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Exchange and refund of complementary products

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Abstract A common dilemma a consumer faces during product return pertains to the decision of exchanging the product or obtaining a refund. This issue becomes even more salient for durable goods, when the initial purchase involves complementary products from different categories. This research examines consumer's trade-off decision between returning and keeping complementary products by exploring various retail actions (using umbrella branded products (UBP)) and customer characteristics. We also investigate the trade-off between product exchange and refund when consumer returns a product. We find interesting extensions to past research wherein UBP are returned less and result in greater exchange than refund. Furthermore, an interesting caveat is that higher degree of complementarity between UBP intensifies the impact of various factors on exchange as opposed to refund of products. Implications for retail managers and sales teams are explored.

Keywords Product return · Product exchange and refund · Umbrella branding · Nested logit · Multinomial logit

The US consumer electronics industry spent \$16.7 billion in 2011 to deal with product returns, such as receiving, repairing, restocking, and reselling returned merchandise (Douthitt et al. 2011). Manufacturers and retailers found return rates for consumer electronics to be between 11 and 20 (Lawton 2008), and 58 % of retailers were

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experiencing higher return rates than in previous years. These high numbers lead firms to use product returns as part of their marketing activities. For example, while retailers like Nordstrom and Zara always provide free product returns, Gap and American Eagle Outfitters offered free product returns during their 2012 Black Friday sales promotions. Offering convenient or free returns help firms increase their initial sales by demonstrating their confidence in product quality while lowering consumer's risk (Moorthy and Srinivasan 1995). However, if the number of product returns increases, firms have to incur the costs due to reverse logistics (Lee and Chan 2009).

Product return provides firms another opportunity to interact and maintain the long-term relationship with their consumers (Reinartz and Kumar 2003). In general, product return can result in one of two scenarios: consumers can either take their money back (i.e., refund) or exchange it for another product. An exploratory study by Park (2006) found that 53.54 % of customers were interested in receiving a refund, while 46.46 % of customers opted for an exchange during product return. The implications of refund or exchange, however, for a retailer can be quite different. Product exchange provides the retailer another opportunity to interact with the customer and recoup their loss; the same may not be true for refund. Yet, the determinants of consumer's product return decision and the underlying drivers of consumer's choice between exchange and refund have not been investigated in past research. In the durable goods industry, product return decision and the trade-off between exchange and refund become even more salient as the costs associated with repairing, restocking, and reselling are usually higher. Additionally, durable good sales commonly involve two or more products (for example, TV-DVD player, washer-dryer), which are often complementary to each other in functionality and consumption. This further raises the issue of the role of complementary products in return, exchange, and refund decisions.

In this study we focus on three main aspects pertaining to complementary products. First, complementary products in two categories could be from the same manufacturer, and be part of the manufacturer's umbrella branding strategy. We explore the role of this strategy on product return, exchange, and refund. Second, in terms of functionality, we demonstrate that the degree of complementarity or interdependence between the products could play a significant role in consumer's product exchange vs. refund decisions. Finally, in durable product categories, for complementary products, we investigate the differential role of the primary and the accessory products during product exchange and refund decisions.

This research offers several contributions to the literature: (1) We extend product return literature by investigating how consumers make tradeoff decisions between product exchange and refund; (2) We aim to bridge the gap between two disparate streams of research, product returns and umbrella branding of complementary products; (3) We extend the literature on complementary products by incorporating the degree of complementarity and the interdependence of the products (primary and accessory) in understanding the product return, exchange, and refund decisions. Managerially, we provide implications on how retailer's marketing activities (e.g., promotions, extended service contracts, and sale of umbrella branded pairs) and customer characteristics (gender, income, and age) affect consumer's return decision.

Results from our empirical analysis provide rich insights about product return, as well as exchange and refund. In particular, we find that consumers are less likely to return the product if their initial purchase involved umbrella branded complementary products and if they bought an extended service contract. But, price promotion does not have an impact on the return decision. Also, males, high income and older customers

are less likely to return products. Furthermore, when exchanging a product, consumers are more likely to pay a higher price, opt for an umbrella branded pair, and exchange the primary product more than the accessory product. Finally, we find that higher the degree of complementarity, the more influential the impact of umbrella branding strategy on the choice decision during product exchange and larger the impact of various factors on exchange and refund of products. Consequently, our research addresses some of the key issues faced by managers during product return, related to understanding the role their initial marketing activities play during product return, exchange, and refund.

1 Theoretical background

Product return has become an integral part of the transaction process. In the past, product return was mainly introduced as a competitive strategy that can help in reducing product quality uncertainty. Increasingly, firms are gravitating toward stricter return policies due to either high costs involved in handling the entire process or stricter manufacturer guidelines (Janakiraman and Ordóñez 2011). In light of these developments, a majority of research on product returns has focused on the following: understanding the impact of different product return policies on firm profits (Anderson et al. 2009) and customer buying, return and firm allocation (Petersen and Kumar 2009). However, an important and interesting issue faced by retailers during product return, largely ignored in extant research, is understanding the trade-off between product exchange and refund, the role of complementary products, and associated umbrella branding strategy.

The main focus of this research is the purchase, return, exchange, and refund of complementary products. A complementary product is often consumed together with another product, and its demand would not decrease when the price of the other product decreases (Mas-Colell et al. 1995). Depending on the marginal rate of substitution (or complementarity), a pair of products can be perceived by consumers as perfect or imperfect complements (Eaton et al. 2011). We aim to (1) understand the various retail factors and customer characteristics that result in the observed consumer's return behavior of complementary products; and (2) investigate the impact of umbrella branding of complementary products on consumer's return followed by exchange and refund decisions.

2 Returning or keeping the product

In the case of high-ticketed durable goods, there could be a lot of actions that a retailer might take to convince the customer and finalize the initial sale. What roles do the actions taken by the retailer, during initial sale of the product, play when consumers make the product return decision? Specifically, we investigate the roles of product (umbrella branding strategy), retail (promotions), and customer characteristics (age, income, and gender) on product return decision.

Umbrella branding refers to the same brand name being used for multiple products that results in the transfer of brand quality perceptions between the products (Erdem 1998). The initial purchase usage experience and advertising for one category of

umbrella branded products have a positive influence on the utility of the umbrella brand in the other product category (Erdem and Sun 2002). It is however unclear what roles umbrella branded products play in the product return scenario.

Retailers frequently provide promotions during initial purchase of products. Income effect from promotions result in purchase of more expensive brands indicating that, *ceteris paribus*, consumers are less likely to return a product since they bought something more expensive for a lower price. However, perceived value hypothesis suggests that customers are less likely to return the product on sale (Petersen and Kumar 2009). We, therefore, investigate the impact of initial purchase involving promotions on the likelihood of product returns.

3 Exchange or refund

Product exchange has various implications and provides the retailer another opportunity to interact with the customer. This interaction could result in the customer opting for the same product or buying a different higher or lower valued product. Furthermore, research has demonstrated product returns to be positively related to customer's future value to the firm (Reinartz and Kumar 2003). Therefore, the exchange scenario becomes critical to retailers because it provides opportunity for maximum interaction with the customer during product return. Hence, we empirically examine various factors that affect consumer's repurchase decision during product exchange. Specifically, we investigate consumer's intention of maintaining an umbrella branded pair, exchanging primary compared to accessory products and the exchange price compared to the initial purchase.

The uncertainty of the exchange decision outcome could be due to two sources: the problem with the product itself and the level of compatibility or the degree of brand matching (Rahinel and Redden 2013) between the product to be exchanged and the complementary item. Consumers may believe that the same branded products were designed and produced to work with each other so the functional or abstract fit between them would be high. This could be a direct result of synergistic effect of the products (Shine et al. 2007) or the endowment effect (Wood 2001) of the brand that they already own. Furthermore, for complementary products, the role of each product should have an influence in the product exchange process. Whether the returned product is the primary or the accessory product could affect the utility of brand choice decision during product exchange. We identify the primary product to be of higher price and of more important functionality in a complementary product pair and investigate if consumers are more likely to exchange primary as opposed to accessory products and the role of UBP in this decision.

Additionally, a pair of complementary products in durable goods can exhibit different levels of dependence or degree of complementarity between the primary and the accessory product. For example, personal computer and monitor are highly dependent on each other (or have high degree of complementarity), where one product cannot function to its full capacity without the other. While for products like TV and DVD player, TV can function and has other avenues for use without the DVD player, but the DVD player requires a TV. Research has demonstrated that increasing the degree of complementarity increases price competition and

sometimes leads to smaller profits (Sinitzyn 2015). We believe that given more intense price competition between products (even UBP products) with higher complementarity, we might observe less upsell (i.e., exchange to a higher priced product than the returned product) for exchanged products. The intense price competition could result in the manufacturer providing alternate options that are not significantly higher in price. Manufacturers of durable product pairs with higher complementarity might have lower product margin for each product in the pair, but could still gain from consumer's exchange of a product to a different product from the same manufacturer (without a significant increase in price due to intense price competition). We investigate if the degree of interdependence between various pairs of durable goods plays a role in the product exchange and refund decisions.

Finally, price plays an important role in product purchase and exchange. Simonson (1991) finds that if a lower priced product fails, consumers feel regret and blame self; while if a higher priced product fails, consumers tend to blame the manufacturer. Thus, depending on the price of the product, consumers' source of blame shifts from self to the retailer or manufacturer. Furthermore, research on complementary categories (Sinitzyn 2012) demonstrates that switchers are willing to pay a price premium for complementary products as they infer better match between the products due to the same brand name. Hence, we investigate the role of price in the exchange and refund decisions.

4 Empirical analysis

4.1 Data description

The ISMS durable goods dataset is used for empirical analysis. It includes the transaction history of 19,936 households from 1176 stores of a single major US electronics chain from December 1998 to November 2004 (Ni et al. 2012). An advantage of this dataset is it comes from one single retailer and the return policy inferred from the data is 30 days. We focus on complementary products because the retailers for durable goods observe higher purchase and return of these products. For example, we find that complementary products are returned almost three times more than single products. We chose two types of complementary products based on the interdependency of the products in the pair. The first pair has a lower degree of complementarity than the second and consists of a TV and VCR player (pair 1 hereafter). The second pair consists of a personal computer and monitor (pair 2 hereafter). Additionally, the reason for choosing these two pairs is due to a large number of transactions for these two pairs (97 % of the transactions in the complementary products involve these two pairs) and also the varying levels of interdependency (which we test). While a TV can be used without a VCR player, a personal computer cannot be fully utilized without the visual output from a monitor.

We combine the brand information into four different brands (the largest three brands for each pair and all other brands combined as the fourth brand). Refund is coded as the outside good option. Table 1 provides the summary statistics for the transactions related to each pair. The last row of Table 1

Table 1 Summary statistics of transactions

	Pair 1 (TV and VCR)	Pair 2 (PC and monitor)
Number of transactions	3542	3422
Number of product returns	776	502
Number of product exchanges	601	415
Number of product refunds	175	87
Mean price of each product	TV: \$684.08 VCR: \$146.58	PC: \$737.57 Monitor: \$323.14
Correlation of the transaction of two products (both purchase and return)	0.164	0.763

provides the correlation for the product purchase and product return transactions of primary and accessory products within each pair. As expected, pair 2 demonstrates a much higher correlation (0.763) than pair 1 (0.164), i.e., the primary and accessory products in pair 2 are purchased and returned together more often than the products in pair 1.

4.2 Model specification

Our empirical analysis is conducted using a choice model (for data on pair 1 and pair 2 products). The probability that household i returns merchandise j is modeled using a binary nested logit model.

$$P_{ij}(\text{Return}) = \frac{\exp(V_{ij})}{1 + \exp(V_{ij})} \quad (1)$$

where the deterministic utility is:

$$V_{ij} = \beta_0 + \text{UBP_INIT}_{ij} \times \beta_1 + \text{PROMO}_{ij} \times \beta_2 + \text{ESC}_{ij} \times \beta_3 + \text{GENDER}_i \times \beta_4 + \text{AGE}_i \times \beta_5 + \text{INCOME}_i \times \beta_6 + \text{TRANS}_i \times \beta_7 + \text{IV} \times \beta_8 \quad (2)$$

where,

- UBP_INIT Dummy (1=two products initially purchased are of the same brand).
- PROMO = Total amount of discount during initial purchase.
- ESC Dummy (1 = extended service contract was bought with the initial purchase).
- GENDER Dummy (1 = male).
- AGE Dummy (1 = older).
- INCOME Dummy (1 = high).
- TRANS Control for total number of transactions of a household.

IV Inclusive value which captures total amount of attractiveness from exchange and refund.

$$IV = \log \left(\sum_{k=1}^K \exp(W_{ik}) \right) \quad (3)$$

After return, the probability that household i selects alternative k among possible choices of exchange or refund is specified by a multinomial logit model.

$$P_i(k | \text{Return}) = \frac{\exp(W_{ik})}{\sum_{k=1}^K \exp(W_{ik})} \quad (4)$$

and

$$W_{ik} = \gamma_{0k} + \text{UBP_EXG}_{ik} \times \gamma_1 + \text{PRIMARY}_{ik} \times \gamma_2 + \text{UBP_EXG}_{ik} \times \text{PRIMARY}_{ik} \\ \times \gamma_3 + \text{UPSELL}_{ik} \times \gamma_4 + \text{ESCR}_{ik} \times \gamma_5 + \Delta\text{PRICE}_{ik} \times \gamma_6 \quad (5)$$

where,

UBP_EXG Dummy (1 = UBP at product exchange).
 PRIMARY Dummy (1 = exchanged product is primary).
 UPSELL Dummy (1 = price of exchanged product is higher than returned product).
 ESCR Dummy (1 = ESC is returned).
 ΔPRICE amount of price difference between returned and exchanged products.

For each of the two product pairs, there are five dependent variables with the first four being brands of exchanged products and the fifth (outside good) as the refund option. γ_{0k} is the brand-specific intercept. To demonstrate the relative preference of each brand, the intercept for refund is set as the baseline. Estimation is done using Bayesian MCMC methods.

We also investigate which pair of complementary products is affected more by the presence of an umbrella brand. We carry out elasticity analysis (Eq. 6) for each pair (Gupta 1988). Two variables are included because of the main effect of UBP and the interaction effect of primary product and UBP at exchange.

$$\eta_{\text{Choice}(k)} = \frac{\text{UBP_EXG}_k}{P_k} \frac{\partial P_k}{\partial \text{UBP_EXG}_k} \\ = \{\gamma_1 + (\text{PRIMARY}_k \times \gamma_3)\} \text{UBP_EXG}_k (1 - P_k) \quad (6)$$

UBP_EXG_k and PRIMARY_k are the mean values of the dummy for UBP at exchange and the dummy for the primary product, and γ_1 and γ_3 are the mean posterior values of the associated parameters. Based on the mean value of parameters, the choice probabilities (Eq. 4) of five dependent variables are derived at the individual household level. Then, the mean value of the choice probability of each dependent variable, $P_k (k=1, \dots,$

5), is calculated. Since all components of Eq. (6) are mean values across households, the subscript i is removed. For each pair, we calculated the choice elasticity ($\eta_{Choice(k)}$) with respect to the five dependent variables at the mean value.

4.3 Estimation results

Table 2 provides the posterior values of parameters based on the estimation results for pair 1 and 2.

Returning or keeping the product: Both pairs of products show similar results, directionally, albeit different magnitudes. According to the posterior mean value, people who initially purchased an UBP are less likely to return the products ($\beta_1 = -0.07$ pair 1; -0.165 pair 2), which shows the effectiveness of umbrella branding strategy. In terms of promotion (i.e., price discount), if the consumers bought the initial product on promotion we did not find statistically significant impact on their likelihood of returning the product ($\beta_2 = -0.005$ pair 1; -0.004 pair 2). We find that when a product was initially purchased with an ESC, consumers are less likely to return the product for both pairs ($\beta_3 = -0.102$ pair 1; -0.105 pair 2). Finally, male consumers ($= -0.33$ pair 1; -0.625 pair 2), older consumers ($\beta_5 = -0.038$ pair 1; -0.047 pair 2), and consumers with high income ($\beta_6 = -0.045$ pair 1; -0.055 pair 2) are less likely to return a product.

Exchange or refund: Umbrella branding strategy is effective during exchange decision as well. Consumers are more likely to exchange to the same branded product, resulting in UBP, as the other product in the pair that they already own ($\gamma_1 = 0.249$ pair 1; 1.101 pair 2). Since each brand introduces multiple product lines across product categories, and they are differentiated in features, consumers who returned an item are more likely to exchange and maintain the UBP. When the product returned is the primary one in the pair, it has a positive impact on the likelihood of exchange ($\gamma_2 = 0.294$ pair 1; 0.810 pair 2). In addition, when the returned product is the primary one, the likelihood of maintaining an UBP at the product exchange becomes higher ($\gamma_3 = 0.10$ pair 1; 0.674 pair 2). In other words, consumers try to maintain an UBP when they exchange the higher-priced primary product in the product pair. We find that consumers tend to choose a higher priced alternative than the returned merchandise when they exchange ($\gamma_4 = 0.714$ pair 1; 0.481 pair 2). Finally, in terms of controls, we find that customers with more transactions are more likely to return products for pair 1 ($\beta_7 = 0.022$ pair 1; 0.012 pair 2) and the impact of price difference is negative in pair 1 and is only slightly significant in pair 2 ($\gamma_6 = -0.004$ pair 1; 0.002 pair 2).

Our investigation of the effect sizes for the two pairs of products reveals that both pairs have coefficients that are directionally consistent (Table 2) with interesting differences in magnitudes. We test the statistical significance by observing the overlap in the 95 % credible interval of the parameters. We find in the product exchange scenario (i.e., γ 's 1–3), the effect sizes are significantly larger for higher degree of complementarity (i.e., pair 2) for UBP_EXG (1.10 vs. 0.249), PRIMARY (0.810 vs. 0.294) and UBP_EXG \times PRIMARY (0.674 vs. 0.100). This is not true in the case of UPSSELL, which is significantly larger for the less interdependent pair (i.e., pair 1 with 0.714 vs. 0.481). This implies that consumers are willing to pay more during exchange for products with smaller degree of complementarity, which is in line with our expectation that given more intense price competition between products with higher degree of complementarity, we might observe less upsell. We

Table 2 Posterior parameter estimates

Model	Parameters	Pair 1	Pair 2
Product return	β_0	-0.458 (0.004) [-0.465,-0.452]	-0.907 (0.011) [-0.923,-0.888]
	β_1 (UBP_INIT)	-0.070 (0.005) [-0.080,-0.060]	-0.165 (0.004) [-0.171,-0.156]
	β_2 (PROMO)	-0.005 (0.005) [-0.016, 0.002]	-0.004 (0.004) [-0.012, 0.003]
	β_3 (ESC)	-0.102 (0.004) [-0.110,-0.094]	-0.105 (0.004) [-0.114,-0.098]
	β_4 (GENDER)	-0.330 (0.006) [-0.339,-0.317]	-0.625 (0.005) [-0.632,-0.610]
	β_5 (AGE)	-0.038 (0.001) [-0.040,-0.035]	-0.047 (0.002) [-0.052,-0.044]
	β_6 (INCOME)	-0.045 (0.003) [-0.050,-0.039]	-0.055 (0.006) [-0.066,-0.045]
	β_7 (TRANS)	0.022 (0.002) [0.019, 0.025]	0.012 (0.004) [0.005, 0.020]
	β_8 (Inclusive Value)	1.400 (0.008) [1.394, 1.414]	2.109 (0.004) [2.102, 2.118]
Exchange or refund	γ_{01}	0.028 (0.006) [0.018, 0.039]	0.238 (0.005) [0.231, 0.247]
	γ_{02}	0.134 (0.007) [0.150, 0.124]	0.309 (0.005) [0.298, 0.319]
	γ_{03}	-0.008 (0.012) [-0.025, 0.004]	0.271 (0.006) [0.263, 0.284]
	γ_{04}	0.313 (0.006) [0.304, 0.326]	0.057 (0.005) [0.047, 0.066]
	γ_1 (UBP_EXG)	0.249 (0.007) [0.239, 0.264]	1.101 (0.007) [1.088, 1.111]
	γ_2 (PRIMARY)	0.294 (0.006) [0.289, 0.307]	0.810 (0.005) [0.800, 0.821]
	γ_3 (UBP_EXG*PRIMARY)	0.100 (0.006) [0.093, 0.109]	0.674 (0.003) [0.669, 0.681]
	γ_4 (UPSELL)	0.714 (0.008) [0.704, 0.726]	0.481 (0.003) [0.476, 0.485]
	γ_5 (ESCR)	0.043 (0.004) [0.034, 0.050]	0.278 (0.011) [0.263, 0.301]
	γ_6 (Δ PRICE)	-0.004 (0.000) [-0.004,-0.003]	0.002 (0.000) [0.002, 0.002]

Note: Estimates in bold have more than 95 % of their posterior mass away from zero

Table 3 Umbrella brand elasticities

Brands	Pair 1	Brands	Pair 2
Brand A	0.061	Brand X	0.393
Brand B	0.026	Brand Y	0.277
Brand C	0.030	Brand Z	0.181
Others	0.089	Others	0.116
Refund	0.102	Refund	0.117
Mean elasticity	0.061		0.217

Note: Calculation based on $\eta_{Choice(k)} = \{\beta_1 + (\text{PRIMARY}_k \times \beta_3)\} \text{UBP_EXG}_k(1 - P_k)$

find, based on elasticity calculations from Eq. (6) (Table 3), that all brands in pair 2 have higher elasticity with respect to the umbrella brand than pair 1, and the mean elasticity of pair 2 is higher than pair 1 (0.217 and 0.061, respectively). Therefore, we can deduce that when two products are more interdependent (as in pair 2) umbrella branding strategy is more influential on the choice decision during product exchange.

5 Discussion and future research

Product return costs firms billions of dollars every year and the rate of returns have also consistently risen. Product return usually involves either exchange or refund (money-back). Transactions ending in refund result in substantial losses for the retailer and the manufacturer as it entails the costs of dealing with the reverse supply chain in addition to lost sales from initial purchase. While, transactions resulting in product exchange provide the retailer another opportunity to interact with the customers, understand their preferences, recoup some of their losses, and maintain an ongoing relationship for future purchases. Despite these different consequences resulting from product exchange and refund, research has not jointly investigated the trade-offs customers make during product return. This understanding becomes even more critical when the initial purchase involves complementary products (which is common for durable goods).

Using transaction data for durable goods from a national large chain retailer, we find that different retail factors and customer characteristics, during initial purchase of a pair of products, play into consumer's keep or return and exchange or refund decisions. Specifically, we find that initial purchase of UBP results in consumers opting to keep the product, while initial purchase involving price promotions does not have an impact on product return decisions. Also, males, older, and high-income consumers are expected to keep products than opting to return. In the product exchange scenario, we find that consumers are more likely to go for a higher priced product during exchange, and consumers exchange primary products more than accessory products and this impact becomes larger with UBP products. This study aims to bridge the gap between different streams of research, specifically, product exchange, refund, umbrella branded pair of products, and interdependence of complementary products.

Table 4 Average incremental revenue—return vs. keep

	UBP	Non-UBP	Overall
<i>Pair 1</i>			
Return: average revenue	-779.96	-667.41	-705.00
Keep: average revenue	1226.65	1036.27	1092.61
Net revenue	446.69	368.86	387.60
<i>Pair 2</i>			
Return: average revenue	-1029.21	-926.85	-999.82
Keep: average revenue	1257.12	1146.49	1229.07
Net revenue	227.91	219.64	229.24

5.1 Managerial implications

This research provides insights into different retail, product, and customer characteristics that managers' need to focus on to maintain an ongoing relationship with their customers. Since, our research emphasized the pivotal role of umbrella branding strategy in the product return decisions; we now demonstrate its true impact on the bottom line of retailers.

Based on our data we compute, for each product pair, the average incremental revenue due to UBP and non-UBP complementary products. Table 4 provides the results from these computations. Overall revenue for return and keep decisions is computed as the revenue for a specific decision divided by the number of products returned or kept. The total net revenue of the retailer for the both complementary product pairs are positive (\$387.6 and \$229.24, respectively). But, the net revenue gain for UBP products (\$446.69) is greater than non-UBP products (\$368.86) which is an increase of about 21 % for pair 1 and is about 4 % for pair 2. This demonstrates the advantage of umbrella branding strategy. Similarly, in the exchange and refund scenarios (Table 5), the loss in the average incremental revenue due to exchange is much smaller than refund (pair 1 -\$109.64 vs. -\$241.12) and the retailer, on an average, experiences an increase of \$131.48 due to exchange compared to refund. This difference is much larger when there is higher degree of complementarity between the

Table 5 Average incremental revenue—exchange vs. refund

	UBP	Non-UBP	Overall
<i>Pair 1</i>			
Exchange: average revenue	-64.64	-115.42	-109.64
Refund: average revenue	-234.16	-242.48	-241.12
Difference (exchange-refund)	169.52	127.06	131.48
<i>Pair 2</i>			
Exchange: average revenue	-0.70	-68.03	-30.88
Refund: average revenue	-555.90	-511.48	-536.79
Difference (exchange-refund)	555.20	443.44	505.91

products (pair 2 \$505.91). It should be noted that these are conservative estimates as we are computing the average. The actual gain would be much larger because the number of exchanges is much greater than the number of refunds.

However, we find interesting differences between UBP and non-UBP products. We find that, for pair 1, the average gain in incremental revenue due to exchange as opposed to refund is \$169.52 for UBP compared to \$127.06 for non-UBP products, which is a 25 % gain. Similarly, for pair 2 we find that this gain is about 20.1 % (\$555.20 vs. \$443.44). These findings clearly demonstrate the benefits of the sale of UBP products. We believe that this provides valuable information to retailers to emphasize through feature, displays, and in-store advertising to push for UBP products. Another interesting observation from Table 5 is the large difference in magnitude in incremental revenue for products in pair 2 compared to pair 1. Therefore, retailers can focus on educating consumers about the degree of complementarity of various pairs of products through their sales personnel. There is a certain push from manufacturers and retailers to include better instruction guides and studies have demonstrated that it does have a positive impact on reducing product returns (Lawton 2008).

Interestingly, we find that degree of complementarity of products plays a critical role in the product exchange scenario. In particular, we observe that higher degree of complementarity amplifies the impact of most factors (maintaining UBP and exchanging primary product) during product exchange. However, the lower degree of complementarity results in the purchase of higher priced products than higher degree of complementarity. Thus, from a retail standpoint, lower degree of complementarity between the products could still result in larger revenue during product exchange. We believe this is indeed an interesting implication. Currently, we do not have any other factors to decide if there are any inherent differences between the two categories, and hence, complementarity is primarily decided based on our elasticity calculations. This could be investigated further in future research.

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