the store and online retailer to alter the market configuration and get higher than the equilibrium profits. We find that this analysis imposes additional bounds on parameter conditions where the equilibrium applies. Finally, we compare the equilibrium profits of the BM store when it charges a showrooming fee versus its profits under the competitive showrooming equilibrium. We also analyze the situation when showrooming customers get zero surplus, and find that this cannot happen in equilibrium when customers are charged a fee for showrooming. Based on this analysis, we conclude that:

Proposition 5 *The profits of the BM store under the “showrooming fee” equilibrium are given*

by $\frac{4t^2 - 9f(f - (1 - \delta)v)}{9t}$. These profits are higher than its profits under the competitive showrooming equilibrium for the entire parameter range where this equilibrium exists.

Notice that the profit function of the BM store is concave in f . However, the existence of this equilibrium is constrained with an upper bound, $f < \frac{t}{3}$. This bound is always smaller than the value of f that maximizes the profit expression of the BM store (please see Appendix for more details). Hence, to get the maximum possible profit in the context of this equilibrium, the BM store would want to charge the highest showrooming fee that is allowed by the constraints.

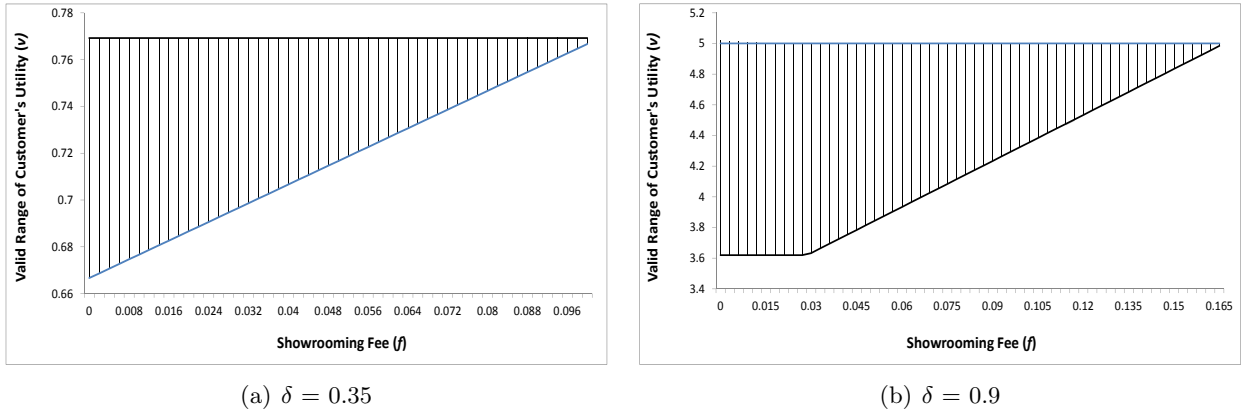


Figure 7: Parameter range where showrooming fee equilibrium improves profits of the BM store

Next, in Figure 7, we illustrate the showrooming fee equilibrium for different values of δ , f and v at $t = 0.5$. The shaded part in each of these figures shows the range of v at a particular value of f for which the result in Proposition 5 applies. At $f = 0$, the showrooming fee equilibrium is the same as the competitive showrooming equilibrium. However, the parameter space in which the showrooming fee equilibrium holds shrinks even as the profits of the BM store increase with f . The reason for this is that the BM store and the online retailer charge the same prices from their customers as in the competitive showrooming equilibrium. On top of the revenues generated through selling, the BM store extracts a fee from showroomers to extract the surplus they generate. Thus, charging a showrooming fee extracts surplus from customers without changing the nature of price competition

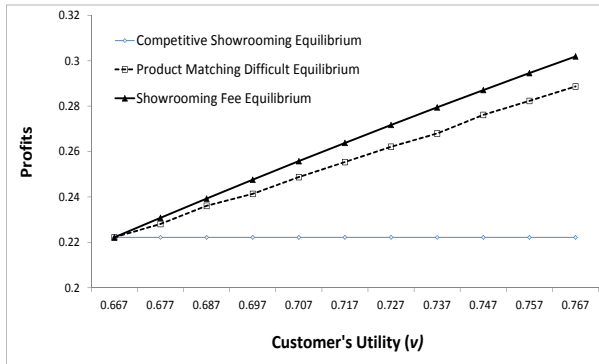
between retailers. However, as the fee increases, the segment of showrooming customers shrinks until it disappears completely.

4.4 Comparison of Profits Across Strategies

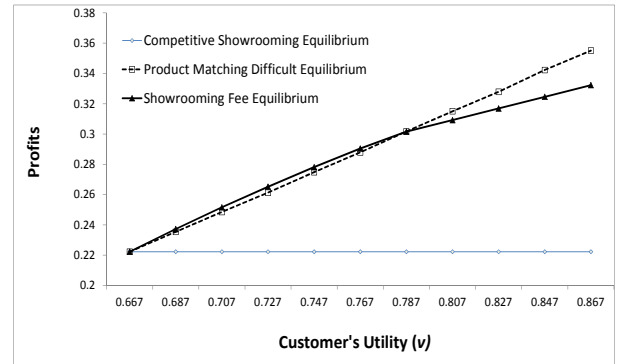
As shown earlier in Propositions 4 and 5, the possible strategies for the BM store to improve its profit are (i) making product matching difficult and, (ii) charging a showrooming fee. Hence, in this section, we compare the profit of the BM store in (i) competitive showrooming equilibrium, (ii) product matching difficult equilibrium, and (iii) showrooming fee equilibrium. The results are presented in Figure 8, where we plot the profit of the BM store under the three equilibria.

In each of the subfigures of Figure 8, the value of customer's utility (v) is varied on the x-axis over the entire range where the competitive showrooming equilibrium is valid, corresponding to the value of δ in that subfigure (see Proposition 1). Further, we calculate the profits under product matching difficult equilibrium as follows. For a given value of v , the maximum profit under the product matching difficult equilibrium is obtained at the lowest value of a where v lies in the valid range of v . For example, in Figure 6(a) (where $\delta = 0.35$), $v = 0.68$ is valid only when $a \geq 0.96$. Hence, in this case, the maximum profit for $v = 0.68$ under the product matching difficult equilibrium is obtained by setting $a = 0.96$. The profit under showrooming fee equilibrium is calculated in a similar manner. However, in this equilibrium, the maximum profit is obtained at the highest value of f where v lies in the valid range of v . For example, in Figure 7(a), $v = 0.68$ is valid only when $f \leq 0.012$. Hence, in this case, the maximum profit for $v = 0.68$ under the showrooming fee equilibrium is obtained by setting $f = 0.012$.

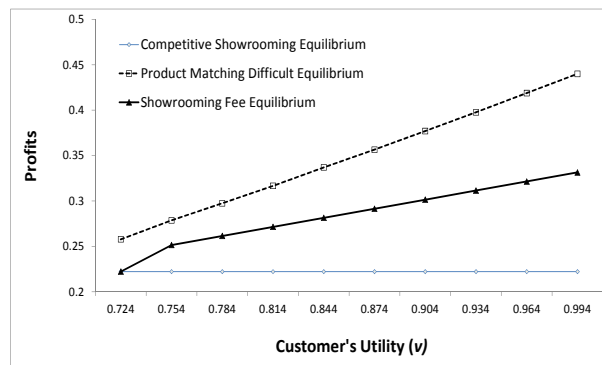
Clearly, in each of the subfigures, the profit under product matching difficult and showrooming fee equilibria are never inferior to those under the competitive showrooming equilibrium. However, the comparative performances of the product matching difficult and showrooming fee equilibria depend on the values of δ and v . As shown in Figure 8(a), when $\delta = 0.35$, the showrooming fee equilibrium provides a higher profit for all possible value of v .



(a) $\delta = 0.35$



(b) $\delta = 0.425$



(c) $\delta = 0.5$

Figure 8: Comparison of profits

Next, Figure 8(b) shows that, when $\delta = 0.425$, the showrooming fee equilibrium provides better profits only for $v < 0.787$, and the product matching difficult equilibrium performs better for $v \geq 0.787$. Hence, the BM store should choose different strategies for these two ranges of v . We increase the value of δ further in Figure 8(c), and find that the product matching difficult equilibrium outperforms the showrooming fee equilibrium for all possible values of v .

To summarize, we find that charging showrooming fee is the more beneficial strategy for the BM store when δ is low. However, for moderate values of δ , charging showrooming fee is better only for the products with low value of v . For these values of δ , when v is high, the BM store should choose the strategy of making product matching difficult. Finally, when δ is high, it is better to utilize the product matching difficult strategy for products with low as well as high values of v .

A recent Comscore report² reports several product categories where showrooming is very significant. Out of these, consumer electronics, appliances, jewelery and watches, and toys can be categorized as having high digital attributes since text and images can reveal a significant extent of information about these products. On the other hand, apparel can be categorized as having low digital attributes since text and images may not be sufficient to provide enough information. Our analysis shows that the showrooming fee strategy has a bigger potential for product categories with low digital attributes while the product matching difficult strategy may be superior for products with high digital attributes to improve profits for the BM stores.

The major focus of current efforts by BM stores to combat showrooming across different product categories seems to be by matching prices. Tuttle (2012) reports this approach for electronics retailers like Best Buy while Talley (2012b) does so for apparel retailers like Target. Our analysis shows that the success of this strategy is suspect. Making product matching harder is another approach that is being tried out. Wasserman (2012) reports that Target is experimenting with exclusive products. Our analysis shows that while this approach has potential, a retailer like Target who specializes in apparel can perhaps do even better by creatively imposing a cost on showrooming.

²State of the US Online Retail Economy in Q1 2012

5 Summary

Competition between BM stores and online retailers has increased even in those product categories that were previously uncompetitive (or less competitive), such as clothes. The reason for less competition in the past was that the customers could not evaluate products in such categories using the online channel as effectively as they could in the BM store. As a result, the customers ended up making suboptimal purchases if they evaluated products only via the online channel. However, customers are now evaluating products in a BM store, and then ordering the preferred product from an online retailer. The ubiquity of wireless connectivity and hand-held devices to access the Internet makes information about product availability and prices more readily available, and is further abetting this behavior. These developments have led to an increased use of the BM store solely as an information channel to establish definitively a customer's best fit product. Such "showrooming" customers end up making their purchases online so retailers whose business models are predominantly based on BM store outlets view this trend as a threat to their bottom lines.

In the context of multi-channel retail competition, we find that the price cutting incentive of the BM store to stem the leakage of customers to the online retailer due to showrooming is more significant than the incentive of the online retailer to increase its price due to acquisition of showrooming customers. Thus, showrooming enhances price competition and hence profits are reduced.

Given this result, we extend our analysis to consider three strategies for improving the BM store's profits: (i) a price matching commitment, (ii) making product matching difficult between the BM store and the online retailer and, (iii) charging a fee for showrooming. We establish that the last two strategies are effective in improving profits in the face of showrooming, whereas the first is not. We also show that the making product matching difficult strategy is better than charging a fee for showrooming for high value products or products with relatively higher digital attributes (e.g. electronics, jewelery and watches) while the reverse is true for products with relatively lower values or those with low digital attributes (e.g. books and clothes). These theoretical results provide guidance to BM stores that seek to safeguard their profits in the face of increasing competition due

to showrooming behavior of customers.

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