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Strategic Implications of Hybrid Channel Distribution in a Competitive Market

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ABSTRACT

The Internet is growing in significance in B2C electronic commerce as people become more comfortable with the technology. Past analytical research on Internet commerce has mainly focused on its ability to lower consumers' search costs. Few have looked at the implications of having the Internet as an additional channel of distribution on firms. In this paper, I adopt a game theoretic approach to analyze the impact of competition on the hybrid channel distribution problem. I also look at a differentiated product market and highlight the role of product differentiation in Internet commerce. There are three major findings: (1) direct marketing through the Internet can achieve channel coordination by reducing the retailer's markup on goods; (2) there is spillover effect such that Internet marketing implemented by a manufacturer also benefits other manufacturers in the industry; and (3) a manufacturer implementing Internet marketing may actually want to see less product differentiation in the industry.

Keywords

E-commerce, channels of distribution, game theory, product differentiation.

INTRODUCTION

The Internet is growing in significance as a channel of distribution as people become more comfortable with the technology. According to a new forecast by Jupiter Research, online retail sales will grow to $65 billion this year and will continue to increase to $117 billion by 2008 (The Washington Times, 2004). In order to keep pace with the rapid development of Internet commerce, more and more suppliers are selling directly to the consumers through the Internet, in addition to their traditional channels of distribution (The New York Times, 2000).

To effectively make use of this direct channel, businesses must understand the strategic implications of having a hybrid channel of distribution. Past analytical research on Internet commerce has mainly focused on the effects of lowered consumer search costs (Bakos, 1997; Baye and Morgan, 2001; and Iyer and Pazgal, 2003). Few have looked at the implications of having the Internet as a retail channel. Two notable exceptions are Chiang, Chhajed and Hess (2003), and Park and Keh (2003), but they only study the problem in a one-manufacturer (or supplier) setting.

In this paper, I extend their work by analyzing a model with two manufacturers. The aim of this paper is to answer the following questions related to hybrid channel distribution in a competitive market: (1) Can *channel coordination* be achieved as in the monopolistic manufacturer setting (Chiang, Chhajed and Hess, 2003)? (2) How is the welfare of channel members affected by the introduction of Internet marketing? And (3) what are the implications of Internet marketing on *product differentiation*? It is interesting to show that firms having a hybrid channel structure may actually want to see less product differentiation in the industry. This is contrary to the traditional wisdom which suggests that firms' profits always increase with differentiation (Tirole 1988, p. 280).

In the following section, I review the existing literature on vertical channel distribution. Next, I introduce the analytical model and present the analysis results. Finally, implications and future direction of this study are also discussed.

LITERATURE REVIEW

There exists a fair amount of literature on vertical channel distribution. Researchers in this area are typically interested in how manufacturers could coordinate the channel by designing contracts that give retailers appropriate incentives to make decisions that are optimal for the manufacturers (Gerstner and Hess, 1991; Jeuland and Shugan, 1983; Lal, 1990; McGuire and Staelin, 1983). Mechanisms for channel coordination include franchise fees, resale-price maintenance, quantity fixing, and other vertical restraints (Tirole, 1988). Recently, Chiang, Chhajed and Hess (2003) point out that the mere existence of a direct Internet channel from the manufacturer, without even delivering any sales, can achieve a certain level of channel coordination in a one-manufacturer one-retailer channel structure. As shall be shown shortly, my analysis in a two-manufacturer setting is consistent with their finding.

Since vertical restraints or pricing schemes are not the focus of this paper, previous work in these areas are not reviewed here. Table 1 lists some of the previous analytical research related to channel structure. Note that only the last two studies look at hybrid channel distribution. Figure 1 shows the channel structures pictorially.

Paper	Channel Structure*	Summary
Jeuland and Shugan, 1983	1M, 1R (Fig. 1a)	This paper demonstrates the need for channel coordination and compares the advantages of a number of mechanisms, e.g., joint ownership, simple contracts, implicit understanding, profit sharing, and quantity discounts.
McGuire and Staelin, 1983	2M, 2R (Fig. 1b)	This paper studies the effect of product substitutability. Dixit's demand function (1979) is used for their game-theoretic analysis. It is found that with low degrees of substitutabilities (i.e., more differentiation), each manufacturer will distribute its product through a company store; for highly competitive goods, manufacturers are more likely to use a decentralized distributed system.
Choi, 1991	2M, 1R (Fig. 1c)	The constant elasticity demand and linear demand are analyzed. Three types of games between the vertical channel members are examined: 1) Vertical Nash, 2) Manufacturer Stackelberg, and 3) Retailer Stackelberg. The manufacturer's preference for an exclusive dealer is different depending on the form of the demand function and the level of product differentiation.
Choi, 1996	2M, 2R (Fig. 1d)	This paper only looks at the linear demand function. Again, three games are studied: 1) Vertical Nash, 2) Manufacturing Stackelberg, and 3) Retailer Stackelberg. However, the model includes one extra retailer and studies the effect of retail brand differentiation. Raju, Sethuraman and Dhar's demand function (1984) is used. It is found that while product differentiation helps manufacturers, it hurts retailers. Conversely, while store differentiation helps retailers, it hurts manufacturers.
Lee and Staelin, 1997	1M, 1R (Fig.1a) 2M, 2R (Fig. 1b and 1c) 2M, 2R (Fig. 1d)	This paper generalizes vertical strategic interaction by analyzing all the *traditional* channel structures shown in Figure 1.
Chiang, Chhajed and Hess, 2003	1M, 1R (Fig. 1e) 1M, multiple-R (Fig. 1f)	This paper shows that Internet marketing can profit the manufacturer even when no Internet sales are made. On the other hand, the Internet channel may not always be detrimental to the retailer because it will be accompanied by a wholesale price reduction.
Park and Keh, 2003	1M, 1R (Fig. 1e)	Three types of games between the vertical members are analyzed: 1) Vertical Nash, 2) Manufacturer Stackelberg, and 3) Retailer Stackelberg. The effect of Internet marketing on the welfare of each channel member is discussed for each game.

* M = Manufacturer, R = Retailer

Table 1. Review of Existing Analytical Research on Vertical Channel Structure

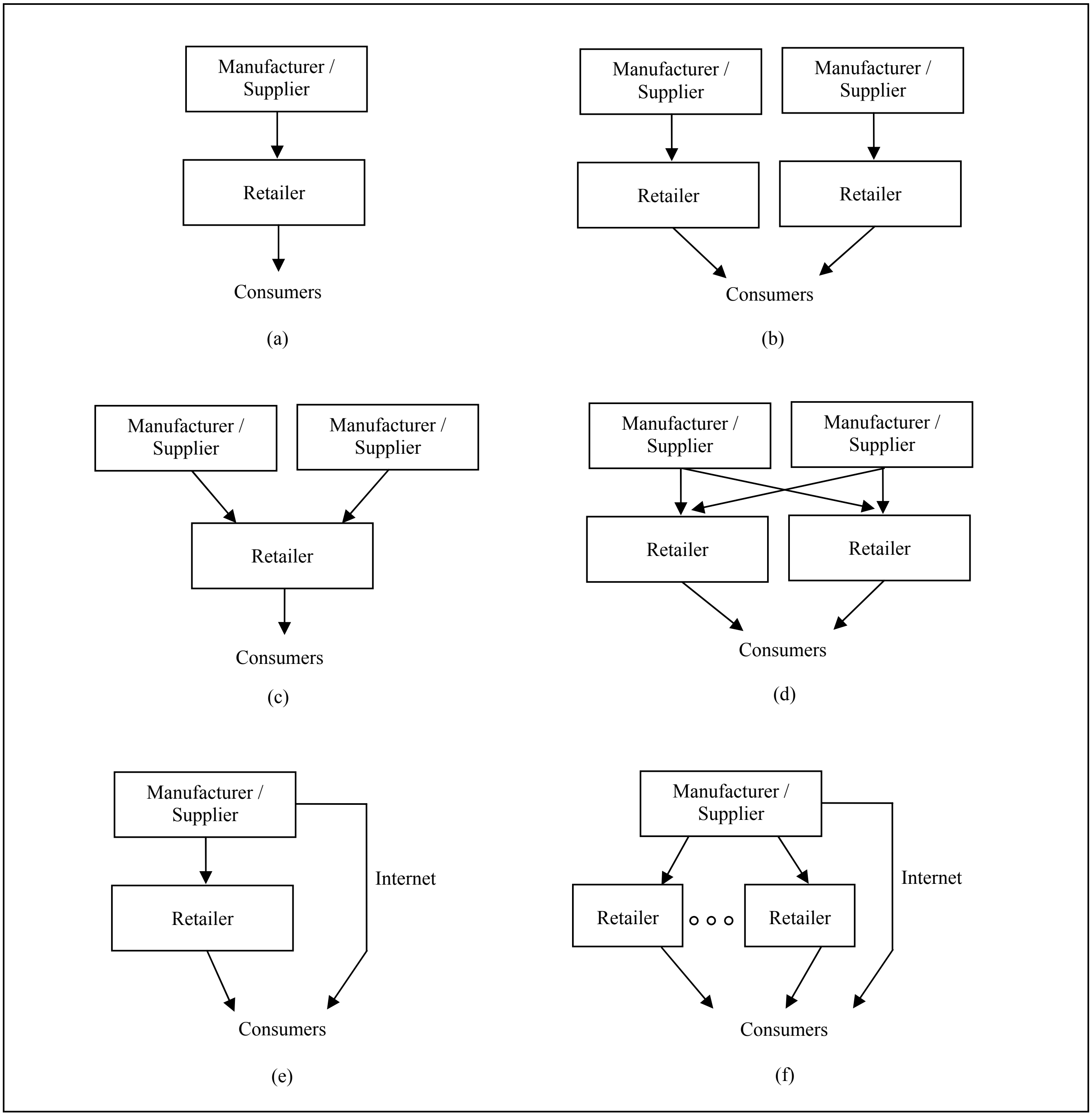


Figure 1. Channel Structures Analyzed in Studies Listed in Table 1

THE MODEL

The channel structure in this study has two manufacturers and a common retailer, as shown in Figure 2. Each manufacturer has the option to introduce an Internet channel to reach consumers directly. If both manufacturers do not engage in Internet marketing, this structure would be the same as that in Figure 1c, which represents an industry in which retailers implement product line pricing but serve completely separate markets (Choi, 1991; Lee and Staelin, 1997; Sudhir, 2001). It is the simplest model structure that can address the research questions of this study.

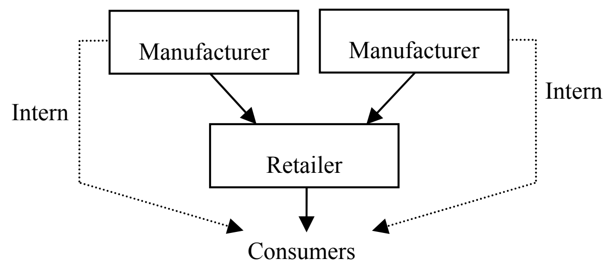


Figure 2. Channel Structure of this Study

Consumer demand

Although it is realized that different forms of demand would yield different and sometimes conflicting results (Choi, 1991; Jeuland and Shugan, 1988), it is common to assume that demand has a linear form. In an oligopolistic market, demand for each firm's product is contigent on the prices of other firms' products. The "cross-price sensitivity" is often used to capture this feature (Choi, 1996; Park and Keh, 2003). Raju, Sethuraman and Dhar (1994) introduced this notion of "cross-price sensitivity" based on the n-firm oligopolistic model developed by Shubik and Levitan (1980), in which the demand for Firm i's product set at price p_i is given by

$$d_i = \frac{1}{n}\left(\alpha - \beta\left[p_i + \gamma\left(p_i - \bar{p}\right)\right]\right) \tag{1}$$

where α denotes the base demand or the market size, β the industry demand slope, γ the substitutability of the products in the oligopolistic market, and $\bar{p}$ the average price. Importantly, this demand function is consistent with the utility maximizing behavior.

Case I: No Internet Marketing

Adhering to the common approach used in Raju, Sethuraman and Dhar (1994), Choi (1996), and Park and Keh (2003), I model the demand for Product A distributed by the Retailer (Q_{RA}) and the demand for Product B distributed by the Retailer (Q_{RB}) as

$$\begin{aligned} Q_{RA} &= \frac{1}{2}\left(1 - P_{RA} + \delta\left[P_{RB} - P_{RA}\right]\right) \\ Q_{RB} &= \frac{1}{2}\left(1 - P_{RB} + \delta\left[P_{RA} - P_{RB}\right]\right) \end{aligned} \tag{2}$$

where P_{RA} and P_{RB} are, respectively, the retail prices of Product A and Product B. Adding Q_{RA} and Q_{RB} together gives the total industry demand $1 - \frac{P_{RA} + P_{RB}}{2}$. In other words, the base industry demand is normalized to one and the total industry demand decreases with the average price of the horizontally differentiated products. $\delta \in [0,1]$ is the cross-price sensitivity between Product A and Product B. It can also be used to measure the degree of product substitutability or differentiation. The higher the value of δ, the higher the product substitutability and the lower the differentiation.

Case II: One Internet Channel

Suppose Manufacturer A now introduces Internet marketing. As in Chiang, Chhajed and Hess (2003), I assume that valuation of a product sold through the Internet is lower than that sold through a traditional retail channel. The assumption is reasonable because unlike physical stores, the Internet deprives consumers of evaluation of products by touch, taste, and smell. Further, Internet purchases often require consumers to wait several days for delivery. To guarantee a positive demand for the Internet channel, P_{IA}, the price at which Product A is sold through the Internet, has to be cheaper than P_{RA}, the price at which Product A is sold in the Retailer. Hence, $P_{IA} < P_{RA}$. To capture this feature, I model the various demands for the case where only Manufacturer A implements hybrid channel distribution as

$$
\begin{aligned}
Q_{RA} &= \frac{1}{2}\left(1 - P_{RA} + \delta\left[P_{RB} - P_{RA}\right] + \theta\left[P_{IA} - P_{RA}\right]\right) \\
Q_{IA} &= \frac{1}{2}\left(\theta\left[P_{RA} - P_{IA}\right] + \delta\theta\left[P_{RB} - P_{IA}\right]\right) \\
Q_{RB} &= \frac{1}{2}\left(1 - P_{RB} + \delta\left[P_{RA} - P_{RB}\right] + \delta\theta\left[P_{IA} - P_{RB}\right]\right)
\end{aligned}
\tag{3}
$$

In this case, the total industry demand remains $1 - \frac{P_{RA} + P_{RB}}{2}$. Consumers who used to buy Product A from the Retailer would consider switching to buy Product A directly from the Internet if P_{IA} is lower than P_{RA} and the Internet channel is found capable of substituting the retail channel. The degree of substitutability of the Retailer by the Internet channel is measured by $\theta \in [0,1]$, which can also be viewed as the consumer acceptance of the Internet channel in the industry. If the difference $P_{RB} - P_{IA}$ is low enough, Product A sold through the Internet can also attract consumers who originally purchase Product B from the Retailer. However, given that Product B is differentiated from Product A, Product A distributed by the Internet is less able to substitute Product B distributed by the Retailer. Hence, the cross-price sensitivity of Product B sold through Retailer and Product A sold through the Internet should be smaller than min[θ,δ]. To keep the model simple without introducing another parameter, this cross-price sensitivity is modeled as $\delta\theta$. The assumption here is that the channel effect and the differentiation effect are independent and multiplicative.

Case III: Two Internet Channels

Finally, when both Manufacturers make use of the Internet to reach consumers directly, the various demands are modeled as

$$
\begin{aligned}
Q_{RA} &= \frac{1}{2}\left(1 - P_{RA} + \delta\left[P_{RB} - P_{RA}\right] + \theta\left[P_{IA} - P_{RA}\right] + \delta\theta\left[P_{IB} - P_{RA}\right]\right) \\
Q_{IA} &= \frac{1}{2}\left(\theta\left[P_{RA} - P_{IA}\right] + \delta\theta\left[P_{RB} - P_{IA}\right]\right) \\
Q_{RB} &= \frac{1}{2}\left(1 - P_{RB} + \delta\left[P_{RA} - P_{RB}\right] + \theta\left[P_{IB} - P_{RB}\right] + \delta\theta\left[P_{IA} - P_{RB}\right]\right) \\
Q_{IB} &= \frac{1}{2}\left(\theta\left[P_{RB} - P_{IB}\right] + \delta\theta\left[P_{RA} - P_{IB}\right]\right)
\end{aligned}
\tag{4}
$$

The three cases discussed here will be studied separately in the Analysis and Discussion section.

Vertical Strategic Interaction

Choi (1991) distinguishes three types of vertical strategic interaction depending on the power structure along the vertical channel: the Vertical Nash game, the Manufacturer Stackelberg game, and the Retailer Stackelberg game. In the Vertical Nash game, each manufacturer chooses its wholesale price conditional on both the Retailer's margins and the observed retail price of the competing firm. The Retailer determines the retail margins for both products conditional on the wholesale prices. The manufacturers and the Retailer make their moves simultaneously. In the Manufacturer Stackelberg game, the manufacturers are the price leaders in the vertical channel. Each manufacturer chooses the wholesale price using the response function of the Retailer, conditional on the observed wholesale price of the competitor's product. The Retailer, being the follower, determines the margins on each product given the respective wholesale prices. Finally, in the Retailer Stackelberg game, each manufacturer chooses its wholesale price conditional on both the Retailer's margin on its own product and the observed retail price of the competing product. The Retailer determines the margins on each product using the response functions of both manufacturers. Note that in all of the three games, the *horizontal* strategic interaction between the manufacturers is assumed to be a Nash game.

As in Chiang, Chhajed and Hess (2003), I will only analyze the Manufacturer Stackelberg game, even though the Vertical Nash and Retailer Stackelberg games can also be solved easily. The objective here is to keep this paper within a reasonable length.

Problem Solving

Suppose the manufacturers and the Retailer all engage in simple pricing schemes. The per unit wholesale prices for Product A and Product B are, respectively, w_A and w_B, and the per unit retail margins for Product A and Product B are, respectively,

m_A and m_B. For simplicity, assume further that all delivery costs are zero. The retail prices for Product A and Product B are given by

$$P_{RA} = w_A + m_A \\ P_{RB} = w_B + m_B \tag{5}$$

The Retailer's profit (Π_R) is given by

$$\Pi_R = Q_{RA}m_A + Q_{RB}m_B \tag{6}$$

The profit for Manufacturer A and Manufacturer B are dependent on whether Internet marketing exists and they are presented in Table 2.

Different cases	**Manufacturer A's profit**	**Manufacturer B's profit**
No Internet Marketing	$\Pi_A = Q_{RA}w_A$	$\Pi_B = Q_{RB}w_B$
One Internet Channel (by Manufacturer A)	$\Pi_A = Q_{RA}w_A + Q_{IA}P_{IA}$	$\Pi_B = Q_{RB}w_B$
Two Internet Channels	$\Pi_A = Q_{RA}w_A + Q_{IA}P_{IA}$	$\Pi_B = Q_{RB}w_B + Q_{IB}P_{IB}$

Table 2. Manufacturers' Profit by Different Cases

In a Manufacturer Stackelberg game, the Retailer takes the wholesale prices as given. The Retailer's profit maximization problem is, therefore, only dependent on the margins m_A and m_B, i.e.,

$$\max_{m_A, m_B} \Pi_R(m_A, m_B) \tag{7}$$

The optimal margins m_A^* and m_B^* calculated from the Retailer's maximization problem should be in terms of P_{RA}, P_{IA} (if applicable), P_{RB}, and P_{IB} (if applicable). They can then be substituted into the profit maximization problems of Manufacturer A and Manufacturer B as follows.

$$\max_{w_A, P_{IA}} \Pi_A\left(m_A^*(w_A, P_{IA}), m_B^*(w_A, P_{IA}), w_A, P_{IA}\right) \\ \max_{w_B, P_{IB}} \Pi_B\left(m_A^*(w_B, P_{IB}), m_B^*(w_B, P_{IB}), w_B, P_{IB}\right) \tag{8}$$

Note that if an Internet channel is not present, the maximization problems simply would not involve the Internet prices P_{IA} or P_{IB}. The optimal solutions for w_A^*, P_{IA}^* (if applicable), w_B^*, and P_{IB}^* (if applicable) in terms of δ and θ can then be used to compute back m_A^* and m_B^* in terms of δ and θ. The equilibrium prices, demands, and profits for various channel players can also be calculated easily. These quantities should be again in terms of δ and θ.

I present here analysis of the simplest case as an example. When Manufacturer A and Manufacturer B sell only through the traditional retail channel, the demands for their products is given by Eq. (2). Substituting these quantities and the retail prices (Eq. 5) in the Retailer's profit function (Eq. 6), the Retailer's profit maximization problem becomes

$$\max_{m_A, m_B} \quad \Pi_R = \frac{m_A}{2}\left[1 - w_A - m_A + \delta(w_B + m_B - w_A - m_A)\right] \\ + \frac{m_B}{2}\left[1 - w_B - m_B + \delta(w_A + m_A - w_B - m_B)\right] \tag{9}$$

Taking the wholesale prices as given, the Retailer maximizes profit by setting its optimal margins m_A^* and m_B^* to be

$$m_A^* = \frac{1 - w_A}{2} \\ m_B^* = \frac{1 - w_B}{2} \tag{10}$$

With the knowledge of the Retailer's response function, Manufacturer A and Manufacturer B then maximize their profits conditional on the observed retail price of the competing product. They substitute Eq. (10) into their corresponding manufacturer profit functions in Table 2 and their respective profit maximization problems become

$$\max_{w_A} \quad \Pi_A = \frac{m_A}{4}\left(1 - w_A + \delta(w_B - w_A)\right)$$
$$\max_{w_B} \quad \Pi_A = \frac{m_B}{4}\left(1 - w_B + \delta(w_A - w_B)\right) \tag{11}$$

Solving these problems simultaneously give the optimal wholesale prices

$$w_A^* = w_B^* = \frac{1}{\delta + 2} \tag{12}$$

Substituting $w_A{}^*$ and $w_B{}^*$ back into Eq. (10), the optimal retail margins in terms of δ are

$$m_A^* = m_B^* = \frac{\delta + 1}{2(\delta + 2)} \tag{13}$$

The equilibrium prices P_{RA} and P_{RB}, the quantity demanded Q_{RA} and Q_{RB}, and the channel players' profits Π_R, Π_A and Π_B can be then be calculated easily by Eq. (5), Eq. (2), Eq. (6) and the corresponding manufacturer profit functions in Table 2.

This procedure is repeated to solve for the other two cases with Internet marketing. The mathematics involved in solving these problems are simple enough to be handled by mathematical software packages such as *Maple* and *Mathematica* and they are not presented here.

ANALYSIS AND DISCUSSION

Closed form solutions could be obtained, but they are too complicated for interpretation. Instead, my analysis is based on comparative statics. Due to the constraint on length, I present only the ones relevant to my research questions.

Case I: No Internet Marketing

Obviously, the equilibrium is only dependent on product substitutability (δ); channel substitutability (θ) is irrelevant in this case. Table 3 shows the comparative statics and Figure 3 shows how the manufacturers and the Retailer's profit change in δ. Note that the vertical channel in this case is symmetrical such that the equilibrium quantities for Manufacturer A and Manufacturer B are equal.

The comparative statics in Table 3 show that as δ increases (less product differentiation), the wholesale prices $w_A{}^*$ and $w_B{}^*$ decrease, while the retail margins $m_A{}^*$ and $m_B{}^*$ increase. The overall effect is decreased manufacturer profits and increased retailer profits as shown in Figure 3. Consistent with the existing literature, our results show that the manufacturers' profits always increase with product differentiation.

$\frac{\partial w_A^*}{\partial \delta} = \frac{\partial w_B^*}{\partial \delta}$	-ve
$\frac{\partial m_A^*}{\partial \delta} = \frac{\partial m_B^*}{\partial \delta}$	+ve
$\frac{\partial \Pi_R^*}{\partial \delta}$	+ve
$\frac{\partial \Pi_A^*}{\partial \delta} = \frac{\partial \Pi_B^*}{\partial \delta}$	-ve

Table 3. Comparative Statics for Case I

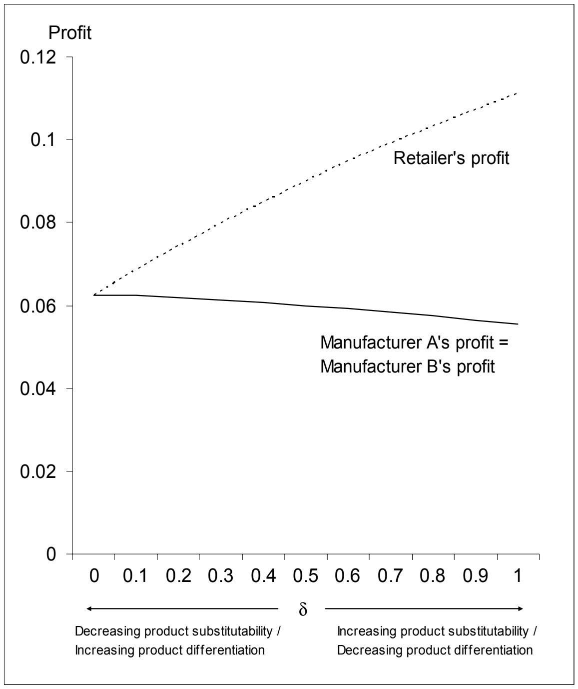


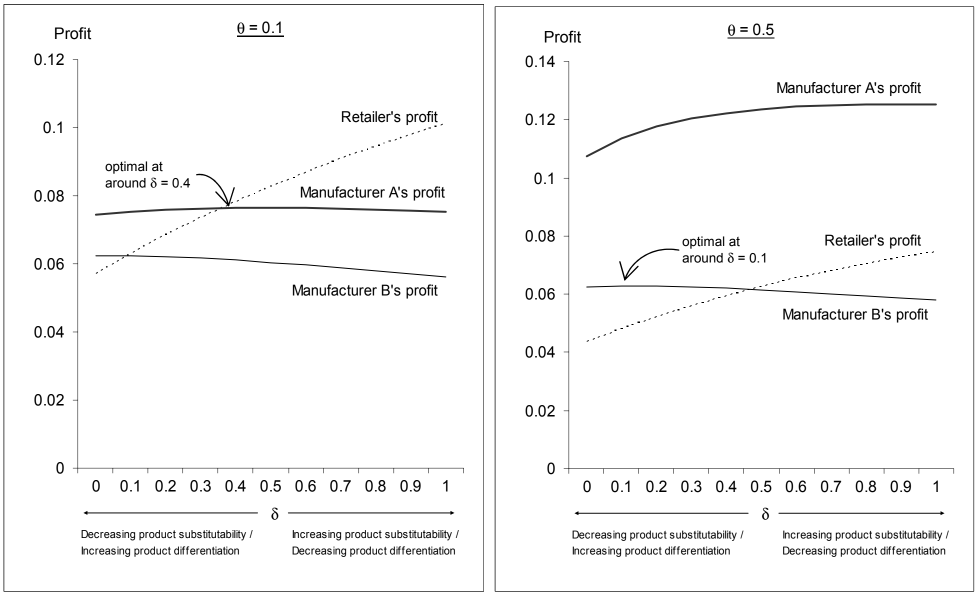
Figure 3. Equilibrium Profits for Case I

Case II: One Internet Channel

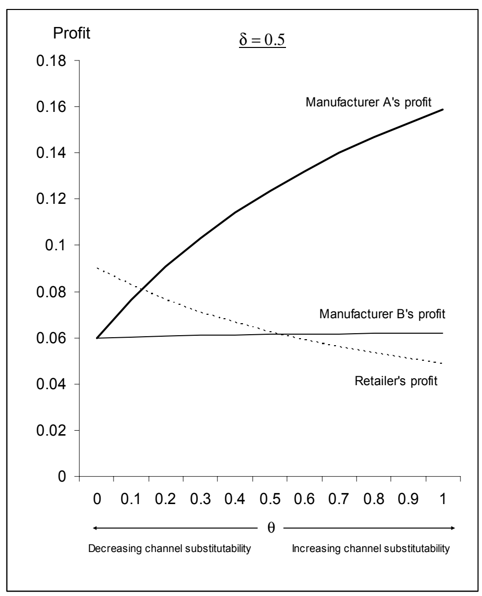
Both product substitutability (δ) and channel substitutability (θ) affect the equilibrium in this case. The comparative statics are shown in Table 4. Figure 4 shows the changes of the manufacturer and retailer profits with respect to δ while keeping θ constant.

$\frac{\partial \Pi_R^*}{\partial \delta}$	+ve	$\frac{\partial m_A^*}{\partial \theta}$	-ve
$\frac{\partial \Pi_A^*}{\partial \delta}$	?	$\frac{\partial m_B^*}{\partial \theta}$	-ve
$\frac{\partial \Pi_B^*}{\partial \delta}$	?	$\frac{\partial \Pi_R^*}{\partial \theta}$	-ve
$\frac{\partial \left(Q_{RA}^* / \left(Q_{RA}^* + Q_{IA}^*\right)\right)}{\partial \delta}$	-ve	$\frac{\partial \Pi_A^*}{\partial \theta}$	+ve
		$\frac{\partial \Pi_B^*}{\partial \theta}$	+ve

Table 4. Comparative Statics for Case II



(a)



(b)

Figure 4. Equilibrium Profits for Case II

With respect to δ

When Manufacturer A introduces Internet marketing, the role of product substitutability is changed slightly. The Retailer still wants to see higher product substitutability, or less differentiation. However, Manufacturer A is ambivalent to product differentiation. On the one hand, more differentiation gives Manufacturer A more power over the Retailer and the consumers. On the other hand, with less differentiation, Manufacturer A's Internet channel is better able to attract Manufacturer B's customers (since they see little difference between the two products) and exert competitive pressure on the Retailer. My numerical analysis shows that when channel substitutability θ is small, there exists an optimal level of differentiation for Manufacturer A beyond which its profit would drop. In Figure 4a, we can see that when θ = 0.1 the optimal level of differentiation for Manufacturer A is approximately δ = 0.4. Beyond a certain level of channel substitutability, Manufacturer A actually unambiguously prefers less differentiation, as shown in the case for θ = 0.5 in Figure 4a.

It is interesting to note that $\frac{\partial\left(Q^*_{RA}/\left(Q^*_{RA}+Q^*_{IA}\right)\right)}{\partial\delta}$ is negative, indicating that Manufacturer A's reliance on the traditional retail channel decreases when there is less product differentiation. This is because when product differentiation is low, some consumers who normally prefer Product B may find that the degree of differentiation is not significant enough to make purchase of Product B at a higher price through the Retailer worthwhile. As a result, sales of Product A through the Internet increase, reducing Manufacturer A's reliance on the traditional retail channel.

Further, I find that Manufacturer B's attitude towards differentiation is also ambiguous when only Manufacturer A adopts hybrid channel distribution. This is rather counter-intuitive. The explanation for this finding is that competitive pressure created by sales of close to homogeneous products through the Internet channel forces to the Retailer to cut its retail margins drastically, resulting in lower retail prices and higher retail sales volume for Product B. Therefore, it may happen that Manufacturer B's benefits from lower retail margins more than compensate the loss of customers to Manufacturer A. My numerical analysis shows that when channel substitutability is high enough, there exists an optimal level of differentiation for Manufacturer B beyond which its profit would drop. For example, as shown in Figure 4a, when θ = 0.5, the optimal level of product differentiation for Manufacturer B is around δ = 0.1. Thus, we observe here some spillover effect of Internet marketing.

With respect to θ

Comparative statics with respect to channel substitutability (θ) give intuitive and unambiguous results. The Internet channel gives Manufacturer A the power to charge at a higher wholesale price w_A. The reliance on the traditional retail channel decreases as consumers find it more substitutable by the Internet channel. The Retailer has to lower its margins in order to stay competitive and this move further undermines its profit. On the other hand, increased sales through the Internet increase Manufacturer A's profit.

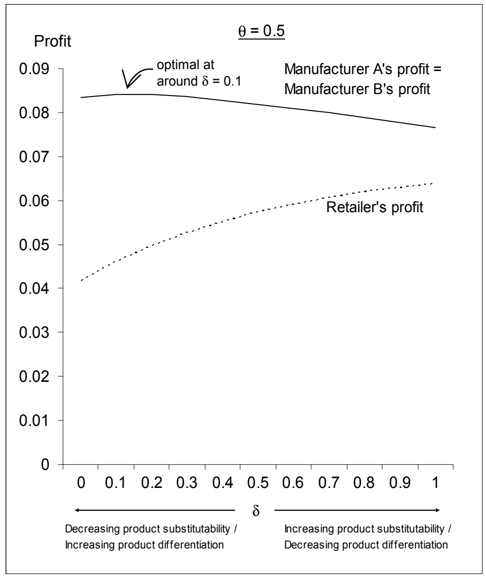
Manufacturer B is also better off when channel substitutability is high. Although its wholesale prices w_B are lowered under the competitive pressure of the Internet channel, the retail margins on Product B m_B are also lowered by the Retailer under the same competitive pressure. Therefore, overall, Product B is cheaper and consumers purchase more, allowing Manufacturer B to earn a higher profit than it would if there is no Internet channel in the market. Again, we observe here the spillover effect of channel coordination.

Case III: Two Internet Channels

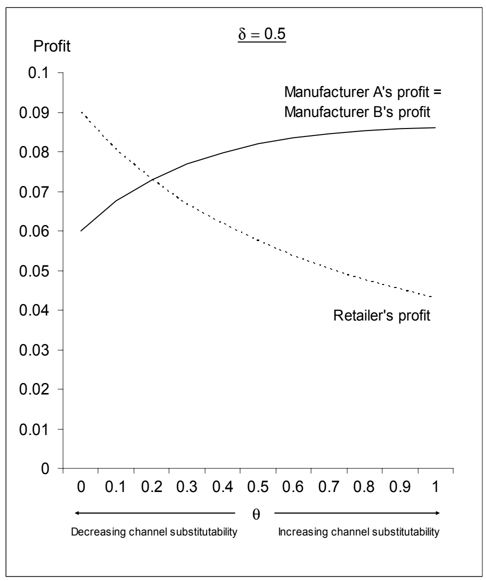
When Manufacturer B also makes use of the Internet to market its products, the vertical channel becomes symmetrical as in Case I. The equilibrium quantities for Manufacturer A and Manufacturer B are again equal. The comparative statics for this case are shown in Table 5. Figure 5 shows the changes of the manufacturer and retailer profits with respect to δ while keeping θ constant.

$\frac{\partial\Pi^*_R}{\partial\delta}$	+ve
$\frac{\partial\Pi^*_A}{\partial\delta}=\frac{\partial\Pi^*_B}{\partial\delta}$	?
$\frac{\partial m^*_A}{\partial\theta}=\frac{\partial m^*_B}{\partial\theta}$	-ve
$\frac{\partial\Pi^*_R}{\partial\theta}$	-ve
$\frac{\partial\Pi^*_A}{\partial\theta}=\frac{\partial\Pi^*_B}{\partial\theta}$	+ve

Table 5. Comparative Statics for Case III



(a)



(b)

Figure 5. Equilibrium Profits for Case III

As it turns out, comparative statics with respect to δ for this case do not add much to our understanding of Internet marketing. As in the previous cases, the Retailer's profit increases with lower product differentiation. The manufacturers' attitude towards product differentiation is still ambiguous. However, in this case, Manufacturer A's favorability towards product homogeneity is much lessened with the knowledge that Manufacturer B's Internet channel is also able to make consumers switch. Both manufacturers now generally prefer high product differentiation. However, as differentiation increases, Internet marketing becomes less attractive a distribution channel to the consumers compared to the Retailer. Beyond a certain level of differentiation, Internet marketing no longer generates significant profits for the manufacturers. As a result, profits begin to drop. This trend is similar to that observed in Case II for Manufacturer A's profit.

Comparative statics with respect to θ for this case are again similar to those for Case II. With higher channel substitutability, the retailer profit decreases as a result of lowered retail margins; whereas the manufacturer profits increase with increased sales as a result of lower retail prices and increased Internet sales.

Discussion

In this analysis, there are three interesting findings:

1. Internet marketing can achieve channel coordination by reducing the retailer's markup on goods. This is consistent with findings in a monopolistic manufacturer setting.
2. There is spillover effect such that Internet marketing by a manufacturer also benefits other manufacturers in the industry.
3. Manufacturers adopting hybrid channel distribution may actually want to see less product differentiation in the industry.

Channel coordination achieved by Internet marketing is equivalent to saying that the Retailer is worse off as it faces additional competition. In fact, my numerical analysis shows that unless the Retailer is able to differentiate itself from the Internet such that channel substitutability equal to zero ($\theta = 0$), its profit will be decreased with the introduction of Internet marketing. A managerial implication of this finding is that traditional retailers should provide consumers value-added services that could not be delivered through the Internet. This way, the consumers will find that their services are irreplaceable by the Internet.

The second finding on the spillover effect is also related to channel coordination. The introduction of Internet marketing by some manufacturers (or suppliers) in an industry can achieve channel coordination that benefits all manufacturers (or suppliers) in the industry. Those who implement Internet marketing obviously are able to push retail margins of their products lower. A rather unexpected outcome, however, is that retailers have to also lower the margins on products supplied by those not implementing Internet marketing. This is because the retailers are afraid that customers who normally buy products supplied by those without an Internet channel would switch to buy other brands through the Internet if the selling prices of these products are too high. As a result, the retail margins on all products in the industry are lowered, resulting in overall cheaper selling prices, higher sales volume and higher consumer surplus.

The third finding offers new insights to the role of product differentiation in Internet commerce. Traditionally, the more differentiated products are in an industry, the closer to the monopolistic price the manufacturers could charge. Hence, more differentiation is always preferred by the manufacturers. This study has shown that traditional wisdom on product differentiation may be too simplistic for understanding Internet commerce. With less differentiation, consumers see less value-added making purchases from physical retail stores, and thus they are more willing to shop online. As a result, manufacturers who implement Internet marketing may actually get more business online when differentiation is low.

CONCLUSION AND FUTURE RESEARCH

In this study, I make use of a simple analytical model to investigate the effect of Internet marketing on vertical channel distribution in a two-manufacturer setting. It is found that channel coordination can be achieved as in the monopolistic manufacturer case. It provides another explanation of increased consumer surplus provided by Internet commerce other than reduced search costs and increased product variety (Brynjolfsson, Hu and Smith, 2003). It is also shown that role of product differentiation is more complicated in Internet commerce than in traditional retail businesses.

Although there are some interesting results, there are many opportunities for future research. First, to make this study complete, the Retailer Stackelberg and Vertical Nash game for the vertical strategic interaction should also be analyzed and compared. Second, hybrid channel distribution should be investigated in a 2-manufacturer and 2- retailer setting to see whether it would produce results different from Park and Keh (2003), Chiang, Chhajed, and Hess (2003), and this study. Finally, empirical support should be sought to verify the findings.

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