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Manufacturer's pricing strategies for a supply chain with fairness concern

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ABSTRACT

This paper investigates the contracts and the manufacturer's pricing strategies in a single-manufacturer and single-retailer supply chain in which the retailer shows inequity aversion to his monetary payoffs. We develop a utility model for the retailer considering his inequity-averse effects and analyze its influences on supply chain coordination and the manufacturer's decision making under different cases. In particular, three cases are discussed in our paper, the manufacturer provides the retailer a low, high and extreme high wholesale price, and under which we study their influences on the supply chain coordination schemes, i.e., the constant wholesale price contract (CWPC), linear quantity discount contract (LQDC) and revenue sharing contract (RSC). Based on above studies, the manufacturer will set his pricing strategy to determine his globally optimal payoff. Our analysis reveals that (i) on a supply chain with an inequity-averse retailer, all the CWPC, LQDC and RSC can coordinate the chain when the manufacturer sets a low-pricing strategy; (ii) when a high-pricing strategy is made, only the LQDC (both the CWPC and RSC fail in this case) can coordinate the supply chain, but only when the retailer shows low inequity aversion; (iii) the CWPC， LQDC and RSC all fail to coordinate the supply chain when an extreme-high pricing strategy is made by the manufacturer; (iv) for the manufacturer, the LQDC and RSC show better profit performance than that of the CWPC; (v) the retailer can benefit from the supply chain by manipulating his expression of inequity aversion..

Key words: Behavioral Operations; Inequity Aversion; Pricing; Supply Chain Coordination

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INTRODUCTION

How should a supply chain achieve coordination? In the traditional supply chain that agents are self-interested and they only care their own monetary payoffs, i.e., they maximize their respective expected profits, and the supply chain can be coordinated by some contracts if no agents can achieve higher payoffs by unilaterally deviating from equilibrium. While this approach is appealing, it harbors an important weakness. The member on the supply chain may show fairness concern, so such a personal behavior may influence the equilibrium or even break it. For example, a retailer may feel inequity when his monetary payoff is lower than the manufacturer's, and he may disagree in principal to cooperate when he achieves a very low monetary payoff. Supposing such behavior may affect each firm's decision making, how will the firms behave? Furthermore, how to coordinate the supply chain when considering such behavior?

This paper studies the contracts and manufacturer's pricing decisions in a serial supply chain with one manufacturer and one retailer. Consumer demand is certain and has reverse correlation with retail price. In our study, the retailer is inequity-averse and pursues both of his monetary payoff and the equity of profit distribution on the supply chain. For the manufacturer, there are three pricing strategies, low, high and extreme-high pricing, can be made by him, and under which we will investigate their influences on the supply chain coordination schemes. Specifically, three well known contracts, the constant wholesale price contract (CWPC), linear quantity discount contract (LQDC) and revenue sharing contract (RSC), will be investigated in our paper. Finally, the manufacturer will set his optimal pricing strategy to maximize his globally payoff.

The firms play a Stakelberg game in the supply chain that the manufacturer first sets his pricing strategy to the retailer and then the retailer decides the retail price to the consumers. Both of them play a Nash equilibrium (each firm maximizes its object assuming the other player chooses its equilibrium strategy.). Thus, the manufacturer makes his optimal pricing decision given the retailer's behavior, and therefore neither firm has an incentive to deviate unilaterally from the equilibrium.

To well investigate the influences of the retailer's inequity aversion on the manufacturer's decision making, we built a baseline case without inequity aversion. Obviously, such a baseline case is same to that in the traditional supply chain. Then we consider the inequity scenario in which the retailer shows inequity aversion to his monetary payoff. Unlike traditional supply chain, after incorporating the inequity aversion into the retailer's objective function we find some interesting results that (i) on a supply chain with an inequity-averse retailer, all the CWPC, LQDC and RSC can coordinate the chain when the manufacturer sets a low-pricing strategy; (ii) when a high-pricing strategy is made, only the LQDC (both the CWPC and RSC fail in this case) can coordinate the supply chain, but only when the retailer shows low inequity aversion; (iii) the CWPC， LQDC and RSC all fail to coordinate the supply chain when an extreme-high pricing strategy is made by the manufacturer; (iv) the manufacturer can achieve a higher profit by using the LQDC or RSC than that of CWPC; (v) the retailer can benefit from the supply chain by manipulating his expression of inequity aversion.

The remainder of the paper is structured as follows: the literature review in Section 2, and then the model description in Section 3. In the Section 4 we built a baseline case of manufacturer's pricing strategies without considering the retailer's inequity aversion, and then the Section5 incorporates the inequity aversion into manufacturer's decision making. In the final Section 6 we summarize the results and point out the future research directions.

LITERATURE REVIEW

This paper is closely related to supply chain coordination management and behavioral economic. Supply chain coordination has been a major issue in supply chain research. We refer the readers to [1] for a review. A scheme is said to coordinate the supply chain if the set of supply chain optimal actions is Nash equilibrium, i.e., no firm has a profitable unilateral deviation from the set of supply chain optimal actions. Lots of well known contracts have been proved to coordinate the supply chain, such as revenue sharing, quantity discount, buy-back, wholesale price. The constant wholesale price contract is the simplest one while is generally considered a non-coordinating contract [2]. Another simple contract, the quantity discount contract, which can be used to coordinate a supply chain with one manufacturer and one retailer supply chain and which is beneficial to a seller [16]. The quantity discount contract has been wildly used in supply chain management. Results in [17] address the problem of determining the economic order quantities for the retailer, given a quantity discount schedule set by the supplier. Results in [17] provided a quantity discounts schedule to coordinate the supply chain with multiple independent retailers. Results in [4] using a linear quantity discount schedule to coordinate the supply chain after demand disruption.

In the traditional supply chain literature, much of research assume that manager's choices are made by fully rational decision-makers who are self-interested and they are only care their own monetary payoffs while research in behavioral economics considers people's behavior into decision making.

The potential applications of behavioral economic to managerial decisions have attracted an increasing amount of attention from the academic community. Such as Results in [11] who builds a model considering the consumer overconfidence to explain the use of flat rates and late fees in rental markets, and teaser rates on loans. Results in [13] modify the Salop model of price competition with differentiated products in their paper and assume that consumers are loss aversion. Results in [18] presents a model of product-line design that considering the context effects. Results in [11] built a model considering the consumer overconfidence to explain the use of flat rates and late fees in rental markets, and teaser rates on loans. Fewer researchers study such issue from the empirical point, such as results in [7] who survey the empirical evidence from the field to explain why individuals deviate from the standard model in behavioral economics and they both in their paper emphasize consumer analysis inside and outside the lab. Results in [12] consider the psychology of consumer in their marketing models. Results in [8] explore the question of how a rational agent (whether a profit-maximizing firm or a mechanism designer) would want to contract with dynamically inconsistent agents. Results in [21] explore the consequences of neglecting non-salient information when making such inferences by using e-bay data for DVD auctions.

As inequity aversion plays an important role in developing and maintaining channel relationships, some research papers address related issues. Results in [20] investigates the procedural inequity aversion to explain why "people are nice to those who are nice to them and punish those who are not". Results in [9] builds a model by considering the distributive inequity aversion and incorporating people's aversion to inequity. Results in [14] discuss how peer-induced inequity aversion might limit price discrimination, account for low variability in CEO compensation, and explain pattern bargaining. Results in [6] consider the peer-induced price inequity aversion into a model of price competition. Results in [5] consider the inequity aversion on channel members' decision making in situations involving choices on both investments and prices.

Coordinating a supply chain with inequity aversion is one of the most important issues in supply chain coordination management and which has attracted few researchers' attention and shown some interesting results. Results in [3] incorporate the concept of inequity aversion in a conventional dyadic channel to investigate how inequity aversion may affect channel coordination and they find that the manufacturer can use a simply constant wholesale price contract to coordinate this channel. Results in [19] extend the results of [3] to other nonlinear demand functions. Results in [3] made a significant contribution to incorporate the concept of fairness concern into the channel coordination issue, while there are some problems should be analyzed deeply. First, in their paper, they summarize the conditions under which the CWPC can coordinate the supply chain, while they do not study the influences of inequity aversion to other important schemes, such as LQDC and RSC. Second, the influences of the retailer's inequity aversion to contracts can be summarized more interesting and meaningful conclusions. Our paper fills these gaps and considers retailer's equality aversion into manufacturer's decision making, and all the CWPC, LQDC and RSC are investigated.

MODEL DESCRIPTION

Consider a single-manufacturer and single-retailer supply chain in which the manufacturer sells his products to the consumers throw a retailer. Consumer demand at the retailer is determined linearly as the function of the retail price, i.e., $D(p) = a - bp$ with $0 < b < 1$, where a is the market scale, p is the unit retail price (a decision variable) and b is a price-sensitive coefficient. The following is the sequence of events in the game: (1) the manufacturer provides the retailer his wholesale price, w, and contracts, i.e., CWPC, LQDC or RSC; (2) the retailer decides whether to participate in the game; (3) if the retailer accepts the manufacturer's scheme, he will set a retail price p and an order is made, then, the manufacturer start to produce with a unit production cost c. At the end of the selling season, they receive their profits π_M and π_R, respectively. Otherwise, no cooperation between them and both receives zero profit.

In traditional supply chain, agents are fully rational who maximize their own monetary payoffs without considering any behavior issues such as inequity aversion. Using simply algebra we can verify the following equilibrium results for this setting: the retailer's optimal retail price is $\bar{p}=(a+bc)/2b$ and based on such a price the manufacturer can maximize his profit by setting a wholesale price $\bar{w}=\arg\max \pi_m=(w-c)(a-b\bar{p})$. It is well known that the CWPC cannot coordinate such a supply chain unless $w=c$ (the manufacturer earns zero profit).

As firms, like individuals, are motivated by concerns of fairness in business relationships, including channel relationships (Kahneman et al. 1986), we consider the agent's behavior of inequity aversion into the traditional supply chain. In specific, the retailer is inequity-averse who not only care about his own monetary payoffs but also distribution fairness. Similar to Cui et al. (2007), we built a utility function of the retailer in the following

$$\begin{aligned} U_R(w,p) &= \pi_R(w,p) \\ &-\lambda[\gamma\pi_M(w,p)-\pi_R(w,p)]^+, \quad \lambda>0, \quad \gamma>0, \end{aligned} \tag{1}$$

where the first term $\pi_R(w,p)=(p-w)D(p)$ in Eq. (1) represents the retailer's monetary payoff from the game and the second term, $\lambda[\gamma\pi_M(w,p)-\pi_R(w,p)]^+$, reflects the his inequity aversion from receiving a payoff that is behind that of the equitable payoff, i.e., when $\pi_R(w,p)<\gamma\pi_M(w,p)$. Here, $\gamma>0$ represents the manufacturer's contributions to the supply chain (which is exogenous in our model) and $\lambda>0$ is the retailer's inequity aversion parameter. Here, we assume that there is no impact to the retailer's utility when his payoff is over the equitable level, i.e., when $\pi_R(w,p)\geq\gamma\pi_M(w,p)$ (similar assumption can also be found in Ho and Su (2009)).

Different with traditional supply chain that the retailer in this game is bounded rational who maximizes his utility rather than profit. Thus, an inequitable monetary payoff (when $\pi_R(w,p) < \gamma\pi_M(w,p)$), will bring him a disutility which may change his decision making, therefore, the manufacturer's strategies may be influenced.

3.1Baseline Case: Manufacturer's Decision without Inequity Aversion

To well investigate the influences of the retailer's inequity aversion on the manufacturer's pricing decision making, we built this baseline case (BC) without considering inequity aversion against other cases with inequity aversion. As we mentioned before that the CWPC cannot coordinate the supply chain in this case, thus, the LQDC and RSC can be tried. Then we have the retailer's and the manufacturer's profit functions in LQDC and RSC, respectively.

$$\begin{cases} \pi_{R\text{-}LQDC}^{baseline}(w,p)=[p-(w_0 - \theta q)]D(p) \\ \pi_{M-LQDC}^{baseline}(w,p)=[(w_0 - \theta q)-c]D(q) \end{cases}$$

and

$$\begin{cases} \pi_{R-RSC}^{baseline}=(\phi p-w)D(q) \\ \pi_{M-RSC}^{baseline}=[w-c+(1-\phi)p]D(q) \end{cases} . \qquad (2)$$

where w_0 is the vertical maximum variable wholesale price and $\theta > 0$ is the discount slope of the per-unit wholesale price schedule and q is the order quantity of the retailer (Ingene and Parry, 1995). Under RSC in Eq. (2), the manufacturer charges w to the retailer and shares a portion of the retailer's revenue that $(1-\phi)pq$ with $0 \le \phi \le 1$. Then by setting an appropriate $LQDC(w_0,\theta)$ or $RSC(w,\phi)$ form the manufacturer, the retailer will be induced to price $\bar{p}=(a+bc)/2b$ and the supply chain can achieve coordination.

Lemma1. For a supply chain without inequity aversion, $LQDC(w_0,\theta)$ can be used to achieve coordination with $w_0 = \theta(a-bc)+c$, where $\theta \in (0,1/b]$; the $RSC(w,\phi)$ can coordinate the supply chain with $w=\phi c$, where $\phi \in [0,1]$.

The LQDC and RSC in lemma 1 are devised from the manufacturer's point of view without considering the retailer's behavior. The manufacturer controls the chain's profit by pricing $w_0 = \theta(a-bc)+c$ or $w=\phi c$ and the retailer's profit distribution by setting $\theta \in (0,1/b]$ or $\phi \in [0,1]$. If we incorporate the retailer's inequity aversion into such a supply chain, the manufacturer's decision may be changed.

MANUFACTURER'S DECISION WITH INEQUITY AVERSION

How about the manufacturer's pricing strategies when considering the retailer's behavior of equity aversion? This section tries to give the answer through two scenarios: the equity scenario and the inequity scenario.

4.1. Equity Scenario

From the retailer's utility function in Eq. (1) we know that the retailer will show his inequity aversion only when his monetary payoff is behind the equity level, i.e., $\pi_R(w,p) < \gamma\pi_M(w,p)$. Under equity scenario (ES) that when $\pi_R(w,p) \ge \gamma\pi_M(w,p)$, we have $U_R(w,p)=\pi_R(w,p)$. Obviously, such scenario is similar to the BC in section 4 (the inequity aversion has no influence on players' decision making), thus we can easily get the proposition 1 by utilizing the same algebra.

Proposition1. On a supply chain with an inequity-averse retailer, when the manufacturer's profit satisfies $\pi_R(w,p) \ge \gamma\pi_M(w,p)$, the CWPC fails to coordinate the supply chain, while the $LQDC(w_0,\theta)$ works with $w_0 = \theta(a-bc)+c$, where $\theta \in (0,1/b(1+\gamma))$. The $RSC(w,\phi)$ can also be used by setting $w=\phi c$, where $\phi \in [\gamma/(1+\gamma),1)$.

Proposition 1 shows that (i) the CWPC cannot be used both in the BC and the ES; (ii) the LQDC and RSC can coordinate the supply chain both in the BC and ES; (iii) the manufacturer has fewer choices of pricing and more limited profit than that in the BC for the decreased range of θ and ϕ.

4.2. Inequity Scenario

In this section, we will investigate the manufacturer's pricing decision in the inequity scenario with $\pi_R(w,p) \le \gamma\pi_M(w,p)$. Here, we solve the game using the standard backward induction principle, therefore, we can first calculate the retailer's optimal pricing strategies.

Given any wholesale price (CWPC) setting by the manufacturer, the retailer set his retail price $p(w)$ to maximize his utility $U_R(w,p)$ under the condition that $\pi_R(w,p) \le \gamma\pi_M(w,p)$. Hence, the retailer's object utility function is given below

$$\max_p U_R(w,p) = \pi_R(w,p) - \lambda[\gamma\pi_M(w,p) - \pi_R(w,p)]$$
$$s.t.\begin{cases} U_R(w,p) \ge 0 \\ \gamma\pi_M(w,p) - \pi_R(w,p) \ge 0 \end{cases}, \tag{4}$$

The first inequality, $U_R(w,p) \ge 0$, in Eq. (4) is the condition that the retailer is willing to participate in the game ,and $\gamma\pi_M(w,p) - \pi_R(w,p) \ge 0$ is the constraint of inequity scenario.

After careful calculation, we derive the following lemma.

Lemma2. In the inequity scenario with $\pi_R(w,p) \le \gamma\pi_M(w,p)$, the inequity-averse retailer's best pricing response, $p^*(w)$, under CWPC is given below

$$p^*(w) = \begin{cases} p_H, & if\ w < w_L \\ p_0, & if\ w_L \le w < w_H \\ p_L, & if\ w \ge w_H \end{cases}, \tag{5}$$

where $w_L \le w_H$, $p_L \le p_0 \le p_H$ and

$$\begin{cases} w_L = (\lambda\gamma bc + \lambda a + a + 2\gamma \mathrm{bc}) / b(1+\lambda+\lambda\gamma+2\gamma) \\ w_H = (\lambda\gamma bc + \lambda a + a) / b(1+\lambda+\lambda\gamma) \\ p_L = w + \lambda\gamma(w-c)/(1+\lambda) \\ p_H = \gamma(w-c)+w \\ p_0 = [(1+\lambda)(a+bw) + \lambda b\gamma(w-c)] / 2b(1+\lambda) \end{cases}. \tag{6}$$

In lemma 2, p_0 is the retailer's optimal price with the upper bound p_H and lower bound p_L. Based on above results we can summarize the following managerial insights: (i) as $\partial p^*(w)/\partial\lambda > 0$ when $w \ge w_L$, a higher inequity-averse level, λ, will induce a higher retail price; (ii) an extreme high (low) wholesale price, $w \ge w_H$ ($w < w_L$), will induce a low price, p_L (p_H), from the retailer.

For now the manufacturer can anticipate the retailer's optimal response $p^*(w)$ and incorporates it into his optimization problem which is given by $\max \pi_M(w, p^*(w))$. As the retailer's pricing decisions $p^*(w)$ take different forms depending on the regions of the wholesale prices w in Eq. (5), the manufacturer has three pricing strategies, Case I with a low wholesale price $w < w_L$, Case II with a high wholesale price $w_L \le w < w_H$ and Case III with a very high wholesale price $w \ge w_H$, to induce the retailer's retail price. To well compare the manufacturer's pricing strategies with the CWPC, we will also investigate the LQDC and the RSC separately in above there cases.

Case I:Low-pricing Strategy with $w < w_L$

In this case, the manufacturer set a low wholesale price, $w < w_L$, to the retailer to maximize his profit, $\pi_M(w,p)=(w-c)(a-bp)$, given by the retail price $p^*(w)$ in Eq. (5). Hence, we can write the manufacturer's objective function in this case with CWPC that

$$\max_{w>c} \pi_M(w, p) = (w-c)(a-bp)$$
$$s.t. \begin{cases} \gamma\pi_M(w, p) - \pi_R(w, p) \geq 0 \\ w < w_L \\ p = p_H \end{cases} . \quad (7)$$

Similar to Eq. (4), the inequality $\gamma\pi_M(w, p) - \pi_R(w, p) \geq 0$ is the condition where inequity aversion occurs, $w < w_L$ is the manufacturer's low pricing strategy and $p = p_H$ is the retailer's optimal pricing response.

Proposition2. When a low pricing strategy, $w < w_L$, is made by the manufacturer, the CWPC can be used to coordinate the supply chain only when $\pi_R(w, p) = \gamma\pi_M(w, p)$ and the optimal wholesale price satisfies $w^*_{caseI} = (a + bc + 2b\gamma c) / 2b(1+\gamma)$.

Comparing with the BS (without inequity aversion), while the CWPC fails to coordinate the traditional supply chain, it works on a chain with an inequity-averse retailer who receives a low wholesale price, $w < w_L$, from the manufacturer. The similar result can also be found in Cui et al. (2007).

In the same case with LQDC and RSC, we find that

Proposition3. In case I with a low wholesale price $w < w_L$, the $LQDC(w_0, \theta)$ and $RSC(w, \phi)$ can also be used to coordinate the supply chain. For the former, $LQDC(w_0, \theta)$, where $w_0 = \theta(a-bc) + c$ and $\theta \in [1/b(1+\gamma), 2(1+\lambda)/b(1+\lambda+\lambda\gamma+2\gamma)]$ with low inequity aversion that $\lambda \in (0, (2\gamma-1)/(1+\gamma)]$ or $\theta \in [1/b(1+\gamma), (1+\lambda)/b(1+\lambda+\lambda\gamma)]$ with high inequity aversion $\lambda \in ((2\gamma-1)/(1+\gamma), +\infty]$; for the latter, $RSC(w, \phi)$, where $w = \phi c$ with $\phi \in [\lambda\gamma/(1+\lambda+\lambda\gamma), \gamma/(1+\gamma)]$.

Case II: High-pricing Strategy with $w_L \leq w < w_H$

If the manufacturer set a high-pricing strategy with a wholesale price $w_L \leq w < w_H$ under CWPC, the retailer's pricing response is $p = p_0$ given by Eq. (5). Thus, the manufacturer's objective function will be

$$\max_{w>c} \pi_M = (w-c)(a-bp)$$
$$s.t. \begin{cases} \gamma\pi_M(w, p) - \pi_R(w, p) \geq 0 \\ w_L \leq w < w_H \\ p = p_0 \end{cases} . \quad (9)$$

Using the same algebra as Case I we can get the following Lemma 3.

Lemma3. The CWPC fails to coordinate the supply chain in inequity scenario when the manufacturer makes a high-pricing strategy, $w_L \leq w < w_H$, for an inequity-averse retailer.

After investigating the LQDC and RSC, we have the following proposition.

Proposition4. In inequity scenario with $\gamma\pi_M(w, p) - \pi_R(w, p) \geq 0$ and if the manufacturer set a high-pricing strategy with $w_L \leq w < w_H$, the RSC fails to coordinate the supply chain while the LQDC does with

$$\begin{cases} \gamma \geq 1/2 \\ 0 \leq \lambda \leq (2\gamma-1)/(1+\gamma) \\ w^*_{caseII} = c + \theta(a-bc)/2 \\ \dfrac{2(1+\lambda)}{b(1+\lambda+\lambda\gamma+2\gamma)} \leq \theta \leq \dfrac{1+\lambda}{b(1+\lambda+\lambda\gamma)} \end{cases} , \quad (10)$$

From Eq. (10) we find that though the LQDC can coordinate the supply chain, it fails when the retailer shows a high inequity aversion $\lambda > (2\gamma - 1)/(1+\gamma)$.

Due to above lemmas and propositions we can summarize the following managerial insights: (i) inequity aversion has a significant influence on manufacturer's decision making; (ii) the retailer benefits from showing his inequity aversion to the manufacturer; (iii) the CWPC and RSC cannot be used to coordinate the chain with a high-pricing strategy by the manufacturer; (iv) in case II with a high wholesale price, the LQDC can coordinate the supply chain only when the retailer shows a lower inequity aversion level.

Case III: Extreme-high-pricing Strategy with $w \ge w_H$

In this case with $\pi_R(w,p) \le \gamma \pi_M(w,p)$, an extreme high pricing strategy is made by the manufacturer ($w \ge w_H$) and the retailer's optimal response is $p_H(w) = \gamma(w-c) + w$ under the CWPC. Thus, we can write the manufacturer's objective function

$$\max_{w>c} \pi_M = (w-c)(a-bp)$$
$$\begin{cases} \gamma\pi_M(w,p) - \pi_R(w,p) \ge 0 \\ w \ge w_H \\ p = p_L \end{cases} . \tag{12}$$

After careful calculating, we summarize the following proposition.

Proposition5. On the supply chain with an inequity-averse retailer, the manufacturer cannot set an extremely high wholesale price, $w \ge w_H$, under CWPC, LQDC or RSC with $\pi_R(w,p) \le \gamma\pi_M(w,p)$.

CONCLUSION

In this paper, we study the manufacturer's pricing strategies on a supply chain with an inequity-neutral manufacturer and an inequity-averse retailer. Inequity aversion is formally modeled through disutility from inequitable situations. In our game, the manufacturer as the leader who first decides his wholesale price to the retailer and the retailer as the follower set his retail price based on the manufacturer's decision. We first show the retailer's responses given any wholesale price and calculate the manufacturer's decisions, low, high or extreme high pricing strategy, backwardly with CWPC, LQDC and RSC, and summarize the manufacturer's optimal strategies in the final part. Many interesting and meaningful results are found.

Our results show the CWPC and LQDC can be used to coordinate the supply chain only when the manufacturer set a low wholesale price to the inequity-averse retailer, but it fails when a higher wholesale price is set. The LQDC shows better performances both on profit and applications than CWPC and RSC, and CWPC shows the worst. The manufacturer should prepare more contracts to the retailer with different level of inequity aversion he shows, and such a behavior can be used as a strategic behavior to the retailer to maximize his utility, i.e., he will exaggerate his real inequity aversion when the manufacturer makes him a low utility.
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REFERENCES

[1] Chen, F, *Management Science*, **2001**, 47 (5), 698–708.

[2] Cachon, G., Supply chain coordination with contracts, The Handbook, **2003** .

[3] Cui, T.H., Raju, J.S.& Zhang, Z.J, *Management Science*, **2007**, 53(8), 1303-1314.

[4] Chen, K., & Xiao, T, *European Journal of Operational Research*, **2009**, 197(1), 225-234.

[5] Cui, T.H., &Mallucci, P, Quantal response equilibrium in a inequity channel – an experimental investigation, *Working Paper*, **2010**.

[6] Chen, Y., &Cui, T.H, The benefit of uniform price for branded variants, *Working Pape*r, **2010**.

[7] DellaVigna, S. &Malmendier, U, *American Economic Review*, **2006**, 96(3),694-719.

[8] DellaVigna S., *Journal of Economic Literature*, **2009**, 47(2), 315-372.

[9] Fehr, E., &Schmidt, K.M., *Quarterly Journal of Economics*, **1999**, 114(3), 817-868.

[10] Fehr, E., Klein, A., &Schmidt, K.M., *Econometrica*, **2007**, 75(1), 121–154.

[11] Grubb, M. , *American Economic Review*, **2009**, 99(5), 1770-1807.

[12] Ho, T.H., Lim, H., &Camerer, C, *Journal of Marketing Research*, **2006**, 43(3), 307-331.

[13] Heidhues, P. & Koszegi, B, *American Economic Review*, **2008**, 98(4), 1245-1268.

[14] Ho, T.H., &Su, X, *American Economic Review*, **2009**, 99(5), 2022-2049.

[15] Kahneman, D., Knetsch, J. L.,& Thaler, R., Inequity aversion and the assumptions of economics. J. Bus. 59(4) (Part 2: *The Behavioral Foundations of Economic Theory)*, **1986**, S285–S300.

[16] Lal, R., & Staelin, R, *Management Science*, **1984**, 30(12), 1524-1539.

[17] Meir, J.R. & Hau L. Lee, *IIE Transactions*, **1985**, 17(4), 388-395

[18] Orhun, A. &Yesim, *Marketing Science*,**2009**, 28(5), 868-886.

[19] Ozgun, C.D., Chen, Y., &Li, J. (2010), *European Journal of Operational Research*, **2010**, 207(3), 1321–1326

[20] Rabin, M. (1993). *American Economic Review*, **1993**, 83(5), 1281-1302.

[21] Simonsohn, U. & Ariely, D, *Management Science*, **2008**, 54(9), 1624-1637