

Chapter 13

MODELING CONFLICT AND COORDINATION IN MULTI-CHANNEL DISTRIBUTION SYSTEMS:

A Review

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1. Introduction

1.1 Business Setting

For any company with a product to sell, how to make that product available to the intended customers can be as crucial a strategic issue as developing the product itself¹. While distribution channel choice is a very traditional concern, for many companies it has recently come under intense scrutiny due to a number of major developments. The expanding role of the Internet in consumer and business procurement activity has created new opportunities for access to

customers. Information and materials handling technologies have broadened the feasible set of sales and distribution activities that a producer might reasonably perform. The economics of materials delivery has been transformed by the pervasive logistical networks deployed by third-party shipping powerhouses such as Federal Express and United Parcel Services. As a result, many manufacturers are reconsidering their approaches to distribution, with particular attention to the role of intermediaries².

The prospect of reducing or even eliminating the reliance on resale intermediaries has always offered certain lures for manufacturers, including the following: (1) intermediaries carry only small assortments of a manufacturer's products, (2) direct control of distribution and pricing can lead to higher profit margins, (3) intermediaries can use their power to extract various concessions from the manufacturers, (4) manufacturers can provide a broader product selection in a better ambience with higher service in direct outlets, (5) more flexibility in experimenting with product attributes, (6) closer contact with customers, and (7) protection from crises faced by intermediaries (Stern *et al.* 1996). Eliminating intermediaries ("disintermediation") can also improve supply chain efficiency by allowing upstream parties better visibility into market demand (cf. Lee *et al.* 1997). While these arguments have long supported the use of print catalog sales and company-owned stores, the explosion in possibility of electronic commerce has been particularly influential in drawing many manufacturers into the realm of direct sales³.

Elimination of intermediaries is not without disadvantage. The role of intermediaries is to efficiently create and satisfy demand, through activities that include building brand and product awareness through advertising and customer education, providing market coverage, gathering market information, providing breadth of assortment, breaking bulk, processing orders, customer support, etc. If a manufacturer cannot otherwise attend to these functions efficiently, elimination of intermediaries may cause an erosion of profits, market share, or both (cf. Ghosh 1998). As noted by Stern *et al.* (1996, p.115), "It is an old axiom of marketing that it is possible to eliminate wholesalers (or any middlemen, for that matter) but impossible to eliminate their functions."

The "age of eBusiness" has now been underway for a few years, and evidence that has accumulated thus far indicates a trend towards a portfolio approach that includes both intermediated and manufacturer-owned channels (each type of which can take either bricks-and-mortar or online⁴ form). This exploits the relative strengths of each and their appeal to different market segments. Indeed, leveraging multiple channel types may allow greater market penetration than using any one alone, and may enable innovative methods of value-delivery yet to be imagined (cf. Balasubramanian and Peterson 2000).

This vision faces a number of implementation challenges. An obvious obstacle that comes with increasing system complexity is the difficulty in main-

taining coherence across channels with respect to strategy and execution. Perseverant manufacturers can presumably overcome this with management effort and appropriate information technologies. However, a different issue altogether is one that is frequently cited among the most significant barriers to multi-channel strategies, and is unlikely to be remedied purely internally since the root cause is interfirm conflict. Specifically, the existence of a manufacturer-owned channel may establish the manufacturer as a direct competitor to its intermediary. For example, Nike's opening of a Niketown store in downtown Chicago was considered a serious threat by retailers carrying Nike products (Collinger 1998). Estee Lauder's plans to sell its flagship Clinique brand directly over the Internet put the firm squarely in competition with the department stores whose cosmetics counters feature Clinique products so prominently (Machlis 1998(b)). Similar conflicts have been reported by Avon Products Inc. (Machlis 1998(c)), Bass Ale (Bucklin *et al.* 1997), IBM (Nasiretti 1998), the former Compaq (McWilliams 1998), Mattel (Bannon 2000), and others. Some trade groups such as the National Shoe Association and the National Sporting Goods Association have gone to the point of urging members to reduce or eliminate purchases from manufacturers establishing direct sales outlets (Stern *et al.* 1996). A well-publicized incident involved letters sent in May of 1999 by Home Depot to more than 1,000 of its suppliers, stating,

"Dear Vendor, It is important for you to be aware of Home Depot's current position on its' [sic] vendors competing with the company via e-commerce direct to consumer distribution. We think it is short-sighted for vendors to ignore the added value that our retail stores contribute to the sales of their products.... We recognize that a vendor has the right to sell through whatever distribution channels it desires. However, we too have the right to be selective in regard to the vendors we select and we trust that you can understand that a company may be hesitant to do business with its competitors." (Brooker 1999)

In general, this type of channel conflict can undermine attempts to develop cooperative relations in the intermediated channel, possibly to the ultimate detriment of all involved parties.

To effectively assess the costs and benefits of multi-channel distribution, manufacturers and intermediaries alike must understand the cross-channel tensions that can arise. The desire to use multiple channel types may ultimately compel a manufacturer to redefine its relationship with its intermediaries, with careful attention to the division of labor and any associated financial terms. Indeed, the management of channel conflict is a key B2B concern that will profoundly influence supply chain success in the age of eBusiness.

1.2 Scope of Discussion

The title of this chapter declares our interest in multi-channel distribution, but we must still clarify what we mean by "multi-channel." Following the lan-

guage of practitioners, we regard a particular method of accessing end customers as a single "channel" type even if the actual execution involves multiple outlets. For example, our framework views traditional retail as a single channel even if the manufacturer distributes through a retail firm with multiple physical stores, or through multiple, competing retail firms. Adding one or more physical outlets owned by the manufacturer would create a distinct channel. Yet another could arise from the various forms of manufacturer-managed mail-order (Internet or print catalog). Our terminology must also distinguish between control and materials flow. We will use the term "manufacturer-owned channel" to cover both of the latter two examples of channel types. The term "direct sales" will be reserved for the specific case in which the manufacturer controls the sales and marketing activities and a concrete purchase by the end customer is what triggers the product's flow from the manufacturer's warehousing/fulfillment operation (possibly co-located with the factory) to that customer.

Our primary interest is in how an intermediary reacts to creation of a new channel (that is assumed to enjoy some economic advantage and/or favorable treatment from the manufacturer), and if the resulting conflict might overwhelm any potential advantages. This is motivated by the recent attention of the business community to the scenario in which a manufacturer's direct online channel disrupts a status quo in which intermediaries are used heavily (although similar issues have long arisen in non-eBusiness settings as well, as examined by some of the papers in Section 3). This focus is intended to go beyond the manufacturer-intermediary conflict that can arise when a manufacturer sells exclusively through an intermediary (*vertical competition*). Similarly, it requires more than *horizontal competition* among sellers vying for the same customers. (These two and other related cases will be summarized in Section 2.) Described in these terms, our notion of channel conflict is associated with the case in which a manufacturer and its intermediary are engaged in horizontal and vertical competition simultaneously⁵.

Two distinctions are central to understanding popular usage of the term "channel conflict." One is between actual harm and the perception of harm. Another is between effects on intermediate outcomes (e.g., sales volume or revenue) and on bottom-line objectives (e.g., profit). A strictly rational firm should care only about real impacts to its main objective (although conflict can still arise when individual employees do not share the firm's immediate goal, perhaps a consequence of the internal performance measurement and reward mechanisms). From that perspective, incumbent channels should not automatically be alarmed when additional channels are introduced. Consider that under certain circumstances one channel's efforts can drive traffic to another channel, especially when conducted with such an intent (Bucklin *et al.* 1997, McIntyre 1997, Schmid 1999). And losing sales need not hurt overall prof-

itability. For instance, a new channel might be targeted at an existing channel's least profitable customers. Or a manufacturer opening a direct channel might at the same time sweeten the wholesale terms offered to existing intermediaries. However, real behavior is often driven by perceived impacts (either to intermediate impacts or the bottom line), perhaps due to difficulty in proving linkages to bottom-line consequences. As McIntyre (1997) notes, "This is the type of channel conflict we do hear a lot about, not because it is real, but because the fear is real." So, managing channel conflict might have a psychological component as well, which can give rise to practices whose primary or even sole purpose is to signal good intentions or reinforce a certain message. Our discussion will not pass judgment on the relative importance of managing perceptions. Instead, we will simply report the findings of existing research, which does occasionally take the perspective of demonstrating why popular perceptions may be inconsistent with rational economic conclusions.

1.3 Contribution

The intent of this chapter is to review quantitative approaches to modeling conflict in multi-channel distribution systems (as described previously) and policies that may coordinate the actions taken by channel partners, thereby improving system performance. To this end, attention will be focused on research that meets the following criteria:

- analytical modeling approach
- the distribution system is a design variable (this includes cases where the structure is set but the action strategies are not)
- the manufacturer and intermediary(ies) are independent
- the multiple channels interact in some way, primarily competing either for demand or supply.

An implication of these criteria is that research that takes a purely descriptive (e.g., empirical research that seeks to validate certain hypothesized relationships) rather than prescriptive approach will not be subject to our detailed review, although we will briefly mention some such works.

Because much of the research in this area is quite recent, many of the papers to be discussed have not yet appeared in the open literature, and are available as working papers only. Our including a paper in this review does not mean we believe it to be completely correct, or that it will eventually pass peer review and appear in print. We also seek to remain impartial about the significance of recent works, as many are very similar and only time will tell which will have the greatest impact. When we call attention to key assumptions, our intent is not to challenge the validity of those assumptions, but to identify the potential

drivers of certain results and offer possible explanations for why models of similar settings might offer divergent conclusions.

While our primary focus has been very explicitly defined, there are a number of other bodies of literature that touch upon this setting. Section 2 delineates a framework to help organize the related work, and discusses each category briefly. Section 3 provides some commentary about modeling multi-channel settings, and detailed descriptions of the papers falling directly within the scope defined earlier. Section 4 concludes by summarizing key limitations of existing models and identifying areas open for future research.

2. Related Literature

Our general interest is in settings that offer end customers multiple ways of obtaining a given manufacturer's product, at least one of which involves intermediaries. A vast amount of research is relevant in some way, much of which we will not discuss in detail because of space limitations. Nevertheless, organizing this will sharpen the statement of our intended focus.

We make a primary distinction with respect to methodological approach. There is a vast amount of descriptive research about channel structure and conflict that performs analysis of empirical data or discusses evidence obtained anecdotally or by case study. We comment on this in Section 2.1. This chapter is primarily interested in analytical model-based research, which is introduced in Section 2.2. This literature will subsequently be partitioned with respect to assumptions concerning control structure and channel type.

2.1 Descriptive research

Marketing and economics researchers have conducted a substantial amount of empirical research that focuses on a variety of aspects of channel design and management, and on channel conflict and coordination in particular. Frazier (1999) and Balasubramanian and Peterson (2000) offer multidisciplinary reviews.

While this body of work is rich in the breadth of issues addressed, it is primarily descriptive in approach. The mechanism by which the various factors interact and ultimately affect system performance is generally not investigated mathematically. For that reason, and also due to the sheer amount of this type of research, here we will briefly summarize only the portion that is most relevant to our focus: dual-distribution in franchise systems. The interested reader is urged to consult Stern *et al.* (1996) and the references therein for further details.

Franchising is common when the establishing and promoting of a brand name are centralized, but production and/or distribution of the good or service are decentralized (Scott 1995). In other words, the franchisor (analogous to

a *manufacturer* in our discussion) supplies a brand name and also a model of business for the franchisees (analogous to an *intermediary*, even though the franchisee may actually be manufacturing the product) to copy. Franchising typically involves an initial conveyance of industrial property rights leading to a common appearance, ongoing transfer of know-how, and regular technical assistance (Lafontaine 1992). See Dnes (1996) for a review of the economics literature on franchising.

A dual-distribution arrangement arises when the franchisor also owns and operates some of the stores. The mix of ownership types has been observed to correlate with the heterogeneity across stores, some salient dimensions of which are listed below:

- *Firm-specific investment in outlets* (Brickley and Dark 1987, Brickley *et al.* 1991(a)): Firm-specific investments in the franchise system by the franchisees will generate quasi-rents that can be expropriated by an opportunistic franchisor. This risk may deter the franchisees from making such investments when the required levels are high, which favors company ownership of stores.
- *Distance from the headquarters and monitoring costs* (Brickley and Dark 1987, Minkler 1992): The cost of monitoring the outlets increases with the distance from the franchisor's headquarters. Consequently, more distant outlets are more likely to be franchised than company owned.
- *Density or physical dispersion of outlets* (Caves and Murphy 1976, Brickley and Dark 1987, Brickley *et al.* 1991(b)): Geographic dispersion of the outlets increases the costs of monitoring the performance of company employees, which makes franchising more likely.
- *Repeat customers* (Caves and Murphy 1976, Klein 1980, Brickley and Dark 1987, Brickley *et al.* 1991(a,b)): When the frequency of repeat business is high, the impact of any debasement in quality on the operation's revenues will be high. Consequently, franchising makes the most sense when the costs of quality debasement are borne primarily by the franchisee. This is a reason why fast-food restaurants situated along freeways are more likely to be company owned.
- *Technological factors* (Caves and Murphy 1976, Klein and Saft 1985, Norton 1988): Monitoring the local production of goods or services becomes easier (less critical) if the process is more capital intensive and requires a greater proportion of machine effort than human effort. When monitoring costs are low, company ownership is a more likely outcome.
- *Age of the franchise* (Oxenfeldt and Kelley 1969, Caves and Murphy 1976, Martin 1988, Minkler 1990): The early stages of a franchise's life

cycle are characterized by a greater degree of risk, and a greater need to raise capital for expansion, which may lead the franchisor to rely more heavily on franchising. As the franchisor learns about the local markets over time, the need for reliance on franchisees will diminish, which increases the likelihood of company ownership. Another rationale for franchising is based on the need to motivate both the franchisee and the franchisor to exert the effort needed for the business to succeed. Vertical integration suffers from the inherent difficulty in monitoring the actions of employees (whose compensation is not tied to the outlet's profits), while franchise arrangements align interests by giving each side a claim on a percentage of the outlet's profits. In contrast to the resource-based argument, this incentive-based argument implies that franchisors would want to move toward a fully franchised chain over time (see Lafontaine and Kaufmann 1994 for further discussion).

- *Signaling* (Gallini and Lutz 1992, Scott 1995): When there is uncertainty about the demand or profitability of the good or service being distributed, potential franchisees may be reluctant to make investments. Franchisors can send positive signals about demand or profitability by distributing their products through a high proportion of company-owned stores.

As an example of the methodology that is typical among descriptive research such as described above, consider Scott (1995), which tested hypothesized relationships between various factors and the proportion of stores franchised. Here, firm-level data from 47 different industry groups were used to estimate a regression equation of the following form:

$$\begin{aligned} \text{Percent Franchised} = & \beta_0 + \beta_1 [\text{Royalty Rate}] + \beta_2 [\text{Franchise Fee}] \\ & + \beta_3 [\text{Age}] + \beta_4 [\text{Area}] + \beta_5 [\text{Cash Investment}] + \beta_6 [\text{Training}] \\ & + \beta_7 [\text{Capital-Labor Ratio}] + \beta_8 [\text{Franchise Purchases}]. \end{aligned}$$

The vast number of findings in the empirical dual-distribution franchising literature certainly can assist in corroborating the assumptions or assessing the predictions of analytical models of more general multi-channel settings, which are the topic of Section 2.2.

2.2 Analytical research

The analytical paradigm formulates a model of a decision problem and then recommends courses of actions based on rigorous mathematical justification. In contrast to the descriptive literature, for which numerous summaries and discussions already exist (as noted in Section 2.1), the analytical studies of our focal setting have not previously been reviewed to the extent attempted by this chapter.

Our specific interest is in the multi-echelon models that are necessary to explicitly represent channel intermediation, and therefore conflict between pro-

ducers and their intermediaries. However, since one dimension of such conflict is due to a producer and its intermediary battling over the same market, models of horizontal competition provide a natural building block.

Horizontal competition arises when multiple sellers pursue the same pool of customers. The phenomenon is well studied in the economics literature and elsewhere, dating at least as far back as the classic models of oligopoly, and notions of Cournot, Bertrand, and Stackelberg competition. Variants of this are too numerous to review here, so we direct the reader to Shapiro (1989). In the inventory literature, most treatment of competition has been in a single echelon environment. For instance, Parlar (1988) and Lippman and McCardle (1997) study a pair of "newsvendor" firms who become competitors because their products are partially substitutable, while Bernstein and Federgruen (2002) examine an oligopoly in which sales are awarded based on the competitors' relative selling prices and fill rates. Cachon (2002, Section 5) summarizes this literature.

This area also includes studies of markets that are served either by multiple types of sellers and/or by individual sellers using multiple non-intermediated channel types (where the various modes of selling are differentiated by cost structure and/or market reach). Balasubramanian (1998) and Druehl and Porteus (2001) both model a horizontal competition between a direct marketer and conventional retailers. The topic of Cattani *et al.* (2002) is a competition between a traditional and an Internet channel that are either owned by the same retailer or by different entities. In Reinhardt and Levesque (2001), a seller decides how to allocate its product across two markets that are each reached a different way (online vs. offline sales channels), given a competitor in one of the markets. Huang and Swaminathan (2003) study the pricing strategies that might arise when a retailer with both traditional and Internet channels competes with a pure Internet retailer. Lal and Sarvary (1999) and Zettelmeyer (2000) examine a competition between two retailers that each sell both online and offline. In Chen *et al.* (2002), all sales occur at one of two competing bricks-and-mortar retailers, but customers can subscribe to an independent, online service that offers price quotes (possibly communicating discounts from affiliated retailers) and other product information. Balasubramanian *et al.* (2002) offer a vision of a "wireless" version of this marketing approach, in which retailers can compete on a customer-by-customer basis by broadcasting personalized discounts through mobile devices. Since these models do not explicitly represent intermediation, they do not investigate manufacturer-intermediary conflict or coordination.

Figure 13.1 provides a framework for organizing the types of multi-echelon distribution systems, and helps characterize what will and will not be highlighted in this review. This framework is motivated by our belief that at an aggregate level, control structure and choice of channel type are two of the

most important determinants of the overall performance of any supply chain. Even this classification will not be perfect, as some papers study multiple settings. We will exercise judgment in classifying such papers by the system type that we believe to be their primary emphasis, or for which the most substantive results are obtained.

As indicated in the figure, the following three subsections will provide brief overviews of each class of literature related to our primary focus. As necessary we will emphasize the details of any interaction across channels, such as the decision variables available to each firm and the mechanism by which these have cross-channel effects. We do not claim our review to be comprehensive. Rather, our primary intent is to provide the reader some particularly recent or meaningful examples (and ideally to call attention to appropriate review papers) that might serve as a starting point for further investigation. This will create context for Section 3, which details the extant analytical research regarding the phenomenon of central interest: conflict and coordination in multi-channel systems.

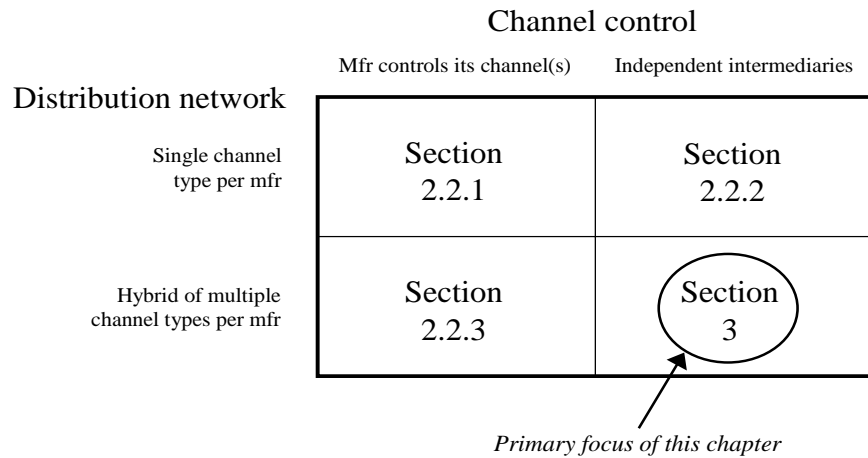


Figure 13.1. Classification of models of multi-echelon distribution systems

2.2.1 Single channel type systems under manufacturer control.

In this class of literature the product stops at intermediate points between a manufacturer and its end customers, for instance at distribution centers or depots. These locations add value in a variety of ways, including risk pooling of demand uncertainty across multiple retail locations, lower produc-

tion and distribution costs through coordination of shipments, etc. But because these locations are not independent, they are not intermediaries by our definition.

Many papers whose primary interest is in settings with independent agents begin with this scenario as a benchmark, as system performance is theoretically maximized under unified control (achievable perhaps by "forced compliance"). However, they quickly move on to studying mechanisms that might induce the independently managed parts to replicate the efficiency of central control.

The benchmark case is of greater stand-alone interest when the network exhibits complexities such as stochastic demand that is filtered through the inventory policies implemented at the successive echelons, intricate cost structures, lead times, and multiple time periods of activity. This is the theme of the bulk of multi-echelon inventory theory, dating back to the serial supply chain analysis of Clark and Scarf (1960). This literature also considers system architectures that move product from a manufacturer to end customers along multiple parallel paths, such as a 1-depot N-warehouse network.

We do not review this class of research since centralized control prevents internal conflict altogether, between manufacturers and intermediaries or otherwise. Instead, we refer the reader to reviews by Muckstadt and Roundy (1993) for deterministic demand models, Federgruen (1993) for discrete time models with stochastic demands, and Axsater (1993) for continuous time models with stochastic demands.

2.2.2 Single channel type systems with independent intermediaries.

The most general form of this setting has multiple manufacturers selling exclusively through multiple independent retailers. While these cases do not qualify as multi-channel, understanding issues of conflict and coordination between manufacturers and intermediaries provides insights for managing the intermediated channel within a hybrid system. We highlight five major classes of research.

Bilateral monopoly

The vast majority of works assumes a single manufacturer and single retailer, which certainly is the most tractable case. This does not fall within our scope, since customers then have only one source for the product.

The typical analytical approach is to study the source of inefficiency (often related to *double marginalization*), and various mechanisms for achieving channel coordination and/or Pareto improvement. Mechanisms so studied recently include resale price maintenance, full-line forcing, quantity discounts, manufacturer returns, quantity flexibility, sales rebates, revenue sharing, price protection, and markdown allowances. New studies continue to be produced at a prodigious rate by generalizing the basic framework, perhaps by adding retailer decision variables (e.g., some form of effort, in addition to retail price

or quantity decisions) or adding informational asymmetry. Examples of the former are Krishnan *et al.* (2001) which gives the retailer control over promotional effort (which is possibly unobservable), and Netessine & Rudi (2001(a)) which investigates the incentive effects of drop-shipping strategies (i.e., the retailer handles all sales, but avoids inventory ownership as fulfillment occurs directly from the supplier's warehouse to the end customer) when demand is dependent on the retailer's spending for customer acquisition. Examples of the latter are Corbett and de Groote (2000) and Ha (2001) in which the retailer's cost information is private, Bali *et al.* (2001) in which the retailer has private information about its own inventory level, and Kolay *et al.* (2002) in which a retailer has private information about demand. Cachon (1999), Lariviere (1999) and Tsay *et al.* (1999) review this literature in depth, and Cachon (2002) provides an updated perspective.

Single manufacturer with multiple retailers, where the retailers do not interact with each other

This generalization allows the product to flow through multiple independent retailers. However, the retailers do not interact because end customers are assumed to be captive to a particular retailer (i.e., exclusive territories) and the manufacturer produces enough to satisfy all retailer requests. Recent examples include Ingene and Parry (1995(a)), Chen *et al.* (2001), Fransoo *et al.* (2001), Netessine and Rudi (2001(b)). The first considers price-sensitive end demand while the other three include inventory effects.

Single manufacturer with multiple retailers, where the retailers interact with each other

Two types of retailer interaction that provide basis for conflict are (1) common interest in an item in scarce supply, and (2) competition for customers.

Recent works about the first phenomenon include Cachon and Lariviere (1999(a,b)) and Deshpande and Schwarz (2002), who investigate the forecast gaming behavior observed among retailers attempting to secure a disproportionate share of the supply. Such research typically investigates methods for mitigating dishonesty.

The second phenomenon has been studied much more extensively by building on insights from the literature of horizontal competition that was described earlier. The majority of papers assume a single dimension of retailer competition. For instance, Ingene and Parry (1995(b), 1998, 2000) examine issues of channel coordination faced by a manufacturer selling through two retailers that compete on price. Padmanabhan and Png (1997) investigate the role of manufacturer return policies in a similar setting. Marx and Shaffer (2001(b)) explore why a manufacturer might benefit from using a nondiscrimination ("most favored customer") clause when negotiating wholesale prices with multiple re-

tailers sequentially. Lal (1990) considers the coordination of a franchise system in which the retailers engage in service competition. Models that broaden the breadth of decisions made by each retailer include the following. Mathewson and Winter (1984) include advertising as a decision, although not directly as a dimension of competition. Perry and Porter (1990) focus on a type of retailer service with positive externality effect across the retailers. In Winter (1993), Iyer (1998), and Tsay and Agrawal (2000) the retailers compete directly along both price and non-price dimensions.

In the majority of works the retailers are similar in their mode of sales. One exception is Purohit (1997), in which a durable goods manufacturer's two intermediaries differ significantly: one only sells the product new, while the other can rent out the new product for a period before subsequently selling the used good.

Some papers that are primarily focused on the bilateral monopoly will discuss applicability to multiple retailer settings. A typical question raised is whether a given manufacturer-retailer contract will retain its effectiveness if applied uniformly to multiple retailers that are asymmetric in some way. This may be motivated both by legal concerns (e.g., Robinson-Patman⁶ considerations) and the desire to minimize the costs of negotiating and administering the contracts. For instance, the channel-coordinating properties of the manufacturer return contract of Pasternack (1985) are known to extend to the case of multiple retailers with identical costs but different market demand distributions (provided that the markets do not overlap). This is because the coordinating contract is independent of the retailer's market demand. Whether and when a common contract can coordinate a channel comprising asymmetrical, competing retailers remains a generally unresolved issue. Interestingly, O'Brien and Shaffer (1994) find that forcing a manufacturer to treat competing retailers equally can lead to substantial welfare loss.

Because of the multi-level setting and the tension across sellers, the formulations that arise when a single manufacturer sells through multiple, interacting retailers are very closely related to those of direct interest in this chapter. Indeed, similar solution methodologies are typically used.

Multiple manufacturers with one or more common retailers

This class of models moves towards greater network complexity and realism by introducing competitive dynamics at the manufacturer level, although still within a single channel type strategy. Choi (1991) examines two manufacturers whose partially substitutable products are sold through a common retailer, while in Choi (1996) and Trivedi (1998) the two manufacturers also use a second common retailer that price-competes with the first. These study the effect of decision structure (channel leadership), channel interaction, and product differentiation. O'Brien and Shaffer (1993) address the question of

whether competing manufacturers should sell through a common retailer instead of through exclusive retailers. O'Brien and Shaffer (1997) allow for both nonlinear pricing and exclusive dealing arrangements when two manufacturers contract with a retail monopolist. Marx and Shaffer (1999, 2001(a,c)) examine sequential contracting with two manufacturers and their common retailer, focusing on the role of bargaining power and implications for rent-shifting. Shaffer and Zettelmeyer (2002) show how different types of information shocks can affect the allocation of profits among a retailer and the two competing manufacturers whose products it carries. Raju *et al.* (1995) investigate the profitability of introducing a store brand into a product category that consists of price-competing national brands sold by different manufacturers. In Corbett and Karmarkar (2001), the number of firms at each echelon is a function of an entry and exit model. Shaffer (2001) investigates how the balance of power between manufacturers and retailers influences not only the terms of trade, but also the bargaining process used to allocate channel profits.

Competition between two manufacturer-retailer dyads

This class of models considers two manufacturers selling through dedicated intermediaries that compete for end customers. One research stream asks whether the manufacturers are better off using the intermediaries instead of vertically integrating. Representative studies include McGuire and Staelin (1983, 1986), Coughlan (1985), Moorthy (1988), Coughlan and Wernerfelt (1989), Gupta and Loulou (1998), and Gupta (2001). Here a key conjecture is that intermediaries may be able to mitigate the competition between manufacturers. Choi (2002) examines the impact of channel choice on industry structure, specifically the degree of total market coverage by the incumbents and ease of entry by challengers when all manufacturers use the same channel type (direct, exclusive retailer, or common retailer). Other models explore implications of using various channel policies in this competitive setting (e.g., slotting allowances and resale price maintenance are examined in Shaffer 1991). We exclude this class of literature because while different modes of selling may be considered (e.g., a vertically integrated channel competing against an intermediated channel), each manufacturer uses only a single mode at a time.

2.2.3 Multiple channel type systems under manufacturer control.

In this class of research, the term "coordination" takes the meaning of optimizing decisions across a complex system, rather than overcoming conflicts of interest. Consequently, such models tend to present the structural complexities (especially the differences across channel types) in greater detail. Central control also gives the manufacturer greater influence over the design of the system's physical topology.

Building upon initial work by Artle and Berglund (1959) and Balderston (1958), Baligh and Richartz (1964) consider the problem of designing the optimal distribution system to transfer materials from multiple manufacturers to multiple retailers for a single product. They determine the number of levels in this system (with zero levels indicating direct sales) as well as the number of firms within each level to minimize the communication and contact costs in the network. Blumenfield *et al.* (1985) present a cost-minimizing framework when end users can be served directly by the manufacturers or through a consolidating warehouse for deterministic end user demands. Jaikumar and Rangan (1990) and Rangan and Jaikumar (1991) study how price rebates offered to different intermediary levels affect the channel choice decision (buying direct or through intermediaries), and determine the optimal pricing and distribution strategy. Cohen *et al.* (1995) perform an industry-level analysis of distribution networks by focusing on the specific functions performed by intermediaries (redistributors), for which the intermediaries charge their customers (distributors) a premium relative to prices for direct purchases from the manufacturers, and derive profit maximizing channel management policies (pricing and rebates) for the manufacturers. Cohen *et al.* (1990) and Cohen *et al.* (1999) analyze service parts logistics systems where parts can reach customers through service depots as well as directly from the manufacturer's warehouses. Chiang and Monahan (2001) advise a manufacturer on how to set inventory levels when distribution occurs through one direct sales channel and one company-owned store, given that each customer has an initial preference for one of the channel types but there is some spillover across channels on stockout.

3. Analytical Research on Conflict and Coordination in Multi-Channel Systems With Both Manufacturer-Owned And Intermediated Channels

This section provides detailed examination of works that consider our primary focus, in which the manufacturer is simultaneously a supplier to and a competitor⁷ of its retail partner(s)⁸. Figure 13.2 illustrates how goods and customers physically come together in the setting. Solid lines represent the basic structure, while dotted lines suggest generalizations pursued by some researchers.

The primary research objectives are to enlighten the following questions faced by the various parties:

- manufacturer: which channel or channel portfolio to use, and how to coordinate strategies and decisions across channels

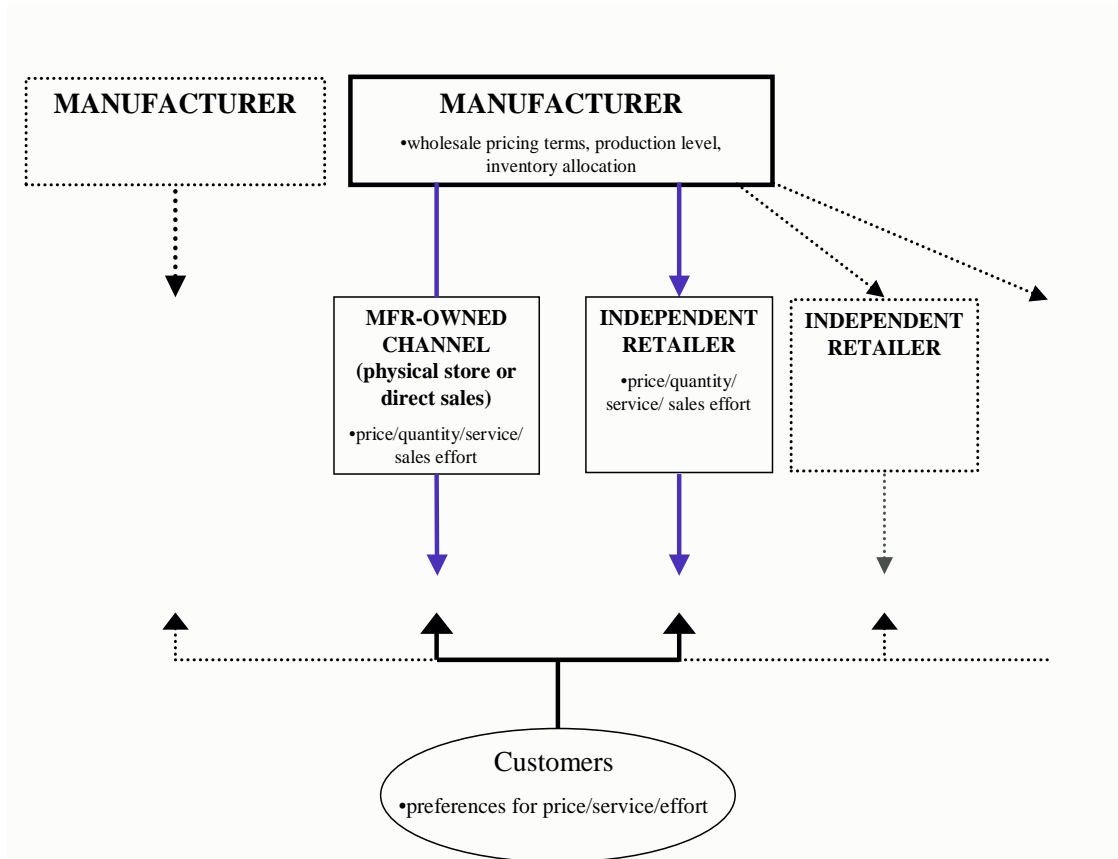


Figure 13.2. Multi-channel distribution system with independent retailer(s)

- independent retailer: whether to participate in a given distribution system, and if so, how to adjust behavior in response to the presence of the competing channel
- customers: which channel to use to serve which needs

The prevailing modeling approach is to formulate a game between a manufacturer and a retailer (or multiple retailers) transpiring during the single selling season of a single product (the same sold in all channels). The horizontal competition is modeled in a fairly standard way. All selling firms simultaneously compete for end customers via a primary decision variable such as price (or, less commonly, quantity). But there also needs to be a way for fundamentally

different types of sellers to exist in the same marketplace without necessarily matching each other along that dimension⁹. This is typically done by one of two approaches: (1) including some Hotelling-style representation of customer heterogeneity (such as tastes, or aversion to travel or search); or (2) giving each seller a second control variable, such as some measure of service or sales effort. These assumptions dictate how seller decisions will affect aggregate buying behavior. Vertical competition is added by giving one seller (the one designated as manufacturer) the role of supplying product to other seller(s) (the retailer(s)). This entails the setting of a wholesale price, which the manufacturer typically does as Stackelberg leader prior to the horizontal competition for end customers. The manufacturer is typically assumed to enjoy infinite capacity. The costs incurred within the channels are typically summarized by assigning each channel its own per-unit cost parameter to cover production and logistics expenses. All firms maximize individual profit.

Given these assumptions, the analysis proceeds to solve (by reverse induction) for all equilibrium decisions and profit levels under each different distribution strategy, and characterize various sensitivities. Some studies also evaluate mechanisms for channel coordination and/or Pareto improvement. Unless highlighted, the reader should assume that this general framework applies.

As always, expectations regarding analytical conclusions should be tempered by an understanding of the modeling challenges. Most significantly, competition for customers is known to be difficult to model in a multi-echelon setting with independent parties. Moreover, the equations that arise in such models are easier to solve with symmetry across channels (e.g., all channels are independent, and identical intermediaries face the same types of demand), but hybrid distribution systems are inherently asymmetrical. For reasons such as these, the models we have encountered have all made some fairly restrictive assumptions. These issues and others will be discussed in more depth in Section 4.

Table 13.1 provides a quick comparison of the papers reviewed in this section, which are grouped according to whether the manufacturer-owned channel is direct sales or a manufacturer-owned retail store. This makes a distinction between the channel ownership/control and the physical supply chain structure. Selling through a manufacturer-owned physical store is clearly different from direct sales; the latter's logistics and marketing activities are dramatically dissimilar from a reseller channel's while the former's are not necessarily so. Also, the consumer's experience differs more markedly from conventional retail shopping when buying direct than from a company store.

There is no obvious sequence in which to present the papers in each subset. Indeed, with the exception of Rhee and Park (2000) and Rhee (2001), none of these papers can be considered an extension or generalization of any of the oth-

ers since the formulations are so distinct. Overall, these works appear to have been developed largely in parallel by researchers from multiple disciplines.

Table 13.1. Classification of analytical research on conflict and coordination in multi-channel systems

	Basis of channel competition (seller decision variables)			Investigation of channel coordination	Strategic significance of mfr-owned channel	Dual channel preferred by both mfr and retailer?
	Price	Inventory	Other			
Manufacturer-owned channel is direct sales						
Chiang <i>et al.</i> (2003)	X				Implicit mechanism for keeping retail prices low	Maybe
Kumar & Ruan (2002)	X		Retailer service with no externality		Price discrimination between customer segments and influence over retailer service	Not addressed
Rhee & Park (2000)	X		Retailer service with no externality		Implicit mechanism for keeping retail prices low	Maybe
Rhee (2001)	X		Retailer service with no externality		To compete with a direct-selling challenger for price-sensitive customers	No
Hender-shott & Zhang (2001)	X				Price discrimination through a higher direct price	No
Tsay & Agrawal (2001)	X		Marketing effort with positive external-ity	X	Drives traffic to the more efficient channel	Maybe
Peleg & Lee (2002)		X			Access to a price-sensitive customer base	Maybe
Manufacturer-owned channel contains physical stores						
Ahn <i>et al.</i> (2002)	X				Price discrimination and access to a distinct geo-graphic market	Not addressed
Bell <i>et al.</i> (2002)	X		Marketing effort with positive external-ity		Implicit mechanism for keeping retail prices high	Maybe
Boyaci (2001)		X		X	Backup supply for retail stockout	Not addressed

3.1 Manufacturer-owned channel is direct sales

Chiang et al. (2003)

In Chiang *et al.* (2003), a manufacturer is considering whether to sell direct over the Internet, exclusively through a retailer, or through a hybrid of both approaches.

The manufacturer sells to the retailer at a unit wholesale price and incurs a unit cost which includes manufacturing and logistics, and potentially also sells through a direct channel at a different unit cost. The retailer decides on the retail price as Stackelberg follower.

Consumers have a willingness-to-pay parameter that is uniform on $[0,1]$. To impose an assumption that retail provides a superior shopping experience, the value to the consumer is scaled down by a multiplier $\theta < 1$ when the product is obtained through the direct channel. θ can be interpreted as consumers' willingness to tolerate the inconveniences of the direct channel. This structure produces deterministic demand curves that indicate how the market will be split between the channels as a linear function of the prices. Competition in this model is purely along the price dimension. Non-price differences between the channels are captured in θ , but this is a parameter of consumer preferences, not a decision variable that either channel can influence.

The key finding is that the manufacturer may use a direct channel as a way to combat double marginalization in the retail channel, opposing the retailer's tendency to price too high and sell too little. The effectiveness of this strategy depends on the viability of the manufacturer's threat to sell direct, which is driven by θ . When θ is sufficiently low (say, due to consumer perception of delays in direct delivery, potential mismatch of the catalog description and performance of the product, etc.), adding a direct channel creates no threat to the retailer. The retailer can effectively ignore the potential cannibalization of customers by the direct market, so the manufacturer does not profit by adding a direct channel. On the other hand, when θ is sufficiently high, the consumer sees little distinction between a traditional retailer and a direct marketer. Because the direct channel is a credible threat to cannibalize retail sales, the retailer will cut prices more aggressively, partially counteracting the double marginalization problem and increasing the manufacturer's profits.

The authors find that at equilibrium the manufacturer will price in the direct channel so as to drive all customers to the retail channel. In this case, the direct channel exists not to sell product, but as a mechanism for controlling the independent retailer's price. At the same time, there always exist circumstances under which the retailer and the manufacturer are both made better off as a result. This is possible because a reduction in the wholesale price accompanies the use of a direct channel. Hence, multi-channel approaches need not suffer from channel conflict.

Kumar and Ruan (2002)

In Kumar and Ruan (2002) the manufacturer contemplates augmenting the retail channel with a direct online channel.

The manufacturer moves first in choosing the unit wholesale price w to charge the retailer, and the direct sales price p_m if relevant. The retailer carries the manufacturer's product, as well as a substitute product that earns an exogenously specified profit margin k . In addition to retail price p_r for the manufacturer's brand, the retailer decides on the level of service (merchandising support) to provide the two products. The retailer incurs no direct costs for this service, but the total amount that can be provided is constrained (if one product enjoys "high" service, the other is left with "low").

Consumers are one of two types: retailer store loyal (segment size α_u) or manufacturer brand loyal (segment size α_s). Store loyal consumers buy only through the retail channel, with the choice of product determined by the service provided by the retailer: for a service level of s , $\alpha_u s$ store loyal consumers purchase the manufacturer's brand regardless of p_r and the remaining $\alpha_u(1-s)$ purchase the substitute product. Brand loyal consumers will purchase only the manufacturer's product, provided that its price is less than their reservation price r . If the product is available in both channels, a fraction $F=0.5+\beta(p_r-p_m)$ of brand loyal consumers will buy from the direct channel, where β measures the price sensitivity of brand loyal customers. The assumed form of F implies that some of these customers value the direct shopping experience enough to pay a premium over the prevailing retail store price.

As the retailer favors the product earning the higher margin, a manufacturer can buy a high level of retailer service for its product with a sufficiently low w . The manufacturer's total cost of achieving this goal can be reduced by adding a direct channel, which diverts some brand loyal customers away from the retailer (hence reducing the number of units impacted by w). Even with this reduction in sales the retailer may still be better off with the reduced w . The direct channel also affords the manufacturer a way to price discriminate between store loyal customers (who never buy direct at any price) and brand loyal customers (who never buy the substitute product), charging the latter a higher price in some cases. The authors provide scenarios in which the manufacturer benefits from opening a direct channel alongside its retail channel, and scenarios in which the direct channel benefits the retailer. However, the question of whether both outcomes can occur simultaneously is not addressed.

Rhee and Park (2000)

Rhee and Park (2000) examine the distribution strategy question for a scenario similar to that in Chiang *et al.* (2003) and Kumar and Ruan (2002).

The manufacturer moves first in choosing the unit wholesale price w to charge the retailer, and the direct sales price p_m if relevant. (The manufacturer is constrained by a no-arbitrage condition that forbids setting w higher

than p_m , since otherwise the retailer would obtain its product from the direct channel. The analysis ultimately concludes that the manufacturer should set $p_m = w$ when using the hybrid system, meaning that customers buying direct can do so at exactly the wholesale price.) In addition to choosing its retail price p_r , the retailer provides S dollars worth of service with each unit, where the service is of a form that cannot be delivered to customers through an online interaction. Examples include personalized shopping assistance and convenient refunds/replacements. The direct channel is viewed as providing no service. The same cost is incurred per unit delivered in either channel, and delivery costs are ignored.

Individual end customers, who are each free to purchase up to one unit from their preferred channel, have reservation prices that are uniform on $[0, V]$, where V represents the market potential. A proportion m of the market is "service-sensitive," meaning that these consumers value the retailer service at $t\sqrt{S}$, while the other $(1 - m)$ derives no value from service; t characterizes the degree of customer heterogeneity. From these assumptions, the induced demand for each channel can be derived as a function of the decisions p_m , p_r , and S .

The main findings are conditions on the parameters (m , t , and V) under which the manufacturer will favor each channel structure. For instance, a hybrid system is preferable when customers are similar across segments in their valuation of retail services, i.e., when m is small or when t^2/V is not too large. (This is at odds with the traditional wisdom that the main objective of a hybrid system is to increase coverage of a heterogeneous market.) On its own the retailer will price too high and serve too few customers; the manufacturer uses the competitive influence of a direct channel to lower retail prices, but still needs the retail channel to reach service-sensitive customers. Hence, this paper argues that a hybrid approach offers a manufacturer an implicit mechanism for exerting control over the retailer's price. This does not necessarily hurt the retailer's profits.

Rhee (2001)

Rhee (2001) generalizes Rhee and Park (2000) by explicitly modeling a competitive impetus for a manufacturer to add a direct channel alongside its established retail channel: to respond to a direct-sales-only challenger (usually Internet-based). A motivating example is Compaq's 1998 introduction of the Compaq.com online store, largely viewed as a response to the likes of Dell Computer.

Manufacturer M sells either exclusively via a retailer (charging the retailer a wholesale price of w per unit) or through a hybrid network (requiring the setting of a direct price p_m). Manufacturer D is an online-only direct marketer, selling its product for p_d . M and D are given identical cost structures, and the

model excludes any inventory costs, scale economies in shipping or handling, or distribution costs. As in Rhee and Park (2000), the retailer sets a retail price of p_r and provides S dollars worth of service per unit, while no service is provided in any direct channel. M and D move simultaneously (setting w and p_m , and p_d , respectively), while M's retailer is a follower (in setting p_r and S).

All channels compete for the same set of customers, who are distributed along an interval $[0, l]$. M and D are located at opposite ends of the interval, and customers incur linear travel/search costs to obtain the product. A fraction m of the population values retail service at $t_1\sqrt{S}$ while the remaining $(1-m)$ assigns a valuation of $t_2\sqrt{S}$. An assumption $t_1 > t_2$ renders the first segment more service-sensitive, and the development immediately sets $t_2 = 0$. t_1 is then relabeled as t , which has the same meaning as in Rhee and Park (2000). These assumptions allow computation of the segment of each customer type that goes to each seller under each channel arrangement.

Conditions under which M will favor each arrangement are obtained as a function of t , m , and l . One key finding is that M can increase market coverage (sales) by supplementing its retail distribution with an online store. However, this intensifies the price competition with D, which in turn lowers the wholesale price necessary to appease the retailer, ultimately decreasing M's total profits. The authors offer this as an explanation of the financial ineffectiveness of the Compaq online store initiative, and a rationalization of the decision by manufacturer Levi Strauss to terminate its direct online sales activities.

Hendershott and Zhang (2001)

Hendershott and Zhang (2001) take a distinctive approach to modeling the hybrid channel arrangement in which a manufacturer can sell directly or through intermediaries. In contrast to the other models discussed in this section, the number of firms in their intermediary echelon is not discrete.

The monopolist manufacturer, which has infinite capacity and no operating costs, sets the wholesale price in the intermediated channel. Intermediaries are uniformly distributed on a unit interval, differentiated by their per-item transaction cost k_I . Each intermediary determines first whether to enter. On entering, an intermediary chooses a price p_I to charge and buys an amount equal to the expected demand in each search period. N^I is the equilibrium "number" of intermediaries (actually an interval size) who will be in the market.

Consumers have heterogeneous valuations for the good, represented by willingness to pay v . Each consumer purchases at most one item, and the population has a uniform distribution of v on a unit interval. Consumers have an expectation of the equilibrium distribution of prices $F(p_I)$, but individual intermediaries' prices are revealed only through search. This discovery takes time, delaying the consumer's benefit from purchase. This is modeled by applying a discount factor $\beta \in (0, 1)$ to the value of the good. Based on a recursive

value function, a consumer can calculate a reservation price r (as a function of v and $F(p_I)$) that characterizes the search policy: conduct search until finding a price lower than r .

Discounting creates a correlation between consumers' values and their search costs, i.e., consumers with higher valuations of the good will have higher reservation prices and hence engage in less search. The manufacturer may also sell in the direct channel at a price of p_M , incurring a transaction cost of k_M (either positive or negative) to provide the same services as the intermediaries. Direct purchases are discounted according to a factor $\beta_M > \beta$. Although search and discounting of value combine to inject time-sensitivity into the consumer's preferences, the sellers of product compete exclusively by setting prices.

Distribution strategy is evaluated not just in terms of the manufacturer's priorities, but also with respect to consumer surplus and social welfare. The analysis provides conditions under which either single-channel option will be used, and when the manufacturer will pursue the hybrid approach. The disintermediated market structure is used only when direct selling is more efficient than any of the intermediaries (i.e., $k_M > 0$). The manufacturer will use the intermediated channel for two reasons. First, the correlation between consumers' values and search costs due to discounting allows price discrimination through a higher direct price. Second, the intermediaries may provide a channel with an advantage in transactions costs. However, the drawbacks are that intermediaries mark up the price, and intermediated sales involve additional search, which delays those sales. Adding a direct channel alongside the intermediated channel increases the manufacturer's demand and profit by attracting the highest-value consumers from the intermediaries. Consumers are also made better off. However, this makes the intermediaries strictly worse off, as fewer of them will exist, markups will be reduced, and demand and profit will both drop. This argues that channel conflict is inevitable in dual-channel systems, although the analysis suggests that enough benefit can be generated to fund side payments that would appease the intermediaries.

A generalization of the basic model considers the case in which n symmetric manufacturers engage in Cournot competition in selling to the intermediaries and directly to consumers. The main conclusion is that the impact of adding direct sales is not sensitive to the assumption of a solitary upstream firm.

Tsay and Agrawal (2001)

Tsay and Agrawal (2001) consider a single manufacturer whose end customer market is sensitive to both price and sales effort. The manufacturer must decide whether to sell through an independent reseller, a direct channel¹⁰, or a hybrid of the two, given each channel's relative supply chain and marketing cost structures, and the tendency of some customers to research the product in one channel but make the purchase in the other. The manufacturer also con-

siders ways to improve the performance of the distribution system, such as revisiting the division of labor in the system.

The manufacturer sets the sales effort and selling price for the direct channel, while the reseller controls these decisions in its channel. Regardless of the choice of channel strategy, the demand in each channel is an increasing function of the sales effort within that channel. When both channels are open, each one's demand is increasing in the effort of the other as well, with magnitudes captured by parameters b_r and b_d . Hence, sales effort exhibits a positive externality across channels.

The reseller's cost of providing sales effort level s is represented as $\eta_r s^2/2$, whereas the manufacturer would have to spend $\eta_d s^2/2$ to achieve the same effect in the direct channel. Two supply chain unit cost parameters, c_d and c_r , are used to distinguish between the production/logistics methods needed to deliver direct to end customers vs. to an intermediary.

In this model, system inefficiency results from two factors. One is double marginalization within the reseller channel. Another is the failure of each channel to fully perceive the positive externality that its sales efforts can have on the other channel.

Contrary to expectation, the addition of a direct channel alongside a reseller channel is not necessarily detrimental to the reseller. In fact, to retain some of the reseller's selling effort the manufacturer will reduce the wholesale price, and in some cases this can make both parties better off. There can be a net system-wide efficiency gain to share because the wholesale price reduction can counteract double marginalization. In general, the desirability to each party of the distribution options depends on how the channels compare in terms of both supply chain efficiency and marketing capability, and none of the distribution strategies examined is universally preferred by either party. In fact, there are circumstances in which the conventional expectation is reversed: the manufacturer favors using only the reseller, but the reseller prefers that the manufacturer open a direct channel in parallel.

The analysis suggests that revisiting the wholesale pricing terms can improve the overall efficiency of a dual-channel system. However, the greatest improvements are realized when the pricing is premised on the reseller's sales effort, which may be difficult or impossible to monitor in practice. Fortunately, certain schemes observed in industry do not have this requirement. These include paying the reseller a commission for diverting all customers toward the direct channel, or conceding the demand fulfillment function entirely to the reseller. Such schemes could in fact be more profitable for both parties in that they achieve a division of labor according to each channel's competitive advantage: customers are *obtained* using the most cost-effective combination of channel efforts (as determined by η_r , η_d , b_r , and b_d) and *served* using the most

cost-effective method (which is determined by the relative magnitudes of c_r and c_d).

Peleg and Lee (2002)

Peleg and Lee (2002) is distinctive in that the activities of the different sales channels are staggered in time. There is a primary market attended to by a traditional retail channel. The manufacturer may later emerge as a competitor to the retailers in a secondary market.

The manufacturer produces at unit cost c , and wholesales at price p_1 , which is exogenous. Each of n identical retailers faces a stochastic primary demand in an isolated market, and purchases quantity Q from the manufacturer to sell at fixed price r_1 . Value can only be recovered from overstocked product by opening a secondary market, which provides access to a different, more price-sensitive market segment. The manufacturer may view this market as an additional revenue source and then intervene by offering additional units for direct sales (of the amount by which initial production exceeds nQ). Transportation and handling costs required to move inventory from primary stores to secondary customers are ignored, so all units in the secondary market are treated equally.

Total demand in the secondary market is $D_2 = n[a - (a/b)p_2]$, where all units will be sold at price p_2 . The equilibrium p_2 is the one at which supply and demand are equal. The retailers' concern is the downward price pressure resulting from the manufacturer's injection of additional supply.

Each retailer's overstock is dependent on its random primary demand, so p_2 will also be stochastic. However, for very large n (an assumed property of Internet-based markets), the Law of Large Numbers affords a limiting approximation of total retail overstock, and by extension a tractable form for the limiting value of the equilibrium p_2 .

Opening the secondary market will always improve the profitability of the retailers despite the prospect of manufacturer intervention, but might hurt the manufacturer's profitability as well as supply chain performance in the primary market. In addition, it will not always be in the manufacturer's best interest to intervene in the secondary market. This is because the retailers may in turn reduce their initial orders in anticipation of the low secondary market price, and p_2 might end up below c . Compared to the scenario in which the secondary market is theirs exclusively, the retailers are always made worse off by manufacturer intervention. However, their expected profits will still be higher than in the absence of the secondary market. Therefore there may be cases in which the retailers and manufacturer all benefit from the secondary market.

3.2 Manufacturer-owned channel contains physical stores

Ahn et al. (2002)

Ahn *et al.* (2002) consider competition between independent retailers and manufacturer-owned stores, where the parties compete in selling price and the manufacturer stores are in remote locations (which is common for discount factory outlets). The design of this distribution approach reflects intent to mitigate retailer concerns about channel conflict. (Retail stores tend to be in larger metropolitan locations while discount outlets are typically placed 60-80 miles away, where the real estate may also be cheaper.)

In this model, the manufacturer's product is sold in two spatially separated markets: market 1 contains an independent retailer and is K times the size of market 2, which contains the discount outlet. The manufacturer sets the wholesale price (p_0), the retailer then sets retail price (p_1), and finally the manufacturer sets the outlet price (p_2). Production cost is normalized to zero, and storefront i incurs a marginal cost of c_i .

Each potential consumer in each market has a reservation price that is uniform in $[0,1]$, and incurs a fixed transportation cost T for buying from the other market. A distinctive feature is that price competition is only unidirectional: travel costs and the assumption that retail prices must be higher than outlet prices mean that some customers in the retail market might be willing to travel to get the outlet deal, but not vice versa. Hence the retailer's demand, $D_1(p_1) = K(1 - p_1)$, is declared to be independent of p_2 . The outlet demand is $D_2(p_1, p_2) = 1 - p_2 + 1_{\{p_2 + T \leq p_1\}} \cdot [K(p_1 - p_2 - T)]$. The analysis focuses on the manufacturer's perspective, in particular the usage of the channel options.

The manufacturer is found to have three equilibrium strategies: (1) "elimination" (set the wholesale price so high that the retailer decides not to carry the good), (2) "monopoly" (keep both channels, but price in the outlet so that no consumers cross regions, preserving a local monopoly for each store), and (3) "competitive" (price so that both channels carry the product, and some retail consumers cross regions to buy the from factory store). As for when each will occur, the authors note that as the transportation cost T is lowered, the monopoly strategy collapses. If the retailer's marginal cost c_1 is also sufficiently high, the manufacturer will choose to eliminate the retailer. Hence, as the locational advantage of the retailer diminishes, a retailer with higher marginal operating costs becomes more vulnerable. Conversely, as T or c_2 becomes larger, diminishing the manufacturer's cost advantage for selling through its outlet, a monopoly strategy becomes more likely. As long as c_1 is sufficiently low, the retailer will be used as a means of price discrimination: region 1 customers who are willing to pay a higher price will in fact be charged a

higher price. The authors also consider a more general case that acknowledges the retailer's marketing contribution: when the retailer is removed, market 2 demand K is replaced by $K\alpha$ for some $\alpha < 1$ when the retailer is removed. α is an exogenous parameter, in contrast to the "effort" or "service" retailer decision variables seen in some papers. The analysis draws no conclusions about how the retailer behaves differently (i.e., pricing) when the manufacturer opens the outlet channel, hence is silent on the issue of channel conflict.

Bell et al. (2002)

Bell *et al.* (2002) propose the term "partial forward integration" to describe a manufacturer's use of a company-owned channel (involving physical store-fronts) alongside a retail channel. In contrast to Ahn *et al.* (2002), they focus on the specific case where the company store and the retailers are colocated, such as in the same mall. (They also apply their findings to the case in which all stores are on the Internet, hence again are in the same "location.") For example, Polo Ralph Lauren, DKNY, Liz Claiborne, and Armani are among a number of apparel manufacturers who operate company stores in malls where independent retailers such as Macy's and Nordstrom carry these brands. A key research objective is to determine why a manufacturer would forward integrate when adding a company store would not extend total market coverage geographically. The authors note that this might be a way for the manufacturer to reach a different customer segment (where segmentation is along a dimension other than location, such as "brand loyalty"), to benchmark the performance of individual retailers, or to invest in marketing effort to provide price support for other independent retailers. The latter motive is the focus of the investigation.

The manufacturer sets a wholesale price w , and has a marginal cost of production c (normalized to zero). Each of n stores (indexed by s) affects demand via price p_s and "marketing effort" e_s (which captures retail value-add through activities such as salesperson support, retailer advertising, and in-store displays). The cost of providing effort is quadratic: $C(e) = e^2$. r_s is the unit retailing cost for independent retailer s , while the manufacturer incurs a unit retailing cost of r_m in its own store.

The demand faced by each of n stores is a linear function of all prices and effort levels, with the form

$$q_s = 1 - p_s + [\theta/(n-1)] \sum_{s' \neq s} (p_{s'} - p_s) + e_s + [\beta/(n-1)] \sum_{s' \neq s} e_{s'}$$

θ is own-price responsiveness, and β measures the spillover effect. The latter acknowledges that a customer can benefit from a retailer's effort without necessarily purchasing from that retailer. This establishes effort as a "public good," with the accompanying potential for free-riding.

The base case has the manufacturer selling through three independent retailers, where the manufacturer first sets w and then the retailers maximize their individual profits by choosing their p_s and e_s . In the partially integrated case,

the manufacturer also sets price and effort in the company store before the two independent retailers make their decisions simultaneously. The authors normalize r_s to zero for the independent retailers, while setting r_m to whatever value will lead to equal market share for all three stores in equilibrium. The rationale for this is to rule out the market share motive for opening a company store, and the bulk of the results are premised on this condition. The positive value of r_m also gives the independent retailers an efficiency advantage that justifies their existence.

Under the equal-market-share condition, the company store charges the highest price, followed by an independent retailer competing against the company store, and then the independent retailers in the base case with no company stores. The same ordering applies to marketing effort. So, left on their own the retailers will under-invest in marketing due to horizontal free riding. The marketing effort of the company store reduces the emphasis on price-based competition. Hence, the partial integration allows the manufacturer a form of retail price maintenance, except without relying on explicit arrangements that might violate antitrust laws. This finding may contradict a retailer's concerns about being undercut in price, because the channel that ostensibly enjoys an advantage in wholesale cost also contributes effort. The positive externality that drives customers to the retail stores is what creates the possibility that retailers can benefit from the competition presented by a direct channel.

The basic results are shown to extend to other cases, such as when the company store is a new addition rather than a replacement for an existing independent retailer, when the total demand does not increase on adding new stores, and when the company store has a base demand that differs from those of the retailers.

Boyaci (2001)

In Boyaci (2001), a manufacturer sells through a self-owned distribution channel as well as a competing retail channel¹¹. This model is distinctive in considering stochastic demand, in which inventory is the basis of interaction between channels.

The manufacturer produces at unit cost c , and the retailer purchases at wholesale price $w \geq c$. All sales occur at the same exogenous price r . Random variables D_m and D_r describe "first-choice demand" in the direct and retailer channels, respectively. A fraction α of customers who encounter a stockout in their preferred channel will subsequently search the other channel before walking away. This dynamic is what induces interdependence between the two channels. The resulting objective functions have newsvendor form (with product substitution) and the two firms simultaneously choose order-up-to levels. The analysis proceeds to identify the equilibrium stocking levels and profits of

both parties for any given w . w is treated not as a decision variable, but as a parameter for sensitivity analysis.

A combination of analytical and numerical investigations indicates that both channels will tend to overstock due to the channel interaction, and also examines the impact of changes in w and α . However, the parties' preferences for channel structure are not studied. Channel coordination is considered, with attention paid to the coordinating properties of various contracts: price-only, buyback, vendor-managed inventory (in which the manufacturer controls the retailer stock level and the retailer chooses the wholesale price), penalty (where the retailer pays a unit penalty for missed sales), and target rebate (where the manufacturer offers the retailer a rebate for every unit by which sales exceed a target level). Price-only, buyback, and vendor-managed inventory contracts are determined to be incapable of coordinating the system, as they are too simple to overcome the simultaneous influence of horizontal and vertical distortion of incentives. When designed appropriately, the penalty and target rebate forms have coordinating properties, although they face some implementation barriers.

3.3 Discussion

Traditional reasons for a manufacturer to install a captive channel alongside an independent retail channel include reaching a different market segment and achieving price discrimination. These play key roles in several of the papers described in this section, including Ahn *et al.* (2001), Rhee (2001), Hendershott and Zhang (2001), Kumar and Ruan (2002), and Peleg and Lee (2002).

A number of the models discover that the manufacturer-owner channel can offer an indirect means to influence the retailer's behavior (such as price) where more explicit control might be outlawed. However, there is some disagreement about the direction of pressure on the retail price. Bell *et al.* (2002) find "partial forward integration" to provide price support, while Rhee and Park (2000) and Chiang *et al.* (2003) see the direct channel as a way to keep prices low by combating double marginalization. The root explanation for this divergence is not obvious due to substantial differences in the assumptions of the three models. However, it is worth noting that the formulation of Bell *et al.* (2002) includes marketing effort that has positive spillover effects on all channels, while the service described in Rhee and Park (2000) has no externality across channels and Chiang *et al.* (2003) consider no non-price control variables at all.

Another recurring conclusion is that all firms involved can conceivably prefer a hybrid system to any single-channel alternative. A rationale offered by Tsay and Agrawal (2001) is that sales effort in a direct channel can be used to drive traffic to whichever channel is most efficient at fulfillment, possibly cre-

ating enough gains to share. This would suggest that retailer concerns about channel conflict might be unfounded. Unfortunately, this finding is not robust across the different model formulations, as summarized in Table 13.1.

A potentially significant caveat arises from the progression from Rhee and Park (2000) to Rhee (2001). Rhee and Park (2000) report that adding a direct channel alongside a retail channel can increase the manufacturer's profit. However, Rhee (2001) rules this out when the manufacturer faces competition from another direct seller, as the challenger weakens the manufacturer's pricing power. This raises the possibility that the research findings may depend on the manufacturer being a monopolist. Such an assumption is made in all these papers with the exception of Hendershott and Zhang (2001), whose qualitative conclusions are equally true of a symmetric set of manufacturers engaged in Cournot competition. This is a substantive source of controversy that invites further research.

4. Research Opportunities

A number of factors, including recent developments in Internet-based commerce, information and material handling technologies, and the transformation of shipping economics driven by the growth of the third-party logistics industry, have led many manufacturers to establish their own channels for reaching end customers. This may put such companies in direct competition with their existing reseller partners. The potential channel conflict has momentous implications for distribution strategy. In this chapter, we have reviewed the model-based literature on this topic.

Our review has led us to conclude that there are significant opportunities to enhance the extant literature. Although some may be particularly challenging, we state a number of these here with hopes of inspiring the community of researchers.

We provide recommendations along two broad categories. Section 4.1 discusses some limitations in existing model representations of the various channel types, especially in capturing the differences between online and bricks-and-mortar channels. Some perspectives on the analytical appraisal of alternative channel strategies are offered in Section 4.2. Section 4.3 presents our closing remarks.

4.1 Representing channel characteristics

To adequately represent disparate channel types within a single model requires capturing the ways in which they differ. These include differences in the "bundle of attributes" the customers actually get when they buy, the cost impact to the channel of satisfying demand, and the methods used to structure the terms of each sale. Also, the customers' preferences regarding any channel

differences must be appropriately comprehended. The existing literature has approached these in a fairly parsimonious way (as mentioned in Section 3), yet the analysis has already been found to be challenging.

Much has been written about the diversity in possible channel types (cf. Stern *et al.* 1996), with the distinctive attributes of online channels receiving special attention in the last few years (e.g., Alba *et al.* 1997, Peterson *et al.* 1997, Kenney 1999). These bodies of work provide much more detail than we can or should replicate here. Instead, we will briefly mention a few of the more salient issues, and comment on the implications of incorporating these into analytical models of multi-channel distribution systems.

4.1.1 Pricing. Existing models tend to assume that all channels take the same, fairly traditional approach to the pricing dimension of the transaction: (1) each seller posts a price; (2) potential customers decide whether to buy the product at all, and if so, from which seller. For tractability, most models consider just a single time period, so that every seller controls only a single price (if price is a control variable at all) and all units sold by each seller are at that same price. However, this paradigm might not adequately represent how new channel types approach pricing. For example:

- When comparing direct and bricks-and-mortar channels, differences in pricing strategies may be revealed by modeling the individual components that form the buyer's total out-of-pocket expense. One component of this is shipping and handling (S&H). Some sellers believe that consumers might not evaluate S&H fees as critically (or even at all) when comparing prices. Also, many comparison-shopping services on the Internet report selling price only, and do not handle S&H costs well since these vary by customer location. As a result, some direct sellers may price aggressively to attract customer attention while relying on S&H as a profit center. Some also use the S&H schedule to implement a volume discount, a simple example of which is offering free shipping with a minimum purchase. In comparison, bricks-and-mortar sellers lack this additional instrument for collecting money from customers and influencing buyer behavior. (Many of the same effects can certainly be achieved through other types of price promotions or policies, some of which may not enjoy the same cultural acceptance as S&H fees.)
- Dynamic pricing becomes much more feasible when selling online, as there are no physical price tags or display labels to manually update. Dell Computer is known to alter its prices on a frequent basis to balance demand and supply (McWilliams 2001).

- An online channel's ability to identify individual customers raises the prospect of personalized pricing, although public acceptance of the practice remains an obstacle¹².
- Auctions have always provided sellers a way to pursue the highest possible price for an item, and perhaps to offer multiples of the same product at different prices (if auctioned separately). The growing reach and market acceptance of online auction-enablers such as eBay have led an increasing number of firms to consider adding an auction-based channel for regular sales (as opposed to the occasional liquidation of distressed inventory¹³) and for reaching individuals (as opposed to other firms) (Brown 2002).

The Internet has enabled sellers to make innovative use of traditional instruments such as volume pricing. Mercata.com and others enabled unaffiliated individuals to spontaneously pool their buying power to become eligible for the bulk discounts¹⁴. Anand and Aron (2002) evaluate this selling approach in a context without intermediaries or multiple channels.

Modeling these types of pricing strategies would most likely require some combination of more time periods, more price variables and all the ancillary demand elasticities and cross-elasticities, and more detailed models of consumer behavior and preferences.

4.1.2 Non-financial aspects of the purchase. A purchase is more than an exchange of dollars for product, and different channels can provide distinctive experiences for the buyer even if selling the same physical product at the same price. Many facets of this issue have been studied extensively in the marketing and consumer behavior literatures, but not in the competitive context of a multi-channel model. Two commonly mentioned examples are:

- A number of experiential distinctions are especially pronounced when comparing direct and bricks-and-mortar channels. These include visual and tactile interaction with the product¹⁵, the method of obtaining product information (e.g., face to face, over a phone line, or through a computer screen), the delay between purchase and receipt, and even the crowds that often define bricks-and-mortar shopping (which can either be a positive or a negative depending on individual preferences). Naturally, these types of qualitative factors have been difficult to model in any detail.
- Ease of returning product is a major consideration when customers decide how to buy. Bricks-and-mortar channels enjoy an advantage in this category, as most virtual channels do not reimburse return freight

charges except for defective products (and even then, the customer must still endure the hassle of shipping and then ensuring the proper crediting of a refund). Existing models offer guidance on how a seller might design a customer return policy to accommodate legitimate customer concerns while guarding against opportunistic behavior (e.g., Davis *et al.* 1995, Hess *et al.* 1996, Chu *et al.* 1998, Davis *et al.* 1998). However, they do not consider the return policy in a competitive context.

Modeling the competitive consequences of non-financial dimensions can be challenging. Unlike a seller's price, which ultimately is only relevant to either the buyer or seller when a purchase is made from that seller, some of the non-price factors can be decoupled from the actual purchase of the item. That is, there are cases in which one channel delivers value to consumers but is uncompensated for this because the consumers ultimately spend their money in a different channel. An obvious example is when a consumer researches a product using the resources of a retail store, but makes the actual purchase online. On the other hand, a direct seller may invest heavily in generating demand for the product only to have customers make the purchase at a local store (usually for immediate gratification and convenient return privileges)¹⁶. Either way, a firm is choosing investment levels in actions that may influence collective demand but which might not provide an appropriate individual payback. This is a major contributor to concerns about channel conflict. It is not clear when the net externality of such activities will be positive (i.e., some new customers also spill over to the other channel) and hence subject to free-riding, or negative (i.e., cannibalizing) in which case the non-price factor is more a competitive weapon like price. Hence, both possibilities need to be modeled for adequate realism¹⁷. At the very least this suggests the limitations of considering just one type of "service" or "sales effort" as many models do. Existing research has not done an adequate job of handling both in the same model, likely because of the additional dimensionality this would entail.

4.1.3 Non-price product attributes. The prevailing modeling framework has competing channels selling the same product, or at least closely substitutable variants. In reality, key attributes of the product may depend significantly on the channel type.

A direct channel may be selling the same good as a bricks-and-mortar channel, but in a different form. This is especially likely for information goods such as software or music, which are purchased on tangible storage media at retail stores but may be downloaded in purely digital form online¹⁸. Or, a direct channel and a bricks-and-mortar channel may be selling fundamentally different products. Customization is often a key dimension of the value proposition. By self-selection, customers of direct channels are willing to tolerate some delay in obtaining the product. This creates the prospect of shift-

ing from make-to-stock mode (which dominates traditional retail) to make-to-order mode. This option has always existed for all forms of mail-order, but the Internet has provided an automated and efficient mechanism for extracting and even influencing customer preferences, and communicating these from the customer to the factory. Furthermore, recent manufacturing and supply chain process innovations have facilitated time compression and efficiency in production and logistics. Together these have given direct sellers a viable way to meet individual customer preferences better than traditional retailers can, and at reasonable prices. Dell Computer is the most prominent practitioner of this business model.

When selling the same product in different forms or fundamentally different products, the competing channels may exhibit sharply divergent economic properties, in areas such as inventory management. Customer preferences are also likely to vary substantially across the channels.

4.1.4 Product assortment. Assortment planning is a fundamental core competence and competitive differentiator in traditional retail. The decision process attempts to take into account simultaneously a multitude of factors, some more quantifiable than others (cf. Smith and Agrawal 2000, Mahajan and van Ryzin 2001, Rajaram and Tang 2001). As a result, it may be reasonable for a given retailer's stores in two neighboring shopping centers to carry strikingly different product offerings. (Whether the stores actually do so is a management decision.) The topic is far too complex to address here, so we will simply highlight some factors that might lead different channels to carry different assortments.

- Manufacturers, selling either direct or through company stores, are generally not likely to offer as broad an assortment as retailers (although a manufacturer might offer a much greater selection within its own brands, and might offer new products earlier). This is mostly attributable to the differing business objectives of manufacturers and retailers.
- Products whose attributes are difficult to convey virtually¹⁹ (hence have more of an experiential requirement, as described earlier) are more likely to be included in bricks-and-mortar assortments.
- Shipping costs and constraints are another influence. Home Depot's website states, "Due to UPS shipping restrictions, not all products that are available in our stores can be delivered. Large items and heavy items are the most notable exceptions. For our full selection of products, please visit your local store."
- Product sales volume can shape assortment strategy, although occasionally in contrasting ways. Perhaps seeking the advantages of focus, Macy's

only offers its store bestsellers through Macys.com. Alternatively, a direct channel is unconstrained by the need to carry inventory for presentation purposes and also can pool demand for each SKU across a larger set of customers, so can more feasibly offer less-popular items such as extreme sizes of clothing. This is true of the size selection offered online by The Gap Inc.

- Just as with pricing, selling online allows dynamic updating of the assortment to achieve a better match between supply and demand. Again, Dell is known to alter its website offerings frequently. A related strategy is to customize the assortment presented to each individual based on past purchase behavior or stated preferences.

Product assortment is a means by which channel members can signal their concerns about channel conflict. A retailer may express dissatisfaction with a manufacturer's direct sales efforts by adding competing products, dropping that manufacturer's product altogether, or at least positioning the product in a less favorable context (e.g., by reducing the number of sizes/colors/styles carried, or discontinuing other items that are natural complements). To avoid such situations, some manufacturers will create entirely different product lines (or at least project that illusion through product names and model numbers) for the direct channel to obfuscate price comparisons or to target different segments, or may release products to different channels in phases.

Studying assortment decisions fundamentally requires a multi-product perspective that includes substitution effects. This has posed difficulties even in a traditional retail context without incorporating competition. As such, product line strategy for multi-channel settings presents a very open research opportunity.

4.1.5 Operational costs. Alternative channels often represent fundamentally distinct operating models. The standard approach of using a single, exogenous unit-cost parameter per channel may obscure salient economic factors such as:

- Different channels may diverge in the fixed costs required for creation and ongoing operation.
- A number of costs are likely to be nonlinear. These include the costs of providing customer service or sales effort, and a seller's S&H expenditures.
- The costs experienced in different channels are not independent. For instance, in reality there are often scale economies in shipping goods to stores. In such a case, any reduction in volume (such as due to the

diversion of some demand to a direct channel) will increase the average cost per unit shipped to the stores.

These issues can likely be represented in a mathematically straightforward way, but as always the challenge is tractability of analysis. We note that existing multi-channel models have inherited many of the cost-related simplifications that are common in models of a single channel or even a single firm.

4.1.6 Demand uncertainty. One motive for using a direct channel is to get better visibility into end-customer demand levels and/or product preferences. In a multi-channel strategy this could provide a vehicle for evaluating the quality of judgment and level of honesty exhibited by a retailer's forecasting and ordering behavior. However, to model this would require that a retailer have more information than a manufacturer who sells only through that retailer.

Most of the works that model competitive interactions between channel members assume entirely deterministic environments, so that improved information has no value whatsoever. Among models that include uncertainty, the vast majority assumes common knowledge, in which case the channel choice does not affect the manufacturer's state of information. Experience thus far indicates that asymmetric information is difficult to model even in dyadic models with an extremely stylized representation of uncertainty.

4.1.7 Alternative types of competition between channels.

Existing research has focused on conflict that arises when different channels compete for demand, primarily via price. However, retailers are increasingly able to detect when a manufacturer undercuts them, especially online. There is enough awareness of this irritant that many manufacturers deliberately price above the prevailing retail "street price" (cf. Machlis 1998(a,b), Bannon 2000). Yet channel conflict can still arise from a perception that a manufacturer might be favoring its own channels when allocating scarce products. Independent retailers carrying Apple Computer's hot-selling new iMac computer made this accusation in early 2002. Even though prices were the same across channels, the product seemed to be more readily available through Apple's own online and bricks-and-mortar stores (Wilcox 2002). Modeling this phenomenon may require explicit consideration of inventory, as well as allocation practices (which are often based on factors that can be difficult to quantify, such as gaining goodwill with strategically important partners).

4.1.8 Alternative types of multi-channel strategies . The basic distinctions among the channel types covered are (1) intermediated vs. manufacturer-owned; and (2) online vs. bricks-and-mortar. Multi-channel models typically represent some combination of the following possibilities:

a direct sales channel (usually Internet-based), a company store channel, or a channel containing a single intermediary level (usually bricks-and-mortar). However, current environments are characterized by a proliferation of distribution network types that are more complex, even ignoring the multitude of nuances mentioned previously.

One development is that many bricks-and-mortar retailers are adding their own online channels (Tessler 2000). So a manufacturer that chooses to distribute only through, say, Walmart may yet obtain an Internet sales presence (albeit still an intermediated one) through Walmart.com. Here any channel conflict would be between Walmart's stores and online divisions²⁰. More generally, a modern manufacturer may simultaneously manage a variety of its own channels (e.g., online and company stores), sell through independent bricks-and-mortar retailers that also have online channels (e.g., Walmart, Macy's, Costco, etc.), and also sell through independent online retailers (e.g., Amazon.com).

Revisiting the division of labor of the channel functions can form new channel types. One approach is to "unbundle" a product offering, and then assign different channels exclusive rights to the various components. For example, the PC industry has migrated towards a model of integrated distribution, where manufacturers and their channel partners (such as value-added resellers, distributors, etc.) combine their strengths to provide a total solution composed of products and services. In Compaq's recent PartnerDirect program, computing products were ordered directly from Compaq but integration and complex configuration support were left to third-parties such as Tech Data Corp. and Ingram Micro Inc. (Zarley and Darrow 1999). Dong and Lee (2002) model a variety of intermediated channel structures observed in the PC industry.

Practices such as drop-shipping (Netessine and Rudi 2001(a,b)) separate the selling task from the physical or financial ownership of material, so that the seller becomes essentially an order-taker. For example, a book ordered from Amazon.com might travel directly from the book distributor to the end customer, with activity initiated only after Amazon has assured payment from the customer's credit card company. Monitors in Dell's orders are shipped directly from Sony's warehouses to the end customer without ever passing through Dell-owned facilities. A related development is exemplified by the option for Amazon.com's customers to pick up certain purchases (and make returns later if necessary) at a local Circuit City store, which was introduced in late 2001.

The dissolution of traditional divisions of labor raises new questions for managers and researchers. Which party should perform each channel function? How should the individual parties be compensated for their roles? (cf. Frazier 1999) A poorly designed strategy could suffer from even more channel conflict than its predecessor.

4.2 Evaluating distribution strategies

Section 4.1 outlined some channel characteristics and activities that might merit additional attention. Independently of whether these are modeled, there may be some need to revisit the approach to evaluating and comparing channel strategies. These reflect the assumptions about how the firms make decisions and interact.

4.2.1 Company objectives. The notion of an optimal strategy is obviously sensitive to the choice of objective function. Like most economic models, the multi-channel literature has tended to assume that all firms seek to maximize some form of (expected) gross profit. While this may be the ultimate aim for most companies, certain legitimate channel strategies are not tied directly to this, at least not in the short run.

As is true of other areas of management, some channel decisions appear to trade immediate profit for some less tangible goal. A manufacturer may sell direct out of a desire to maintain "ownership" of the relationship with the customer, so that the customer is loyal to the product brand rather than to the retailer. Similarly, manufacturers may add direct channels primarily for advertising or to educate the market, even at an operating loss. In response to the initial hype about eCommerce, some firms quickly created Internet stores as a way to learn about online sales and to avoid being left behind. Some manufacturers simply distrust intermediaries or any other outside parties, perhaps due to difficulties in monitoring and controlling their behavior.

There may also be a time dimension to a company's goals, and hence the appropriate distribution strategy. An evolution may occur over a product's life cycle²¹. Early on, the prime concern might be market share rather than profit. Major retailers could be used at this stage for their ability to provide product exposure. As the product becomes established, the manufacturer might grow less interested in sharing the profit margin with an intermediary, so might sell exclusively direct or in a multi-channel arrangement (channel conflict notwithstanding). Toward the product's end of life, retailers might no longer be interested in carrying the product, leaving an exclusive direct channel as an option. Certain types of products, such as replacement parts, might be sold direct for years at a loss as a manufacturer's form of customer service. A similar evolution might occur over the life cycle of the manufacturer rather than the product. In either case, a major modeling challenge is the inherently multi-period nature of the setting.

Especially in turbulent environments, a multi-channel strategy can be a form of diversification by which a manufacturer protects itself against the failure of any individual channel (Anderson *et al.* 1997, Balasubramanian and Peter-

son 2000). This argues for an objective function that incorporates a tradeoff between profit and risk.

4.2.2 Channel power structure. To fall within the scope of this review, a model must represent the perspectives of multiple independent decision makers. The selection of the distribution strategy obviously depends on which party is making the decision, which is a statement of relative power. Indeed, this will determine how channel conflict will be ultimately resolved. Assumptions about the relative power of the parties are also embedded in the decision structure of the model.

The majority of the literature puts the manufacturer in a position of dominance, proposing the channel structure and taking Stackelberg leadership for various price and non-price decisions. Although the retailer might prefer some structures to others, it is almost always compelled to accept any arrangement under which a non-negative (expected) profit is attainable. In some cases this assumed allocation of power might be purely an artifact of the manufacturer being the common link between the two channels used, and is challenged by some empirical evidence (cf. Anderson *et al.* 1997). Shaffer (2001) argues that retailers are gaining power, and that bargaining models are necessary to see what channel contracts will result and how the gains will be split.

4.3 Concluding remarks

Existing literature on modeling coordination and conflict in multi-channel distribution systems has just begun to address some key issues, but opportunities for further research abound. Especially timely questions surround the use of nontraditional ways of selling and creative divisions of labor that have been enabled by information technologies. We hope that our review will provide a starting point for researchers who wish to contribute to this body of literature.

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Notes

1. In general, this decision entails a determination of the number of levels in the distribution network, the number of outlets within each level, and other variables such as pricing, inventory levels, service levels, etc. The traditional marketing literature refers to these as *distribution strategy*, *distribution intensity*, and *distribution management*, respectively (Corstjens and Doyle 1979).

2. In this chapter, intermediaries should be understood to be largely independent of the manufacturers, as issues of conflict are only relevant when intermediaries are motivated by their own objectives. Intermediaries take various names depending on the context, including reseller, wholesaler, distributor, retailer etc. Our focus will be restricted to intermediaries that play a sales role, as opposed to, say, serving purely as a communication channel.

3. The use of print catalog or Internet sales does not necessarily constitute a direct channel, as in many cases this still relies on reseller intermediation. An obvious example is any manufacturer whose product is carried by Amazon.com.

4. In this chapter, the discussion surrounding this term applies to any "virtual" mode of distribution in which the seller provides no means for face-to-face contact with customers. In this context, print catalog and Internet sales are merely variants that differ in the medium through which customers obtain product information and communicate their desires. Indeed, increasingly rare is the virtual seller that does not accommodate nearly every available communication option. However, in describing the literature we will use the specific terminology used by the researchers, who in most cases draw motivation from Internet-based scenarios.

5. In marketing and other related disciplines, the term "channel conflict" has long been used to describe any tensions within or across channels (cf. Stern *et al.* 1996). Our usage is more specific than this.

6. There are two classes of Robinson-Patman violations (cf. American Bar Association Antitrust Section (1992)). One is termed "primary line price discrimination." An example is when manufacturer 1 claims that manufacturer 2 offered discriminatory prices to retailers. For this suit to succeed, manufacturer 1 must prove that it has been harmed and that competition has been injured. This generally entails proving that manufacturer 2's prices are predatory and below-cost (most courts apply a marginal-cost test). This form of Robinson-Patman violation is not relevant with a single manufacturer. The second class is "secondary line price discrimination." An example of this would be retailer 1 suing a manufacturer for giving a lower price to retailer 2. For this suit to succeed, retailer 1 must prove it has been harmed and competition has been injured. The latter can only occur when the retailers compete in the same market.

7. We note the possibility that the interaction across the independently managed channels has no basis for conflict. For instance, Seifert and Thonemann (2001) and Seifert *et al.* (2002) propose transshipping overstocked retail inventory to cover stockouts in the manufacturer's direct channel. But because their direct channel is assumed to serve a market entirely unavailable to the independent retailers, the retailers have no reason not to cooperate with this proposal as long as the shipping and handling costs are reimbursed.

8. From this point forward we will follow the general convention in the analytical literature of referring to a resale intermediary as "retailer" even if certain individual papers might not use this language. This is purely for clarity. Using the more general terms of "intermediary" or "reseller" is problematic when the need arises to describe multiple ones. For instance, a manufacturer that uses "multiple intermediaries" could be reselling through several in parallel within a single echelon, a series of echelons, or a combination. The term "retailer" avoids this ambiguity because of its terminal nature. Also, in many model formulations the business issues used to characterize the intermediary are evocative of traditional retail.

This restriction to two levels does rule out some plausible multi-channel scenarios. For example, the manufacturer may start selling through wholesalers who in turn sell to existing retailers, thereby creating a new channel with three echelons (manufacturer-wholesaler-retailer) instead of only two (manufacturer-retailer). In the analytical literature we have reviewed, this option has been considered only in cases in which the entire network was under the full control of the manufacturer, thereby preventing any channel conflict (cf. Cohen *et al.* 1995).

Note that attention is focused squarely on a retailer's function as a resale intermediary, whereas some of the horizontal competition frameworks treat retailers as the primary source of product (by excluding the retailers' procurement activities from the model scope). Such models blur the distinction between the terms "manufacturer" and "retailer."

9. A frequent complaint from bricks-and-mortar sellers is that even with parity in selling prices, their competitors selling from out-of-state are perceived to be cheaper due to the current practices around the collection of sales tax.

10. This model does not restrict the manufacturer-owned channel to be either direct sales or a manufacturer outlet. We have included this paper in the direct sales section because the formulation allows that channel to have an operating cost structure that differs substantively from that of the reseller channel.

11. Although the type of manufacturer channel is not explicitly stated, the similarity in the structural treatment of the two channels (identical selling price and same customer behavior) is more suggestive of a manufacturer outlet rather than direct sales.

12. Amazon.com terminated its Fall 2000 experiment with this strategy due to customer complaints after the practice was publicized (Rosencrance 2000).

13. The secondary market of Peleg and Lee (2002) is described as an auction, but is used only for the disposal of surplus. The modeled mechanism results in all units being sold at the same price to all interested buyers.

14. Mercata.com invited any online visitor to join a buying group for a particular product, with the price of the product dropping with each new member. The final price would be known only at the end of the joining period, but that price would be available to all group members regardless of when they joined. This was premised to accelerate demand creation since potential buyers would join even if the current price exceeded their maximum willingness to pay, as long as they could expect additional price declines. Such collective behavior would in turn make the desired price a self-fulfilling prophecy. Moreover, this method gives group members incentive to recruit additional buyers from their personal networks, effectively turning customers into a volunteer sales force. (The notion of customers providing sales effort, which is an example of what some term "viral marketing," is certainly outside the scope of any model of which we are aware.) Mercata.com ceased operations in January 2001, in part because manufacturers were reluctant to sell this way for fear of angering their traditional retail partners (Fowler 2002). This does not necessarily invalidate the sales model, but certainly underscores our thesis about the importance of managing channel conflict.

15. Goods are sometimes categorized into "search" and "experience" goods. Features of a search good can be evaluated from externally provided information, whereas experience goods need to be personally inspected (cf. Peterson *et al.* 1997).

16. This is an issue when the retailer is independent. However, sellers that control all their channels can exploit this concern by allowing direct purchases to be returned at the physical stores. The Gap Inc. is one firm using this approach.

17. A first step might be to categorize service or effort activities into "transactional" and "informational" types. Transactional service describes those aspects that are not meaningful to a customer who does not complete the purchase transaction in that channel. Examples include a fast checkout process or a lenient return policy. Informational service, such as activities that educate customers about the brand or product, can be "consumed" separately from the product. Informational service is obviously the type that is susceptible to free riding.

18. Reinhardt and Levesque (2001) discuss a product's level of "intangibility," which measures the feasibility of not only selling, but also distributing the product online.

19. For instance, a piece of clothing might be purchased based on the fit, the feel of the fabric, and the look of the color in natural light.

20. Being part of the same firm does not preclude conflict, as the channels may be controlled by divisions with individual incentives. Exacerbating this possibility, recently some online divisions have even been spun off into independent corporate entities to create a different culture and perhaps an opportunity to go to the capital markets for funding (e.g., Walmart.com, BarnesandNoble.com, Bluelight.com). However, many of these are in the process of being reabsorbed into the parent company.

21. As noted in Section 2.1, Lafontaine and Kaufmann (1994) examine the evolution of franchising strategy over a firm's life cycle.

References

- Ahn, H., I. Duenyas, and R.Q. Zhang, "Price Competition Between Independent Retailers And Manufacturer-Owned Stores," Working Paper, University of California at Berkeley, 2002.

- Alba, J., J. Lynch, B. Weitz, C. Janiszewski, R. Lutz, A. Sawyer, and S. Wood, "Interactive Home Shopping: Consumer, Retailer, And Manufacturing Incentives To Participate In Electronic Marketplaces," *Journal of Marketing*, **61**, July (1997), 38-53.
- American Bar Association Antitrust Section, *Antitrust Law Developments*, 3rd Edition (1992), 401-450.
- Anand, K.S. and R. Aron, "Group-Buying On The Web: A Comparison of Price Discovery Mechanisms," Working Paper, OPIM Department, The Wharton School, University of Pennsylvania, 2002.
- Anderson, E.A., G.S. Day, and V.K. Rangan, "Strategic Channel Design," *Sloan Management Review*, **38**, Summer (1997), 59-69.
- Artle, R. and S. Berglund, "A Note On Manufacturers' Choice Of Distribution Channels," *Management Science*, **5**, 2 (1959), 460-471.
- Axsater, S., "Continuous Review Policies For Multi-Level Inventory Systems With Stochastic Demand," in S.C. Graves, A.H.G. Rinnooy Kan, and P.H. Zipkin (Eds.), *Handbooks in Operations Research and Management Science*, Volume 4 (*Logistics of Production and Inventory*), Elsevier Science Publishing Company B.V., Amsterdam, The Netherlands 1993, 175-197.
- Balasubramanian, S., "Mail Versus Mall: A Strategic Analysis Of Competition Between Direct Marketers And Conventional Retailers," *Marketing Science*, **17**, 3 (1998), 181-195.
- Balasubramanian, S. and R.A. Peterson, "Channel Portfolio Management: Rationale, Implications And Implementation," Working Paper, Department of Marketing, University of Texas at Austin, 2000.
- Balasubramanian, S., R.A. Peterson, and S. Jarvenpaa, "Exploring The Implications Of M-Commerce For Markets And Marketing," *Journal of the Academy of Marketing Science*, forthcoming, 2002.
- Balderston, F.E., "Communication Networks In Intermediate Markets," *Management Science*, **4**, 2 (1958), 154-171.
- Bali, V., S. Callander, K. Chen, and J. Ledyard, "Contracting Between A Retailer And A Supplier," Working Paper, Michigan State University, 2001.
- Baligh, H.H. and L.E. Richartz, "An Analysis Of Vertical Market Structures," *Management Science*, **10**, 4 (1964), 667-689.
- Bannon, L., "Selling Barbie Online May Pit Mattel Vs. Stores," *Wall Street Journal*, November 17 (2000), B1.
- Bell, D.R., Y. Wang, and V. Padmanabhan, "An Explanation For Partial Forward Integration: Why Manufacturers Become Marketers," Working Paper, The Wharton School, University of Pennsylvania, 2002.
- Bernstein, F. and A. Federgruen, "A General Equilibrium Model For Decentralized Supply Chains With Price And Service Competition," Working Paper, Fuqua School, Duke University, 2001.

- Blumenfield, D.E., L.D. Burns, J.D. Diltz, and C.F. Deganzo, "Analyzing Trade-offs Between Transportation, Production And Inventory Costs On Freight Networks," *Transportation Research*, **19b** (1985), 361-380.
- Boyaci, T., "Manufacturer-Retailer Competition And Coordination In A Dual Distribution System," Working Paper, McGill University, 2001.
- Brickley, J.A. and F.H. Dark, "The Choice Of Organizational Form: The Case Of Franchising," *Journal of Financial Economics*, **18** (1987), 401-420.
- Brickley, J.A., F.H. Dark, and M.S. Weibach, "An Agency Perspective On Franchising," *Financial Management*, **20** (1991(a)), 27-35.
- Brickley, J.A., F.H. Dark, and M.S. Weibach, "The Economic Effects Of Franchise Termination Laws," *Journal of Law and Economics*, **34**, 4 (1991(b)), 101-132.
- Brooker, K., "E-Rivals Seem To Have Home Depot Awfully Nervous," *Fortune*, **140**, August 16 (1999), 28-29.
- Brown, E., "How Can A Dot-Com Be This Hot?," *Fortune*, January 21 (2002), 78-84.
- Bucklin, C.B., P.A. Thomas-Graham, and E.A. Webster, "Channel Conflict: When Is It Dangerous?," *The McKinsey Quarterly*, June 22 (1997), 36.
- Cachon, G.P., "Competitive Supply Chain Inventory Management," in S. Tayur, R. Ganeshan, and M. Magazine (Eds.), *Quantitative Models for Supply Chain Management*, Kluwer Academic Publishers, Norwell, MA, 1999, 111-146.
- Cachon, G.P., "Supply Chain Coordination With Contracts," to appear in S. Graves and T. de Kok (Eds.), *Handbooks in OR and MS: Supply Chain Management*, North-Holland, 2002.
- Cachon, G.P. and M.A. Lariviere, "Capacity Allocation Using Past Sales: When To Turn-and-Earn," *Management Science*, **45**, 5 (1999(a)), 685-703.
- Cachon, G.P. and M.A. Lariviere, "Capacity Choice And Allocation: Strategic Behavior And Supply Chain Performance," *Management Science*, **45**, 8 (1999(b)), 1091-1108.
- Cattani, K., W. Gilland, and J.M. Swaminathan, "Coordinating Internet And Traditional Channels," Working Paper OTIM-2002-04, Kenan-Flagler Business School, UNC Chapel Hill, 2002.
- Caves, R.E. and W.F. Murphy, "Franchising: Firms, Markets And Intangible Assets," *Southern Economic Journal*, **42**, 4 (1976), 572-586.
- Chen, F., A. Federgruen, and Y. Zheng, "Coordination Mechanisms For A Distribution System With One Supplier And Multiple Retailers," *Management Science*, **47**, 5 (2001), 693-708.
- Chen, Y., G. Iyer, and V. Padmanabhan, "Referral Infomediaries," *Marketing Science*, **21**, 4 (2002), 412-434.
- Chiang, W.K., D. Chhajed, and J.D. Hess, "Direct Marketing, Indirect Profits: A Strategic Analysis Of Dual-Channel Supply-Chain Design," *Management Science*, **49**, 1 (2003), 1-20.

- Chiang, W.K. and G.E. Monahan, "The Impact Of The Web-Based Direct Channel On Supply Chain Flexibility In A Two-Echelon Inventory System," Working Paper, University of Maryland, Baltimore County, 2002.
- Choi, S.C., "Price Competition In A Channel Structure With Common Retailer," *Marketing Science*, **10**, 4 (1991), 271-296.
- Choi, S.C., "Price Competition In A Duopoly Common Retailer Channel," *Journal of Retailing*, **72**, 2 (1996), 117-134.
- Choi, S.C., "Expanding To Direct Channel: Market Coverage As Entry Barrier," Working Paper, Rutgers University, 2002. Forthcoming, *Journal of Interactive Marketing*.
- Chu, W., E. Gerstner, and J.D. Hess, "Managing Dissatisfaction: How To Decrease Customer Opportunism By Partial Refunds," *Journal of Service Research*, **1**, 2 (1998), 140-155.
- Clark, A.J. and H. Scarf, "Optimal Policies For A Multiechelon Inventory Problem," *Management Science*, **6** (1960), 475-490.
- Cohen, M.A., N. Agrawal, V. Agrawal, and A. Raman, "Analysis Of Distribution Strategies In The Industrial Paper And Plastics Industry," *Operations Research*, **43**, 1 (1995), 6-18.
- Cohen, M.A., P. Kleindorfer, and H.L. Lee, "OPTIMIZER: A Multi-Echelon Inventory System For Service Logistics Management," *Interfaces*, **20**, 1 (1990), 65-82.
- Cohen, M.A., Y. Zheng, and Y. Wang, "Identifying Opportunities For Improving Teradyne's Service-Parts Logistics System," *Interfaces*, **29**, 4 (1999), 1-18.
- Collinger, T., "Lines Separating Sales Channels Blur: Manufacturers, Direct Sellers, Retailers Invade Each Others' Turf," *Advertising Age*, March 30 (1998), 34.
- Corbett, C.J. and X. de Groote, "A Supplier's Optimal Quantity Discount Policy Under Asymmetric Information," *Management Science*, **46**, 3 (2000), 444-450.
- Corbett, C.J., and U.S. Karmarkar, "Competition And Structure In Serial Supply Chains With Deterministic Demand," *Management Science*, **47**, 7 (2001), 966-978.
- Corstjens, M. and P. Doyle, "Channel Optimization In Complex Marketing Systems," *Management Science*, **25**, 10 (1979), 1014-1025.
- Coughlan, A.T., "Competition And Cooperation In Marketing Channel Choice: Theory And Application," *Marketing Science*, **4**, 2 (1985), 110-129.
- Coughlan, A.T. and B. Wernerfelt, "On Credible Delegation By Oligopolists: A Discussion Of Distribution Channel Management," *Management Science*, **35**, 2 (1989), 226-239.

- Davis, S, E. Gerstner, and M. Hagerty, "Money Back Guarantees In Retailing: Matching Products To Consumer Tastes," *Journal of Retailing*, **71**, 1 (1995), 7-22.
- Davis, S, M. Hagerty, and E. Gerstner, "Return Policies And Optimal Level Of 'Hassle,'" *Journal of Economics and Business*, **50**, 5 (1998), 445-460.
- Deshpande, V. and L.B. Schwarz, "Optimal Capacity Allocation In Decentralized Supply Chains," Working Paper, Krannert School, Purdue University, 2002.
- Dnes, A.W., "The Economic Analysis Of Franchise Contracts," *The Journal of Institutional and Theoretical Economics*, **152** (1996), 297-324.
- Dong, L. and H.L. Lee, "Efficient Supply Chain Structures For Personal Computers," in J.S. Song and D.D. Yao (Eds.). *Supply Chain Structures: Coordination, Information, and Optimization (Volume 42 of International Series in Operations Research & Management Science)*, Kluwer Academic Publishers, Norwell, MA, 2001, 9-46.
- Druehl, C. and E. Porteus, "Price Competition Between An Internet Firm And A Bricks And Mortar Firm," Working Paper, Graduate School of Business, Stanford University, 2001.
- Federgruen, A., "Centralized Planning Models For Multi-Echelon Inventory Systems Under Uncertainty" in S.C. Graves, A.H.G. Rinnooy Kan, and P.H. Zipkin, (Eds.). *Handbooks in Operations Research and Management Science*, Volume 4, (Logistics of Production and Inventory), Elsevier Science Publishing Company B.V., Amsterdam, The Netherlands 1993, 133-173
- Fowler, G.A., "Where Are They Now?," *Wall Street Journal*, June 10 (2002), R13.
- Fransoo, J.C., M.J.F. Wouters, and T.G. de Kok, "Multi-Echelon Multi-Company Inventory Planning With Limited Information Exchange," *Journal of the Operational Research Society*, **52** (2001), 830-838.
- Frazier, G.L., "Organizing And Managing Channels Of Distribution," *Journal of the Academy of Marketing Science*, **27**, 2 (1999), 226-241.
- Gallini, N. T. and N.A. Lutz, "Dual Distribution And Royalty Fees In Franchising," *Journal of Law, Economics and Organization*, **8** (1992), 471-501.
- Ghosh, S., "Making Business Sense Of The Internet," *Harvard Business Review*, **76**, 2 (1998), 126-135.
- Gupta, S., "Coordination Incentives In Competing Supply Chains With Knowledge Spillovers," Working Paper, University of Michigan, 2001.
- Gupta, S. and R. Loulou, "Process Innovation, Product Differentiation, And Channel Structure: Strategic Incentives In A Duopoly," *Marketing Science*, **17**, 4 (1998), 301-316.
- Ha, A.Y., "Supplier-Buyer Contracting: Asymmetric Cost Information And The Cut-Off Level Policy For Buyer Participation," *Naval Research Logistics*, **48**, 1 (2001), 41-64.

- Hendershott, T. and J. Zhang, "A Model Of Direct And Intermediated Sales," Working Paper, University of California at Berkeley and University of Rochester, 2001.
- Hess, J.D., W. Chu, and E. Gerstner, "Controlling Product Returns In Direct Marketing," *Marketing Letters*, **7**, 4 (1996), 307-317.
- Huang, W. and J.M. Swaminathan, "Pricing On Traditional And Internet Channels Under Monopoly And Duopoly: Analysis And Bounds," Working Paper, Kenan-Flagler Business School, UNC Chapel Hill, 2003.
- Ingene, C.A. and M.E. Parry, "Coordination And Manufacturer Profit Maximization: The Multiple Retailer Channel," *Journal of Retailing*, **71**, 2 (1995(a)), 129-151.
- Ingene, C.A. and M.E. Parry, "Channel Coordination When Retailers Compete," *Marketing Science*, **14**, 4 (1995(b)), 360-377.
- Ingene, C.A. and M.E. Parry, "Manufacturer-Optimal Wholesale Pricing When Retailers Compete," *Marketing Letters*, **9**, 1 (1998), 65-77.
- Ingene, C.A. and M.E. Parry, "Is Channel Coordination All It Is Cracked Up To Be?," *Journal of Retailing*, **76**, 4 (2000), 511-547.
- Iyer, G., "Coordinating Channels Under Price And Non-price Competition," *Marketing Science*, **17**, 4 (1998), 338-355.
- Jaikumar, R. and V.K. Rangan, "Price Discounting In Multi-Echelon Distribution Systems," *Engineering Costs and Production Economics*, **19**, 1-3 (1990), 341-349.
- Katz, M.L., "Vertical Contractual Relations," in R. Schmalensee and R.D. Willig (Eds.). *Handbook of Industrial Organization*, Elsevier Science Publishers, Amsterdam, The Netherlands, 1989, Vol. 1, 655-721.
- Keeney, R.L., "The Value Of Internet Commerce To The Customer," *Management Science*, **45**, 4 (1999), 533-542.
- Klein, B., "Transaction Cost Determinants Of 'Unfair' Contractual Arrangement," *American Economic Review*, **70**, 5 (1980), 356-362.
- Klein, B. and L.F. Saft, "The Law And Economics Of Franchise Tying Contracts," *Journal of Law and Economics*, **28**, 5 (1985), 345-361.
- Kolay, S., G. Shaffer, and J.A. Ordover, "All-Units Discounts In Retail Contracts," Working Paper, University of Rochester, 2002.
- Krishnan, H., R. Kapuscinski, and D.A. Butz, "Coordinating Contracts For Decentralized Channels With Retailer Promotional Effort," Working Paper, University of Michigan, 2001.
- Kumar, N. and R. Ruan, "On Strategic Pricing And Complementing The Retail Channel With A Direct Internet Channel," Working Paper, University of Texas at Dallas, 2002.
- Lafontaine, F., "Agency Theory And Franchising: Some Empirical Results," *The RAND Journal of Economics*, **23**, 2 (1992), 263-283.

- Lafontaine, F. and P.J. Kaufmann, "The Evolution Of Ownership Patterns In Franchise Systems," *Journal of Retailing*, **70**, 2 (1994), 97-113.
- Lal, R., "Improving Channel Coordination Through Franchising," *Marketing Science*, **9**, 4 (1990), 299-318.
- Lal, R. and M. Sarvary, "When And How Is The Internet Likely To Decrease Price Competition," *Marketing Science*, **18**, 4 (1999), 485-503.
- Lariviere, M.A., "Supply Chain Contracting And Coordination With Stochastic Demand," in S. Tayur, R. Ganeshan and M. Magazine (Eds.), *Quantitative Models for Supply Chain Management*, Kluwer Academic Publishers, Norwell, MA, 1999, 233-268.
- Lee, H.L., V. Padmanabhan, and S. Whang, "Information Distortion In A Supply Chain: The Bullwhip Effect," *Management Science*, **43**, 4 (1997), 546-558.
- Lippman, S.A. and K.F. McCardle, "The Competitive Newsboy," *Operations Research*, **45**, 1 (1997), 54-65.
- Machlis, S., "Channel Conflicts Stall Web Sales," *Computerworld*, February 16 (1998(a)), 2.
- Machlis, S., "Going Online, Lauder Remembers Retailers," *Computerworld*, July 6 (1998(b)), 79.
- Machlis, S., "Beauty Product Sites Facing Channel Clash," *Computerworld*, November 9 (1998(c)), 24.
- Mahajan, S. and G. van Ryzin, "Stocking Retail Assortments Under Dynamic Consumer Substitution," *Operations Research*, **49**, 3 (2001), 334-351.
- Martin, R.E., "Franchising And Risk Management," *American Economic Review*, **78**, 12 (1998), 954-968.
- Marx, L.M. and G. Shaffer, "Predatory Accommodation: Below-Cost Pricing Without Exclusion In Intermediate Goods Markets," *Rand Journal of Economics*, **30**, 1 (1999), 22-43.
- Marx, L.M. and G. Shaffer, "Bargaining Power In Sequential Contracting," Working Paper, University of Rochester, 2001(a).
- Marx, L.M. and G. Shaffer, "Opportunism And Nondiscrimination Clauses," Working Paper, University of Rochester, 2001(b).
- Marx, L.M. and G. Shaffer, "Rent-Shifting And Efficiency In Sequential Contracting," Working Paper, University of Rochester, 2001(c).
- Mathewson, G.F. and R.A. Winter, "An Economic Theory Of Vertical Restraints," *Rand Journal of Economics*, **15**, 1 (1984), 27-38.
- McGuire, T.W. and R. Staelin, "An Industry Equilibrium Analysis Of Downstream Vertical Integration," *Marketing Science*, **2**, 2 (1983), 161-191.
- McGuire, T.W. and R. Staelin, "Channel Efficiency, Incentive Compatibility, Transfer Pricing, And Market Structure: An Equilibrium Analysis Of Channel Relationships," *Research in Marketing*, **8** (1986), 181-223.

- McIntyre, S.J., "How To Reap Profits And Avoid Pitfalls When A Catalog Is Only Part Of Your Business, Pt. 2," *Direct Marketing*, June 1 (1997), 32.
- McWilliams, G., "Mimicking Dell, Compaq To Sell Its PCs Directly," *The Wall Street Journal*, November 11 (1998), B1.
- McWilliams, G., "Lean Machine: How Dell Fine-Tunes Its PC Pricing To Gain Edge In A Slow Market," *The Wall Street Journal*, June 8 (2001), A1.
- Minkler, A.P., "An Empirical Analysis Of A Firm's Decision To Franchise," *Economic Letters*, **34** (1990), 77-82.
- Minkler, A.P., "Why Firms Franchise: A Search Cost Theory," *Journal of Institutional and Theoretical Economics*, **148** (1992), 240-259.
- Moorthy, K.S., "Strategic Decentralization In Channels," *Marketing Science*, **7**, 4 (1988), 335-355.
- Muckstadt, J.A. and R.O. Roundy, "Analysis Of Multistage Production Systems," in S.C. Graves, A.H.G. Rinnooy Kan, and P.H. Zipkin (Eds.). *Handbooks in Operations Research and Management Science*, Vol. 4 (Logistics of Production and Inventory), Elsevier Science Publishing Company B.V., Amsterdam, The Netherlands, 1993, 59-131.
- Nasireti, R., "IBM Plans To Sell Some Gear Directly To Fight Its Rivals," *The Wall Street Journal*, June 5 (1998).
- Netessine, S. and N. Rudi, "Supply Chain Structures On The Internet: Marketing-Operations Coordination Under Drop-Shipping," Working Paper, The Wharton School, University of Pennsylvania, 2001(a).
- Netessine, S. and N. Rudi, "Supply Chain Choice On The Internet," Working Paper, The Wharton School, University of Pennsylvania, 2001(b).
- Norton, S.W., "An Empirical Look At Franchising As An Organizational Form," *Journal of Business*, **61**, 4 (1988), 197-218.
- O'Brien, D.P. and G. Shaffer, "On The Dampening-Of-Competition Effect Of Exclusive Dealing," *Journal of Industrial Economics*, **41**, 2 (1993), 215-221.
- O'Brien, D.P. and G. Shaffer, "The Welfare Effects Of Forbidding Discriminatory Discounts: A Secondary-Line Analysis Of The Robinson-Patman Act," *Journal of Law, Economics, and Organization*, **10**, 2 (1994), 296-318.
- O'Brien, D.P. and G. Shaffer, "Nonlinear Supply Contracts, Exclusive Dealing, And Equilibrium Market Foreclosure," *Journal of Economics & Management Strategy*, **6**, 4 (1997), 755-785.
- Oxenfeldt, A.R. and A.O. Kelly, "Will Franchise Systems Ultimately Become Wholly-Owned Chains?," *Journal of Retailing*, **44** (1969), 69-87.
- Padmanabhan, V. and I.P.L. Png, "Manufacturer's Returns Policies And Retail Competition," *Marketing Science*, **16**, 1 (1997), 81-94.
- Parlar, M., "Game Theoretic Analysis Of The Substitutable Product Inventory Problem With Random Demands," *Naval Research Logistics*, **35** (1988), 397-409.

- Pasternack, B.A., "Optimal Pricing And Returns Policies For Perishable Commodities," *Marketing Science*, **4**, 2 (1985), 166-176.
- Peleg, B. and H.L. Lee, "Secondary Markets For Product Diversion With Potential Manufacturer's Intervention," Working Paper, Department of Management Science and Engineering, Stanford University, 2002.
- Perry, M.K. and R.H. Porter, "Can Resale Price Maintenance And Franchise Fees Correct Sub-Optimal Levels Of Retail Service," *International Journal of Industrial Organization*, **8**, 1 (1990), 115-141.
- Peterson, R., S. Balasubramanian, and B.J. Bronnenberg, "Exploring The Implications Of The Internet For Consumer Marketing," *Journal of the Academy of Marketing Science*, **25**, 4 (1997), 329-346.
- Purohit, D., "Dual Distribution Channels: The Competition Between Rental Agencies And Dealers," *Marketing Science*, **16**, 3 (1997), 228-245.
- Rajaram, K., and C.S. Tang, "The Impact Of Product Substitution On Retail Merchandising," *European Journal of Operations Research*, **135**, 3 (2001), 582-601.
- Raju, J., R. Sethuraman, and S. Dhar, "The Introduction And Performance Of Store Brands," *Management Science*, **41** (1995), 957-978.
- Rangan, V.K. and R. Jaikumar, "Integrating Distribution Strategy And Tactics: A Model And An Application," *Management Science*, **37**, 11 (November 1991), 1377-1389.
- Reinhardt, G. and M. Levesque, "Virtual Versus Bricks-and-Mortar Retailing," Working Paper, Department of Management, DePaul University, 2001.
- Rhee, B., "A Hybrid Channel System In Competition With Net-Only Direct Marketers," Working Paper, HKUST, 2001.
- Rhee, B. and S.Y. Park, "Online Stores As A New Direct Channel And Emerging Hybrid Channel System," Working Paper, HKUST, 2000.
- Rosencrance, L., "Amazon Charging Different Prices On Some DVDs," *Computerworld*, September 05 (2000).
- Schmid, J., "Reaching Into Retail: Can The Catalog And Retail Marketing Channels Coexist?," *Catalog Age*, January (1999), 59-62.
- Scott, F.A., "Franchising Vs. Company Ownership As A Decision Variable Of The Firm," *Review of Industrial Organization*, **10** (1995), 69-81.
- Seifert, R. W. and U.W. Thonemann, "Relaxing Channel Separation - Integrating A Virtual Store Into The Supply Chain," Working Paper, IMD – International Institute for Management Development, Lausanne, Switzerland, 2001.
- Seifert, R.W., U.W. Thonemann, and S.A. Rockhold, "Integrating Direct And Indirect Sales Channels Under Decentralized Decision Making," Working Paper, IMD – International Institute for Management Development, Lausanne, Switzerland, 2002.

- Shaffer, G., "Slotting Allowances And Resale Price Maintenance: A Comparison Of Facilitating Practices," *Rand Journal of Economics*, **22**, 1 (1991), 120-135.
- Shaffer, G., "Bargaining In Distribution Channels With Multiproduct Retailers," Working Paper, University of Rochester, 2001.
- Shaffer, G. and F. Zettelmeyer. "When Good News About Your Rival Is Good For You: The Effect Of Third-Party Information On The Division Of Profit In A Multi-Product Distribution Channel," *Marketing Science*, **21**, 3 (2002), 272-293.
- Shapiro, C., "Theories Of Oligopoly Behavior," in R. Schmalensee and R.D. Willig (Eds.), *Handbook of Industrial Organization*, Volume 1, Elsevier Science Publishers B.V., New York, NY, 1989, 329-414.
- Smith, S.A. and N. Agrawal, "Management Of Multi-Item Retail Inventory Systems With Demand Substitution," *Operations Research*, **48**, 1 (2000), 50-64.
- Stern, L.W., A.I. El-Ansary, and A.T. Coughlan, *Marketing Channels*, 5th edition, Prentice Hall, Upper Saddle River, New Jersey, 1996.
- Tessler, J., "Hybrid's Here: Retailers Finding A Mix Of Stores, Ads, And Net Best Way To Reach Customers," *San Jose Mercury News*, December 24 (2000), G1-2.
- Tsay, A.A. and N. Agrawal, "Channel Dynamics Under Price And Service Competition," *Manufacturing & Service Operations Management*, **2**, 4 (2000), 372-391.
- Tsay, A.A. and N. Agrawal, "Manufacturer And Reseller Perspectives On Channel Conflict And Coordination In Multiple-Channel Distribution," Working Paper, Santa Clara University, 2001.
- Tsay, A.A., S. Nahmias. and N. Agrawal, "Modeling Supply Chain Contracts: A Review," in S. Tayur, and R. Ganeshan, and M. Magazine (Eds.), *Quantitative Models for Supply Chain Management*, Kluwer Academic Publishers, Norwell, MA, 1999, 299-336.
- Wilcox, J., "Is Apple Stocking Its Own Shelves First?," *CNETnews.com*, March 13 (2002).
- Winter, R., "Vertical Control And Price Versus Nonprice Competition," *Quarterly Journal of Economics*, **108**, 1 (1993), 61-76.
- Zarley, C. and B. Darrow, "Industry Moves To Integrated Distribution," *Computer Reseller News*, April 5 (1999), 1.
- Zettelmeyer, F., "Expanding To The Internet: Pricing And Communications Strategies When Firms Compete On Multiple Channels," *Journal of Marketing Research*, **37**, 3 (2000), 292-308.