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Benefiting the Online Multi-brand Retailer: The Impact of Supplier’s Direct Channel on Wholesale Market Competition

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ABSTRACT
In ecommerce, a product/service supplier with an Internet direct channel can sell through both its own direct channel and independent online retailers’ sites. The competition between the direct channel and the independent retailer’s channel has received significant research attention, however, little has been investigated on the impact of direct channel on the competition in wholesale market when the independent retailer carries multiple brands. We built a model in which two suppliers, one with a direct channel and the other without, both sell through a common retailer and compete in offering trade deal to the retailer. We find that the presence of the direct channel can make the supplier without a direct channel become more aggressive in offering large trade deal and sometimes benefit the independent retailer. The result helps explain why the current growth of many major online intermediaries is largely driven by small sellers without significant online presence.

Keywords
Direct Channel, Wholesale Market, Price Promotion, E-commerce.

1. INTRODUCTION
1.1 Background
In modern Internet commerce environment, the network effect is helping large online shopping sites attract more and more buyers as well as sellers, resulting in the success of big ecommerce players such as auctioneer eBay, Web portal Yahoo!, and travel agent Expedia. On the other hand, however, the Internet also provides an unprecedented opportunity for sellers to build up their own direct online channels to sell to consumers. Take the lodging industry as an example. Major online travel agents such as Expedia and Hotel.com sell rooms for both for those branded chain hotels and independent hotels. Most branded chain hotels, such as Marriott, also heavily promote and sell more through their own web-based channels. However, those independent brands, many of whom do not have their own web presence, depend more on and largely drive the growth of these independent online intermediaries (AFX UK, 11/11/2003).

When examining the Internet direct channel, previous research largely focuses on the impact of the Internet direct channel on the retail market competition and how an upstream manufacturer/supplier can improve its channel profitability by introducing a direct channel (Chiang, et. al. 2003; Bell, et. al., 2003; Tsay and Agrawal, 2002). Inefficient attention has been given to the impact of a company’s direct channel on the competition in wholesale market, especially the competition between the suppliers with a direct channel and the suppliers without direct channel. One might conjecture that if a supplier introduces a direct channel to attract many of its consumers away from the retail channel, it should be less aggressive to offer trade deals to the retailer and consequently the competition in the wholesale market between the supplier with the direct channel and the supplier without the direct channel should be softened. However, our model suggests that the impact of a particular supplier’s direct channel on the wholesale market competition is not that simple. Sometimes a supplier’s introduction of a direct channel can force its competitor who does not have a direct channel to be become more aggressive in offering trade deals to the retailer and therefore intensify the wholesale market competition.

1.2 Literature Review
The competition between the product/service supplier’s direct channel and traditional independent retail channel has become one of the focuses of modern research on e-business (Tsay and Agrawal, 2004). The issues that have been examined include how the direct channel can be used by the supplier to reduce the retail channel inefficiency caused by the well-known double-marginalization problem (Chiang, et. al. 2003), to support the independent retailers’ service and pricing (Tsay and Agrawal, 2003). However, most of these models focus on the single-brand retailer (i.e. the independent retailer only carries a single brand from a single supplier). Therefore, the competition between the direct channel and the retail channel is just over a single brand and the retailer's channel power of using the substitute brand or the entire category to compete with the supplier’s direct channel has not been sufficiently addressed. Also, since only single-brand retailers are examines in these models, the impact of the supplier’s direct channel on the competition in the wholesale market cannot be illustrated. The connection between wholesale market competition and retail market competition has been examined in recent marketing literatures (e.g. Lal and Villas-Boas, 1996; 1998). However, these literatures do not consider the role of the supplier’s direct channel. Xue & Whinston (2003) bridges the gap between these two streams of literatures by considering a model incorporating both a supplier’s direct channel and a multi-brand independent retailer. The major finding is that if the multi-brand retailer can acquire a large trade deal on a substitute brand from a relatively less branded small supplier, the large branded supplier with a direct channel may not be able to improve its own channel profitability by introducing the direct channel. However, in that model, the wholesale price of the substitute brand is exogenously given and therefore, the competition in the wholesale market is not fully endogenized.

The model in this paper is built to examine the wholesale market competition (rather than the retail market competition) in presence of a direct channel. In this paper, we study the strategic interaction in the wholesale market between a supplier with a direct channel and a supplier without a direct channel. The research issue addressed here is whether this competition in wholesale market is intensified or not by the direct channel, compared to the case where no direct channel is used. Also, another issue explored is whether the independent retailer can benefit if the wholesale market competition is driven more intense.

The rest of the paper is organized as the follows. Section 2 presents the model setup, game structure, and equilibrium solution. In Section 3, we show when the independent retailer may benefit from the supplier’s direct channel. Section 4 concludes the paper.

2. The Model

2.1 Consumers and Firms

There are two suppliers, A and B. \( w_A \) and \( w_B \) denote the wholesale price of brand A and B, respectively. Both suppliers sell through a common retailer. \( p_A \) and \( p_B \) denote the retail channel prices of brand A and B, respectively. The common retailer determines \( p_A \) and \( p_B \). In addition to the use of the retailer channel, supplier A can also operate a direct channel of its own, through which manufacture A can sell brand A directly to consumers at a direct channel price \( d_A \). Figure 1 presents the channel structure. The segmentation of consumers is assumed as the follows:

- There exists a segment of size \( S \) containing cross-channel price-sensitive consumers. These consumers always buy the brand with the lowest price (i.e. \( p_A \), \( p_B \), or \( d_A \)).
- Supplier A has two types of loyal consumers: a segment of size \( I \) contains brand-A-retailer-buyers. These consumers always buy brand A from the retailer regardless of other alternatives. A segment of size \( M \) contains brand-A-channel-switchers. These consumers always buy brand A. However, they can search between channels (if a direct channel is available) and buy brand A from the channel with the lowest price (i.e. \( p_A \), or \( d_A \)).
- There exists a segment of size \( R \) contains intra-retailer price-sensitive consumers. They always buy the brand with the lowest price (i.e. \( p_A \) or \( p_B \)) from the retailer.

![Figure 1. The Channel Structure](image-url)
• Supplier B also has a segment of brand-B-retailer-buyers, which is of size \( I_B \). These consumers always buy brand B from the retailer since the supplier B has no direct channel. We assume that \( I_B < I + M \) to reflect the fact that brand B (A) is a small (large) brand.

In the rest of the paper, to vivify the theoretical interpretation, we will keep using the lodging industry as an example and extensively rely on numerical examples to illustrate the main insights. (The mathematical details which are abstracted from the paper can be provided by the authors on request.) Let’s imagine that Marriott, one of the most well-known hotel brands, is supplier A; Cathedral Hill Hotel, an independent hotel in San Francisco, is supplier B; and Expedia, a major online agent, is the independent retailer who sell rooms for these two hotels.

2.2 Benchmark: When Supplier A Does Not Have a Direct Channel

To build up a benchmark case, we first examine a simple three-stage model in which supplier A does not have a direct channel. The timing of the game is as the follows:

Stage 1: supplier B determines its wholesale price, \( w_B \);
Stage 2: supplier A determines its wholesale price \( w_A \);
Stage 3, the retailer determines the retail prices \( p_A \) and \( p_B \).

We examine the Subgame-Perfect Nash equilibrium (SPNE) of this game. In SPNE, supplier B sets \( w_B^* = \frac{r(I + M)}{I + M + R + S} - \varepsilon \) (where \( \varepsilon \) is arbitrarily small and can be omitted) in stage 1; supplier A sets \( w_A^* = r \) in stage 2; and in stage 3, the retailer sets \( p_A^* = r \) and use \( p_B \) to slightly undercut \( p_A^* \) (i.e. \( p_B^* = p_A^* - \varepsilon \), where \( \varepsilon \) is arbitrarily small and can be omitted). In other words, the retailer chooses to only promote brand B. The reason is that by charging \( p_B^* < p_A^* \), the retailer induces the segment \( R \) and \( S \) to buy brand B, which has a higher profit margin. In the rest of the paper, we denote \( w_B^* \) as the benchmark of supplier B’s wholesale price. (Note by this definition, we assume an implicit tie-breaking rule that when the retailer is indifferent between promoting brand A or not, it chooses not to promote it.) In the equilibrium of this benchmark case, the profit for supplier B is \( \pi_B^{Bench} = \frac{r(I + M)(I_B + R + S)}{I + M + R + S} \), the profit for supplier A is \( \pi_A^{Bench} = r(I + M) \), and the profit for the retailer is \( \pi_r^{Bench} = \left(r - w_B^*\right)(I_B + R + S)\).

Consider the example of lodging industry. Suppose \( r = 10, I = 40, M = 15, R = 100, S = 35, I_B = 30 \). Then in equilibrium, Cathedral Hill will charge Expedia a wholesale price \( w_B^* = 3.45 \) for selling its room (in other words, a trade deal of \( 10 - 3.45 = 6.55 \)). In response, Marriott will not offer any trade deal to Expedia and simply charge \( w_A^* = 10 \). As a result, Expedia will charge \( p_A^* = 10 \) for Marriott’s room and charge a \( p_B^* \) slightly lower than 10 for Cathedral Hill’s room. By offering a trade deal to motivate Expedia to promote its room, Cathedral Hill not only captures \( I_B \) of its loyal consumers, but also captures the segments \( R \) and \( S \) of price-sensitive consumers; while Marriott only sells to the segments \( I \) and \( M \) of its own loyal consumers.

In this benchmark case, supplier A, as the supplier of a large brand, has more power than supplier B in negotiating with the retailer. Note that supplier A has a second-mover advantage since after supplier B moves, it can choose accordingly whether or not to slightly undercut \( w_B \) to increase its sales by the segments \( R \) and \( S \). However, as the equilibrium illustrates, supplier B can always use a large trade deal to beat supplier A. The reason is that supplier B has a small captive base of loyal consumers (i.e. \( I_B < I + M \)) and as a consequence, it always has a larger incentive than supplier A to charge a sufficiently low wholesale price. This will prevent supplier A from leveraging its negotiation advantage (i.e. the second-mover advantage) in competing with supplier B in the wholesale market.

### 2.3 When Supplier A Operates a Direct Channel

When supplier A operates a direct channel, we still consider a three-stage game. Stage 1 and 2 are same as in section 2.2. In stage 3, the retailer determines \( p_A \) and \( p_B \), and supplier A determines the price in the direct channel \( d_A \). The retailer and supplier A move simultaneously in stage 3. Therefore, supplier A not only competes with supplier B in the wholesale market, but also, by using the direct channel, competes with the retailer in the retail market.

To solve this game, we follow the approach of backward induction. First, we consider the competition between the retailer and supplier A’s direct channel in stage 3, given the values of wholesale prices \( w_A \) and \( w_B \). Second, taking into account the retail market competition in stage 3, we derive supplier A’s optimal wholesale price \( w_A^* \) in stage 2 given supplier B’s wholesale price \( w_B \). Lastly, taking into account the supplier A’s optimal wholesale pricing strategy in stage 2 and retail market competition in stage 3, we derive supplier B’s optimal wholesale price \( w_B^* \). We assume that \( I_B \) is sufficiently small such that it satisfies that \( \frac{M(R+S)}{I+M} < \frac{M^2 + (M+R+S)S}{I_B + I + M + R + S} \). The reason is that we are interested in the case when brand B is a sufficiently small brand (i.e. \( I_B \) is sufficiently small). This assumption dramatically simplifies the analysis.

### Stage 3: The Competition Between the Retailer and the Direct Channel

In stage 3, since the retailer carries two brands A and B, its pricing strategy is relatively complicated, depending on the values of \( w_A \) and \( w_B \). We assume that when the retailer charges \( p_A = p_B \), the segment \( R \) and \( S \) (if \( S \) buys from the retailer) will buy the brand with a lower wholesale price. It is because if \( w_A > w_B \) (\( w_A < w_B \)), the retailer can always slightly undercut \( p_A \) (\( p_B \)) by setting \( p_B = p_A - \varepsilon \) (\( p_A = p_B - \varepsilon \)), where \( \varepsilon \) is arbitrarily small and can be omitted, to induce the segment \( R \) and \( S \) to buy brand B (brand A).

When the retailer carries two brands to compete with the direct channel, its business model is characterized by the following three promotion strategies:

- First, the retailer can promote only brand A at a price \( p \) (i.e. sets \( p_A = p \)) and set \( p_B = r \), we call this strategy “brand promotion on A”;
- Second, the retailer can promote only brand B at a price \( p \) (i.e. sets \( p_B = p \)) and set \( p_A = r \). We call this strategy “brand promotion on B”;
- Third, the retailer can promote both brands at a price \( p \) (i.e. sets \( p_A = p_B = p \)), We call this strategy “category promotion”.

Note without any constraint on the values of \( w_A \) and \( w_B \), there could be numerous equilibria for the sub-game in stage 3. However, if we consider supplier A’s optimal choice of \( w_A \) in stage 2 given the value of \( w_B \), many of these equilibria will never be realized and can be eliminated for consideration. Therefore, we only discuss the potential sub-game equilibria in stage 3 which survives this elimination.
Result 1: (A) In stage 3, the retailer and the direct channel engage in a mixed-strategy equilibrium of price competition; (B) In the mixed-strategy equilibrium, the retailer’s promotion strategies are:

B1: If $w_A \leq w_B$, the retailer only provides brand promotion on A;

B2: If $w_A > w_B$ and $w_A - w_B$ is sufficiently large, the retailer only provides brand promotion on B;

B3: If $w_A > w_B$ and $w_A - w_B$ is not too large, the retailer provides brand promotion on A when promoting heavily and provides category promotion when promoting lightly.

The mixed-strategy equilibrium for this sub-game can be concluded following the standard approach in Narasimhan (1988). The intuition is that for a specific set of prices $p_A$, $p_B$ and $d_A$, either the retailer or supplier A will has an incentive to deviate from its price by either undercutting the rival’s price correspondingly, or not promoting at all. Therefore, there is no pure-strategy equilibrium. In mixed-strategy equilibrium, both the retailer and the direct channel randomly charge their prices with a probability distribution function. The price distribution of each player should make the other indifferent between charging any specific price within its own price distribution support.

We use the example of lodging industry to interpret the equilibrium cases. The details of the price distribution in the mixed-strategy are presented in Appendix. Assume $I = 40, M = 15, R = 100, S = 100, I_f = 54$:

- Suppose that Marriott charges a wholesale price $w_A = 7$, and Cathedral Hill charges $w_B = 8$ (case B1 in Result 1). Expedia finds it optimal to always charge $p_B = 10$ for Cathedral Hill’s room but promote Marriott’s room with $p_A \leq 10$. There are two reasons. First, since $w_A < w_B$, the profit margin of Marriott’s room is higher than that of Cathedral Hill. Expedia promotes Marriott’s room to induce the segment $R$ of intra-retailer price-sensitive consumers to order Marriott’s room rather than Cathedral Hill’s; Second, by promoting Marriott’s room, Expedia can compete with Marriott’s direct channel for those segments $M$ and $S$ who can order Marriott’s room from both channels. In the competition between Expedia and Marriott’s direct channel, Marriott randomly charges its direct channel price $p_d \in [8.65,10]$ with a distribution function $F_d(x) = 1 - \frac{28(10 - x)}{23(x - 7)}$, Expedia randomizes $p_A \in [8.65,10]$ with a function distribution $F_A(x) = 1 - \frac{420}{255(x - 7)}$;

- Suppose that Marriott charges $w_A = 7$, and Cathedral Hill charges $w_B = 0.5$ (case B2 in Result 1). Since the trade deal from Cathedral Hill is so huge, Expedia finds it optimal to only promote Cathedral Hill’s room but charge $p_A = 10$ for Marriott’s rooms. This will make Expedia loses all of the segment $M$ (who only order Marriott’s room) to Marriott’s direct channel. However, for the segment $R$ buying from Expedia, these consumers will buy Cathedral Hill’s rooms, whose profit margin is much higher than that of Marriott’s room. The profit gain from segment $R$ exceeds the loss from segment $M$. In the competition between Expedia and Marriott’s direct channel, Marriott randomly charges its direct channel price $p_d \in [6.26,10]$ with a distribution function $F_d(x) = 1 - \frac{77(10 - x)}{50(x - 0.5)}$, Expedia randomizes $p_B \in [6.26,10]$ with a function distribution $F_B(x) = \frac{23(x - 6.26)}{20x}$;

- Suppose that Marriott charges $w_A = 2.5$, and Cathedral Hill charges $w_B = 2$ (case B3 in Result 1). Since $w_A$ is low, Expedia has the incentive to promote Marriott’s room to attract the cross-channel segments $M$ and $S$. Also, since $w_B < w_A$, Expedia still has the incentive to induce the segment $R$ to order Cathedral Hill’s room rather than Marriott’s room. Therefore, Expedia will also promote Cathedral Hill’s room (to match the promotion of Marriott’s room). In the competition between Expedia and Marriott’s direct channel, Expedia offers category promotion (i.e. promotes both brands at the same price) with a probability 0.68 and offers brand promotion on A with a probability 0.32. In category promotion, Expedia charges $p_A = p_B = p$ and randomizes $p \in [8.79,10]$; while in brand promotion on A, Expedia charges $p_B = r$ and randomizes $p_A \in [6.81,8.79]$. Marriott randomizes $p_d \in [6.81,10]$. 


2468
Stage 2: Supplier A’s Optimal Wholesale Price \( w_A^* \)

In stage 2, when supplier A determines its wholesale price \( w_A \), it takes into account the competitive equilibrium in stage 3. The decision problem for supplier A can be expressed as

\[
\arg \max_{w_A} E\pi_A (w_A) = E\pi^d_A (w_A) + E\pi^r_A (w_A)
\]

where \( E\pi_A (w_A) \) denotes supplier A’s expected total profit in stage 3 as a function of \( w_A \). \( E\pi^d_A (w_A) \) denotes supplier A’s expected profit in direct channel, \( E\pi^r_A (w_A) \) denotes supplier A’s expected total in retail channel (note that for each brand A sold by the retailer, supplier A earns \( w_A \)). Result 2 characterizes supplier A’s equilibrium strategies.

Result 2: Given that \( I, R \) are not too large:

(a) when \( w_B \) is sufficiently high, supplier A sets \( w_A^* = w_B \), and the retailer offers only brand promotion on A in stage 3;

(b) when \( w_B \) is sufficiently low, supplier A sets \( w_A^* = r \), and the retailer offers only brand promotion on B in stage 3;

(c) when \( w_B \) is in an intermediate range, supplier A sets \( w_A^* = w_B + \frac{(r - w_B)M}{M + R + S} \), the retailer offers both category promotion and brand promotion on A in stage 3.

Let us use the example of the lodging industry to interpret Result 2 (suppose \( I = 40, M = 15, R = 100, S = 100, I_B = 54 \)).

- First, consider when \( w_B \) is high, for example, Cathedral Hill charges \( w_B = 8 \). It is not costly for Marriott to match Cathedral Hill’s trade deal. Therefore, Marriott will charge \( w_A^* = w_B = 8 \) so that Expedia only promotes Marriott’s room. Consequently, Marriott can sell its rooms to both the segments I and R through Expedia. Also, since Marriott’s direct channel competes with Expedia for the segments M and S, Marriott sells to these segments through each channel with a probability;

- Second, consider when \( w_B \) is sufficiently low, for example, Cathedral Hill charges \( w_B = 0.5 \). Then, it is too costly for Marriott to also offer a trade deal to induce Expedia to promote its room. Therefore, Marriott will just charge \( w_A^* = 10 \) and Expedia only promotes Cathedral Hill’s room. Consequently, Marriott only sells to the segment I (i.e. its loyal consumers) through Expedia, and uses the direct channel to attract the segments M and S who shop across channels;

- Third, consider when \( w_B \) is in an intermediate range, for example, Cathedral Hill charges \( w_B = 2 \). It is still too costly for Marriott to also offer a trade deal to match Cathedral Hill’s trade deal. However, Marriott is willing to offer a smaller trade deal, i.e. Marriott charges \( w_A^* = w_B + \frac{(r - w_B)M}{M + R + S} = 2.558 \). The reason is that this induces Expedia to incur a probability to only promote Marriott’s room when promoting heavily. Therefore, by offering trade deal, Marriott can sell its room to the segment R through Expedia with a probability (although not all the time). Even though the trade deal from Marriott enable Expedia to compete more aggressively with the Marriott’s own direct channel, the profit gain from the intra-retailer price-sensitive consumers (segment R) can compensate the loss caused by the increased cross-channel competition.

Figure 2 illustrates how different equilibrium scenarios arise contingent on the value of \( w_B \) and how supplier A benefits from introducing the direct channel.
Stage 1: Supplier B’s Optimal Wholesale Price $w_B^*$

Taking into account the equilibrium behaviors of the retailer in stage 3 and supplier A in stage 2, supplier B can determine its optimal wholesale price $w_B^*$. According to the three sub-game contingencies specified in Result 2, supplier B can choose among the following three strategies:

- First, supplier B can choose to set a sufficiently low $w_B^*$ so that in stage 2, supplier A will not offer any trade deal (i.e. $w_A^* = r$). Then in stage 3, the retailer will only offer brand promotion on $B$. In this case, in addition to the segment $I_B$ of its brand-loyal consumers, supplier B can also capture the whole segment $R$. Also, since the retailer promote brand $B$ to compete with the direct channel, supplier B can also sell to segments $S$ with a probability;

- Second, supplier B can choose to set a relatively low $w_B^*$ so that in stage 2, supplier A will offer a smaller trade deal (i.e. $w_A^* = w_B + \frac{(r-w_B)M}{M+R+S}$). Then in stage 3, the retailer will offer both category promotion (when promoting lightly) and brand promotion on $A$ (when promoting heavily). In addition to segment $I_B$, supplier B can sell to the segment $R$ in category promotion;

- Third, supplier B can choose not to offer any trade deal (i.e. $w_B^* = r$) so that in stage 2, supplier A will offer a trade deal and in stage 3, the retailer will offer only brand promotion on $A$. In this case, supplier B can only sell to the segment $I_B$.

Since the main objective of this paper is to examine the impact of supplier A’s direct channel on the wholesale market competition, a relevant question is: if supplier A has a direct channel, will supplier B become more aggressive in offering trade deal in wholesale market? (or, is it possible that $w_B^* < w_B^{Bench}$)? Result 3 addresses the finding.
**Result 3:** If $I_B$ is sufficiently small, $R$ is sufficiently large, and $S$ is sufficiently small, in equilibrium, supplier $B$ charges a $w_B^* < w_B^{Bench}$.

Result 3 can be illustrated by a numerical example in Figure 3 ($r = 10, I = 40, M = 15, R = 100, S = 35$). In Figure 3, $w_B$ represents the minimum wholesale price that supplier $B$ is willing to charge if it decides to offer a trade deal. Therefore, by charging $w_B$, supplier $B$ earns exactly the profit of $rI_B$, which is the profit it can earn if it does not offer any trade deal. When $I_B \leq 43.06$, supplier $B$ is willing to offer trade deal since for any value of $I_B$ in this region, it satisfies that the optimal wholesale price $w_B^* \geq w_B$. When $I_B > 43.06$, supplier $B$ is not willing to offer any trade deal since if it offers trade deal, the optimal wholesale price $w_B^* < w_B$, which means offering trade deal yields less profit than not offering. In Figure 3 when $I_B < 22.64$, the optimal wholesale price $w_B^*$ satisfies $w_B^* < w_B^{Bench} = 2.89$, which means that supplier $A$’s direct channel drives supplier $B$ to offer a greater trade deal to the retailer than if there is no direct channel. However, when $22.64 < I_B < 43.06$, supplier $B$ is still willing to offer trade deal but will charge a $w_B^* > w_B^{Bench} = 2.89$.

Consider the example of the lodging industry. Suppose that Cathedral Hill’s segment $I_B$ of loyal consumers is sufficiently small.

If Marriott operates a direct channel, then compared with the case where Marriott has no direct channel, the minimum level of $w_A$ that Marriott is willing to charge Expedia for selling its room is lower. There are two main reasons. First, with its own direct channel, Marriott does not have to always sell to segment $M$ through Expedia. Therefore, it will worry less about losing profits from this segment if it offers a large trade deal to Expedia; Second, considering those consumers who may buy either hotel brand (i.e. segments $R$ and $S$), Marriott can sell to segment $S$ through its direct channel but can sell to segment $R$ only through Expedia. Therefore, if $R$ is large and $S$ is small, the direct channel cannot significantly soften the competition between the two hotel brands within Expedia. Marriott still has a large incentive to offer trade deal so that it can capture segment $R$. The shifting of segment $M$ from the retailer to the direct channel also enhances this incentive. In gross, Marriott becomes more aggressive in offering trade deal in presence of the direct channel. Therefore, for Cathedral Hill, in order to beat Marriott in the wholesale market, it also becomes more aggressive in offering trade deal, which results in a lower equilibrium $w_B$.

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**Figure 3.** Supplier $B$’s optimal wholesale price $w_B^*$ (in presence of the direct channel) and $w_B^{Bench}$ (in absence of the direct channel)

**Figure 4.** The retailer’s equilibrium total profits $\pi_r$ (in presence of the direct channel) and $\pi_B^{Bench}$ (in absence of the direct channel)

3. The Retailer’s Benefit from the Direct Channel
If the presence of supplier A’s direct channel actually motivate both suppliers to be more aggressive in offering trade deal, the relevant question is: can the retailer benefit from such an intensified wholesale market competition? Result 4 addresses this issue.

**Result 4:** If $S$ is sufficiently small and supplier B offers a larger trade deal than if there is no direct channel for supplier A, the retailer’s profit increases.

Result 4 implies that in order to benefit from the intensified wholesale market competition, the retailer prefers a small number of pure price-sensitive shoppers (i.e. a small value of $S$). In the lodging example, it means that *Expedia* prefers that there are few consumers who can visit both channels and buy either hotel brand.

Consider the equilibrium in which only *Cathedral Hill* offers *Expedia* a trade deal while *Marriott* does not. Then there are two forces influencing *Expedia*’s total profit. First, since *Marriott*’s direct channel competes with *Expedia*, *Expedia* extracts less consumer surplus from the segment $S$ (than if there is no *Marriott*’s direct channel). However, if $S$ is small, such a profit loss is also small. Second, Result 3 indicates that if supplier A has a direct channel, a small value of $S$ can motivate *Cathedral Hill* offers a larger trade deal, which increases the consumer surplus that *Expedia* extracts from segment $I_B$ and $R$ who order *Cathedral Hill*’s room. Therefore, when $S$ is small enough, the gross effect of the above two forces leads to the increase of the retailer’s profit. With a numerical example ($r = 10, I = 40, M = 15, R = 100$), Figure 4 shows how the retailer’s total profit $\pi^*_r$ in presence of the direct channel exceeds its total profit $\pi^*_B$ in absence of the direct channel when $S$ becomes sufficiently small.

### 4. Managerial Implications and Concluding Remarks

Our paper generates important implications regarding the business model of supplier’s online direct sales. Previous research has noticed the benefit of this model on the supplier. However, our model shows that the online multi-brand retailer can also benefit from such model, although competition has been inevitably introduced between the retailer and the direct channel in the retail market. The major insight is that the supplier’s direct channel influences a multi-brand online retailer’s profit through two forces:

- First, the competition between the supplier’s direct channel and the retailer in the retail market affects the retailer’s profit;

- Second, the introduction of a direct channel by a large brand supplier can also intensify the competition in the wholesale market and motivate suppliers of small brands to offer larger trade deals. Such trade deals benefit the retailer in the wholesale market.

Therefore, if the second force dominates the first one, the retailer can even benefit from the introduction of the supplier’s direct channel. For example, the first effect can be insignificant when the size of cross-channel price-sensitive consumers is relatively small. The second effect can be significant when those small brands have relatively small loyal consumer bases but have to rely on the online retailer to establish their Internet presence. In this situation, those small brands who do not have their own online presence will become the key driver of the online retailer’s profit. Such insight is supported by anecdotal evidences from lodging industry. For example, recent observation suggests that major online intermediaries such as *Expedia* has the bargaining power to acquire a significantly lower wholesale price from those independent hotels who do not have significant online brand awareness (*Businessweek*, 10/13/2003).

Note our model differs from, but also complements, the existing literatures in illustrating how the online retailer can benefit from the supplier’s direct online channel. Existing literatures have identified that the supplier’s direct channel benefits downstream retailers by providing supports for sales-enhancing service (*Tsay, A. A. and Agrawal, N.*, 2003). *Chiang, et al.* (2003) finds that with a supplier-owned direct channel, the retailer can still benefit by obtaining a lower wholesale from the supplier. In contrast, our model shows that even the supplier-owned direct channel is a real threat to the independent retailer (i.e. no service support, only price competition), it can still indirectly benefit the retailer by intensifying the competition in wholesale market. This major insight deserves future empirical study.
Appendix

Price Distributions in Mixed-strategy Equilibrium in Stage 3

Let $F_a(x) = \Pr\left(d_a \leq x\right), F_r(x) = F_a(x,r) = \Pr\left(p_a \leq x, p_B = r\right), F_b(x) = F_r(x) = \Pr\left(p_r = r, p_B \leq x\right), F(x, x) = \Pr\left(p_r \leq x, p_B \leq x\right)$.

When the retailer offers only brand promotion on $A$:

$$F_a(x) = 1 - \frac{(r-x)(I+R)}{(x-w_A)(M+S)} \quad \text{for} \quad x \in [q_A, r], \quad F_r(x) = 1 - \frac{(r-w_A)(I+R)}{(x-w_A)(I+R+M+S)} \quad \text{for} \quad x \in [q_A, r]$$

$$q_A = \frac{(r-w_A)(I+R)}{I+M+R+S} + w_A$$

When the retailer offers both category promotion and brand promotion on $A$:

$$F_a(x, x) = \theta_A + \left[\frac{1-\theta_A + \theta_A w_A - p_A}{(M+S)-w_A} \right] \frac{(M+S)}{x} \quad \text{for} \quad x \in [\hat{k}_A, r], \quad F_a(x) = \frac{x}{x-w_A} \quad \text{for} \quad x \in [\hat{p}_A, \hat{k}_A],$$

$$\theta_A = \frac{\hat{p}_A - p_A}{\hat{k}_A - w_A} = \frac{x}{x-w_A}$$

$$F_d(x) = 1 - \frac{(r-x)(I_B + I + R)}{(x-w_A)(M+S)} \quad \text{for} \quad x \in [\hat{k}_A, r], \quad F_d(x) = \frac{x}{x-w_A} \quad \text{for} \quad x \in [\hat{p}_A, \hat{k}_A],$$

$$x \in \left[\hat{p}_A, \hat{k}_A\right], \text{ where } \hat{k}_A = \frac{r - (w_A - w_B)(R + \delta)}{I_B}, \quad \delta = \frac{(r - \hat{k}_A)(I_B + I + R)}{(\hat{k}_A - w_A)M + (\hat{k}_A - w_B)S} = 1 - F_d(\hat{k}_A)$$

When the retailer offers only brand promotion on $B$:

If $r - \frac{(w_B + S)}{I_B + R + S} \geq \frac{M}{M+S} \Rightarrow F_a(x, x) = \frac{x}{x} \quad \text{for} \quad x \in [\hat{p}_B, r], \quad F_d(x) = \frac{x}{x} \quad \text{for} \quad x \in [\hat{p}_B, r],$$

If $r - \frac{(w_B + S)}{I_B + R + S} < \frac{M}{M+S} \Rightarrow F_a(x, x) = \frac{x}{x} \quad \text{for} \quad x \in [\hat{p}_B, r], \quad F_d(x) = \frac{x}{x} \quad \text{for} \quad x \in [\hat{p}_B, r],$$

Table 3. Equilibrium Price Distribution in Stage 3

References

1. AFX. (2003) Marriott Tries to Push out Online Travel Middlemen, AFX UK (Focus), 11/11/2003