Comparative Analysis of Bargaining Power Scenarios in 3-tier Marketing Channels

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Abstract

The emergence of prevailing retailers over time has proved that access to market is undoubtedly a competitive advantage in analyses of marketing channels. This shift of power, from conventional assumption by which manufacturers' brands play often a more dominant role, has created different possibilities. Sometimes, source of power resides on the manufacturer (retailer) side in upstream (downstream) and yet in some circumstances both sides possess similar level of power. Based upon such possibilities, during bargaining process along the channel, we practically face variety of scenarios in which pricing decisions are made at different sequences. In a 3-tier marketing channels, we examine and compare all such scenarios and identify dominant scenarios from perspectives of manufacturer and retailer. Among other results, we characterize dependency of upstream (downstream) bargaining process between wholesaler and manufacturer (retailer) on downstream (upstream) relative bargaining power of retailer (manufacturer).

Keywords: Marketing Channels, Bargaining Power, Stackelberg Games, Nash Bargaining, 3-tier Channels.

1 Introduction

The characteristics of marketing channels have changed over time. Given the influential role of brands, manufacturers have been conventionally assumed to be playing often a more dominant role in distribution channels. However, by emergence of prevailing retailers over time, access to market has undoubtedly become a competitive advantage in analysis of marketing channels. This shift of power has gained increasing attention amongst practitioners and researchers. More specifically, in contrast with the past perception in marketing channels, different scenarios are possible in practice. Sometimes, source of power resides on the manufacturer side in upstream through un-substitutable products, brand equity, effective advertising, ability to directly go to market, etc. On the other hand, in some other situations, source of power could reside on the retailer side in downstream through availability of substitutable products, high customer service levels, store loyalty, etc. Yet, in some circumstances, we could be facing a scenario of more balanced environments where both sides possess more or less equal level of power; for instance, manufacturer relying on her brand position while retailer accentuating on selling price decision to market and consequently determining the flow volume fed into distribution channel.

In the real world, we can face many different scenarios where order of bargaining processes can take place in different sequences. For instance, in high tech industry, some branded manfucturers set first their selling price of their products to distributors, sometimes through a negotiation process while they often have more power. Then, distributors set sellling prices to retailers, sometimes through a negotiation process with large retailers. Finally, retailers set independently their selling prices to their local market. In such a 3-tier channel strcuture, sequence of bargaining processes happen from upstream towards downstream. In some other real world situations, bargaining proceses are formed from downstream towards upstream.

The primary objective of our study is to examine all possible sequences of pricing in 3-tier channels, where a wholesaler is intermediating between the manufacturer and the retailer. Alternatively, in a 3-tier channel structure, a manufacturer can be considered instead of the wholesaler, whose upstream is a supplier. Our model is general so that either perspective is acceptable, though in the rest of paper we refer to the first structure in the 3-tier channel.

In this paper, we consider only monopolist players in 3-tier channels since our primary objective is to assess relative comparison of different scenarios from perspective of vertical competition, as opposed to horizontal competition with multiple players. Furthermore, given our objective, we consider players in 3-tier channel having interaction only for a single product. In the following, first the past research is reviewed. Then, in section 3, Nash Bargaining solution of a 3-tier channel is investigated through thirteen possible scenarios. The conclusion is provided in section 4 and all the proofs are available in appendix.

2 Literature review

In comparison with Stackelberg game, which has been well established in literature, bargaining games have gained attention more recently. Although bargaining models are more realistic especially in business-to-business environments, probably due to tractability issues, adoption of such models has been rather slow. However, over time, attention of researchers to apply bargaining-based models is growing (e.g.[1], [2];[3]). Most of such studies apply Nash bargaining solution in bilateral monopoly settings. The Nash bargaining framework [4,5] is often applied in marketing [6,7,8] and can fulfill the purpose of bilateral interactions. Misra and Mohantyin [8] proposed a theoretical perspective in distribution channel where wholesale price is determined via Nash bargaining between manufacturer and retailer. Through an econometric framework, in comparison with manufacturer Stackelberg game, they also found that such a bargaining model is a more plausible pricing mechanism in distribution channels.

With respect to the bargaining, most of earlier studies has been for two-tier channel structures such as [9]; [6]; and [10]. As Iyer and Villas-Boas (2003) stated, the bargaining process can simultaneously determine the size of the pie (primary focus of marketing literature) and split it up (main concentration of economics literature); and coordinate the channel. Furthermore, Draganska, Klapper, and Villas-Boas in [11] showed that the overall profitability of the distribution channel is not necessarily a zero-sum game and hence, size of cake could be subject to the bargaining power. In this paper, our concentration is on behavior of monopolist players in distribution channel by using the asymmetric Nash bargaining solution.

With respect to bargaining-based models, Feng and Lu in [12] recently showed that, under some conditions, presence of a powerful retailer could be beneficial to all channel members. The general belief is that higher relative power leads to greater profit[13]; [14]. But, they showed this might not always be the case. Specifically, greater relative bargaining power of retailer improves channel coordination. In other words, an increase in power of manufacturer can actually harm her profit and in the extreme, "excess manufacturer power can even lead to complete breakdown of the channel"[6]. Such finding is supported not only by empirical evidences but also by an in-class experiment reported in their study. In our model, with our objective of comparing different scenarios of bargaining sequences, we focus on the simple form of wholesale-price contracts.

Many real-world channels have three-tier structure, with bargaining processes of manufacture-wholesaler and wholesaler-retailer, while bargaining process has been investigated more in two-tier channels in the existing literature. Yet, primary focus of existing studies in three-tier channels has been mostly channel coordination; not bargaining. For instance, some recent studies related to channel coordination in three-tier channels are:[15]; [16]; [17].

The only work directly related to our study is the work of Kunter (2011) in [18]. He studies a three-tier distribution channel where demand is price dependent and there are two bargaining processes, one between manufacturer and wholesaler and the other one between wholesaler and retailer, while retailer makes selling price of product. Results of this study indicate that retailer has a unique pricing power by which can have positive profit even if she has no relative power against wholesaler. Furthermore, there is asymmetric outcome such that bargaining power of the retailer over the wholesaler in downstream is beneficial to the manufacturer while bargaining power of the manufacturer over the wholesaler in upstream is harmful to the retailer. In our model, we extend Kunter's work by considering different scenarios of bargaining sequences, which yields to totally different results upon which we provide managerial insights from the view point of the manufacturer and the retailer.

3 Model and Analysis of 3-tier Channel

In a 3-tier channel, a monopolist wholesaler (W) is playing an intermediary role between M and R, so there are two sets of bargaining process. One bargaining process is between M and W in determiningP_M, while the second bargaining process is between W and R on determining P_W. Considering Nash Bargaining Solution, bargaining function between M and W is defined as:

$$\Omega_\mu = \pi_{M3}^{\mu}.\pi_{W3}^{1-\mu} = ((P_M - C_M).q)^{\mu}.\left((P_W - P_M - C_W).q\right)^{1-\mu}, \tag{1}$$

whereμ is the bargaining power of M over W ($0 \le \mu \le 1$). Similarly, the bargaining function between W and R is defined as:

$$\Omega_\lambda = \pi_{W3}^{\lambda}.\pi_{R3}^{1-\lambda} = ((P_W - P_M - C_W).q)^{\lambda}.\left((P_R - P_W - C_R).q\right)^{1-\lambda}, \tag{2}$$

whereλ is the bargaining power of W over R ($0 \le \lambda \le 1$). According to the Nash Solution, P_M (P_W), is determined through maximizing Ω_μ (Ω_λ) with regard to P_M (P_W). Thus, $P_M(P_W)$ could be determined as the result of solving the equation: $\partial\Omega_\mu/\partial P_M = 0$ ($\partial\Omega_\lambda/\partial P_M = 0$).

Based upon demand function, R determines P_R to maximize her profit. In addition, the total profit of 3-tier channel is a function of only P_R: $\pi_{T3} = \pi_{M3} + \pi_{W3} + \pi_{R3} = (P_R - C_{T3}).(a - b.P_R))$, where C_{T3} is the total 3-tier channel cost ($C_{T3} = C_M + C_W + C_R$). Therefore,

P_R determines size of the whole cake and P_W (P_M) determines W and R's (M and W's) relative share of cake.

The two mentioned bargaining processes and the retailer's profit maximization can take place in different sequences; or scenarios. Specifically, there are thirteen scenarios through which P_i is determined ($i \in \{M, W, R\}$) and corresponding optimal profits of each player and the total channel are stated in the following proposition. The thirteen scenarios consist of six scenarios for sequential decision making of three prices, six other scenarios decomposed into two triplet sets, where two prices are simultaneously made while the third price is made either first (one set) or last (another set), and finally one scenario in which all three prices are made simultaneously.

3.1 Proposition 1

Unique Optimal profit of M, W and R, as well as 3-tier channel profit (T3) are based on table 1, where $K_3 = \frac{(a-b.C_{T3})^2}{4b}$.

Table 1- π_{i3}^*/K_3 for each of thirteen scenarios, where i ∈ {T,M,R}

#	Scenario	π_{M3}^*/π_{T3}^*	π_{W3}^*/π_{T3}^*	π_{R3}^*/π_{T3}^*	π_{T3}^*
1	$P_R \to P_W \to P_M$	$\frac{4\mu}{2\mu-\mu\lambda+2\lambda+4}$	$\frac{2\lambda(2-\mu)}{2\mu-\mu\lambda+2\lambda+4}$	$\frac{(2-\lambda)(2-\mu)}{2\mu-\mu\lambda+2\lambda+4}$	$\frac{K_3(2-\lambda)(2-\mu)(2\mu-\mu\lambda+2\lambda+4)}{64}$
2	$P_R \to P_M \to P_W$	$\frac{2\mu\lambda}{2+\lambda}$	$\frac{2\lambda(1-\mu)}{2+\lambda}$	$\frac{2-\lambda}{2+\lambda}$	$\frac{K_3(2-\lambda)(2+\lambda)}{4}$
3	$P_W \to P_M \to P_R$	μ	$\lambda(1-\mu)$	$(1-\lambda)(1-\mu)$	K_3
4	$P_W \to P_R \to P_M$	$\frac{2\mu}{\mu+2}$	$\frac{\lambda(2-\mu)}{\mu+2}$	$\frac{(1-\lambda)(2-\mu)}{\mu+2}$	$\frac{K_3(2-\mu)(2+\mu)}{4}$
5	$P_M \to P_R \to P_W$	$\frac{2\mu\lambda}{2+\lambda}$	$\frac{2\lambda(1-\mu)}{2+\lambda}$	$\frac{2-\lambda}{2+\lambda}$	$\frac{K_3(2-\lambda)(2+\lambda)}{4}$
6	$P_M \to P_W \to P_R$	$\mu\lambda$	$\lambda(1-\mu)$	$(1-\lambda)$	K_3
7	$P_R \to P_W \leftrightarrow P_M$	$\frac{2\mu\lambda}{\mu\lambda-2\mu+\lambda+2}$	$\frac{2\lambda(1-\mu)}{\mu\lambda-2\mu+\lambda+2}$	$\frac{(1-\mu)(2-\lambda)}{\mu\lambda-2\mu+\lambda+2}$	$\frac{K_3(1-\mu)(2-\lambda)(\mu\lambda-2\mu+\lambda+2}{(\mu\lambda-2\mu+2)^2}$
8	$P_W \to P_M \leftrightarrow P_R$	μ	$\lambda(1-\mu)$	$(1-\lambda)(1-\mu)$	$\frac{4K_3(1-\mu)}{(2-\mu)^2}$
9	$P_M \to P_W \leftrightarrow P_R$	$\lambda\mu$	$\lambda(1-\mu)$	$(1-\lambda)$	$\frac{4K_3(1-\lambda)}{(2-\lambda)^2}$
10	$P_R \leftrightarrow P_W \to P_M$	$\frac{\mu(2-\lambda)}{2-\mu\lambda+\mu}$	$\frac{\lambda(2-\mu)}{2-\mu\lambda+\mu}$	$\frac{(2-\mu)(1-\lambda)}{2-\mu\lambda+\mu}$	$\frac{K_3(2-\mu)(1-\lambda)(2-\mu\lambda+\mu)}{(2-\lambda)^2}$
11	$P_R \leftrightarrow P_M \to P_W$	$\frac{2\mu\lambda}{2+\lambda}$	$\frac{2\lambda(1-\mu)}{2+\lambda}$	$\frac{2-\lambda}{2+\lambda}$	$\frac{K_3(2-\lambda)(2+\lambda)}{4}$
12	$P_M \leftrightarrow P_W \to P_R$	$\frac{\mu\lambda}{\mu\lambda-\mu+1}$	$\frac{\lambda(1-\mu)}{\mu\lambda-\mu+1}$	$\frac{(1-\mu)(1-\lambda)}{\mu\lambda-\mu+1}$	K_3
13	$P_R \leftrightarrow P_W \leftrightarrow P_M$	$\frac{\lambda\mu}{\mu\lambda-\mu+1}$	$\frac{\lambda(1-\mu)}{\mu\lambda-\mu+1}$	$\frac{(1-\lambda)(1-\mu)}{\mu\lambda-\mu+1}$	$\frac{4K_3(1-\lambda)(1-\mu)(\mu\lambda-\mu+1)}{(2\mu-2\mu\lambda+\lambda-2)^2}$

In the following, based upon proposition 1, some observations along with their intuitive justifications are reviewed.

3.2 Observations

3.2.1 Equivalence

Table 1 indicates that scenarios 2, 5 and 11 are equivalent, therefore, we consider only scenario 5 as the representative scenario in the rest of discussions. In the three mentioned equivalent scenarios, in the real world, first P_W is determined out of bargaining between W and R. Then, decisions of P_R and P_M should be determined whose values will be the same no matter which one is determined first or second or simultaneously. The reason is that, upon bargaining between W and R as the first step, P_W has immediate impact on downstream decision of R; P_R, out of which size of cake is also determined. Furthermore, determination of P_W in downstream has no impact on upstream bargaining between M and W in which P_M is determined. These two observations indicate that after determining P_W, the other two prices will be independently known regardless of sequence of decision making; whether being made sequentially or simultaneously. As a result, all prices and total channel profit (due to the same P_R) are the same between the three scenarios. This intuitively explains equivalency of the three scenarios.

3.2.2 Size of cake

Size of cake is fully dependent on R's decision; P_R. Therefore, to seek dependency on size of cake, one should check dependency of P_R. For instance, the total profit of the channel is independent of bargaining powers of λ and μ in scenarios 3, 6, and 12. The primary reason is that, in the real world, R determines P_R first, before any bargaining process takes place in the channel. So, P_R is independent of bargaining powers of λ and μ and consequently the total channel profit will be independent of any bargaining power.

The amounts of total channel profit in any of the other scenarios are dependent and yet decreasing by bargaining powers of λ and/or μ. However, total channel profit is dependent only on λ (μ) in scenarios 5 and 9 (4 and 8). Justification of such observation is rooted again in dependency of P_R on such bargaining power(s). Specifically, the reason that in scenarios 5 and 9 (4 and 8) the total cannel profit is dependent on λ (μ) is that, in the real world, R determines P_R right after bargaining process between M and W (W and R). Therefore, P_R is dependent only on λ (μ) and so is the total channel profit. Note that in such scenarios, it does not matter that P_R is determined first or simultaneously with bargaining between W and R (M and W) since it makes P_R dependent on the related bargaining power, regardless of being sequential or simultaneous. Finally, in scenarios 1, 7, 10, and 13 the channel profit is dependent on both bargaining powers. The reason is the same since P_R is made as the last decision in the real world, regardless of being sequential or simultaneous, and as a result, it will be impacted by both bargaining powers.

Finally, in cases where the channel profit is dependent on bargaining power(s), optimal profit is a decreasing function of bargaining power(s). For instance, in scenarios 3, 6, and 12, R makes her selling price decision first and independent of bargaining processes, in the real world. In such scenarios, the values of P_R that maximize the channel profit are the same as all situations in which R makes decision on selling price independently. In other situations, optimal selling price of R will be dependent on bargaining power(s) and consequently decreasing by increasing of bargaining power. Thus, as bargaining power(s) become(s) larger, optimal P_R becomes farther than optimal P_R that maximizes total channel profit. That's why the total channel profit is decreasing function of bargaining power(s) in all scenarios other than scenarios 3, 6, and 12.

3.2.3 Share of cake

Given the definitions of bargaining powers, μ (λ) being bargaining power of M over W (W over R), it is expected that optimal profit of M (R) be an increasing (decreasing) function of μ (λ), while W is expected to be an increasing (decreasing) function of λ (μ). However, counter intuitively it is observed that this is not the case for M in scenarios 7, 8 and 13, and for W in scenarios 7, 9 and 10. As shown in figure 1 (a) and (b), behavior of optimal profit of M and W is respectively dependent on μ and λ. Specifically, optimal profit of M happens at μ =2/(2+λ) in scenario 7, at μ =2/3 in scenario 8 and at μ=1- λ/2 in scenario 13, while optimal profit of W happens at λ=2(1-μ)/(2-μ) in scenario 7 and at λ=2/3 in scenario 9 and 10. The intuitive reason behind such a behavior is that while μ (λ) is increasing, profit of the whole channel is decreasing so that negative impact of total channel profit dominates over higher share of pie for M (W). Thus, there is an optimal level of bargaining power at which optimal profit of M (W) is maximized.

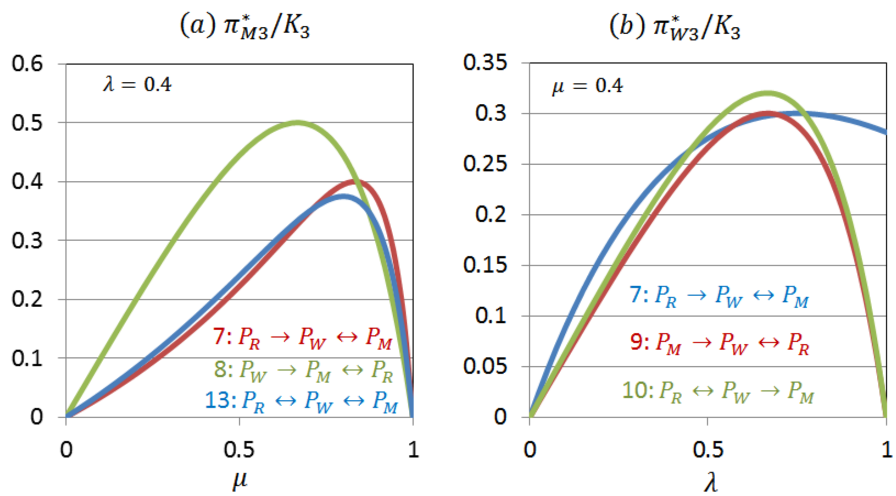

Figure 1- π^*_{M3}/K_3 and π^*_{W3}/K_3 for scenarios being dependent on respectively μ and λ

The unique characteristic of 3-tier channel, in comparison with a 2-tier channel, is notion of cross bargaining power. Specifically, bargaining power between M and W (W and R) can have impact on optimal profit of R (M). In this regard, Kunter (2011) has identified an asymmetric outcome such that bargaining power of the retailer over the wholesaler in downstream is beneficial to the manufacturer while bargaining power of the manufacturer over the wholesaler in upstream is harmful to the retailer. In fact, his model is corresponding to scenario one ($P_M \rightarrow P_W \rightarrow P_R$), given the fact that in our study bargaining power λ is defined as bargaining power of W over R (reverse of Kunter's definition). Since we have examined the comprehensive set of all feasible scenarios in our study, the asymmetric property claimed by Kunter (2011) is only one of the valid possibilities! Results of cross bargaining power(s) are shown in table 2, where scenarios not being dominant have been excluded (see next sub-section of domination). As table 2 shows, in scenario one, cross bargaining powers both have negative impact. Managerial insight of this scenario is that if M (R) is trying to engage in bargaining with a W, it is better to engage with the one that deals with a more powerful (powerless) R (M) in downstream (upstream). That is, for M (R) a stronger (weaker) customer of customer (supplier of supplier) matters. In contrast, in scenario twelve, M should engage with a weaker R while dealing with a W! Also, in scenario seven, changes of optimal profit of M with respect to λ are positive (negative) at small (large) levels of bargaining power of μ, so we are witness of characteristics similar to scenario six or five (one) where more powerful (powerless) R is preferred by M. Furthermore, in scenarios three and four, where in the real world all pricing decisions are made sequential while bargaining between W and R is the last decision, relative bargaining power in downstream has no impact on M's (R's) performance. Finally, scenarios five and six, where all pricing decisions are made sequential while bargaining between M and W is the last decision, relative bargaining power in upstream has no impact on R's performance. That is, R should have no concern in engaging with a W about the relative bargaining power of her upstream M.

Table 2- Impact of cross bargaining powers on optimal profit of M and R

#	Scenario	Impact of μ on π^*_{R3}	Impact of λ on π^*_{M3}
1	$P_R \to P_W \to P_M$	-	-
3	$P_W \to P_M \to P_R$	-	0
4	$P_W \to P_R \to P_M$	-	0
5	$P_M \to P_R \to P_W$	0	+
6	$P_M \to P_W \to P_R$	0	+
7	$P_R \to P_W \leftrightarrow P_M$	-	depends
12	$P_M \leftrightarrow P_W \to P_R$	-	+

3.2.4 Domination

Results related to domination of scenarios are key contributions of this study. In this regard, it can be easily verified that always scenarios 3 over 8, 6 over 9, 12 over 13, and 4 over 10 are dominant – from perspective of each of the channel members. The reason for the first three dominant scenarios is that share of pie for each of channel members is the same in each pair of scenarios, while in one scenario size of cake is fixed (maximum) and in another one size of cake is dependent on bargaining powers (not maximum). Hence the one whose total channel profit is fixed is dominant (i.e., scenarios 3, 6, and 12). The domination in the last pair of scenarios is similar to the domination of scenario two ($P_M \to P_R$) over three ($P_R \leftrightarrow P_M$) in 2-tier channel. In both scenarios four ($P_W \to P_R \to P_M$) and ten ($P_R \leftrightarrow P_W \to P_M$), in the real world P_M is determined first. Then R and W decide on the amount of P_R and P_W, as if we face a 2-tier channel including R and W. In the fourth scenario, R determines selling price; independent of bargaining process between W and R, so that maximizes her profit. The total channel profit is thus determined totally independent of any notion of bargaining between W and R. On the contrary, in scenario ten, R's decision on selling price of product is simultaneously influenced by bargaining between W and R. The total channel profit is then dependent on λ in scenario ten. Scenario four is expected to be dominant over scenario ten.

Thus, always all channel members should avoid scenario 8; ($P_W \to P_M \leftrightarrow P_R$), scenario 9 ($P_M \to P_W \leftrightarrow P_R$), scenario 10 ($P_R \leftrightarrow P_W \to P_M$), and scenario 13; ($P_R \leftrightarrow P_W \leftrightarrow P_M$). Practically speaking, it means bargaining process between W & R on determining P_W and determining selling price P_R by R should never take place simultaneously, regardless of sequence of bargaining process between M & W. Also, bargaining process between M & R on determining P_M and determining selling price P_R by R should not take place simultaneously unless after determining P_W.

Also, across all scenarios, for M (R) dominant scenario is scenario three (five) while there is no dominant scenario for W! In dominant strategic scenario of M; $P_W \rightarrow P_M \rightarrow P_R$, in the real world, first selling price is determined by R, followed by negotiation between M & W, and finally bargaining process between M & R happens. For R, dominant strategic scenario is $P_M \rightarrow P_R \rightarrow P_W$, where in the real world, first the negotiation of W & R happens, followed by determination of selling price by R, and finally bargaining process between M &W. Note that in strategic scenario of M (R), size of cake is (is not) fixed and optimal profit is linearly (non-linearly) increasing (decreasing) by bargaining power μ (λ)!

By excluding scenarios not being dominant (8, 9, 10, 13), and keeping scenario five as representative of equivalent scenarios (2, 11), only seven scenarios remain (i.e., 1, 3, 4, 6, 5, 7, 12) out of which scenario 5 (3) is dominant (or strategic) scenario for M (R). Note that, in the real world, if such strategic scenario for M or R is not feasible, then one may consider the Next Best Alternative Scenario (NBAS). For instance for M, by comparing optimal profit of M across the above seven mentioned scenarios, if strategic scenario 3 is not feasible, then NBAS is scenario 4 for $0 \leq \mu \leq (\lambda - 3/2 - \sqrt{1/4 + \lambda - \lambda^2})/(1 - \lambda)$ else scenario 12. That is, at rather low bargaining powers of M, NBAS is first bargaining between M & W, followed by determining the selling price of R, and finally bargaining process between W & R. Also, at rather high bargaining powers of M, NBAS is having two bargaining processes simultaneously and then having selling price be determined. The relative performance level of scenarios is summarized in table 3.

Table 3- Relative performance of scenarios for π_{i3}^*/K_3 where $i \in \{T, M, R\}$

#	Scenario	π_{M3}^*/K_3	π_{R3}^*/K_3	π_{T3}^*/K_3
1	$P_R \rightarrow P_W \rightarrow P_M$	No domination	No domination	No domination
3	$P_W \rightarrow P_M \rightarrow P_R$	Dominant over #8 Best scenario	Dominant over #8	Dominant over #8
4	$P_W \rightarrow P_R \rightarrow P_M$	Dominant over #10	Dominant over #10	Dominant over #10
5	$P_M \rightarrow P_R \rightarrow P_W$	Equals #2 & #11	Equals #2 & #11 Best scenario	Equals #2 & #11
6	$P_M \rightarrow P_W \rightarrow P_R$	Dominant over #9	Dominant over #9	Dominant over #9
7	$P_R \rightarrow P_W \leftrightarrow P_M$	No domination	No domination	No domination
12	$P_M \leftrightarrow P_W \rightarrow P_R$	Dominant over #13	Dominant over #13	Dominant over #13

4 Conclusion

In this paper, we examined all possible scenarios of pricing in 3-tier channel structure, through bargaining games. We compared the relative performance of each scenario and identified dominant scenarios. More specifically, we observed that there exist thirteen scenarios out of which three ones yield exactly the same performance (eleven distinct scenarios). Furthermore, we found that four scenarios out of eleven distinct scenarios are always dominant over other four scenarios from perspective of all channel members (seven scenarios remaining for comparison). From perspective of the total channel profit, we observed that the dominant scenarios are those in which R determines P_R first, before any bargaining process takes place in the channel. In such dominant scenarios size of cake is fixed, while in all other scenarios size of cake is dependent on and decreasing of bargaining power(s). While increase of bargaining power should logically enhance profit of the related party in the channel, we observed that there are some counter intuitive scenarios in which it is not necessarily the case for M and W. The reason behind such behavior is that increase of bargaining power can negatively impact the size of cake so sharply that it dominants increase of share of profit. As a unique characteristic of 3-tier channel in comparison with a 2-tier channel, cross bargaining power between M and W (W and R) can have impact on optimal profit of R (M). We extended the asymmetric property claimed by Kunter (2011) as we showed that there are different possibilities (captured in table 2) and asymmetric property is only one of such possibilities. Such results are highly useful from managerial perspective, as one of the primary contributions of this study. Specifically, depending on related scenario in the real world, we showed when for M (R) a stronger (weaker) customer of customer (supplier of supplier) is critical.

Regarding domination of scenarios, we found dominant unique scenario for M and R, while there was no dominant scenario for W. In dominant scenario of M, in the real world, first selling price is determined by R, followed by negotiation between M & W, and finally bargaining process between M & R happens. For R, dominant strategic scenario is when the negotiation of W & R happens first, followed by determination of selling price by R, and finally bargaining process between M &W.

With respect to future research directions, incorporating horizontal competition and its impact on the relative performance of scenarios would provide a more realistic model to the real world situations. Also, rather than the wholesale price contract, we can analyze some other types of contracts for interaction between channel members. In particular, due to capturing entire surplus, two-part tariff can be applied to investigate how much found results remain valid. Finally, instead of having channel members with risk neutral attitude, we can incorporate probabilistic demand function and assess validity of results for risk-averse decision makers in the channel.

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6 Appendix

Proof of Proposition 1.P_M, P_W, and $P_R$could be determined as the result of solving respectively the equation $\partial \Omega_\mu / \partial P_M = 0$, $\partial \Omega_\lambda / \partial P_W = 0$, and $\partial \pi_R / \partial P_R = 0$, based on (1) and (2). Depending on sequence of solving each of the three differentiations, thirteen scenarios of proposition 1 can be easily derived. The second derivatives are negative and optimality condition is met. This concludes proof of proposition 1.