Why Would a Big Retailer Refuse to Collaborate on Manufacturer SPIFF?

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Abstract

Big retailers that carry a large assortment of products rely on knowledgeable salespeople to provide purchase advice to customers and match customers with suitable products. Interestingly, big retailers vary in their policies regarding whether to allow their salespeople to receive manufacturer SPIFF (Sales Person Incentive Funding Formula) payments, which motivates salespeople advising at no cost of the retailer. In this study, we investigate a big retailer's incentive to block manufacturer SPIFF programs, which has the consequence of demotivating salespeople from advising customers, from the perspective of vertical channel interactions. We scrutinize a big retailer's decision to maximize its profit through managing its channel interactions with upstream manufacturers offering horizontally differentiated products, customers uncertain about true fits with competing products, and its salesperson who can match customers with suitable products through offering purchase advice. Our analysis shows that motivating the salesperson to advise customers is profitable for the retailer only if the such advising has moderate effectiveness in matching consumers and suitable products, and only in this case would the retailer collaborate on manufacturer SPIFF programs. Otherwise, salesperson advising hurts retailer profit and the big retailer benefits from blocking manufacturer SPIFF programs. Our study reveals the interesting theoretical insight that the incentives of a big retailer and upstream manufacturers to motivate sales advising reside in their incentives to battle for a more favorable channel status.

Keywords: Retailing, Sales Advising, Manufacturer SPIFF, Vertical Channel Interactions

1 INTRODUCTION

Big retailers such as department stores (e.g., Sears and Macy's) and specialty stores (e.g., Best Buy and Lowe's) are characterized by their large customer base with diverse tastes and the large assortment of differentiated products they carry to satisfy the diverse customer tastes. An individual customer shopping at a big retailer often has difficulty choosing from the large selection of products the one that best suits her need (e.g., Iyenger and Leppter 2000) and may even avoid the choice decision altogether when facing too many alternatives (Kuksov and Villas-Boas 2010). In practice, big retailers rely on knowledgeable salespeople to offer customers purchase advice and match customers with suitable products (Wernerfelt 1994). Salesperson advising alleviates customers' search burden and help them make good choice decisions.

Big retailers can motivate salespeople to advise customers by offering outcome-based sales compensation. Interestingly, some big retailers choose not to do so even if the sales compensation payments come at no cost of their own. In early 2012, the home improvement retail chain Lowe's terminated all vendor-sponsored SPIFF (Sales Person Incentive Funding Formula) programs that reward its salespeople, despite these programs normally making up to 50% of its salesforce payments (Hubbard 2012).[1] The other major player in the home-improvement industry, Home Depot, cancelled such salesforce programs even earlier. Different from manufacturer rebates to retailers (e.g., Taylor 2002; Taylor and Xiao 2009) or to end customers (e.g., Gerstner and Hess 1991a, 1991b; Chen et. al. 2007; Ayra and Mittendorf 2013), manufacturer SPIFF programs specifically target retailers' salespeople. Once signed up for a SPIFF program, the retailer has the obligation to pass the reward to the salesperson who made the sale.[2] SPIFF programs are observed in many industries, including home appliances, electronics, computer devices. Although many believe spiffing is a short-term phenomenon, SPIFF programs are commonly used for a long term and can last for multiple years (Caldieraro and Coughlan 2007). Table 1 lists sample manufacturer SPIFF programs in various industries and Figure 1 shows a flyer of Lenovo's SPIFF program.[3]

[1] *http://www.journalpatriot.com.* See Online Appendix 1 for a snapshot.

[2] For instance, Samsung in its description for the "*Power Cash Incentive Program*" explicitly states that "*the main target of this program is the sales representative of the reseller who can earn extra income from Samsung when selling Samsung products.*" (*http://www.samsung.com.* See Online Appendix 2 for a snapshot.) And the furniture maker Highmark in the description for its SPIFF program indicates that "*participants must be an authorized dealer sales representative for HighMark product." (http://www.highmarkergo.com.* See Online Appendix 3 for a snapshot.)

[3] Modern technologies have made it easier for manufacturers to operate SPIFF programs. For instance, Lenovo operates an online system; all sales invoices reported by retailers are preloaded into an online claiming pool and salespeople only need to log in to claim their SPIFF rewards. (*http://www.partnerinfo.lenovo.com.* See Online Appendix 4 for a snapshot.)

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In this study, we ask the following questions: Why would manufacturers offer SPIFF reward to a big retailer's salesperson? And why would a big retailer block SPIFF programs that provide free resources for motivating salesperson advising? Lastly, what factors affect a big retailer's decision on whether to collaborate on manufacturer SPIFF programs? We try to answer these questions through examining the vertical channel relationship between a big retailer and upstream manufacturers. The big retailer acquires channel power against upstream manufacturers lacking direct-selling capability by providing them access to extensive distribution networks and an established customer base. Manufacturers selling through a common retailer compete for shoppers at the retailer, and in this regard compete fiercely on offering more lenient wholesale terms to win more favorable retail support. When the retailer has a greater influence over consumers' choice decisions, manufacturer competition intensifies, allowing the retailer to enjoy a greater margin. A big retailer in pursuit of maximized profit thus has to evaluate how its strategic activity affects its control over consumers' choice decisions and consequently affects its channel power against upstream manufacturers.

Gu and Liu (2013) shows that when consumers can find their true fits with products through self-inspection, a big retailer can strengthen its channel status against upstream manufacturers by manipulating store shelf layout. Our study considers a different context where consumers cannot find product fits through self-inspection, but rely on salespeople for purchase advice, which captures the sales scenario for many complex products such as furniture and home appliances. In this context, the sales advising effort of a motivated salesperson inevitably interferes with the retailer's influence over consumers' choice decisions. The manufacturers' incentive to offer SPIFF programs and the retailer's incentive to block such programs can thus be understood as channel members' efforts to battle for channel power. Our approach to investigate sales compensation policies from the perspective of vertical channel interactions brings a unique contribution to the sales management literature (e.g., Basu, Lal, Srinivasan, and 1985; Lal and Staelin 1986) [4].

Model and Results

[4] A majority of the salesforce literature models the principal-agency relationship between a monopolistic seller and its sales representative with more information about aggregate market demand and examines how sales commissions should be devised to eliminate the moral hazard problem in such a relationship (see Coughlan and Sen 1989 and Prendergast 1999 for reviews). For example, Basu, Lal, Srinivasan, and Staelin (1985) examines the optimal commission schedule when the sales outcome is a function of the sales agent's effort and market uncertainty but the principal only observes the sales outcome, not the sales effort or market uncertainties. Lal and Staelin (1986) examines the optimal commission schedule when the sales outcome is a function of the sales agent's effort and selling capability, but the principal only observes the sales outcome, not the sales effort or sales agent's selling capability. Recently, the

We consider a vertical channel where a retailer sells two horizontally differentiated products offered by two competing manufacturers to end customers through a knowledgeable salesperson. Customers are fit-uncertain prior to purchase, and may learn their true fits with both products upon receiving advice from the salesperson. A key insight from our analysis is that the salesperson's advising effort creates differentiation between competing products and consequently curtails the retailer's influence over customers' choice decisions. In particular, a retailer can induce fit-uncertain customers to buy a particular product by offering a more favorable retail term. This strategy, however, becomes less effective when customers already know which product provides a better fit. That is, salesperson advising pushes sales for a product as long as customers see a fit even if the retail term is not favorable. Manufacturer competition for more favorable retail support is alleviated as a consequence, leading to enhanced manufacturer profit. Manufacturers thus benefits from offering SPIFF programs that motivate salesperson advising. For the retailer, the advising effort of the motivated salesperson expands the total product sales, but weakens its channel power against upstream manufacturers. Moreover, manufacturers' SPIFF payments reduce their surplus that the retailer can potentially exploit. The retailer thus has incentive to block manufacturer SPIFF programs if the two negative impacts of salesperson advising dominate its positive impact. This happens when the effectiveness of salesperson advising in matching customers with suitable products is sufficiently low or sufficiently high.

In our study, the negative impacts of salesperson advising on retailer profit result from the joint power of two layers of channel conflict: the battle between the big retailer and upstream manufacturers for channel power and the discrepancy between the big retailer and its salesperson in their objective functions. Missing either layer of channel conflict will eliminate the retailer's incentive to block manufacturer SPIFF programs. Our study abstracts out the double marginalization problem between the retailer and upstream manufacturers by assuming homogeneity in consumer willingness to pay. Our study also abstracts out the moral hazard problem originated from the information asymmetry between a seller and its salesperson by assuming common knowledge on market potential and salesforce working efficiency.[5] Another type of moral hazard problem often happens

principal-agent model has been adopted in structural empirical analysis of sales force compensation. Misra and Nair (2011) examines dynamic effects of quota-compensation contracts on salesforce output with a Fortran 500 contact lens manufacturer. Chung, Steenburgh, and Sudhir (2014) examines how different components of a sales compensation plan, including salary, commissions, and bonuses on achieving annual quotas, affect the sales outcome of the direct sales force with a Fortune 500 firm that sells office durable goods.

[5]This assumption well captures the business reality in our research context. Big retailers typically maintain a stable customer base, which allows them to accumulate extensive operating experience in a sales territory. A survey conducted by Forester Research shows that across 12 industries, retailers inspire the most loyalty among customers,

in the market of financial services, where the true fit of a service product takes long to reveal, making product returns infeasible. In this case, outcome-based sales compensation may motivate the salesperson to push sales for services that are unlikely to satisfy customer needs (Inderst and Ottaviani 2009, 2012). This type of moral hazard problem is largely absent in the retail context we study where offering generous return policy is a business norm. In fact, Federal law provides a "Cooling-Off Rule" giving buyers three days to cancel purchases of $25 or more.[6]

Contributions

By modeling the retailer and its salesperson as separate entities with distinct objective functions, our study bridges external marketing and internal marketing. Our study shows that the interaction between the big retailer and its salesperson has important implications for the interaction between the big retailer and its upstream manufacturers, adding to the traditional channel literature (e.g., Jeuland and Shugan 1983; Iyer and Villas-Boas 2003), which generally abstracts out the role of the salesperson. In a similar effort, Caldieraro and Coughlan (2007) examines a multiple-product manufacturer's optimal SPIFF strategy when it hires an independent rep firm to sell its products. The study shows that offering SPIFFs is optimal when the salesperson of the rep firm receive the same commission rate for selling products with different features. Our analysis corroborates with this insight. While Caldieraro and Coughlan (2007) focuses on a manufacturer's decision on whether to offer SPIFF programs, our research examines a big retailer's decision on whether to collaborate on manufacturer SPIFF programs.

Our study expands the literature on sales communication. Wernerfelt (1994) considers a multi-period model where a seller offers two horizontally differentiated products to a fit-uncertain buyer and shows that through a "dialogue" or an interactive communication, a knowledgeable salesperson can effectively and truthfully match the buyer with the product that fits her need. While Wernerfelt (1994) focuses on the case when salesperson advising is fully effective, our study extends to the case when salesperson advising is not fully effective in matching customers with suitable products and demonstrates that a big retailer may encourage or suppress sales communication depending on salesperson advising effectiveness. Another related study is Bhardwaj, Chen, and Godes (2008),

with 80% of respondents reported being reluctant to switch business away from favorite stores than from hotels or airlines (Korkki 2009). Moreover, big retailers commonly undertake technology and organizational efforts to improve CRM capabilities (Chu 2006), which allows them to obtain deep insights into customer needs and wants as well as keep track on key measurements on salesforce productivity such as *sales per employee*. For example, the office supply store Staples uses mystery shopping, third-party research, monthly customer surveys, and automated data analytics to study its customers' purchasing behaviors.

[6] https://www.consumer.ftc.gov/articles/0176-buyers-remorse-when-ftcs-cooling-rule-may-help (accessed November 2017).

which considers a sales context where a firm's salesperson in sales communication can only transmit partial quality information of its product and shows that buyer-initiated sales conversation allows a monopolistic firm to signal a high product quality and also helps alleviate firm competition. While Bhardwaj, Chen, and Godes (2008) examines sales communication that helps resolve consumer uncertainty about products' vertical quality, our study focuses on sales communication that helps resolve consumer fit uncertainty regarding products with similar qualities but differentiated horizontal features (Chen and Xie 2008; Gu and Xie 2013). Moreover, while Wernerfelt (1994) and Bhardwaj, Chen, and Godes (2008) abstract away the supplier channel, our study brings the interesting insight that the salesperson's sales communication effort has important implications for vertical channel interactions.

Our study also contributes to the salesforce management literature. While existing studies (e.g., Coughlan and Sen 1989; Prendergast 1999) demonstrate how optimal sales compensation policies can be designed based on salesperson characteristics, our study shows that a retailer's optimal sales compensation policy is also shaped by category characteristics reflected in the effectiveness of salesperson advising. Hauser, Simester, and Wernerfelt (1994) examines the optimal reward system in a market where the firm maximizes the long-term profit and its salespeople have a shorter strategic span in allocating their ephemeral and enduring effort. Conflict between the firm and the salespeople arises from different strategic spans. Similarly, in our model, the conflict between the firm and its salesperson arises from their different objective functions: the retailer maximizes its total profit, but the salesperson maximizes its total compensation income. Kalra, She, and Srinivasan (2003) considers a market where consumers are unable to judge the value difference between a baseline product and a product upgrade with add-on features and rely on sales assistance to evaluate alternatives. The key issue in this context is that when the firm cannot monitor the salesperson's activity, the salesperson has incentive to "oversell," or to make exaggerated claims about the value of an add-on feature in a product upgrade. In our study, we have controlled for the overselling problem by assuming that consumers can return a product for free and the salesperson does not receive commissions from a returned product.

The rest of the paper proceeds as follows. In Section 2, we set up the main model. We solve the main model in section 3 and examine various model extensions in section 4. Section 5 concludes the study.

2 MODEL

We consider a big retailer operating in a consumer market with a unit mass. The retailer carries two horizontally differentiated products, 1 and 2, offered by two competing manufacturers labeled accordingly, and sells the products to end customers through a knowledgeable salesperson.

2.1 Demand

Each customer has a single-unit demand. A customer's utility from buying product i ($i = 1, 2$) is $U_i = v_i - p_i$, where v_i is the customer's perceived value of product i and p_i is product i's retail price. When the customer has a good fit with product i, $v_i = V (V > 0)$ and her utility from buying the product is $U_i^G = V - p_i$. When the customer has a bad fit with product i, $v_i = 0$, and she perceives a disutility from buying the product, $U_i^B = 0 - p_i$. For each of the two products, a proportion α ($0 \leq \alpha \leq 1$) of customers have a good fit and a proportion $(1 - \alpha)$ have a bad fit, with parameter α capturing the product's fit probability. We further assume that a customer's perceived fits with the two products are independent. Prior to purchase, customers are uncertain about their true fits with either product. Customers find the true fit with a product after purchase and can return a bad fit product for a full refund. In the main model, we assume zero return cost and will relax this assumption in model extension. *Ex-ante*, a fit-uncertain customer's expected utility from buying product $i (i = 1, 2)$ is thus $U_i = \alpha(V - p_i)$.

2.2 Supply

The vertical channel consists of two manufacturers, a big retailer, and the retailer's salesperson. The salesperson receives from the retailer a compensation package that includes a fixed salary and a commission rate $m_R (0 \leq m_R \leq 1)$ on total category sales. The fixed salary does not affect the salesperson's advising decision in our model and is normalized to zero. The salesperson may also receive SPIFF payments from a manufacturer on sales of that manufacturer's product. We let m_{M1} and $m_{M2} (0 \leq m_{M1}, m_{M2} \leq 1)$ denote the SPIFF rates offered by manufacturers 1 and 2 respectively. The salesperson does not receive sales compensation from the retailer or the manufacturers for products that are first purchased and later returned. In the main model, we assume $m_R = 0$ to focus on the impact of manufacturer SPIFF rewards and will relax this assumption in model extension. The salesperson incurs a cost of $e (e > 0)$ to advise a customer, which we assume to be sufficiently small so that the retailer or the manufacturers have incentive to motivate salesperson advising. We model the informative role of sales advising and assume that upon receiving the salesperson's purchase advice a proportion s ($0 \leq s \leq 1$) of customers learn about their true fits with both products, with parameter s capturing the effectiveness of salesperson advising. We will demonstrate the robustness of our core results when the salesperson plays a persuasive role in model extension.

We model a wholesale price contract between the retailer and the manufacturers, under which manufacturer $i (i = 1, 2)$ sets wholesale price $w_i (w_i \geq 0)$ for its product and then the retailer decides the product's retail price p_i. The retailer suffers a reputation loss $r(r > 0)$ when a customer receives no purchase advice and ends up buying a misfit product. In particular, when the salesperson does not advise customers, a proportion $1 - \alpha$ of customers end up buying a misfit product, leading to a reputation loss of $r(1-\alpha)$ for the retailer.[7] We assume zero production cost for both manufacturers and zero selling cost for the retailer.

2.3 Game Sequence

The game involves six stages. In stage 1, the retailer decides whether to allow manufacturers to offer SPIFF incentives to its salesperson. In stage 2, the two manufacturers simultaneously decide SPIFF payment rates m_{M1} and m_{M2}, if allowed by the retailer. In stage 3, the two manufacturers simultaneously decide wholesale prices w_1 and w_2. And then in stage 4, the retailer decides retail prices p_1 and p_2 for the two products. In stage 5, the salesperson decides whether to offer sales advice to customers. Lastly, in stage 6, customers make purchase decisions.[8]

[7] Our parsimonious approach to modeling reputation effect follows existing literature (e.g., Houser et al. 1994; Kalra, Shi, and Srinivasan 2003). For example, in Kalra, Shi, and Srinivasan (2003), the firm's profit function is specified as $\pi = (p - c)x - s(x, y) + \theta y$, where p is price, c is production cost, x is demand, s is compensation paid to the salesperson, and θy is future profit related to the stock of consumer satisfaction, which increases with the salesperson's effort. Under this specification, a reduced salesperson effort (a smaller y) leads to a loss in firm profit, which is similar to the impact of reputation effect in our model (i.e., a reputation loss of $r(1 - \alpha)$ in firm profit when the salesperson does not advise customers). Conceptually, this approach to modeling the reputation effect as directly affecting a firm's profit function views the reputation effect as related to the retailer's future profit, and views a reputation loss as caused by dissatisfied customers who attribute the purchase of a misfit product to the lack of sales advising and spend less at the retailer in future shopping occasions. Indeed, abundant evidence has demonstrated the positive relationship between consumer satisfaction and outcome measures of interest to the firm, such as repurchase intentions, loyalty, and profitability (Anderson and Sullivan 1993; Boulding et al. 1993; Boulding et al. 1999; Anderson et al. 1994).

[8] In determining the game sequence, we consider the strategic span of game players' decisions in our research context and model a strategic decision with a longer time span as happening in an earlier stage of the game. In reality, retailers usually maintain policies regarding manufacturer SPIFF programs for a long time, evidenced in that Lowe's change in SPIFF policy has caused big publicity; retailer SPIFF policy can thus be viewed as a strategy with the longest strategic span. Retailers' sales commission policies usually remain unchanged for several years; and we focus on manufacturers' SPIFF programs that last for multiple years; these strategies are viewed as mid-term. Lastly, manufacturers' wholesale prices as well as the retailer's retail prices may change from season to season and are thus viewed as short-term strategies.

3 ANALYSIS

We solve the model backwardly. We first solve two subgames, subgame N, where the retailer blocks manufacturers SPIFF programs, and subgame A, where SPIFF programs are allowed. We then derive the retailer's optimal SPIFF policy by comparing its equilibrium payoffs in the two subgames.

3.1 Subgame N: Retailer blocks manufacturer SPIFF programs

We solve the subgame backwardly from stages 6 to 2.

3.1.1 *Stage 6. Customers make purchase decisions*

Labeling customers using their perceived fits with the two products, $(f_1,\ f_2)$, where $f_i = G$ (good fit), B (bad fit), E (unknown fit), we summarize the utility functions of customers in different fit conditions in the following table.

Table 2. Customer Utilities in Different Fit Conditions

Customer Fit Condition	Utility from Buying Product 1	Utility from Buying Product 2
(G, B)	$U_1 = V - p_1$	$U_2 = 0 - p_2$
(B, G)	$U_1 = 0 - p_1$	$U_2 = V - p_2$
(G, G)	$U_1 = V - p_1$	$U_2 = V - p_2$
(B, B)	$U_1 = 0 - p_1$	$U_2 = 0 - p_2$
(E, E)	$U_1 = \alpha(V - p_1)$	$U_2 = \alpha(V - p_2)$

We focus on the interesting case when demand exists for at least one product, that is, $0 \leq \min\{p_1, p_2\} \leq V$. When the salesperson does not advise, all customers belong to segment (E,E). They all buy the lower-priced product, or randomly pick one if the two products are priced the same. A proportion α of buyers find a good fit with their purchase and keep the product, whereas a proportion $1-\alpha$ find a bad fit and return the product. The realized demand for product $i (i = 1, 2)$ is

(1) $$D_i^{No.Advi} = \begin{cases} \alpha & if \quad p_i < p_j \& p_i \leq V \\ \frac{1}{2}\alpha & if \quad p_i = p_j \leq V \\ 0 & if \quad p_i > p_j, \end{cases} \quad \text{where } i, j = 1, 2 \text{ and } i \neq j.$$

When the salesperson advises customers, a proportion s of customers find their true fits with both products prior to purchase, among whom a proportion $(1-\alpha)^2$ belong to segment (B,B) and buy neither product, a proportion $\alpha(1-\alpha)$ belong to segment (G,B) and buy product 1, a proportion $\alpha(1-\alpha)$ belong to segment (B,G) and buy product 2, and a proportion α^2 belong to segment (G,G) and buy the lower-priced product, or either product if they are priced the same. The remaining proportion $1-s$ of customers stay in segment (E,E). The realized demand for product $i(i=1,2)$ can be derived as

$$(2) \qquad D_i^{Advi} = \begin{cases} \alpha & if \quad p_i < p_j \& p_i \leq V \\ \frac{1}{2}(\alpha + s\alpha(1-\alpha)) & if \quad p_i = p_j \leq V \\ s\alpha(1-\alpha) & if \quad p_j < p_i \leq V \\ 0 & if \quad p_i > V, \end{cases} \quad \text{where } i,j = 1,2 \text{ and } i \neq j.$$

Comparing equations (1) and (2), we obtain that the salesperson's advising effort induces a greater customer demand for the higher-priced product without affecting demand for the lower-priced product. As a result, the total demand $D_1 + D_2$ increases.

3.1.2 *Stage 5. Salesperson decides whether to advise customers*

Since the retailer does not allow the salesperson to receive manufacturer SPIFF rewards, the salesperson obtains zero compensation income and suffers a loss when advising customers, that is, $I^{No.Advi} = 0$ and $I^{Advi} = -e$. The salesperson thus never advises customers.

3.1.3 *Stage 4. Retailer decides retail prices for the two products*

Anticipating that the salesperson never advises customers, the retailer forms its profit function as

$$(3) \qquad \pi_R^N(p_i, p_j) = \begin{cases} \alpha(p_i - w_i) - (1-\alpha)r & if \quad p_i < p_j \\ \frac{1}{2}\alpha(2p - w_i - w_j) - (1-\alpha)r & if \quad p_i = p_j, \end{cases} \quad \text{where } i,j = 1,2 \text{ and } i \neq j.$$

A manufacturer's lower wholesale price makes the retailer enjoy a higher margin from selling the product. The retailer thus has incentive to induce a greater demand for that product by charging a lower retail price. We summarize the retailer's optimal retail pricing strategy in the following lemma.

Lemma 1. When the retailer does not allow manufacturer SPIFF programs, in equilibrium, it *charges retail prices of* $\{p_i^{N*} = V,\ p_j^{N*} > V\}$*, if* $w_i < w_j$*, and* $p_i^{N*} = p_j^{N*} = V$*, if* $w_i = w_j$*;* $i, j = 1, 2, i \neq j$.

Proof. See Appendix.

3.1.4 *Stage 3. Manufacturers decide wholesale prices*

Anticipating the salesperson's advising decision and the retailer's pricing strategy, a manufacturer forms its profit function as

$$(4) \qquad \pi_{Mi}^{N}(w_i) = \begin{cases} \alpha w_i & if \quad w_i < w_j \leq V - \frac{1-\alpha}{\alpha} r \\ \frac{1}{2}\alpha w_i & if \quad w_i = w_j \leq V - \frac{1-\alpha}{\alpha} r \\ 0 & if \quad w_i > w_j, \end{cases} \text{ where } i, j = 1, 2 \text{ and } i \neq j.$$

A manufacturer that offers a lower wholesale price than its rival wins the retailer's support and obtains a greater demand. To compete for demand, manufacturers fiercely undercut each other's wholesale price until it is no more profitable to do so. In equilibrium, $w_1^{N*} = w_2^{N*} = 0$, and both manufacturers earn zero profit, $\pi_{M1}^{N*} = \pi_{M2}^{N*} = 0$.

We skip stage 2 since the retailer does not allow manufacturer SPIFF programs.

We can now derive the retailer's equilibrium payoff in subgame N. The total channel surplus can be easily derived as $\Pi^N = \alpha V - (1-\alpha)r$. Since both manufacturers earn zero profit and the salesperson earns zero compensation income, the retailer acquires the entire channel surplus, that is,

$$(5) \qquad \pi_R^{N*} = \Pi^N - \pi_{M1}^N - \pi_{M2}^N - I^N = \alpha V - (1-\alpha)r.$$

3.2 Subgame A: Retailer allows manufacturer SPIFF programs

We solve subgame A backwardly following a similar procedure as solving subgame N.

3.2.1 *Stage 6. Customers make purchase decisions*

The customer demand functions are the same as depicted in equations (1) and (2) in subgame N.

3.2.2 *Stage 5: Salesperson decides whether to advise customers*

The salesperson receives a SPIFF rate of m_{Mi} from selling manufacturer $i(i = 1, 2)$'s product. When the salesperson does not advise customers, she still receives SPIFF payments from selling to the size α of customers who buy the lower-priced product and end up finding a good fit. The salesperson's compensation income is

$$(6) \qquad I^{No.Advi}(p_i \leq p_j) = \begin{cases} m_{Mi}\alpha p_i & if \quad p_i \leq V \& p_i < p_j \\ \frac{1}{2}m_{Mi}\alpha p_i + \frac{1}{2}m_{Mj}\alpha p_j & if \quad p_i = p_j \leq V. \end{cases}$$

When the salesperson advises customers, she collects additional SPIFF payments from selling to a size $s\alpha(1-\alpha)$ of customers who find a good fit with the higher-priced product only. The salesperson's compensation income is

(7)

$$I^{Advi}(p_i \leq p_j) = \begin{cases} m_{Mi}\alpha p_i + m_{Mj}s\alpha(1-\alpha)p_j - e & if \quad p_i < p_j \leq V \\ m_{Mi}\alpha p_i - e & if \quad p_i \leq V < p_j \\ (\frac{1}{2}s\alpha^2 + s\alpha(1-\alpha) + \frac{1}{2}(1-s)\alpha)(m_{Mi}p_i + m_{Mj}p_j) - e & if \quad p_i = p_j \leq V. \end{cases}$$

Comparing equations (6) and (7), We obtain the following lemma.

Lemma 2. When the retailer allows manufacturer SPIFF programs, the salesperson advises customers if and only if (i) $\{p_i < p_j \leq V \; \& \; m_{Mj}p_j \geq \frac{e}{s\alpha(1-\alpha)}\}$*, or (ii)* $\{p_i = p_j = p \leq V \& \frac{m_{M1}+m_{M2}}{2}p \geq \frac{e}{s\alpha(1-\alpha)}\}$*;* $i, j = 1, 2, i \neq j$*.*

When the higher-priced product offers a SPIFF rate that is sufficiently high, the salesperson is motivated to advise customers, which leads to increased sales of the higher-priced product. Recall that a higher retail price indicates the retailer's intention to suppress sales for that product. We thus obtain that manufacturers' SPIFF programs interfere with the retailer's influence on customer choice decisions.

3.2.3 *Stage 4: Retailer decides retail prices for the two products*

As in subgame N, the retailer's optimal pricing strategy depends on the relative wholesale prices of the two competing products. Moreover, the retailer considers the relative SPIFF rates offered by the two manufacturers. We summarize the retailer's optimal pricing strategy in the following lemma.

Lemma 3. When the retailer allows manufacturer SPIFF programs, in equilibrium, it sets retail prices of $(i, j = 1, 2, i \neq j)$

(i) $\{p_i^{A*} = V - \varepsilon, p_j^{A*} = V\}$ *if* $\{w_i \leq w_j \leq V \ \& \ \frac{e}{s\alpha(1-\alpha)V} \leq m_{Mi} \leq m_{Mj}\}$ *or if* $\{\max\{w_i, w_j\} \leq V \ \& \ m_{Mi} < \frac{e}{s\alpha(1-\alpha)V} < m_{Mj}\}$;

(ii) $\{p_i^{A*} = V, p_j^{A*} > V\}$ *if* $\{w_i < \min\{V - \frac{1-\alpha}{\alpha}r, w_j\} \ \& \ m_{Mi} \leq m_{Mj} < \frac{e}{s\alpha(1-\alpha)V}\}$;

(iii) $\{p_i^{A*} = p_j^{A*} = V$ *if* $\{w_i = w_j \leq V \ \& \ \min\{m_{Mi}, m_{Mj}\} \geq \frac{e}{s\alpha(1-\alpha)V}\}$ *or if* $\{w_i = w_j \leq V - \frac{1-\alpha}{\alpha} \ \& \ \max\{m_{Mi}, m_{Mj}\} < \frac{e}{s\alpha(1-\alpha)V}\}$.

Proof. See the appendix.

Lemma 3 shows that the retailer generally charges a lower retail price for the product with a lower wholesale price, consistent with the insight from subgame N. Moreover, the retailer tends to charge a higher retail price for the product with a higher SPIFF rate so that it can take the most benefit from manufacturer SPIFF programs to motivate salesperson advising.

3.2.4 *Stage 3: Manufacturers decide wholesale prices*

Each manufacturer chooses the wholesale price for its own product to maximize its profit of $\pi_{Mi}^A = D_i^A(w_i - m_{Mi}p_i), i = 1, 2$. As in subgame N, manufacturers compete for the favorable retail term by undercutting each other's wholesale price until it is no more profitable to do so. Note that SPIFF payments constitute a cost for the manufacturers, and therefore a higher SPIFF rate leads to a lower manufacturer surplus that the retailer can exploit. We solve the manufacturers' optimal wholesale prices in the appendix and summarize the maximized profit below $(i, j = 1, 2, i \neq j)$.

$$(8) \quad \begin{cases} \begin{array}{c} \{\pi_{Mi}^A = \alpha(s(1-\alpha)(1-m_{Mj})V + (m_{Mj} - m_{Mi})V), \\ \pi_{Mj}^A = \alpha s(1-\alpha)(1-m_{Mj})V\} \end{array} & if \quad \frac{e}{s\alpha(1-\alpha)V} \leq m_{Mi} \leq m_{Mj} \\ \{\pi_{Mi}^A = \alpha(1-m_{Mi})V, \pi_{Mj}^A = s\alpha(1-\alpha)(1-m_{Mj})V\} & if \quad m_{Mi} \leq \frac{e}{s\alpha(1-\alpha)V} < m_{Mj} \\ \{\pi_{Mi}^A = \alpha(m_{Mj} - m_{Mi})V, \pi_{Mj}^A = 0\} & if \quad m_{Mi} \leq m_{Mj} < \frac{e}{s\alpha(1-\alpha)V}. \end{cases}$$

Note that both manufacturers obtain a profit in equilibrium as long as at least one manufacturer offers a SPIFF rate sufficiently high to motivate salesperson advising; that is, $\min\{\pi^A_{Mi}, \pi^A_{Mj}\} > 0$ if $\max\{m_{Mi}, m_{Mj}\} \geq \frac{e}{s\alpha(1-\alpha)V}$. This is because salesperson advising by inducing demand for the higher-priced product alleviates manufacturer competition, which benefits both manufacturers. Interestingly, a manufacturer that offers a higher SPIFF rate ends up with a lower profit, since a higher SPIFF rate motivates the retailer to set a higher retail price (an unfavorable retail term) for its product.

3.2.5 *Stage 2: Manufacturers decide SPIFF rates*

Since salesperson advising benefits both manufacturers with reduced competition, manufacturers have incentive to offer sufficiently high SPIFF rates to motivate salesperson advising. Moreover, since a higher SPIFF rate leads to a lower profit, manufacturers have incentive to undercut each other's SPIFF rate until it is no more profitable to do so. In equilibrium, the two manufacturers offer equal and the lowest SPIFF rate that motivates sales advising. We obtain the following proposition.

Proposition 1. When the retailer allows manufacturer SPIFF programs, in equilibrium, the manufacturers offer SPIFF rates of $m^{A*}_{M1} = m^{A*}_{M2} = \frac{e}{s\alpha(1-\alpha)V}$ *and obtain profits of* $\pi^{A*}_{M1} = \pi^{A*}_{M2} = s\alpha(1-\alpha)(1 - \frac{e}{s\alpha(1-\alpha)V})V$.

Proof. See Appendix.

We can now derive the retailer's equilibrium profit in subgame A as

$$\pi^{A*}_R = \Pi^A - \pi^{A*}_{M1} - \pi^{A*}_{M2} - I^{A*} = (\alpha - s\alpha(1-\alpha))(1 - \frac{e}{s\alpha(1-\alpha)V})V. \tag{9}$$

3.3 Solving stage 1: retailer decides SPIFF policy

Comparing the retailer's payoffs in subgame N (equation (5)) and subgame A (equation (9)), we derive the retailer's optimal SPIFF policy, as summarized in the following proposition.

Proposition 2. The retailer benefits from blocking manufacturer SPIFF programs, $\pi^{N*}_R > \pi^{A*}_R$, *if the effectiveness of the salesperson's advising in matching customers with suitable products is sufficiently low,* $s < \underline{s}$, *or sufficiently high,* $s > \overline{s}$; *otherwise, if sales advising is moderately effective,*

$\underline{s} \leq s \leq \overline{s}$, *the retailer may allow manufacturer SPIFF programs. Furthermore,*

$$\underline{s} = \frac{e + r(1-\alpha) - \sqrt{e^2 + r^2(1-\alpha)^2 - 2e(2V\alpha - r(1-\alpha))}}{2V(1-\alpha)\alpha}, \text{ and} \tag{10}$$

$$\overline{s} = \frac{e + r(1-\alpha) + \sqrt{e^2 + r^2(1-\alpha)^2 - 2e(2V\alpha - r(1-\alpha))}}{2V(1-\alpha)\alpha}. \tag{11}$$

Proof. See the appendix.

Proposition 2 shows that the retailer may allow its salesperson to receive manufacturer SPIFF payments only if the effectiveness of salesperson advising is in the intermediate range, $\underline{s} \leq s \leq \overline{s}$. For example, when $V = 1, \alpha = 0.25, e = 0.02$, and $r = 0.2$, we have $\underline{s} = 0.2$ and $\overline{s} = 0.7$. An increased salesperson advising effectiveness s benefits the retailer with expanded total demand. Moreover, the salesperson is willing to advise customers at a lower SPIFF rate when advising effectiveness is higher. Manufacturers' save on SPIFF payments is then transferred to the retailer through their competition on wholesale prices. Nonetheless, more effective sales advising informs more customers their true fits with products prior to purchase. As such, the retailer suffers a greater loss in control over customers' choices decisions and consequently a greater loss in channel power against upstream manufacturers. Manufacturer SPIFF programs benefit the retailer only if the effectiveness of salesperson advising is not too high to harm the retailer's channel status by too much, or too low to leave the manufacturers with too low a margin that the retailer can exploit. Otherwise, the retailer actually benefits from blocking manufacturer SPIFF programs. Our result may explain some big retailers' antagonism toward manufacturer SPIFF programs. For example, among various reasons that may have led to Lowe's termination of SPIFF programs in 2012, one could be that the effectiveness of salesperson advising in the home improvement industry has increased, making it no more profitable to continue the SPIFF programs.

Our insight regarding the retailer's incentive to block manufacturer SPIFF programs hinges on two layers of conflicts in the vertical channel. First, multiple manufacturer compete to sell their horizontally differentiated products through a common big retailer and the retailer gains channel power against competing manufacturers through its influence on consumers' product choices. Second, a big retailer relies on its salesperson to match customers with suitable products, but the salesperson with a different objective function may engage in advising activities that interfere with the retailer's influence on customers' product choices. While the second conflict between the retailer and the salesperson provides manufacturers opportunities to interfere with the retailer's influence over customer choices through offering SPIFF payments, the first conflict between the retailer and the manufacturers provides incentive for the retailer to curb such manufacturer interference. Missing either layer of channel conflict will eliminate the necessity for the retailer to block manufacturer SPIFF programs. Below we illustrate this insight through examining two alternative model specifications. Details of the analyses are provided in the online technical appendix.

3.3.1 *Retailer SPIFF policy when it sells two products offered by a single manufacturer*

We consider a model when the two products 1 and 2 are offered by a monopoly manufacturer. Other specifications of the main model apply. In subgame N, SPIFF programs are banned and the salesperson does not advise customers. The manufacturer acquires the entire channel surplus, that is, $\pi_M^{N*} = \alpha V + s\alpha(1-\alpha)$. In subgame A, the manufacturer's optimal SPIFF rates in stage 2 can be solved as $m_{Mi}^{A*} = 0$ and $m_{Mj}^{A*} = \frac{e}{s\alpha(1-\alpha)V}$, $i, j = 1, 2, i \neq j$. This strategy motivates salesperson advising and leads to maximized manufacturer profit of $\pi_M^{A*} = \alpha V + s\alpha(1-\alpha)(1 - \frac{e}{s\alpha(1-\alpha)V})V$. In both subgames, the retailer has no channel power against the monopoly manufacturer and ends up with zero profit, $\pi_R^{N*} = \pi_R^{A*} = 0$. The retailer thus has no incentive to block manufacturer SPIFF programs. In the main model, the retailer blocks manufacturer SPIFF programs to induce more intense manufacturer competition. This incentive disappears in the current model where manufacturer competition is absent.

3.3.2 *Retailer SPIFF policy when it has fully aligned interest with the salesperson*

We consider a model where the salesperson and the retailer are a single entity and maximize their joint payoff of $\Phi = I + \pi_R$. Other specifications of the main model apply. In subgame N, SPIFF programs are banned but the retailer-salesperson may advise customers to maximizes their joint payoff. In stage 5, the retailer-salesperson advises customers if $p_i \leq p_j \leq V \& p_j - w_j \geq \frac{e-(1-\alpha)r}{s\alpha(1-\alpha)}$, $i, j = 1, 2, i \neq j$. In subgame A, SPIFF programs are allowed and in stage 5 the retailer-salesperson advises customers if $p_i \leq p_j \leq V \& (1 + m_{Mj})p_j - w_j \geq \frac{e-(1-\alpha)r}{s\alpha(1-\alpha)}$. As in the main model, the manufacturer that offers a higher SPIFF rate ends up obtaining a lower profit. The two manufacturers keep undercutting each other's SPIFF rate until reaching the equilibrium of $m_{M1}^{A*} = m_{M2}^{A*} = 0$. In the two subgames, the retailer-salesperson obtains the same equilibrium joint payoff of

$$(12)\quad \Phi_R^{N*} = \Phi_R^{A*} = \begin{cases} (\alpha + s\alpha(1-\alpha)V - e - 2s\alpha(1-\alpha)(V - \frac{e-(1-\alpha)r}{s\alpha(1-\alpha)}) & if \quad V \leq \frac{2r(1-\alpha)-e}{(1-s(1-\alpha))\alpha} \\ \alpha V - (1-\alpha)r & if \quad V > \frac{2r(1-\alpha)-e}{(1-s(1-\alpha))\alpha}, \end{cases}$$

and thus has no incentive to block manufacturer SPIFF programs. In the main model, the retailer blocks manufacturer SPIFF programs to deter the manufacturers' interference with the salesperson's advising decision. This incentive disappears in the current model where the retailer and the salesperson operate as a single entity.

4 Model Extensions

In this section, we demonstrate the robustness of our key results and also derive new insights through examining various extensions of the main model. Details of the analyses are presented in the online technical appendix.

4.1 Retailer sales commission

In the main model, we assume that the retailer offers no sales commission, $m_R = 0$. We now consider an extended model where the retailer decides the sales commission rate $m_R (0 \leq m_R \leq 1)$ in stage 1.5, after it decides whether to allow manufacturer SPIFF programs in stage 1 and before the manufacturers decide the SPIFF rates in stage 2. The salesperson receives a sales commission from selling either product.[9] Other specifications of the main model apply.

We first consider Subgame N where the retailer blocks manufacturer SPIFF programs. In stage 5, the salesperson advises customers only if she earns sufficient sales commission from selling the higher-priced product, that is, if $\{p_i < p_j \leq V \ \& \ m_R p_j \geq \frac{e}{s\alpha(1-\alpha)}\}$ or if $\{p_i = p_j \leq V \ \& \ m_R p_i = m_R p_j \geq \frac{e}{s\alpha(1-\alpha)}\}$; $(i, j = 1, 2, i \neq j$. When the sales commission rate is sufficiently high, the salesperson is motivated to advise customers, which leads to increased sales of the higher-priced product. Recall that a higher retail price actually indicates the retailer's intention to suppress sales

[9]This game sequence is determined based on the assumption that the retailer maintains a stable sales commission policy that applies to all products in the sale category invariant with individual manufacturers' SPIFF rates. This specification well captures the business reality. Our conversations with business insiders suggest that commission on total category sales is the most commonly adopted contract type in the retailing industry because of its simplicity. In particular, a big retailer typically carries a large number of products in a category and routinely bring in new products. Renegotiating sales commission terms for each individual product can be costly and thus unrealistic. Moreover, retailers have incentive to maintain salesforce stability and a consistent sales compensation scheme helps in that regard.

for that product. Therefore, the retailer's sales commission offering interferes with its own effort to manipulate customer choice decisions. In Stage 1.5, the retailer's optimal sales commission rate is solved as follows.

Proposition 3. When the retailer does not allow manufacturer SPIFF programs, it optimally offers a commission rate of $m_R^{N*} = \frac{e}{s\alpha(1-\alpha)V}$, *if the effectiveness of salesperson's advising in matching customers with suitable products is sufficiently low,* $s < \underline{s}$, *or sufficiently high,* $s > \overline{s}$. *Otherwise, if sales advising is moderately effective,* $\underline{s} \leq s \leq \overline{s}$, *the retailer offers no sales commission,* $m_R^{N*} = 0$. *The retailer's maximized profit is*

$$\pi_R^{N*} = \begin{cases} (\alpha - s\alpha(1-\alpha))(1 - \frac{e}{s\alpha(1-\alpha)V})V & if \quad \underline{s} < s \leq \overline{s} \\ \alpha V - (1-\alpha)r & if \quad s \leq \underline{s} \text{ or } s > \overline{s}. \end{cases} \tag{13}$$

Thresholds $\underline{s}$ *and* $\overline{s}$ *are defined in Proposition 2 in equations (10) and (11).*

Proof. See online technical appendix.

When the retailer blocks SPIFF programs, it has to offer a sufficiently high sales commission rate to motivate salesperson advising. This strategy is profitable only if the positive impacts of salesperson advising dominates its negative impact, which, according to our discussion in the main model, happens when salesperson advising effectiveness is in the intermediate range.

Proposition 3 may bring an interesting explanation to the common practice among big retailers to implement different sales commission schedules across product categories. For example, department store Sears offers commissions to its salespeople selling home appliances, tires, and tools, but not to those selling apparel. In May 2012, department store JC Penney eliminated sales commissions in the categories of fine jewelry, shoes, men's suits, and some salon products, but kept commissions in other categories. In particular, our result suggests that the category-level variation in sales commission schedules at the same big retailer can be induced by different effectiveness of salesperson advising across categories. We worked with Qualtrics LLC to develop a survey to empirically test this insight. Experienced salespeople at big department stores (N=40) indicated product categories their current employer stores carry but offer no sales commission for and also product categories for which their current employer stores offer the highest commission rate.[10] We

[10] All respondents had at least one year of experience as a retail salesperson and 87% of respondents reported more than three years of retail sales experience. On average, our respondents had sales experience with 5.73 categories among 13 product categories that we listed (home appliances, furniture and home improvement, home tools, women's apparel, women's shoes, men's apparel, men's shoes, kids' apparel, kids' shoes, kids' toy, accessories, jewelry, and watch, home electronics, sports gears).

report the responses to the two questions in columns (a) and (b) of Table 3 respectively. The two measurements are significantly negatively correlated ($p<0.05$), indicating a robust cross-category variation pattern. Respondents also evaluated the effectiveness of sales assistance in each product category on a 7-point Likert scale (1: very ineffective, 7: very effective). The result is presented in column (a) of Table 4.[11] We find a significant negative correlation between columns (a) of Table 3 and column (a) in Table 4 (corr=-0.806, $p=0.001$), which suggests that a retailer tends to eliminate sales commissions for product categories with lower effectiveness of sales advising (corr=-0.806, $p=0.001$). Given the low to moderate levels of salesperson advising effectiveness (2.31-3.71 out of 5) in our data, this empirical finding supports the theoretical prediction of Proposition 3.[12]

= = = Insert Tables 3 and 4 Here = = =

We then consider Subgame A where the retailer allows manufacturer SPIFF programs. In stage 5, the salesperson advises customers if she receives sufficient total compensation income from selling the higher-priced product, that is, if $\{p_i < p_j \leq V$ & $(m_R + m_{Mj})p_j \geq \frac{e}{s\alpha(1-\alpha)}\}$ or $\{p_i = p_j \leq V$ & $(m_R + \frac{m_{Mi}+m_{Mj}}{2})p_i \geq \frac{e}{s\alpha(1-\alpha)}\}$; $i, j = 1, 2, i \neq j$. In stage 2, the manufacturers offer SPIFF rates of $m^A_{Mi} = m^A_{Mj} = \max\{0, \frac{e}{s\alpha(1-\alpha)V} - m_R\}$ in equilibrium to ensure that the salesperson advise customers. In stage 1.5, the retailer may offer any sales commission rate in the range of $m^{A*}_R \in [0, \frac{e}{s\alpha(1-\alpha)V}]$ and obtains the equilibrium profit of $\pi^{A*}_R = (\alpha - s\alpha(1-\alpha))(1 - \frac{e}{s\alpha(1-\alpha)V})V$, which is the same as in the main model (equation (9)). Comparing equations (13) and (9), we obtain the same optimal retailer SPIFF policy as summarized in Proposition 2.

[11] We also collected two additional measurements of sales advising effectiveness. First, in the survey on salespeople we asked the question "Do you feel the product return rate is higher in some product categories/departments than in others?" 35 (88%) of 40 respondents answered "yes" to this question and then evaluated the return rate across product categories on a 5-point Likert scale (1: very low, 5: very high). The result is presented in column (b) of Table 5. Our analysis shows a negative correlation between columns (a) and (b) of Table 5 ($p=0.07$), supporting the notion that a higher level of sales advising effectiveness leads to a lower return rate. Second, we conducted a separate survey targeting consumers, and asked consumers to evaluate their perceived effectiveness of sales assistance across categories on a 5-point Likert scale (1: Not helpful at all, 5: extremely helpful). We collected 38 responses and present the result in column (c) of Table 5. Our analysis shows highly positive correlation between sales advising effectiveness evaluated by salespeople and by consumers (corr=0.927, $p<0.001$), which provides a strong support to the cross-category variation pattern in sales advising effectiveness observed in our data. Interestingly, we found that consumers' evaluation of sales advising effectiveness is consistently lower than that of salespeople. In particular, across the 13 categories, the average level of sales advising effectiveness perceived by consumers is 2.88 (std 0.49) out of 5, which can be interpreted as "neither effective or ineffective." And the average effectiveness perceived by salespeople is 4.99 (std 0.36) out of 7, which can be interpreted as "somewhat effective." This result implies that salespeople tend to believe their effort in assisting customers is effective, whereas in reality customers do not perceive such effort as effective.

[12] Our theoretical insight can have more general implications. For example, our result suggests that a retailer may have incentive to allocate salespeople with different advising capacities to categories with different levels of difficulty in matching consumers with products.

4.2 Salesperson plays a persuasive role

In the main model, we assume the salesperson plays an informative role by helping customers find their true fits with products, but does not make product recommendations. Now we demonstrate the robustness of our key results in an extended model where the salesperson plays a persuasive role in advising customers.

We assume that each product contains two attributes, A and B, and the two products are differentiated in their attribute values. We let v_i^h denote the value of attribute h ($h = A, B$) with product i ($i = 1, 2$), and specify $v_1^A = v_2^B = q > 0$ and $v_2^A = v_1^B = 0$. A customer's perceived value of product i is defined as $V_i = w_A v_i^A + w_B v_i^B$, where w_A and w_B ($0 \leq w_A,\ w_B \leq 1$) are the customer's perceived attribute importance. We model consumer heterogeneity in their perceived attribute importance by assuming two customer types, A and B. Type A customers appreciate attribute A more than attribute B, with $\{w_A = 1,\ w_B = 0\}$; and type B customers appreciate attribute B more than attribute A, with $\{w_A = 0,\ w_B = 1\}$.

Prior to purchase, customers do not know their type. The retailer's salesperson observes a private signal that suggests the customer's true type. We let $Type$ denote a customer's true type and Sig denote the salesperson's observed signal on the customer's type, and specify $\Pr(Type = A|Sig = A) = \Pr(Type = B|Sig = B) = \frac{1}{2}(1 + \tau)$ and $\Pr(Type = B|Sig = A) = \Pr(Type = A|Sig = B) = \frac{1}{2}(1 - \tau)$, where parameter τ ($0 \leq \tau \leq 1$) captures the signal accuracy. The accuracy of the salesperson's observed signals varies across customers and follows a uniform distribution on interval $[0, s]$, where parameter $s (0 \leq s \leq 1)$ captures the effectiveness of salesperson advising in a category. Upon observing the signal, the salesperson decides whether to advise the customer that she is of a particular type, which entails an advising cost $e(0 < e < q)$, or not to advise. When the salesperson advises a customer that she is of type A, the customer accepts the advice[13] and perceives utilities of $U_1 = q - p_1$ and $U_2 = 0 - p_2$. On the other hand, when the salesperson advises a customer that she is of type B, the customer perceives utilities $U_1 = 0 - p_1$ and $U_2 = q - p_2$. Customers find their true type after purchase and can return a misfit product for a full refund. A customer who buys product $i (i = 1, 2)$ upon receiving sales advising and later finds the product unsuitable develops dissatisfaction towards the retailer, causing the retailer a reputation loss of rp_i

[13] Consumer acceptance of sales advice can be operationalized as a rational choice against a burdensome cognitive process of evaluating ex-post product values and foreseeing salesperson persuasion strategies, particularly when full refund is guaranteed with product returns. And our results hold as long as the market contains a sufficiently large segment of consumers whose product preferences can be affected by the salesperson.

$(r > 0)$.

The retailer's profit is $\pi_R = \sum_{i=1,2} D_i(p_i - w_i) - R_i r p_i$, where D_i $(D_i \geq 0, i = 1,2)$ is the quantity of product i that customers buy and keep; R_i $(R_i \geq 0)$ is the quantity of product i that customers buy but later return. Note that the salesperson has incentive to distort information to persuade customers to buy. This allows a manufacturer to use SPIFF incentives to encourage the salesperson to distort information in favor of its product, which gives the retailer an additional incentive to block manufacturer SPIFF programs. Owing to the complexity of the model, we resort to numerical simulation. We let the computer program play subgame N and subgame A separately. In each game, our algorithm searches the parameter space for the optimal strategies of the retailer and the manufacturers, and returns their equilibrium profits. Consistent with main model results (Proposition 2), we find that the retailer obtains a greater profit by blocking manufacturer SPIFF programs when the effectiveness of sales advising s is sufficiently low or sufficiently high. We illustrate this result in Figure 2 by comparing the retailer's maximized payoffs in subgame N and subgame A at $q = 1$, $e = 0.1$, and $r = 0.1$.

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4.3 Customer return cost

In the main model, we assume zero cost for customers to return a misfit product. Now we consider the case where customers incur a cost $c(c > 0)$ to return a misfit product. It is easy to see that customers in segments (G, B), (B,G), (G,G), and (B,B) have the same utility functions as in the main model and make the same choice decisions. Fit-uncertain customers in segment (E,E) by probability $1 - \alpha$ find a misfit with their purchase and return the product. These customers' *ex-ante* expected utility for product $i(i = 1,2)$ is thus $U_i = \alpha(V - p_1) - c(1 - \alpha)$. Importantly, the the return cost does not affect segment (E,E) customers' optimal choice decision, that is, to buy the lower-priced product or either product if they are priced the same.

When the salesperson does not advise, all customers belong to segment (E,E). The realized demand for product $i(i = 1,2)$ is

$$(14) \qquad D_i^{No.Advi} = \begin{cases} \alpha & if \quad p_i < p_j \& p_i \leq V - \frac{1-\alpha}{\alpha}c \\ \frac{1}{2}\alpha & if \quad p_i = p_j \leq V - \frac{1-\alpha}{\alpha}c \\ 0 & if \quad p_i > p_j \text{ or } p_i > V - \frac{1-\alpha}{\alpha}c, \end{cases} \qquad \text{where } i,j = 1,2 \text{ and } i \neq j.$$

When the salesperson advises customers, only a proportion $1 - s$ of customers belong to segment

(E,E). The realized demand for product $i (i = 1, 2)$ can be derived as

$$(15) \qquad D_i^{Advi} = \begin{cases} \alpha & if \quad p_i < p_j \& p_i \le V - \frac{1-\alpha}{\alpha}c \\ s\alpha & if \quad p_i < p_j \& V - \frac{1-\alpha}{\alpha}c < p_i \le V \\ \frac{1}{2}(\alpha + s\alpha(1-\alpha)) & if \quad p_i = p_j \le V - \frac{1-\alpha}{\alpha}c \\ \frac{1}{2}(s\alpha + s\alpha(1-\alpha)) & if \quad V - \frac{1-\alpha}{\alpha}c < p_i = p_j \le V \\ s\alpha(1-\alpha) & if \quad p_j < p_i \le V \\ 0 & if \quad p_i > V. \end{cases}$$

Since the existence of the return cost does not change customers' choice strategy, the key insight in the main model persists, that is, suppressing sales advising allows the retailer to gain better control over customers' choice decisions and consequently greater channel power against upstream manufacturers. The core result in the main model (Proposition 2) regarding the retailer's incentive to block manufacturer SPIFF continues to hold.

Interestingly, the return cost shifts the parameter range where the retailer has incentive to block manufacturer SPIFF programs. In the main model, the willingness to pay of a fit-uncertain customer for a product and a fit-informed customer for a good fit product are the same (i.e., V). Salesperson advising does not affect the retailer's ability to extract customer surplus, but only affects demand in two ways: expanding total demand and changing the split of demand between the two products. In the current model where the return cost is modeled, the two impacts of sales advising on demand persist. Nonetheless, the willingness to pay of a fit-informed customer for a good fit product (i.e., V) is higher than the willingness to pay of a fit-uncertain customer for either product (i.e., $V - \frac{1-\alpha}{\alpha}c$). Salesperson advising, by helping customers find a good fit product prior to purchase, thus enhances customer surplus that the retailer can extract; we label this effect the "surplus effect." When the return cost becomes larger (c is larger), the positive "surplus effect" strengthens, and the region where the retailer benefits from suppressing sales advising shrinks. Moreover, the positive "surplus effect" of sales advising is in a greater magnitude when sales advising is more effective (s is larger), because more effective sales advising helps more customers find a good fit product prior to purchase.

Our analysis shows that if the return cost is not too large, $c \le \frac{\alpha}{1-\alpha}V$, the retailer benefits from blocking manufacturer SPIFF when the effectiveness of sales advising is sufficiently low or sufficiently high. For example, at $c = 0.01$, $V = 1$, $\alpha = 0.5$, $e = 0.02$, $r = 0.4$, $\pi_R^{N*} > \pi_R^{A*}$ is satisfied when $s < 0.25$ or $s > 0.62$. If the return cost is sufficiently large, $c > \frac{\alpha}{1-\alpha}V$, the positive "surplus effect" of sales advising dominates when sales advising is highly effective. The retailer benefits from blocking manufacturer SPIFF programs only if the effectiveness of sales advising is sufficiently low. For example, at $c = 0.8$, $V = 1$, $\alpha = 0.2$, $e = 0.02$, $r = 0.1$, the retailer benefits from blocking manufacturer SPIFF only when $s < 0.23$.

4.4 Reputation Effect

In the main model, when the salesperson does not advise customers, the retailer suffers a reputation loss in profit. We now consider an alternative approach to modeling the negative impact of reputation effect. We assume that when the salesperson does not advise, customers are unhappy and perceive a reduced utility of $U_i = \alpha(V - p_i) - r(1-\alpha)$ $(i = 1, 2)$, where parameter $r(r > 0)$ is the reputation loss coefficient. Note that since the reputation effect has the same negative impact on U_1 and U_2, customers' optimal choice strategy remains the same as in the main model, that is, to buy the lower-priced product or randomly pick one if the two products are priced the same. The realized customer demand is

$$(16) \qquad D_i^{No.Advi} = \begin{cases} \alpha & if \quad p_i < p_j \& p_i \leq V - \frac{1-\alpha}{\alpha} r \\ \frac{1}{2}\alpha & if \quad p_i = p_j \leq V - \frac{1-\alpha}{\alpha} r \\ 0 & if \quad p_i > p_j, \end{cases} \quad \text{where } i, j = 1, 2 \text{ and } i \neq j.$$

When the salesperson advises customers, the realized demand is the same as in the main model (equation (2)). Since the alternative approach to modeling the reputation effect does not change customers' choice strategy, the key insight in the main model persists, that is, salesperson advising impairs the retailer's influence over consumers' choice decisions and consequently the retailer's channel status against upstream manufacturers. The core result in the main model (Proposition 2) regarding the retailer's incentive to block manufacturer SPIFF also continues to hold.

4.5 Asymmetric manufacturers

In the main model, we assume zero production cost for both manufacturers. We now consider the case when the two manufacturers incur asymmetric production costs. Without loss of generality, we assume manufacturer 1 incurs a lower production cost, $c_1 = 0 < c_2 = c < V$. The modified assumption does not affect stages 4-6 of the game. In stage 3, manufacturer $i(i = 1, 2)$'s profit function is $\pi_{Mi}^N = D_i^N(w_i - c_i)$ in subgame N where SPIFF programs are banned and $\pi_{Mi}^A = D_i^A(w_i - m_{Mi}p_i - c_i)$ in subgame A where SPIFF programs are allowed. As in the main model, manufacturers compete on wholesale prices for a more favorable retail term. The increased asymmetry in manufacturers' production cost causes differentiation between manufacturers and consequently alleviates manufacturer competition. The retailer in pursuit of strengthening channel status thus has stronger incentive to block manufacturer SPIFF programs.

5 CONCLUSION

This study considers a vertical channel where a big retailer carries horizontally differentiated products offered by competing manufacturers and sells the products to fit-uncertain customers through a knowledgeable salesperson. We find that a motivated salesperson's effort to advise customers creates product differentiation and thus weakens the retailer's channel power against competing manufacturers. While the manufacturers have incentive to offer SPIFF payments to motivate salesperson advising, the retailer has incentive to block such programs in pursuit a strengthened channel status. In particular, the retailer benefits from allowing for manufacturer SPIFF programs only if salesperson advising has moderate effectiveness in matching customers with suitable products. If salesperson advising effectiveness is very high or very low, the retailer benefits from blocking manufacturer SPIFF programs so as to suppress salesperson advising.

In our model, we assume a two-point distribution of product fit. Our key results will continue to hold with a continuous distribution of product fit. A detailed analysis is provided in the online technical appendix. Our study abstracts out other incentives that may affect a big retailer's sales compensation activities, such as moral hazard problems. This abstraction by no means suggests the non-existence of such incentives. It would also be interesting to examine other mechanisms that drive sales advising at big retailers. For example, Best Buy's Geek Squad has the reputation of providing good sales advice despite the zero sales commission policy. Lastly, our study considers manufacturer incentive programs targeting salespeople only. It would be interesting to examine the interactions of manufacturer SPIFF programs with other types of manufacturer incentive programs, such as channel rebates and consumer rebates, in future studies.

6 REFERENCES

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7 APPENDIX

7.1 Proof of Lemma 1

The retailer has three options of pricing strategies: $p_1 < p_2$, $p_1 = p_2$, and $p_1 > p_2$. When $p_1 < p_2$, the retailer's profit function is $\pi_R^N(p_1 < p_2) = \alpha(p_1 - w_1) - (1-\alpha)r$. The retailer's optimal prices can be solved as $\{p_1 = V, p_2 > V\}$, which leads to the maximized profit of $\pi_R^{N*}(p_1 < p_2) = \alpha(V - w_1) - (1-\alpha)r$. Similarly, we can solve the case when $p_1 > p_2$. Lastly, when $p_1 = p_2 = p$, the retailer's profit function is $\pi_R^N(p_1 = p_2) = \frac{1}{2}\alpha(2p - w_1 - w_2) - (1-\alpha)r$. The retailer optimally charges $p_1 = p_2 = V$, which leads to the maximized profit of $\pi_R^N(p_1 = p_2) = \frac{1}{2}\alpha(2V - w_1 - w_2) - (1-\alpha)r$. Comparing $\pi_R^{N*}(p_1 < p_2)$, $\pi_R^{N*}(p_1 = p_2)$, and $\pi_R^{N*}(p_1 > p_2)$, we obtain Lemma 1.

7.2 Proof of Lemma 3

The retailer has three options of pricing strategies: $p_1 < p_2$, $p_1 = p_2$, and $p_1 > p_2$. We discuss the three strategies respectively.

First, if the retailer charges $p_1 < p_2$, its profit function is

$$(17) \quad \pi_R^A(p_1 < p_2) = \begin{cases} \alpha(p_1 - w_1) + s\alpha(1-\alpha)(p_2 - w_2) & if \quad p_2 \geq \frac{e}{s\alpha(1-\alpha)m_{M2}} \& p_1 < p_2 \leq V \\ \alpha(p_1 - w_1) - (1-\alpha)r & if \quad p_2 < \frac{e}{s\alpha(1-\alpha)m_{M2}} \& p_1 < p_2 \leq V \\ & \qquad \text{or } p_1 \leq V < p_2. \end{cases}$$

The retailer optimally charges the highest possible prices for the two products, that is,

$$(18) \qquad \begin{cases} p_1 = V - \varepsilon, p_2 = V & if \quad m_{M2} \geq \frac{e}{s\alpha(1-\alpha)V} \& w_1, w_2 \leq V \\ p_1 = V, p_2 > V & if \quad m_{M2} < \frac{e}{s\alpha(1-\alpha)V} \& w_1 \leq V - \frac{1-\alpha}{\alpha} r. \end{cases}$$

This strategy leads to the retailer's maximized profit of

(19)

$$\pi_R^A(p_1 < p_2) = \begin{cases} \alpha(V - w_1) + s\alpha(1-\alpha)(V - w_2) & if \quad m_{M2} \geq \frac{e}{s\alpha(1-\alpha)V} \& w_1, w_2 \leq V \\ \alpha(V - w_1) - (1-\alpha)r & if \quad m_{M2} < \frac{e}{s\alpha(1-\alpha)V} \& w_1 \leq V - \frac{1-\alpha}{\alpha} r. \end{cases}$$

Similarly, if the retailer charges $p_1 > p_2$, its maximized profit can be derived as

(20)

$$\pi_R^A(p_1 > p_2) = \begin{cases} s\alpha(1-\alpha)(V - w_1) + \alpha(V - w_2) & if \quad m_{M1} \geq \frac{e}{s\alpha(1-\alpha)V} \& w_1, w_2 \leq V \\ \alpha(V - w_2) - (1-\alpha)r & if \quad m_{M1} < \frac{e}{s\alpha(1-\alpha)V} \& w_2 \leq V - \frac{1-\alpha}{\alpha} r. \end{cases}$$

Lastly, when the retailer charges the same price for the two products, $p_1 = p_2 = p$, its profit function is

$$(21) \quad \pi_R^A(p_1 = p_2 = p) = \begin{cases} \alpha(p - w_i) + s\alpha(1-\alpha)(p - w_j) & if \quad \frac{e}{s\alpha(1-\alpha)\frac{m_{M1}+m_{M2}}{2}} \leq p \leq V \\ \frac{1}{2}\alpha(2p - w_1 - w_2) - (1-\alpha)r & if \quad p < \frac{e}{s\alpha(1-\alpha)\frac{m_{M1}+m_{M2}}{2}} \& p \leq V. \end{cases}$$

The retailer's optimal pricing strategy can be derived as $p_1 = p_2 = V$, if $\{\frac{m_{M1}+m_{M2}}{2} \geq \frac{e}{s\alpha(1-\alpha)V} \& w_1, w_2 \leq V\}$ or if $\{\frac{m_{M1}+m_{M2}}{2} < \frac{e}{s\alpha(1-\alpha)V} \& w_1, w_2 < V - \frac{1-\alpha}{\alpha} r\}$, which renders the retailer profit of

(22)

$$\pi_R^A(p_1 = p_2) = \begin{cases} \frac{1}{2}(\alpha + s\alpha(1-\alpha))(2V - w_1 - w_2) & if \quad \frac{m_{M1}+m_{M2}}{2} \geq \frac{e}{s\alpha(1-\alpha)V} \& w_1, w_2 \leq V \\ \frac{1}{2}\alpha(2V - w_1 - w_2) - (1-\alpha)r & if \quad \frac{m_{M1}+m_{M2}}{2} < \frac{e}{s\alpha(1-\alpha)V} \& w_1, w_2 < V - \frac{1-\alpha}{\alpha} r. \end{cases}$$

Given the wholesale prices for the two products, w_1 and w_2, the retailer decides which pricing strategy to take ($p_1 < p_2$, $p_1 = p_2$, or $p_1 > p_2$). We consider the following conditions.

(i) $m_{M1} = m_{M2} = m_M$. In this case, the retailer's optimal pricing strategy is similar as in subgame N. In particular, if $w_i < w_j$ $(i, j = 1, 2, i \neq j)$, the retailer optimally charges $p_i < p_j$:

$$(23) \qquad \begin{cases} p_i^{A*} = V - \varepsilon, \ p_j^{A*} = V & if \quad m_M \geq \frac{e}{s\alpha(1-\alpha)V} \& w_i < w_j \leq V \\ p_i^{A*} = V, \ p_j^{A*} > V & if \quad m_M < \frac{e}{s\alpha(1-\alpha)V} \& w_i \leq V - \frac{1-\alpha}{\alpha} r \& w_i < w_j. \end{cases}$$

And if $w_i = w_j$, the retailer optimally charges $p_i^{A*} = p_j^{A*} = V$, if $\{m_M \geq \frac{e}{s\alpha(1-\alpha)V} \ \& \ w_i = w_j \leq V\}$

or if $\{m_M < \frac{e}{s\alpha(1-\alpha)V}$ & $w_i = w_j \leq V - \frac{1-\alpha}{\alpha}\}$.

(ii) $m_{M1} < m_{M2}$. In this case, we consider the following conditions.

(ii.a) $m_{M1} \geq \frac{e}{s\alpha(1-\alpha)V}$: The retailer optimally charges $\{p_i^{A*} = V - \varepsilon,\, p_j^{A*} = V\}$ if $w_i < w_j \leq V$, and charges $p_i^{A*} = p_j^{A*} = V$ if $w_i = w_j \leq V$.

(ii.b) $m_{M2} < \frac{e}{s\alpha(1-\alpha)V}$: The retailer optimally charges $\{p_i^{A*} = V,\, p_j^{A*} > V\}$ if $w_i \leq V - \frac{1-\alpha}{\alpha} r \& w_i < w_j$, and charges $p_i^{A*} = p_j^{A*} = V$ if $w_i = w_j \leq V - \frac{1-\alpha}{\alpha}$.

(ii.c) $m_{M1} < \frac{e}{s\alpha(1-\alpha)V} \leq m_{M2}$: The retailer has two strategic options. The retailer can charge $\{p_1^{A*} = V - \varepsilon,\, p_2^{A*} = V\}$ and obtain a profit of $\alpha(V - w_1) + s\alpha(1-\alpha)(V - w_2)$; alternately, the retailer can charge $\{p_1^{A*} > V,\, p_2^{A*} = V\}$ and obtain a profit of $\alpha(V - w_2) - (1-\alpha)r$. It can be proved that the former strategy is more profitable given $w_1, w_2 \leq V$.

(iii) $m_{M1} > m_{M2}$. This case is symmetric to case (ii) and the retailer's optimal pricing strategies can be derived following a similar approach.

Summarizing the above discussion, we obtain Lemma 3.

7.3 Proof of Equation (8)

(i) We first consider the case when the two manufacturers offer the same SPIFF rate $m_{M1} = m_{M2} = m_M$. We consider the following conditions.

(i.a) $m_M \geq \frac{e}{s\alpha(1-\alpha)V}$: Manufacturer $i(i = 1, 2)$'s profit function is

$$\pi_{Mi}^{A} = \begin{cases} \alpha(w_i - m_M V) & if \quad w_i < w_j \leq V \\ \frac{1}{2}(\alpha + s\alpha(1-\alpha))(w_i - m_M V) & if \quad w_i = w_j \leq V \\ s\alpha(1-\alpha)(w_i - m_M V) & if \quad w_j < w_i \leq V. \end{cases} \tag{24}$$

Each manufacturer can guarantee a demand of $s\alpha(1-\alpha)$ by charging the highest possible wholesale price of V. The manufacturer's equilibrium profit is thus $\pi_{Mi}^{A*} = s\alpha(1-\alpha)(1 - m_M)V$. By undercutting its rival's wholesale price, a manufacturer can obtain a demand of α. Therefore, the lowest wholesale price $\underline{w}$ a manufacturer is willing to charge satisfies $(\underline{w} - m_M V)\alpha = s\alpha(1-\alpha)(1 - m_M)V$, that is, $\underline{w} = s(1-\alpha)(1 - m_M)V + m_M V$. In equilibrium, each manufacturer $i(i = 1, 2)$ randomizes its wholesale price over $w_i^{A*} \in [s(1-\alpha)V + m_M V, V + m_M V]$. The distribution function of w_i^A can be derived from

$$s\alpha(1-\alpha)(w_i - m_M V) + (1 - F(w_i))(\alpha - s\alpha(1-\alpha))(w_i - m_M V) = s(1-\alpha)(1 - m_M)V.$$

(i.b) $m_M < \frac{e}{s\alpha(1-\alpha)V}$: Manufacturer i's profit function is

$$(25) \qquad \pi^A_{Mi} = \begin{cases} \alpha(w_i - m_M V) & if \quad w_i < w_j \le V - \frac{1-\alpha}{\alpha} r \\ \frac{1}{2}\alpha(w_i - m_M V) & if \quad w_i = w_j \le V - \frac{1-\alpha}{\alpha} r \\ 0 & if \quad w_i > w_j. \end{cases}$$

In this case, each manufacturer keeps undercutting its rival's wholesale price until it is no more profitable to do so. Therefore, the optimal wholesale price is $w_i^{A*} = m_M V$, which renders the manufacturer profit of $\pi^{A*}_{Mi} = 0$.

(ii) We then consider the case when the two manufacturers offer different SPIFF rates $m_{M1} < m_{M2}$. We consider the following conditions.

(ii.a) $m_{M1} > \frac{e}{s\alpha(1-\alpha)V}$: Manufacturer $i(i = 1, 2)$'s profit function is

$$(26) \qquad \pi^A_{Mi} = \begin{cases} \alpha(w_i - m_{Mi} V) & if \quad w_i < w_j \le V \\ \frac{1}{2}(\alpha + s\alpha(1-\alpha))(w_i - m_{Mi} V) & if \quad w_i = w_j \le V \\ s\alpha(1-\alpha)(w_i - m_{Mi} V) & if \quad w_j < w_i \le V. \end{cases}$$

Each manufacturer can guarantee a demand of $s\alpha(1-\alpha)$ by charging the highest possible wholesale price of V. Manufacturer i's equilibrium profit is thus $\pi^{A*}_{Mi} = s\alpha(1-\alpha)(1-m_{Mi})V$. By undercutting its rival's wholesale price, a manufacturer can obtain a demand of α. Therefore, the lowest wholesale price $\underline{w}_i$ a manufacturer is willing to charge satisfies $(\underline{w} - m_{Mi}V)\alpha = s\alpha(1-\alpha)(1-m_{Mi})V$, that is, $\underline{w}_i = s(1-\alpha)(1-m_{Mi})V + m_{Mi}V$. Clearly, $\underline{w}_1 < \underline{w}_2$. Therefore, manufacturer 1 can charge a wholesale price slightly lower than $\underline{w}_2$ and get the demand of α. The two manufacturers' equilibrium profits are thus

$$(27) \qquad \pi^{A*}_{M1} = \alpha(\underline{w}_2 - m_{M1}V) = \alpha(s(1-\alpha)(1-m_{M2})V + (m_{M2} - m_{M1})V), \text{ and}$$

$$(28) \qquad \pi^{A*}_{M2} = s\alpha(1-\alpha)(\underline{w}_2 - m_{M2}V) = \alpha(s(1-\alpha)(1-m_{M2})V.$$

That is, the manufacturer 2 that offers a higher SPIFF rate ends up with a lower profit.

In equilibrium, both manufacturers randomize their wholesale prices over $[\underline{w}_2, V]$. The distribution function of manufacturer 1's wholesale prices F_1 can be derived from

$$s\alpha(1-\alpha)(w_2 - m_{M2}V) + (1 - F_1(w_2))(\alpha - s\alpha(1-\alpha))(w_2 - m_{M2}V) = s\alpha(1-\alpha)(\underline{w}_2 - m_{M2}V).$$

The distribution function of manufacturer 2's wholesale price F_2 can be derived from

$$s\alpha(1-\alpha)(w_1 - m_{M1}V) + (1 - F_2(w_1))(\alpha - s\alpha(1-\alpha))(w_1 - m_{M1}V) = \alpha(\underline{w}_2 - m_{M1}V).$$

(ii.b) $m_{M1} < \frac{e}{s\alpha(1-\alpha)V} < m_{M2}$: Manufacturer $i(i = 1, 2)$'s profit function is

$$\text{(29)} \quad \begin{cases} \pi^A_{M1} = \alpha(w_1 - m_{M1}V), \pi^A_{M2} = s\alpha(1-\alpha)(w_2 - m_{M2}V) & if \quad w_1, w_2 \leq V \\ \pi^A_{M1} = \alpha(w_1 - m_M V), \pi^A_{M2} = 0 & if \quad w_1 < V - \frac{(1-\alpha)r}{\alpha} \& w_2 > V \\ \pi^A_{M2} = 0, \pi^A_{M1} = \alpha(w_1 - m_M V) & if \quad w_1 > V \& w_2 < V - \frac{(1-\alpha)r}{\alpha} \\ \pi^A_{M1} = \pi^A_{M2} = 0 & if \quad w_1, w_2 > V. \end{cases}$$

No manufacturer has incentive to undercut its rival's wholesale prices and in equilibrium, $w_1^{A*} = w_2^{A*} = V$. The manufacturers' equilibrium profits are thus $\pi^{A*}_{M1} = \alpha(1 - m_{M1})V$ and $\pi^{A*}_{M2} = s\alpha(1-\alpha)(1 - m_{M2})V$ respectively. Again, manufacturer 2 that offers a higher SPIFF rate ends up with a lower profit.

(ii.c) $m_{M1} < \frac{e}{s\alpha(1-\alpha)V}$: Manufacturer i's profit function is

$$\text{(30)} \quad \pi^A_{Mi} = \begin{cases} \alpha(w_i - m_{Mi}V) & if \quad w_i < w_j \leq V - \frac{(1-\alpha)r}{\alpha} \\ \frac{1}{2}\alpha(w_i - m_{Mi}V) & if \quad w_i = w_j \leq V - \frac{(1-\alpha)r}{\alpha} \\ 0 & if \quad w_i > w_j \ . \end{cases}$$

Each manufacturer has incentive to undercut its rival's wholesale price until it is not profitable to do so. The lowest wholesale price $\underline{w}_i$ a manufacturer is willing to charge satisfies $\underline{w}_i = m_{Mi}$. Clearly, $\underline{w}_1 < \underline{w}_2$. Therefore, manufacturer 1 can charge a wholesale price slightly lower than $\underline{w}_2$ and get the demand of α. The two manufacturers' equilibrium profits are thus $\pi^{A*}_{M1} = \alpha(m_{M2} - m_{M1})V$ and $\pi^{A*}_{M2} = 0$. Therefore, manufacturer 2 that offers a higher SPIFF rate ends up with a lower profit.

Summarizing the above discussion, we obtain equation (8).

7.4 Proof of Proposition 1

From equation (8), we obtain that the manufacturers have incentive to undercut each other's SPIFF rate. This undercutting stops when $m_{M1}^{A*} = m_{M2}^{A*} = \frac{e}{s\alpha(1-\alpha)V}$. The manufacturer's equilibrium profit is thus $\pi_{M1}^{A*} = \pi_{M2}^{A*} = s\alpha(1-\alpha)(1-\frac{e}{s\alpha(1-\alpha)V})V$.

7.5 Proof of Proposition 2

The retailer's maximized profit in subgame N when it does not allow SPIFF is given by $\pi_R^{N*} = \alpha V - (1-\alpha)r$, and the retailer's maximized profit in subgame A when it allows SPIFF is given by $\pi_R^{A*} = (\alpha - s\alpha(1-\alpha))(1-\frac{e}{s\alpha(1-\alpha)V})V$. Comparing π_R^{N*} and π_R^{A*}, it is easy to obtain that $\pi_R^{N*} > \pi_R^{A*}$ if $s < \underline{s}$ or $s > \overline{s}$.

Table 1: Examples of Manufacturer SPIFF Programs

Category	Company	SPIFF Program Details
Home Appliance	Americh	Amierich offers an annual spiff program applied to orders invoiced by Americh between January 1st and December 31st. All spiff requests should be received by Americh within 60 days of the Americh invoice. The sales associates are required to provide their personal social security numbers. (www.americh.com)
	American Whirlpool	American Whirlpool offers year-long spiff programs paid quarterly to reseller sales associates. Spiff rates vary among products. Reseller sales associates should fill a W-9 form. (www.americanwhirlpool.com)
Computer Device	Epson	Epson offers year-long spiff programs. Reseller sales associates login to https://www.spiff.epson.com and submit their claims. The sales associates need to provide their social security number. The SPIFF rates vary among different product categories.
	Lenovo	Lenovo offers year-long spiff programs to authorized dealers. Sales associates login to the Lenovo Partner network at http://partners.lenovo.com/et.cfm, register claims, and receive Lenovo Spiff Incentive Debit card mailed to the claimer. The Spiff rates vary among different product categories, and the payments are processed twice a month.
Electronics	SONY	Sony offers year-long spiff programs such as the FY17 Projector Solution Design Reward Program to reseller employees who sell eligible products. All claims must be submitted at www.sony.com/ypc, and the payments will be loaded to the reseller employees' Sony Visa Debit card. The debit card will be issued in the names of the employees. Spiff rates vary among product categories. (https://www.sonyaccelerator.com)
	Panasonic	Panasonic offers year-long spiff programs such as the Panasonic Prize Connection Incentive SPIFF Program which allows Panasonic authorized scanner reseller sales representatives to earn rewards points for selling Panasonic document scanners. Prize points vary among different scanner models. Panasonic Prize Points earned are then converted into dollars and deposited onto a Panasonic Visa debit card.
Furniture	Flash Furniture	Flash Furniture offers year-long spiff programs which are renewable to resellers. The resellers will submit the spiff claim forms around the end of each month to Flash Furniture, and the spiff checks will be mailed out one month after. Spiff dollar amounts depend on different model numbers of the products. Invoices must be paid in terms to qualify for spiff dollars. (www.flashfurniture.com)
	Cherryman	Cherryman offers year-long spiff programs with rewards paid monthly approximately the 20th of every month to the sales associates of authorized dealers. (www.cherrymanindustries.com)
	OFS Brands	OFS offers year-long spiff programs, and the spiff payment is 4% of sales. Sales associates must submit W-9 form. (www.ofsbrands.com)

Note: Snapshots of the SPIFF programs are included in online appendix 5.

Table 3: Survey Responses Regarding Sales Commission Schedules

	(a) “In the current retailer store that you are working in, which of the following categories the retailer store carries but sales commission is NOT offered? Please do NOT check a category if the retailer store does not carry that category.”	(b) “In the retailer store that you are currently working in, which of the following categories offer the highest commission rate? Please check 1-3 categories.”
	Percentage of Responses	Percentage of Responses
Home appliances (e.g., refrigerator, washer, dryer, oven)	20%	40%
furniture and home improvement (e.g., bookshelf, dining set, curtains, bedding)	45%	33%
Home tools (e.g., hand saw, driller)	38%	3%
Women's apparel	73%	15%
Women's shoes	60%	13%
Men's apparel	68%	3%
Men's shoes	60%	0%
Kids' apparel	68%	0%
Kids' shoes	63%	0%
Kids' toy	45%	3%
Accessories, Jewelry, and watch	40%	50%
Home electronics (e.g., digital camera, smart phone)	25%	33%
Sports gear (e.g, golf club, tennis racket, bikes)	30%	10%
Total Responses	40	40

Table 4. Survey Responses Regarding Sales Advising Effectiveness

	(a) "Based on your experience and knowledge, for each of the following product categories, evaluate the effectiveness of sales assistance in helping customers find the product that fits their needs. Note: please make the evaluation based on the general industry practice, but not solely your personal experience. (1: very ineffective, 7: very effective)"		(b) "Based on your experience and knowledge as a retail sales associate, for each of the following product categories, evaluate the product return rate. Note: please make the evaluation based on the general industry practice, but not your personal experience. (1: very low, 5: very high)"		(c) "For each of the following product categories, evaluate how much the sales associates' assistance generally have been helpful for you to find the product that fits your needs, using a 5-point scale. A higher score indicates a higher degree of helpfulness. (1: Not helpful at all, 5: extremely helpful)"	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Home appliances (e.g., refrigerator, washer, dryer, oven)	5.65	1.64	1.91	0.89	3.70	0.94
furniture and home improvement (e.g., bookshelf, dining set, curtains, bedding)	5.13	1.49	2.29	0.99	3.00	1.04
Home tools (e.g., hand saw, driller)	5	1.5	2.49	0.95	3.16	1.13
Women's apparel	4.88	1.38	4.06	0.84	2.39	1.15
Women's shoes	4.95	1.36	3.51	1.15	2.58	1.13
Men's apparel	4.68	1.31	3.57	1.07	2.43	1.14
Men's shoes	4.75	1.33	3.14	1.14	2.59	1.14
Kids' apparel	4.63	1.29	3.26	0.89	2.31	1.14
Kids' shoes	4.6	1.35	3.11	1.08	2.64	1.20
Kids' toy	4.55	1.28	2.89	1.08	2.42	1.05
Accessories, Jewelry, and watch	5.33	1.33	2.97	1.01	3.19	1.13
Home electronics (e.g., digital camera, smart phone)	5.55	1.3	3.11	1.21	3.71	1.04
Sports gear (e.g, golf club, tennis racket, bikes)	5.15	1.29	2.57	1.98	3.26	1.29
Average Score	4.99		3.13		2.98	

Figure 1. An Example of Manufacturer SPIFF Program

Figure 2. Numerical results from the model where the salesperson plays a persuasive role in advising customers (q=1, e=0.1, and r=0.1). The figure shows the same result as in the main model, that is, the retailer has incentive to block manufacturer SPIFF programs when the effectiveness of salesperson advising s is sufficiently low or sufficiently high.