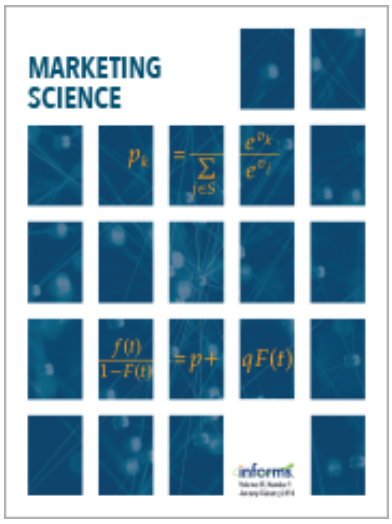

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Internet Channel Entry: A Strategic Analysis of Mixed Channel Structures

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By analyzing various alternative mixed channel structures composed of a monopoly manufacturer and online and offline outlets, we investigate how the specific channel structure and varying market conditions moderate the impact of Internet channel entry on the channel members and consumers. As an extension of Balasubramanian's model [Balasubramanian, S. 1998. Mail versus mall: A strategic analysis of competition between direct marketers and conventional retailers. *Marketing Sci.* **17**(3) 181–195], our game-theoretic model captures the fundamental difference between two different channel types and consumer heterogeneity in preference for the Internet channel use. The equilibrium solutions indicate that Internet channel entry does not always lead to lower retail prices and enhanced consumer welfare. We also find that an independent retailer might become worse off after adding its own Internet outlet under certain market conditions. We find that the impact of the Internet channel introduction substantially varies across channel structures and market environments. We explain these varied results by proposing a framework of five key strategic forces that shape the overall impact of the Internet channel introduction.

Key words: channels of distribution; game theory; Internet marketing; interchannel coordination
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1. Introduction

Despite the rapid growth and exciting potential of emerging marketing channels such as the Internet, finding the best way to utilize them in conjunction with the conventional bricks-and-mortar store channel continues to be a challenge for many firms. For example, Levi Strauss & Co. discontinued its direct Internet channel at http://www.levis.com and http://www.dockers.com and handed online sales over to a few select e-retail partners (Collett 1999). In the personal computer market, Gateway closed all of its manufacturer-owned retail stores in 2004 and now distributes its products through its direct Internet channel and independent retailers such as Best Buy and Costco. In contrast, Dell has added its full-scale manufacturer-owned stores to its existing direct Internet channel since the second half of 2006 (Zehr 2008). These anecdotes point to the need for a better understanding of the impact of the introduction of an Internet channel in a variety of mixed channel structures.

Several game-theoretic studies have investigated the impact of the Internet channel introduction, typically analyzing the case of an independent physical store retailer(s) facing new competition from a manufacturer's direct Internet channel (Balasubramanian 1998, Chiang et al. 2003, Liu and Zhang 2006, Kumar and Ruan 2006, Cattani et al. 2006). However, among the top 10 U.S. Internet retail sites in 2008, only two (Dell.com and Apple.com) were manufacturer's direct channels, whereas five were owned by physical store retailers (Staples, Office Depot, Office Max, Sears, and Best Buy), and the rest were pure-play e-tailers (Amazon.com, CDW.com, and Newegg.com) (Calnan 2009). Furthermore, some manufacturers (e.g., Nike and Apple) operate their own physical stores along with direct Internet channels. The lack of analysis of these diverse channel structure possibilities limit the insights provided by the existing studies.

We seek to address this gap in the literature by exploring the following questions:

1. When the Internet channel is added to an existing channel system, how does it affect each channel member's performance and consumer welfare? How is this effect moderated by the specific channel structure before and after the Internet channel launch?

2. What are the key underlying forces that shape the impact of the Internet channel introduction?

3. How do varying market conditions affect the impact of the Internet channel introduction?

We analyze these issues using the game-theoretic approach. Our demand model is an extension of Balasubramanian's (1998) model, which explicitly captures the relationship between the spatially positioned conventional store and an alternative channel (e.g., direct mail, TV home shopping, and the Internet) that is not spatially constrained. In contrast, the majority of other existing models capture this relationship either as horizontal differentiation in Hotelling's (1929) linear city model (Pan et al. 2002) or as vertical differentiation in shopping costs, convenience, etc. (Chiang et al. 2003). Note that though these models can also represent the competition between two physical store retailers, they may fail to capture the unique relationship between two different *types* of channels.

Despite having many desirable properties, Balasubramanian's (1998) model assumes homogeneous consumer disutility of Internet use (also assumed by Liu and Zhang 2006), which is too limiting for the investigation of our research questions as we demonstrate shortly. Therefore, we assume consumers are heterogeneous in the disutility of using an Internet channel. This extension allows us to analyze the vertical strategic interactions between an upstream manufacturer and downstream retailers within a mixed channel system, in contrast to Balasubramanian's (1998) analysis that focuses exclusively on retail-level competition. Both his model and ours are stylized representations of a mixed channel system composed of any two different types of channels without capturing any unique characteristics that distinguish one particular nonspatial channel from another (e.g., telephone versus Internet). In the rest of the paper, however, we label the nonspatial channel "Internet" because it seems the most applicable example of nonstore channels in today's market.

We also note that our demand model for the case of one physical store and an Internet store is identical to the one used by Cattani et al. (2006). However, our study is differentiated from theirs in two ways. First, they compare a set of wholesale pricing strategies for the manufacturer while assuming identical retail prices between the physical store and the Internet outlet. In contrast, we allow each channel member to set its profit-maximizing price without limitations, which often results in asymmetric retail prices across outlets. Second, we consider a broader range of channel structures that can include multiple physical stores and the Internet, each of which might be owned by the manufacturer or an independent retailer. Our model still considers a limited number of selected channel structures and thus does not cover all possible channel structures resulting from an Internet channel entry. Nevertheless, analyzing a variety of new mixed channel structures provides new insights into the impact of the Internet channel entry on the strategic interactions among the channel members.

Our results show that the impact of the Internet channel introduction varies considerably across channel structures and underlying market environments. For instance, we find that the introduction of an Internet outlet can lead to lower or higher retail prices depending on the specific channel structure resulting from the channel expansion. In addition, when an independent physical store retailer opens an online outlet to become a multichannel retailer, it generally increases the retailer's profit, but not if the market is geographically concentrated. We also find that an independent physical store retailer may experience decreased channel power (measured by its share of the total channel profit) after introducing its own Internet channel, but this depends on whether the manufacturer exercises channel price leadership or not. Thus, we argue against proposing one specific result as *the* impact of the Internet channel introduction. Instead, we propose five key underlying effects that operate together to shape the overall impact of Internet channel introduction in various situations. Intuitive explanations are provided for specific results using the framework of five underlying effects accompanied by real-world examples. In this way, we seek to provide a useful framework for understanding the nature of strategic interactions within various mixed channel structures composed of conventional and emerging outlets. We also show that the competition between a physical store and an Internet outlet is different, in nature and in outcome, from the competition between two physical stores. This implies that the successful management of a mixed channel system might involve substantially different strategic thinking than the management of a channel composed of multiple retailers of the same type (Ingene and Parry 1995).

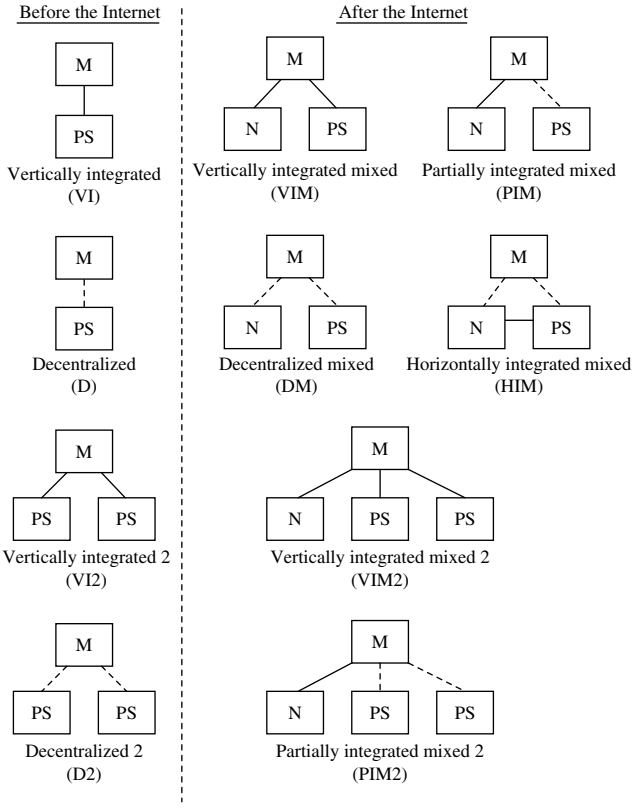
2. Model[1]

2.1. Industry Structure and Rules of the Game

Figure 1 shows the different channel structures analyzed in this study. All of them include a monopolist manufacturer selling its product through one or two physical stores before the entry of an Internet channel. The physical store(s) could either belong to either the manufacturer or an independent retailer. The addition of the Internet outlet to this system results in a mixed channel. The launch of the Internet outlet may be performed by the manufacturer, the existing independent physical retailer, or a new third-party e-tailer.

[1] The model in this paper was first introduced in the doctoral thesis of Yoo (2004).

Figure 1 Channel Structures Before and After Internet Channel Introduction



Note. M, manufacturer; PS, physical store; N, Internet store; solid line, vertical/horizontal channel integration; dotted line, independent relationship.

Specifically, before the Internet store entry, the manufacturer uses a vertically integrated store (VI) or a decentralized physical store channel (D). When these channels are expanded by the manufacturer's introduction of a direct Internet outlet, they become either a vertically integrated mixed channel (VIM) or a partially integrated mixed channel (PIM), respectively. For example, when Gateway closed all of the manufacturer-owned stores and began using independent retailers in 2004 (while keeping its direct Internet channel), it essentially switched from the VIM structure to PIM. Similarly, the decentralized channel (D) can be expanded with a new Internet channel, either introduced by the existing retailer, resulting in a horizontally integrated mixed channel (HIM; e.g., Samsung DVD players sold through Best Buy stores and Bestbuy.com), or by a new independent e-tailer, leading to a decentralized mixed channel (DM; e.g., a publisher marketing books through Borders and Amazon.com). We also consider a channel composed of two vertically integrated physical stores (VI2) to which the manufacturer can add a direct Internet channel to create VIM2. Similarly, D2 and PIM2 represent situations before and after the addition of a direct Internet outlet to two competing physical store retailers.

Similar to numerous previous studies (e.g., McGuire and Staelin 1983, Chiang et al. 2003), we assume the following:

- The manufacturer, as the Stackelberg leader, sets the wholesale price to maximize its own profit with the foresight of the independent retailers' optimal responses.[2]
- As a Stackelberg follower, the independent retailer sets its retail price to maximize its own profit, conditional on the wholesale price. The price competition between two independent retailers is assumed to be Bertrand–Nash.
- When multiple channel members are vertically or horizontally integrated, their pricing decisions are coordinated to maximize the joint profits.
- All costs are constant at zero.

2.2. Demand

2.2.1. Consumer Utility and Choice. Similar to previous studies (Balasubramanian 1998, Cattani et al. 2006, Chiang et al. 2003, Kumar and Ruan 2006, Liu and Zhang 2006), we parsimoniously model consumer utility as a function of product benefit (V), price (P), disutility of using physical store j (δ_{Sij}), and disutility of using the Internet store (δ_{Ni}). Thus,

$$\text{Consumer } i\text{'s utility of purchasing from the Internet store: } U_{Ni} = V - P_N - \delta_{Ni}, \quad (1)$$

$$\text{Consumer } i\text{'s utility of purchasing from physical store } j\text{: } U_{Sij} = V - P_{Sj} - \delta_{Sij}. \quad (2)$$

Each consumer purchases one unit of the offering that delivers the highest positive utility.

The disutility of using a physical store, $\delta_{Sij} = t|\chi_i - \chi_{Sj}|$, is the travel cost proportional to the distance between the store location (χ_{Sj}) and the consumer's location (χ_i). Without loss of generality, we set the unit travel cost, t, to equal 1.[3] The disutility associated with using the Internet channel δ_{Ni} captures various factors that can make online shopping inconvenient, such as the consumer's computer accessibility, Internet connection speed, computer skills, discomfort with online security, waiting time until delivery, shipping charge, inconvenient product

[2] We also analyzed the "Vertical Nash" game to examine the sensitivity of our results to this particular assumption. The results are discussed in §5.2.

[3] Balasubramanian (1998) holds the store locations fixed and varies t, whereas we fix t at 1 and vary the store locations to express varying degrees of store differentiation. The difference does not affect our results.

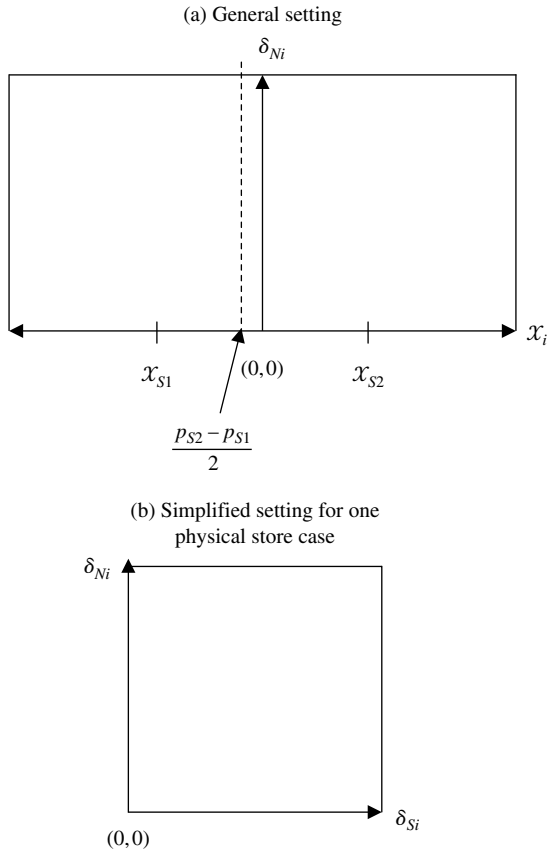
return procedures, and inability to physically examine the product before purchase. We assume that δ_{Ni} and δ_{Sij} are independent of each other, consistent with previous theoretical studies (Balasubramanian 1998, Cattani et al. 2006) and empirical studies (Degeratu et al. 2000).

2.2.2. Consumer Heterogeneity and Demand Derivation. We extend Balasubramanian's (1998) demand model by relaxing his assumption that consumers are homogeneous in disutility of using the Internet ($\delta_{Ni} = \mu$). This assumption results in an inelastic aggregate demand (p. 183), which poses no problem for his analysis of retail-level competition because individual retailers still face downward sloping demands.[4] However, applying this model to our channel structures in Figure 1 is problematic because the inelastic demand faced by the monopolist manufacturer leads to some unrealistic results.[5] Furthermore, this assumption implies that a consumer's choice between the Internet channel and a physical store is dictated by her distance to the physical store, δ_{Sij} (i.e., only those consumers who are located far away from a physical store will purchase from the Internet). In contrast, empirical studies suggest that consumers are substantially heterogeneous in their level of Internet access and their likelihood of online shopping, which depend on factors such as education, convenience orientation, experience, channel knowledge, perceived distribution utility, and perceived accessibility rather than the physical location of the consumer (Hoffman and Novak 1998, 2000; Li et al. 1999; Becker-Olsen 2000; Degeratu et al. 2000).

For these reasons, we assume that δ_{Ni} is not only *independent* of δ_{Sij} but is also *heterogeneous* across consumers. This is graphically represented by a two-dimensional distribution in Figure 2(a), where consumers are uniformly distributed in location χ_i along the horizontal axis, which represents the physical space. Thus, consumer i's disutility of using physical store j located at χ_{Sj} is $\delta_{Sij} = |\chi_i - \chi_{Sj}|$. Consumer heterogeneity in the disutility of using the Internet δ_{Ni} is also assumed to be uniformly distributed. Thus, consumers are uniformly distributed over the rectangular area shown in Figure 2(a).

When only one physical store exists in the market, one can easily show that the best store location is the midpoint (i.e., $\chi_S = 0$) in Figure 2(a). In this case, the symmetry of the model in Figure 2(a) allows us to simplify it into Figure 2(b) by doubling the density of the distribution of consumers in the market. Noting that $\delta_{Si} > V$ and $\delta_{Ni} > V$ means no purchase even at zero prices, we assume that δ_{Si} and δ_{Ni} are uniformly distributed between 0 and V for the base model. We relax this assumption in §5.

Figure 2 Illustration of Consumer Heterogeneity



Deriving demand functions from this spatial model is straightforward. For the case of one physical store, the demand is represented by area A in Figure 3(a), which is $Q_S = V(V - P_S)$. In the case of a mixed channel composed of a physical store and an Internet store, consumers along the line $\delta_{N_i} = \delta_{S_i} + (P_S - P_N)$ are indifferent between the two outlets. Defined by this and the dotted indifference lines between purchase and no purchase in Figure 3(b), regions A and B jointly represent the demand for the physical store, whereas C and D represent the demand for the Internet store. Thus, the demand for the physical store Q_S and the demand for the Internet store Q_N are

$$Q_S = \tfrac{1}{2}(V - P_S)^2 + P_N(V - P_S), \tag{3}$$

$$Q_N = \tfrac{1}{2}(V - P_S)(P_S - 2P_N + V) + P_S(V - P_N), \quad \text{if } P_S \geq P_N; \quad \text{and} \tag{4}$$

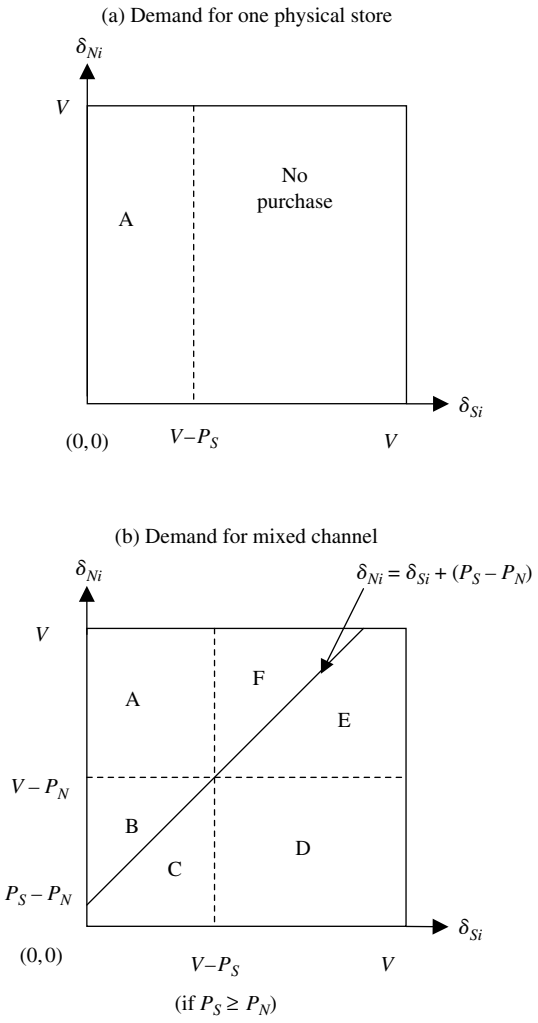
$$Q_S = \tfrac{1}{2}(V - P_N)(P_N - 2P_S + V) + (V - P_S)P_N, \tag{5}$$

$$Q_N = \tfrac{1}{2}(V - P_N)^2 + (V - P_N)P_S, \quad \text{if } P_S < P_N. \tag{6}$$

[4] Balasubramanian (1998) also states that the incorporation of heterogeneous Internet disutility does not affect his main findings. See footnote 4 in his paper.

[5] For instance, the manufacturer extracts 100% of the independent Internet retailer's profit. See Technical Supplement A of the electronic companion (available as part of the online version that can be found at http://mktsci.pubs.informs.org) for further details.

Figure 3 Demand for Channel Structures Involving One Physical Store



3. Results

The model described in §2 is analyzed as a sequential game in which the manufacturer is the Stackelberg leader with respect to an independent retailer.[6] The resulting closed-form solutions for various channel structures are summarized in Table 1.

3.1. Physical Store Entry vs. Internet Store Entry

Our results indicate that an Internet channel entry and a new physical store entry affect the channel members in different ways. Therefore, an Internet channel introduction in our analysis reflects not merely the entry of an additional outlet but also the entry of a *different type* of channel. One can see this by observing two key differences in demand characteristics between structure D2 (two decentralized physical stores) and structure DM (a physical store and an Internet outlet, both decentralized).[7] First, under D2, $\chi_i = (p_{S2} - p_{S1})/2$ represents the marginal consumers who are indifferent between the two competing physical stores (see Figure 2(a)). Therefore, when physical store 2 enters the market, this new competition is not likely to lure highly satisfied customers (i.e., those in close proximity to store 1) away from the incumbent physical store 1. In contrast, under DM, the marginal consumers are found along the line $\delta_{N_i} = \delta_{S_i} + (P_S - P_N)$ as shown in Figure 3(b). Thus, even highly satisfied customers of the incumbent physical store may switch to the new Internet channel, whereas some low-satisfaction customers may continue to buy from the physical store. Second, for structure D2, the demand for each store is a function of the store locations (and the resulting degree of store differentiation). In particular, if the two stores are sufficiently differentiated from each other, each operates as a local monopolist. In contrast, the competition between the physical store and the Internet store in a DM is not defined spatially. Consequently, local monopoly is not possible, as shown in Figure 3(b).

Considering the differences in demand characteristics, it is not surprising to observe two different sets of equilibrium solutions for a D2 and DM, as shown in Table 1. The most obvious difference is the dependence of the equilibrium solutions on store locations when an additional physical store is introduced (VI2 and D2), which does not hold for the mixed channel structures (VIM and DM). Having shown the differential effects of an Internet channel entry and a physical store entry, we next present five key findings based on the results in Table 1, panel a.

3.2. Impact of Ownership Structure

Finding 1: *Double marginalization effect*

(A) Compared to a VI, a D leads to a higher retail price, a lower quantity, a lower total channel profit, and a lower manufacturer profit.

(B) Compared to a VIM (PIM), a PIM (HIM or DM) leads to lower total quantity, total channel profit, and manufacturer profit.

This is the well-documented double marginalization effect (Jeuland and Shugan 1983, Chiang et al. 2003, Liu and Zhang 2006), extended to various mixed channel structures.

Finding 2: *Myopic interchannel price coordination effect*

The joint retail profits are greater for a DM than for a HIM.

This indicates that the two retail outlets are jointly *worse off* if they switch from competitive pricing (i.e.,

[6] The mathematical details of the equilibrium derivation are available from the authors upon request.

[7] The same discussion can be applied to vertically integrated channel settings (i.e., VI, VI2, and VIM).

Table 1 Market Outcomes for Various Channel Structures

	VI	D	VIM	PIM	HIM	DM
			Panel (a): Channel structures involving one physical store			
W^*	0	$0.5V$	0	$0.53834V$	$0.55025V$	$0.52191V$
P_N^*	0	0	$0.57735V$	$0.54759V$	$0.78922V$	$0.74465V$
P_S^*	$0.5V$	$0.75V$	$0.57735V$	$0.74952V$	$0.78922V$	$0.74465V$
Avg. retail price[a]	$0.5V$	$0.75V$	$0.57735V$	$0.60532V$	$0.78922V$	$0.74465V$
Q_N	0	0	$0.3333V^2$	$0.42103V^2$	$0.18858V^2$	$0.22275V^2$
Q_S	$0.5V^2$	$0.2V^2$	$0.3333V^2$	$0.16855V^2$	$0.18858V^2$	$0.22275V^2$
Total Q	$0.5V^2$	$0.25V^2$	$0.6666V^2$	$0.58958V^2$	$0.37716V^2$	$0.44550V^2$
N profit	0	0	0	0	$0.04506V^3$	$0.04962V^3$
S profit	0	$0.0625V^3$	0	$0.03559V^3$	$0.04506V^3$	$0.04962V^3$
Total retail profit	0	$0.0625V^3$	0	$0.03559V^3$	$0.09012V^3$	$0.09923V^3$
M profit w/N	0	0	$0.19245V^3$	$0.23055V^3$	$0.10377V^3$	$0.11626V^3$
M profit w/S	$0.25V^3$	$0.125V^3$	$0.19245V^3$	$0.09074V^3$	$0.10377V^3$	$0.11626V^3$
Total M profit	$0.25V^3$	$0.125V^3$	$0.3849V^3$	$0.32129V^3$	$0.20754V^3$	$0.23251V^3$
Channel profit	$0.25V^3$	$0.1875V^3$	$0.3849V^3$	$0.35688V^3$	$0.29766V^3$	$0.33174V^3$
Consumer surplus	$0.125V^3$	$0.03125V^3$	$0.14088V^3$	$0.10843V^3$	$0.03975V^3$	$0.05688V^3$

	VI2 (local monopoly)	VI2 (competition)	D2 (local monopoly)	D2 (competition)
	Panel (b): Channel structures involving two physical stores only			
W^*	0	0	$0.5V$	$0.5(a+V)$
P_{PS1}^* $(=P_{PS2}^*)$	$0.5V$	$0.5(a+V)$	$0.75V$	$0.7(a+V)$
Q_{PS1} $(=Q_{PS2})$	$0.5V^2$	$0.25V(a+V)$	$0.25V^2$	$0.15V(a+V)$
Total Q	V^2	$0.5V(a+V)$	$0.5V^2$	$0.3V(a+V)$
PS1 (PS2) profit	0	0	$0.0625V^3$	$0.03V(a+V)^2$
Total retail profit	0	0	$0.125V^3$	$0.06V(a+V)^2$
M Profit from each PS	$0.25V^3$	$0.125V(a+V)^2$	$0.125V^3$	$0.075V(a+V)^2$
Total M profit	$0.5V^3$	$0.25V(a+V)^2$	$0.25V^3$	$0.15V(a+V)^2$
Channel profit	$0.5V^3$	$0.25V(a+V)^2$	$0.375V^3$	$0.21V(a+V)^2$
Consumer surplus	$0.25V^3$	$0.083V(a+V)^2$	$0.0625V^3$	$0.03V(a+V)^2$

Notes. The closed-form solutions are converted from fractions to decimals and rounded for easy comparison. The analysis and solutions for structures VIM2 and PIM2 are presented in Technical Supplement F of the electronic companion.

[a]Weighted by demands.

the Bertrand–Nash game in the DM structure) to coordinated pricing (i.e., joint profit maximization in the HIM structure). It shows the danger of retail price coordination without the foresight of the manufacturer's pricing behavior. Switching from competitive pricing to coordinated pricing should lead to higher joint retail profits *for a fixed wholesale price* but not necessarily so when the manufacturer raises its wholesale price using its knowledge of the retailers' changed reaction functions. This further raises the already high retail prices caused by double marginalization and results in lower profits for the channel system and for the individual channel members. This is analogous to Lee and Staelin's (1997) finding of a potentially negative effect of retailers' product line pricing.

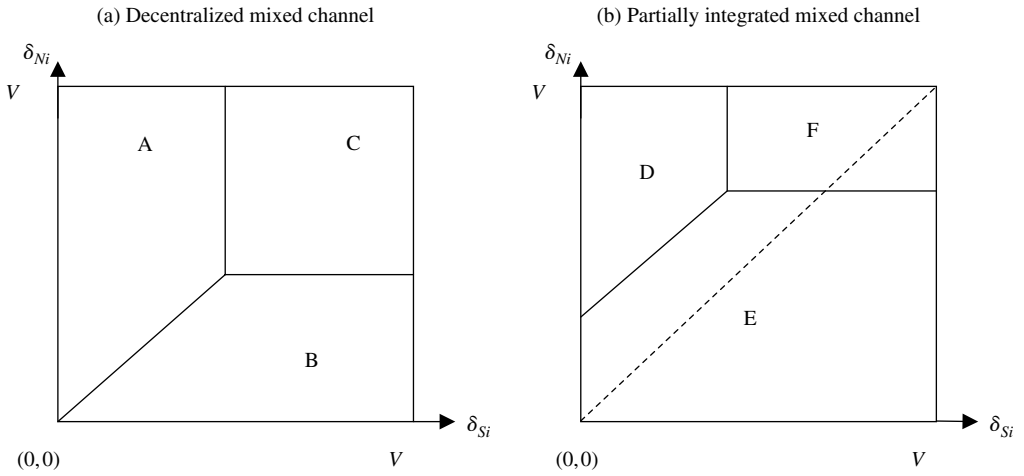
Finding 3: *Price discrimination effect*

The retail price of the physical store P_S^* is higher for a PIM than for a DM.

This may appear counterintuitive considering that the independent physical store faces more intense price competition from the manufacturer's direct Internet store in a PIM than from the independent Internet store in a DM (i.e., P_N^* is lower for a PIM than for a DM). We find that this is due to the manufacturer's strategic price discrimination between the two types of outlets in a PIM, as illustrated in Figure 4.

Figure 4 contrasts the partitioning of the market between the two mixed channel structures. Under the DM structure, the manufacturer charges the same wholesale price for both retailers, which causes them to set symmetric retail prices, and thus the market is split evenly along the diagonal line in Figure 4(a). In contrast, in the PIM structure (Figure 4(b)), the manufacturer recognizes the superior profitability of the direct Internet channel because the manufacturer can retain all the profits generated from it. Therefore, the manufacturer chooses to attract a broad range of consumers (region E) by offering a low online price. This leaves the independent physical store with a smaller target market of those strongly preferring the physical store (area D). Their strong preference for the physical store is exploited by the manufacturer, who sets a high wholesale price and thus induces a high retail price. In this way, the manufacturer in the PIM uses the direct Internet channel for the mass market and the physical store for a niche market.

Figure 4 Price Discrimination in the Partially Integrated Mixed Channel



A: Demand for physical store
B: Demand for Internet channel
C: No purchase

D: Demand for physical store
E: Demand for Internet channel
F: No purchase

$\delta_{Si} = 0$: Consumer i is located at the physical store's location

3.3. Impact of Internet Store Entry

Finding 4: *Market coverage effect*

(A) The addition of a new Internet store to the VI structure (resulting in a VIM or PIM) leads to a greater total quantity and higher retail prices.

(B) The addition of a new Internet store to the D structure (resulting in a PIM, HIM, or DM) leads to a greater total quantity and a higher wholesale price.

(C) The addition of a new Internet store leads to improved consumer surplus, except for a change from a VI to a PIM.

This happens because the two different types of stores jointly cover a wider range of heterogeneous consumers than a single store, which leads to greater demand. This generally translates into enhanced consumer surplus. The only exception is when the vertically integrated channel (VI) is augmented by an independent Internet store, which can result in a PIM, where the introduction of double marginalization hurts consumer surplus. In addition, the manufacturer using a mixed channel (VIM, PIM, HIM, or DM) faces a lower price elasticity of demand than when he uses a single store channel (VI or D). As shown in Figure 5(a), with only one store, area A represents the demand loss resulting from the price increase from P1 to P2 and a price elasticity of $P1/(V - P1)$ is exhibited. In contrast, if two types of outlets serve the market (Figure 5(b)), the area of (B + C + D) represents the demand loss from the same price change and a smaller aggregate demand price elasticity of $P1(P1 + P2)/(V^2 - P1^2)$ is exhibited. Thus, the manufacturer with a mixed channel has an incentive to set higher prices. With the increased demand and prices, the manufacturer's profit increases after the Internet store introduction.

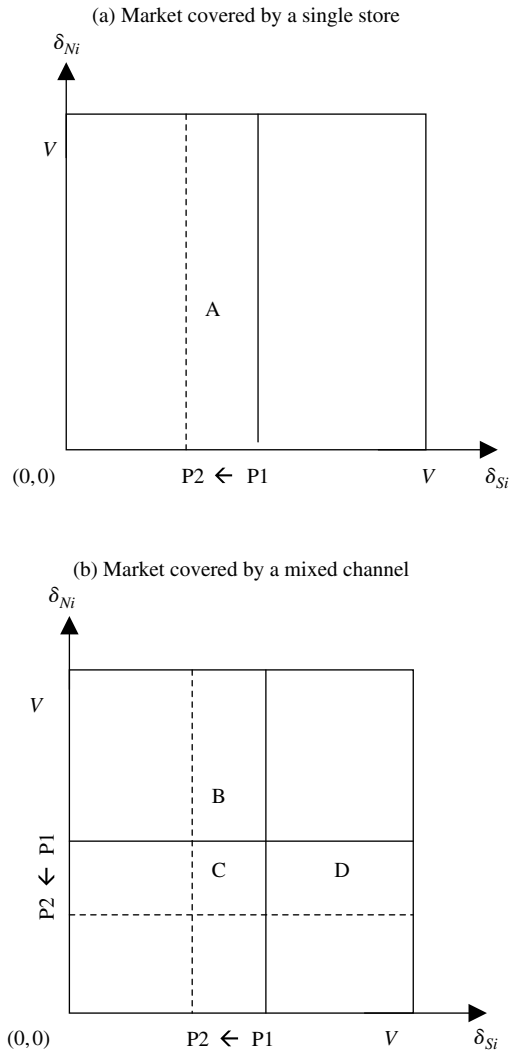
Finding 5: *Retail competition effect*

The competitive entry of a new Internet channel to the existing independent retail store (i.e., a change from a D to a PIM or DM) leads to lower retail prices and a greater share of the total channel profit for the manufacturer.

These results are driven by the retail competition introduced by the entry of the Internet channel. As shown in Table 2, when a new Internet store enters as a competitor to the existing physical store (PIM and DM) to a decentralized channel (D), the manufacturer's "channel power" (measured by its share of the total channel profits) improves from 66.7% to 71.8% in a PIM and to 70% in a DM.[8] This reflects the fact that the manufacturer using competing retail stores can extract more profits from the channel by raising the wholesale price because the competing retail outlets have a smaller incentive to raise their retail prices than those in the decentralized channel (D) structure. This finding is consistent with the results of previous studies (Liu and Zhang 2006, Chiang et al. 2003) as well as with Porter's (1979) argument that powerful suppliers can exert bargaining power by raising prices and squeezing profitability out of downstream industry members who are unable to recover cost increases in their own prices because of intense competition.

[8] In the PIM, we measure the channel power within the physical store channel only. Therefore, the manufacturer's channel power is measured by its profit share in the physical store channel, which is $0.09074V^3/(0.09074 + 0.03559)V^3 = 0.718$.

Figure 5 Illustration of Market Coverage Effect



Interestingly, Table 2 shows that when the independent retailer in the D structure opens its Internet store (resulting in HIM), the retailer's channel power diminishes. This is due to the myopic interchannel price coordination effect. In other words, with little foresight of the manufacturer's pricing behavior, the retailer's coordinated retail pricing intended to maximize the joint profits from the two outlets actually reduces the retailer's ability to capture a larger share of the total channel profit.

Table 2 Channel Member Profit Shares in Various Channel Structures

	Manufacturer (%)	Independent physical store (%)
Vertically integrated	100	N/A
Decentralized	66.7	33.3
Vertically integrated mixed	100	N/A
Partially integrated mixed	71.8	28.2
Horizontally integrated mixed	70	30
Decentralized mixed	70	30

Finally, we find in panel a of Table 1 that the manufacturer prefers to keep the physical store along with its Internet channel (PIM) instead of replacing the physical store with an Internet store (which leads to the same outcome as VI). In other words, at least within the context of our base model, the manufacturer has no incentive for complete disintermediation. Moreover, the quantity sold through the Internet channel is positive in contrast to the Chiang et al. (2003) finding that the manufacturer who sells products through a conventional retailer has no incentive to sell the products online. This result is not surprising considering the market coverage effect. Perhaps this partially explains why disintermediation has taken place to a much smaller extent than many had speculated.

4. Discussion

Our five main findings provide a framework for understanding the impact of Internet channel introduction. Table 3 summarizes the key individual effects that jointly shape the overall impact of the introduction of an Internet channel as summarized in Table 4. A specific market outcome depends on the presence and relative size of each effect. For instance, we have demonstrated that a manufacturer is better off with the introduction of an Internet store regardless of the resulting channel structure. Table 4 indicates that this is primarily due to the market coverage effect common to all the cases of Internet channel introduction. We find that this benefit is maximized when a monopoly manufacturer vertically integrates the Internet channel, which allows the manufacturer to avoid (or minimize) the double marginalization effect (without considering the costs of opening a direct Internet channel). In contrast, for an independent physical store retailer (in the D structure), the only way to benefit from the market coverage effect is to open his own Internet store. Otherwise, an Internet store entry creates new competition that can result in a reduced profit for the incumbent retailer.

Our results also suggest that retail prices are not always lower after the introduction of an Internet channel. When a monopoly manufacturer with a vertically integrated store (VI) introduces an Internet channel (VIM), Tables 3 and 4 indicate that the increased market coverage resulting from the channel expansion results in higher retail prices. Nevertheless, the negative impact of higher prices on consumer welfare is counterbalanced by the positive impact of wider market coverage (i.e., the product is accessible to more consumers), which results in greater total consumer surplus. In contrast, if the Internet channel

Table 3 Underlying Effects Associated with Internet Channel Introduction

Underlying effect	Description	Impact
Double marginalization effect	Each independent player in a channel maximizes his own profit rather than the total channel profit.	• Raises retail price • Reduces quantity sold • Reduces profits of other channel members • Reduces total channel profit • Reduces consumer welfare
Market coverage effect	More stores serve a wider variety of consumers with higher prices.	• Raises retail prices • Raises quantity sold • Raises manufacturer's profit • Raises total channel profit • Raises consumer welfare
Retail competition effect	Adding another retailer to the incumbent channel structure introduces competition between retailers, resulting in lower retail profits and allowing the manufacturer to squeeze profitability from the channel.	• Raises wholesale price • Reduces retail price • Raises quantity sold • Raises manufacturer's profit and channel power • Reduces decentralized retailer's profit and channel power • Raises consumer welfare
Myopic interchannel price coordination effect	Retail price coordination between two retailers with little foresight of the manufacturer's pricing behavior can lead to lower profits and channel power *in comparison with* an uncoordinated situation.	• Raises wholesale price • Raises retail prices • Reduces quantity sold • Reduces manufacturer's profit • Raises channel power of a manufacturer • Reduces combined retail profits • Reduces channel power of retailers • Reduces consumer welfare
Price discrimination effect	A seller charges different prices to different consumer groups to maximize his profit, when he faces heterogeneous consumers and can distinguish the particular type of a given consumer.	• Raises wholesale price • Raises price of a decentralized retailer • Reduces price of an integrated retailer • Raises manufacturer's profit and channel power • Reduces a decentralized channel member's profit and channel power • Raises consumer welfare

Table 4 Impact of the Introduction of the Internet Channel

	Internet channel by manufacturer	Internet channel by physical store	Internet channel by new player
Base case: Vertically integrated	• Market coverage effect	N/A	• Double marginalization effect • Market coverage effect • Retail competition effect • Price discrimination effect
Base case: Decentralized	• Mitigates double marginalization effect • Market coverage effect • Retail competition effect • Price discrimination effect	• Market coverage effect • Avoids retail competition effects • Myopic interchannel price coordination effect	• Market coverage effect • Retail competition effect

is introduced by a new e-tailer (changing the channel structure from VI to PIM[9]), double marginalization enters into the channel system and leads not only to higher retail prices but also to decreased consumer surplus. Furthermore, online shoppers are found to be more convenience oriented and less price sensitive in certain markets (Andrews and Currim 2004), which makes it unnecessary to set prices very low. These findings partially explain why retail prices increased after the Internet channel introduction in certain industries (Schlesinger 1999) and suggest that policy makers need to understand the underlying effects of Internet channel introduction on consumer welfare.

We have also shown that adding a direct Internet store can create an opportunity for a manufacturer in

[9] The resulting partially integrated mixed channel consists of a manufacturer-owned physical store and an independent Internet store, which is a mirror image of the PIM shown in Figure 1.

a decentralized channel to implement price discrimination (switching from a D to a PIM). Such practices have been observed in the insurance and hospitality industries where consumers can find lower prices or better promotional terms through the Internet channel rather than through traditional intermediaries (Brown and Goolsbee 2002, Krantz 2003). Similar online–offline price differences are also observed in the medical service sector (Miller 2008). According to Table 4, this type of channel expansion can be highly profitable for manufacturers as a result of multiple benefits such as increased market coverage, price discrimination, and retail competition while mitigating the double marginalization effect. Conversely, such a channel expansion can significantly hurt the independent physical store's profit. Thus, a manufacturer's plan to open a new direct Internet channel is likely to face very strong resistance from the existing retailers, as observed in Levi Strauss & Co.'s conflict with Macy's and JCPenney (Dugan 1999) and many other instances (Atkinson 2001).

Our finding of the myopic interchannel price coordination effect (smaller joint retail profits for HIM than for DM) has an interesting organizational implication: when an independent physical store retailer opens an Internet channel, it is more profitable to manage the two channels as separate profit centers than to manage them in coordination, unless the retailer is the channel price leader (Lee and Staelin 1997). Retail prices for products such as books, CDs, and DVDs are generally higher at Internet stores in the HIM structures than at pure-play e-tailers (the DM structures in our model), which exhibits the interchannel price coordination effect on retail prices (Tang and Xing 2001, Carlton and Chevalier 2001, Pan et al. 2002, Ancarani and Shankar 2004). Our analysis suggests that such price coordination might diminish the retailer's channel power and profit. This effect might have been a factor leading to Barnes & Noble's decision to spin off its dot-com operations into a separate company (Tedeschi 2000). This highlights the growing importance of understanding channel partners' behaviors as more firms adopt multichannel marketing strategies.

5. Model Extension

5.1. Impact of Asymmetric Consumer Heterogeneity

The base model analysis in the previous sections assumes symmetric distributions of δ_{Si} (disutility of offline purchase) and δ_{Ni} (disutility of online purchase). However, in the real world, the distributions of δ_{Si} and δ_{Ni} can be asymmetric and can vary considerably across markets depending on the degree of geographic concentration of buyers, product characteristics (e.g., "search goods" versus "experience goods") (Peterson et al. 1997), e-commerce readiness (Chabrow 2004), and level of Internet adoption (Walsh 2003). To examine the robustness of our results to such varying market conditions, we analyzed five different market environments characterized by varying ranges of δ_{Si} and δ_{Ni} as shown in Table 5. Specifically, using the base model assumption of $0 \le \delta_{Si} \le V$ and $0 \le \delta_{Ni} \le V$ as the starting point (Case 3 in Table 5), we changed the range of δ_{Ni} to $0 \le \delta_{Ni} \le V/2$ (Case 1) and to $0 \le \delta_{Ni} \le 2V$ (Case 5) while adjusting the density to hold the total market size the same. In Case 1, an average buyer prefers the Internet to the physical store, and all consumers have realistic chances of online purchases. In contrast, an average consumer in Case 5 prefers the physical store, and 50% of all consumers have no possibility of online purchases. The range of δ_{Si} is varied in a similar way to create market environments with geographically concentrated (Case 2) or dispersed (Case 4) consumers.

Table 5 Asymmetric Distributions of Consumer Disutility

	$0 \le \delta_{Si} \le V/2$	$0 \le \delta_{Si} \le V$	$0 \le \delta_{Si} \le 2V$
$0 \le \delta_{Ni} \le V/2$		Case 1	
$0 \le \delta_{Ni} \le V$	Case 2	Case 3	Case 4
$0 \le \delta_{Ni} \le 2V$		Case 5	

The equilibrium solutions are obtained for the four asymmetric cases described above for the six channel structures discussed in §3.[10] The results are qualitatively comparable to those for the symmetric base model, which indicates that the overall impact of the Internet channel introduction in the asymmetric cases is shaped by the five underlying strategic effects as described in Tables 3 and 4. Despite the general resemblance in findings, we note the following three new results for the asymmetric settings.

- The retail competition effect of the Internet channel introduction strengthens as the range of δ_{Si} in a market decreases.
- In a geographically concentrated market ($0 \le \delta_{Si} \le V/2$), the independent physical retailer can be worse off with his own Internet outlet (HIM) than without it (D).
- In a geographically concentrated market ($0 < \delta_{Si} < V/2$), a channel structure change from VI to VIM or from D to HIM decreases consumer surplus.

These results reflect somewhat surprising effects of Internet channel introduction in a geographically concentrated market (Case 2 in Table 5). A physical store in such a market appears well positioned

[10] Detailed results for each case can be obtained from the authors upon request.

(i.e., with strong customer preference). However, a new independent Internet channel, without a unique target market and with a high travel cost to the physical store, has to aggressively compete for the physical store's core customers. Therefore, a "better-positioned" incumbent retailer is more vulnerable to the competitive entry of an Internet channel. On the other hand, if the new Internet channel enters as a horizontally integrated extension of the physical store retailer in such a market, it leads to a minimal market coverage expansion and a greater overlap between the two outlets' target markets. Myopic price coordination in this situation results in inflated retail prices, a decrease in total channel profit, and a smaller share of the total channel profit for the retailer. Consequently, a channel member can become *worse off* by opening his own Internet channel, even if it can be done without cost. The inflated prices, coupled with the minimal market coverage expansion, result in decreased consumer surplus.

5.2. Absence of Channel Price Leadership

So far, our results are based on the assumption of manufacturer price leadership in the channel. Although this is typical in game-theoretic studies of channels, Putsis (1999) empirically shows that the "Vertical Nash" game (i.e., no channel price leader) characterizes many distribution channels. Because of the general sensitivity of channel strategies to channel price leadership (e.g., Choi 1991, Lee and Staelin 1997), we analyzed the Vertical Nash games in our model.[11]

The results of this analysis are largely consistent with the Manufacturer Stackelberg results discussed in §§3 and 4. However, one main difference was found in the manifestation of the myopic interchannel price coordination effect. In the Manufacturer Stackelberg game, the myopic interchannel price coordination of the multichannel retailer (i.e., the retailer in the HIM structure) leads to inferior total profit and less channel power for the retailer relative to uncoordinated pricing (i.e., DM). In contrast, in the Vertical Nash game, the retailer is better off with coordinated pricing than without coordination in terms of profit and channel power. Other symptoms of myopic interchannel price coordination, such as higher retail prices and lower manufacturer profit and consumer welfare, were replicated. The negative profit impact of myopic price coordination on retailer profit disappears in the Vertical Nash game because the retailer does not have a disadvantage of inferior foresight relative to the manufacturer.[12]

[11] Detailed results are available in Technical Supplement E of the electronic companion.

[12] We acknowledge the helpful suggestion provided by an anonymous reviewer on this issue.

5.3. Cases with Two Physical Stores

Our analysis of the mixed channel structures including two physical stores (VI2, VIM2, D2, and PIM2 in Figure 1) reveals that the impact of the Internet channel introduction in the presence of two physical stores is generally consistent with those summarized in Tables 3 and 4. Besides demonstrating the robustness of our main findings, the model produced the following new results when we inserted an additional physical store (see Technical Appendix F of the electronic companion for detailed discussions).

- Even with the greatest degree of spatial differentiation, the physical stores cannot operate as a local monopoly after the Internet channel entry.
- When the manufacturer with two vertically integrated stores (VI2) opens a direct online channel (VIM2), the Internet channel serves a smaller number of customers at a higher retail price than each of the physical stores if the two physical stores are highly differentiated. The opposite is true if the two physical stores are positioned close to each other.
- When the manufacturer selling through two independent retail stores (D2) opens a direct Internet channel (PIM2), the market share captured by the Internet channel is always higher than that of either physical store and increases as the spatial distance between the physical stores diminishes.

6. Conclusion

By analyzing a game-theoretic model that explicitly captures the store channel and the Internet channel in two different dimensions, we have investigated how the introduction of an Internet channel affects the channel members and consumers. We have also demonstrated that the impact of an Internet channel introduction not only differs from the impact of a physical store entry but also varies considerably across channel structures and market conditions. Out of the complex results, we have identified five key strategic forces that shape the overall impact of an Internet channel introduction. Each of the five underlying forces is intuitively appealing, but in combination, they can produce unexpected results under certain conditions. For instance, we find that the addition of an Internet channel does not always lead to lower prices and enhanced consumer welfare, that an existing physical store retailer might react to the competitive entry of the Internet channel by raising its price, and that a horizontally integrated mixed channel retailer might be worse off with interchannel coordination in pricing.

For marketing managers, this study highlights the key moderating role of channel structure and market environment on the impact of an Internet channel entry. Because the impact can vary substantially

depending on whether it is introduced by the manufacturer, the existing retailer, or a new independent e-tailer, the key strategic question is not only whether to introduce an Internet channel but also how. In addition, it will be critical for manufacturers to discern the relationship between market conditions and the strategic role of each channel (e.g., a mass market channel versus a niche channel). Similarly, retailers facing new competition from an Internet channel will have to strategically decide whether to try to maintain its market share, settle for an even split of the market, or substantially narrow its target market scope to remain profitable.

We acknowledge a few limitations of our study. First, some of our simplifying model assumptions, such as the monopoly manufacturer and zero production costs, can be relaxed in the future research for the analysis of the impact of brand-to-brand competition and supply-side factors on optimal multichannel strategies. Second, we assume that consumers' disutility of online shopping is independent of their disutility of offline shopping. Although this assumption is common in this type of study, one cannot rule out the possibility that the two are correlated. Future research is needed for an empirical investigation of such correlations and for theoretical analysis of their strategic implications. Third, our model views consumer channel choice as an "either/or" decision, ignoring the interesting possibility of consumers using both as complements (e.g., product examination in the physical store followed by a purchase through the Internet). Fourth, a future study can also consider different consumer responses to a new Internet channel (i.e., different distributions of δ_{Ni}) depending on whether the channel is operated by a manufacturer or a retailer. The different responses might be caused by their differential abilities for speedy delivery, website design, service, etc. Examining such variations in consumer preferences for the Internet channel has the potential to produce interesting results.[13] Finally, as mentioned earlier, the "Internet" in this study merely represents a type of channel different from physical stores but does not capture any unique characteristics of the Internet compared with other non-store retailing channels such as catalog retailers and TV home shopping channels. Because this is also true for previous models involving the Internet channel (Balasubramanian 1998, Lal and Sarvary 1999, Zettelmeyer 2000, Liu and Zhang 2006, Pan et al. 2002, Kumar and Ruan 2006, Chiang et al. 2003), developing a model that captures key differences across various types of nonspatial channels could be a worthwhile future research direction toward the deeper understanding of multichannel distribution.

[13] We thank an anonymous reviewer for suggesting this research direction.

7. Electronic Companion

An electronic companion to this paper is available as part of the online version that can be found at http://mktsci.pubs.informs.org/.

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