15 Pricing in marketing channels*
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Abstract

This chapter provides a critical review of research on pricing within a channel environment. We first describe the literature in terms of increasing time horizons of decision-making in a channel setting: (1) retail pass-through (2) pricing contracts and (3) channel design, all of which occur within a given market environment. We then describe the emerging empirical literature on structural econometric models of channels and its use in (1) inferring channel participant behavior and (2) policy simulations in a channel setting. We also discuss potential areas for future research in each area.

'Price' and 'channel' are two of the four elements of the marketing mix that managers control, yet they differ fundamentally in how managers can use them to impact market demand. While price is the most flexible, in that managers can change it most easily to impact short-run demand, the distribution channel through which firms reach their end consumer is the least flexible and perhaps the costliest to change in the short run. Therefore channel design is viewed as part of a firm's long-run strategy. Most importantly, in the presence of a typically decentralized distribution channel, an upstream price change by a manufacturer does not affect consumer demand directly, but only through how this upstream price change affects the retail price set downstream in the channel.

In his review of the pricing literature, Rao (1984) stated that 'the issues of pricing along the distribution channel . . . have not received much attention in the literature'. However, over the last 25 years, this gap has been remedied substantially. The tools of game theory have revolutionized the theoretical analysis of pricing within the channel and clarified the many issues about how prices are set within a channel; more importantly, these analyses have offered insights into the optimal long-term channel strategy, given how prices will be set within the channel. A smaller but emerging empirical literature on structural models of channels has provided insights on the behavior of channel participants and tools to perform policy analysis in a channel setting. The purpose of this chapter is to provide a critical review of this literature, identify the key themes of understanding that have emerged from research to date and identify important gaps in our knowledge that would benefit from future research.

Given the short-run nature of price and the long-run nature of the channel, we organize the literature in terms of three key issues of managerial interest that progressively increase in their time horizons for the decision. The three questions are:

1. Conditional on the distribution channel (which is fixed in the short run) and other market characteristics, how can a change in upstream price affect the downstream price seen by the end consumer? This question of 'pass-through' is the most short

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Market environment

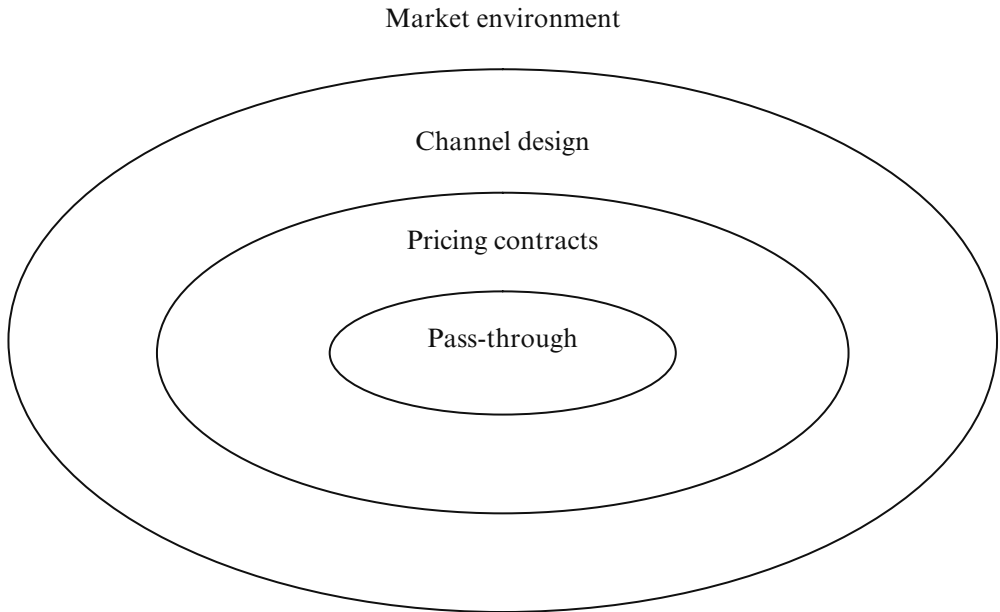Channel design

Pricing contracts

Pass-through

Figure 15.1   Pricing within a channel: key issues

    term of the three sets of decisions we consider. Pass-through is of interest to an upstream manager because it determines the extent to which the upstream manufacturer will change prices.

2. Conditional on the distribution channel (which is fixed in the short run) and other market characteristics, what is the best pricing contract to offer to the downstream channel member? This is a medium-term decision, where managers set the 'rules of their interactions' within the existing channel structure. These contracts affect the objective function of the market participants; and managers seek contracts that maximize their profits given a chosen channel structure. Pricing contracts can include linear tariffs, two part-tariffs, quantity discounts, slotting allowances, resale price maintenance (RPM) etc. Note that the types of pricing contracts that can be used may be constrained by law.

3. Finally, given the market characteristics, what is the optimal channel structure and the pricing contract? This is a long-term consideration where managers decide on the nature of channel ownership given the market characteristics. Should a firm vertically integrate or decentralize? Or would a mixed strategy of partial integration, with the manufacturer directly selling along with independent retailers, be optimal? The emergence of the Internet as a sales channel has brought the issue of partial forward integration again into focus in recent years. Since the optimality of the channel structure depends on the nature of pricing contracts that are available to the manufacturer, channel structure design is intimately linked to the pricing strategy.

    Finally, all of these decisions are embedded in the market environment in which the firms operate. A schematic way of thinking about these three sets of managerial

decisions embedded within a market environment is given in Figure 15.1, where we have laid out each of these questions within concentric circles. The answers to the pass-through questions are linked to the pricing contracts, which are in turn linked to the questions about channel design, which in turn are linked to the market environment in which the firms operate. Since no one contribution can exhaust all possible combinations within the above framework to give us a complete understanding of the tradeoffs involved, one objective of this chapter is to identify generalizable themes across multiple papers that model different combinations of market environments, channel structures and pricing contracts (see Table 15.1). This exercise should also help us identify key gaps in the literature.

We also describe the complementary empirical literature on structural models of channels that have emerged over the last decade. Such models serve (1) to describe manufacturer–retailer interactions that best describe the market and (2) to perform policy analysis of various channel decisions.

Section 2 describes a basic game-theoretic model of channels to illustrate the key modeling issues. Section 3 discusses the pass-through literature, Section 4 discusses the pricing contracts and Section 5 discusses the literature on optimal channel structures. Section 6 reviews the literature on structural econometric models. Section 7 concludes.

2.   An illustrative game-theoretic model of channels: the bilateral monopoly

McGuire and Staelin (1983) laid the foundation for game-theoretic analysis of channels in marketing. At the heart of the channel pricing game-theoretic literature is the concept of double marginalization (Spengler, 1950). The concept is applicable whenever there are multiple decision-makers setting prices in stages; but to make the idea concrete we illustrate double marginalization in the simplest setting of a bilateral monopoly.

Consider the following bilateral monopoly setting as shown in Figure 15.2: a manufacturer who produces at a unit cost c sets a wholesale price w to his retailer who in turn sets a retail price p to the consumer. Consumer demand follows a linear demand model: $q = 1 - p$.

Given the sequential nature of the game, we solve for the optimal retail and wholesale prices by backward induction. We begin by choosing retail price p to maximize the
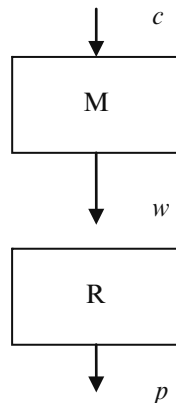

Figure 15.2   A model of bilateral monopoly

Table 15.1   Features modeled in selected papers on channels

Papers	Market characteristics: deterministic/ uncertain demand (DD/ UD)); (durable/ nondurable (D/ND)/non-specifiable (NS)	Manufacturers: monopoly/ competition (M/C); observed/ hidden action (O/H); non-price action (NP)	Retailers: monopoly/ competition (M/C); single/ multiple (SP/MP); observed/hidden action (O/H); non-price action (NP)	Pricing contract: linear pricing (LP); 2-part tariff (TT)/ qty discount (QD)/ RPM/slotting allow (SA)	Model characteristics: demand model: linear(L)/nonlinear (NL); logit/ exponential/general; manufacturer/retailer stackelberg/vertical Nash (MS/RS/VN)
Jeuland and Shugan (1983)	DD, ND	M, O	M, SP, O	LP, QD	L, MS
McGuire and Staelin (1983)	DD, ND	C, O	C, SP, O	LP	L, MS
Coughlan (1985)	DD, ND	C, O	C, SP, O	LP	L, concave, convex, MS
Choi (1991)	DD, ND	C, O	(C, SP); (M, MP), O	LP	L, NL, MS, RS, N
Trivedi (1998)	DD, ND	C, O	C, MP, O	LP	L, MS, RS, N
Desai et al. (2004)	DD, D	M, O	M, SP, O	TT	L, MS
Iyer (1998)	DD, ND	M, O	C, NP		
Moorthy (1987)	DD, ND	M, O	M, SP, O	TT	L, MS
Ingene and Parry (1998)	DD, ND	M, O	C, non-identical, SP, O	TT	L, MS
Iyer and Villas-Boas (2003)	UD, NS	M, O	M, SP, H	TT, bargaining	NL
Romano (1994)	DD, ND	M, H, NP	M, SP, H, NP	RPM	NL, N
Lal (1990)	DD, ND	C, O	M, MP, O	LP, TD	L, N
Gerstner and Hess (1995)	DD, ND	M, O	M, SP, O	LP, manufacturer rebates/coupons	2 segments of high and low valuation, MS
Lal and Villas-Boas (1998)	DD, ND	C, O	C, MP, O	LP, TD	4 segments, MS
Bruce et al. (2005)	DD, D	C, O	C, SP, O	LP, TD	2 segments of high and low valuation, MS
Moorthy (2005)	DD, ND	C, O	C, MP, O	LP, TD	General, MS

Tyagi (1999a)	DD, ND	M, O	M, SP, O	LP, TD	L, concave, convex, MS
Sudhir and Rao (2006)	DD, ND	C, O	M, MP, O	SA	L
Shaffer (1991)	DD, ND	C, O	C, MP, O	LP, SA, RPM	General, MS
Kim and Staelin (1999)	DD, ND	C, O	C, MP, O, NP	LP, SA	L, MS
Chen (2003)	DD, ND	M, O	C, SP, one dominant retailer, O	TT	General, MS
Dukes et al. (2006)	DD, ND	C, O	C, MP, O	Bargaining	L
Chiang et al. (2003)	DD, ND	M, O, direct channel	M, SP, O	LP	L, MS
Kumar and Ruan (2006)	DD, ND	C, O, direct channel	M, MP, O, NP	LP	2 segments of store/brand loyal, L, MS
Purohit (1997)	DD, D	M, O	C, SP, O	LP	Rent vs buy, MS

retailer's objective function: $\Pi^R = (p - w)q(p) = (p - w)(1 - p)$. Taking the first-order conditions with respect to p gives

$$\frac{\partial \Pi^R}{\partial p} = 1 + w - 2p = 0 \Rightarrow p = \frac{1 + w}{2}$$

Therefore retail pass-through measured in this model is given by

$$\frac{\partial p}{\partial w} = \frac{1}{2}$$

The manufacturer then chooses wholesale price w to maximize the manufacturer's objective function:

$$\Pi^M = (w - c)q(p(w)) = (w - c)\left(1 - \frac{1 + w}{2}\right) = (w - c)\left(\frac{1 - w}{2}\right)$$

Taking the first-order conditions with respect to w gives

$$\frac{\partial \Pi^M}{\partial w} = \frac{1 + c - 2w}{2} = 0 \Rightarrow w = \frac{1 + c}{2}$$

Hence retail price is

$$p = \frac{1}{2} + \frac{1 + c}{4} = \frac{3 + c}{4}$$

At the chosen retail and wholesale prices, the manufacturer and retailer profits are

$$\Pi^M = \left(\frac{1 - c}{2}\right)\left(\frac{1 - c}{4}\right) = \frac{(1 - c)^2}{8}; \qquad \Pi^R = \left(\frac{1 - c}{4}\right)\left(\frac{1 - c}{4}\right) = \frac{(1 - c)^2}{16}$$

The total channel profit is

$$\Pi^M + \Pi^R = \frac{3}{16}(1 - c)^2$$

As a point of comparison, it is useful to compare the retail prices and total channel profits if the manufacturer owned the retailer and set the final retail price. In that case, the manufacturer's (or the channel's) optimal price is obtained by maximizing $\Pi^c = (p - c)q(p) = (p - c)(1 - p)$. Taking the first-order conditions with respect to p gives

$$\frac{\partial \Pi^c}{\partial p} = 1 + c - 2p = 0 \Rightarrow p = \frac{1 + c}{2}$$

The total channel profit is given by

$$\Pi^c = \frac{(1 - c)^2}{4}$$

The total profit from the vertically integrated channel is therefore greater than profit from the decentralized channel.

The key takeaways from the above model are: first, the price in the vertically integrated channel is lower than the price in the decentralized channel; i.e. in the decentralized

channel the retail price is distorted upward from the price that would be observed in the integrated channel. At each stage the monopolist marks up the price; therefore in the integrated channel there is only one monopoly markup, while there are two markups in the channel (one by the manufacturer and one by the retailer). This 'double markup' is referred to as the 'double marginalization' and lends itself to the joke: 'From the consumer's point of view, what is worse than a monopoly? A chain of monopolies.' Second, the total channel profit with vertical integration is greater than the profits in the decentralized channel; therefore in this case, it would be optimal for the manufacturer to set up an integrated channel if it were feasible. Finally, given that $\partial p / \partial w = \frac{1}{2}$ in equilibrium, only 50 percent of the change in wholesale prices is passed through to the consumer.

In this model, we allowed for only a linear price contract between the manufacturer and the retailer. Suppose the manufacturer could use another contract such as a two-part tariff, where the retailer pays not only a unit cost, but also a fixed fee. In such a scenario, it is easy to see from the earlier analysis that the optimal strategy for the manufacturer would be to set the wholesale price at the manufacturer's marginal cost c, and the retailer would set the price at the vertically integrated retail price of $(1 + c)/2$. The manufacturer can then extract the entire profits that would result $[(1 + c)^2]/4$ in the form of fixed fees. Thus, using a two-part tariff, the manufacturer can obtain the vertically integrated channel outcome without having to integrate the channel.

The above illustrative model outlines the issues involved in the three managerial questions raised in the introduction. First, the pass-through with either a linear contact or two-part tariff is 50 percent. Second, the optimal pricing contract for the manufacturer between a unit price and two-part tariff is the two-part tariff. Finally, the profit from the vertically integrated channel and the bilateral monopoly structure is identical for the manufacturer when allowing for both a linear price contract and two-part tariff. But if the manufacturer is restricted to a linear price contract, the total channel profit is greater with a vertically integrated structure.

In the bilateral monopoly model above, a single manufacturer sold a single product at a linear unit price to a single retailer, who in turn sold only that product to the end customer. The demand was modeled using a linear demand model. It was also deterministic, and so there was no uncertainty about the market demand. Finally, manufacturers and retailers had no ability to affect demand, except through the change in price.

Markets of course can differ on every one of the dimensions described above. For instance, there could be competition among manufacturers, and competition among retailers. Each manufacturer or retailer could sell more than one product. Market participants may use objectives such as category profit maximization or only choose to maximize profits of any given product without considering the externalities on other products.

Rather than a linear price, the manufacturers could use other pricing contracts. Examples include nonlinear quantity discounts and two-part tariffs, which are common among franchisers. They could also impose a maximum retail price that retailers can charge, i.e. employ resale price maintenance (RPM). In the short term, they could also offer trade promotions or slotting allowances that involve transfers from manufacturers to the retailer.

Finally, uncertainty in demand can be important. If manufacturers and retailers can affect demand through their actions such as better service, then in the presence of demand uncertainty, the issue of whether participants put in the optimal level of effort to create

Table 15.2   Key characteristics modeled in current research

Channel structure	Manufacturers	• Monopoly/competition • Single/multiple products • Observability of actions
	Retailer	• Monopoly/competition/provision of exclusive territories • Single/multiple products/provision of exclusive dealing • Observability of actions/types
Pricing contracts		• Linear pricing • Two-part tariffs • Quantity discount • Resale price maintenance • Trade promotions • Slotting allowances
Market environment		• Deterministic versus uncertain demand • Relative power between manufacturers and retailers • Presence of store brands • Appropriate model of demand: linear, logit, exponential etc.

demand becomes a challenge. The issues of moral hazard and free-riding in terms of services at both the manufacturer and retailer level becomes critical. Researchers have also observed that the functional form used to model demand affects retail pass-through and optimal equilibrium strategies. Indeed, the range of possible institutional and market characteristics is very large. We summarize the key characteristics that have been modeled in current research in the Table 15.2 above.

3.   Retail pass-through
The theoretical literature on pass-through follows two broad streams. The first stream assumes that manufacturers change wholesale prices in response to changing demand and cost conditions (e.g. Moorthy, 2005). The second is based on the price discrimination motive; here trade promotions serve to price-discriminate between price-sensitive and brand-loyal customers (e.g. Lal and Villas-Boas, 1998). In practice, both reasons coexist in the market. Empirical research typically has not drawn a distinction between the different reasons.

3.1   Models where wholesale price changes due to changes in demand and costs
As in our illustrative example in Section 2, own pass-through for a product, j, is typically measured using the comparative static $\partial p_j/\partial w_j$ (e.g. Tyagi, 1999a; Sudhir, 2001; Moorthy, 2005). With multiple products, the extent to which a retailer changes the price of another product i in response to a wholesale price change for product j is termed cross pass-through and is operationalized as $\partial p_i/\partial w_j$.

The literature has highlighted five factors that affect pass-through: (1) retailer objective/ pricing rule; (2) demand characteristics; (3) manufacturer–retailer interaction; (4) manufacturer

competition; and (5) retail competition. We organize the discussion of the results along these factors. Table 15.3 provides a summary of the key results in the literature.

Depending on the retailer's sophistication, a retailer may use a simple markup rule (a constant markup would imply 100 percent own pass-through and 0 percent cross pass-through) or maximize profits. The theoretical literature on pass-through is based on the assumption that the retailer maximizes a profit objective. Retailers may maximize brand profits, category profits, or, when cross-category effects are important, profits across categories.

A profit-maximizing retailer sets the retail price where marginal cost equals marginal revenue. A reduction in the wholesale price reduces the retailer's marginal cost, and therefore it must reduce its price to reduce its marginal revenue by the same amount. As the responsiveness of the marginal revenue to a change in retail price depends on the concavity of the demand function, the change in retail price corresponding to a change in wholesale price, or the pass-through, depends on the functional form of demand (Lee and Staelin, 1997; Tyagi, 1999a).[1]

Lee and Staelin create a typology of vertical strategic interactions between channel members with pass-through between 0 and 100 percent ($0 < \partial p_i/\partial w_i < 1$, which they refer to as vertical strategic substitutability), pass-through over 100 percent ($\partial p_i/\partial w_i > 1$, vertical strategic complementarity) and pass-through of 100 percent ($\partial p_i/\partial w_i = 0$, vertical strategic independence). Tyagi characterizes demand functions with pass-through greater than or below 100 percent in terms of the convexity of the demand curve. While standard demand functions, such as the linear and the logit (or any concave function), lead to vertical strategic substitutes, the multiplicative demand function (and other, but not all, convex demand functions) leads to vertical strategic complements (also see Sudhir, 2001). When a retailer carrying multiple products maximizes category profits, the magnitude of own pass-through is independent of the product's market share in a linear demand specification (Shugan and Desiraju, 2001) but is inversely proportional to own share in a logit demand specification (Sudhir, 2001).

The level of competition between manufacturers (or products from the same manufacturer) affects cross pass-through. Shugan and Desiraju (2001) show that with a linear demand function the cross pass-through depends on the substitutability of the products. If the cross-price slopes are asymmetric, then cross pass-through will be positive for one product and negative for the other, depending on the direction of asymmetry.

In terms of the effect of manufacturer–retailer relationship on pass-through, the three common relationships studied are: (1) manufacturer Stackelberg, where the manufacturers set the wholesale prices and the retailer takes these wholesale prices as given when setting the retail price; (2) vertical Nash, where manufacturers and retailers set prices simultaneously; and (3) retailer Stackelberg, where the retailer sets the retail price and the manufacturer responds with a wholesale price.

Finally, Moorthy (2005) extends the pass-through results to the case of competing retailers (see also Basuroy et al., 2001). Moorthy studies both the linear and nested logit model,[2]

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[1]   See Tyagi (1999a) for a more detailed explanation as to how the demand function influences pass-through.

[2]   In the nested model, consumers make a retailer choice in the first stage and a brand choice in the second stage.

Table 15.3 Summary of pass-through results in the literature

Paper	Market structure	Demand model	Vertical strategic interaction	Retailer objective	Implications for own-brand pass-through ($\partial P_j/\partial w_j$)	Implications for cross-brand pass-through ($\partial P_i/\partial w_j$)
Besanko et al. (1998)	Multiple manufacturers, single retailer	Homogeneous logit	Vertical Nash	Maximize category profits	• Equal to 1	• Equal to 0
Tyagi (1999a)	Single manufacturer, single retailer	Linear; concave; convex	Manufacturer Stackelberg	Maximize profits (only one product)	• Greater or less than 100% depending on demand model	• Not applicable (only one product)
Sudhir (2001)	Multiple manufacturers, single retailer	Homogeneous logit	Manufacturer Stackelberg	Maximize category profits	• Between 0 and 1 • Inversely proportional to own share s_j	• Between 0 and -1 • Magnitude is directly proportional to promoting brand share s_j • Unrelated to s_i
		Homogeneous logit (two brands + outside good)	Manufacturer Stackelberg	Maximize brand profits	• Positive • Inversely related to own share s_j	• Positive • Magnitude is directly proportional to promoting brand share s_j • Directly related to s_i
Shugan and Desiraju (2001)	Multiple manufacturers, single retailer	General linear	Not specified	Maximize category profits	• Between 0 and 1 • Does not vary with share	• 0 if cross-price effects in demand are equal • Positive or negative, depending on direction of asymmetry in cross-price effects in demand • In a product pair cross-brand pass-through rates have opposite signs

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Moorthy (2005)	Two manufacturers and two retailers	Linear demand Hotelling-like model	Manufacturer Stackelberg	Maximize category profits	• Between 0 and 1 w/o retail competition	• Positive with retail competition • Without retail competition, brand asymmetry needed for cross-pass-through, positive for stronger brand and negative for weaker brand
	Two manufacturers and two retailers	Nested logit	Manufacturer Stackelberg	Maximize category profits	• Positive	• Negative cross pass-through w/o retail competition • Can be greater or less than 100% depending on demand model

and arrives at a large number of results on pass-through and cross pass-through. For the nested logit model, which brand gets a greater pass-through from a retailer depends not so much on its strength *vis-à-vis* the other brand (as in Sudhir, 2001), but rather on the relative strengths of the brands at the two retailers. In particular, he finds that pass-through at a retailer for the nested logit model can be greater than or less than 100 percent, depending on whether the brand has lower or greater market share at that retailer.

Moorthy's results show that pass-through for a brand is linked to the extent of retail competition in the market. If retail competition is limited, as is probably true in categories that are not major drivers of store traffic, one can use the predictions of the single retailer models. For categories that drive store traffic, retail competition can be critically important, and therefore the extent of pass-through needs to consider relative brand strengths at the retailers.

Cross pass-through also depends on the extent of retail competition (see Table 15.3 for key results). Moorthy also discusses the cases when wholesale price changes are retailer specific or common across retailers. When wholesale price changes are retailer specific, own pass-through is less than 100 percent and cross pass-through is always negative. But when wholesale price changes are common, cross pass-through can be positive or negative. These differences in results suggest intriguing possibilities about how manufacturers should time trade deals (synchronously or asynchronously) to different retail chains within the market.

3.2   Models where wholesale price changes induce price discrimination

Varian (1980) and Narasimhan (1988) introduce models that seek to discriminate between brand-loyal and price-sensitive customers through promotions. In these models, promotions are characterized as mixed-strategy equilibria. Hence wholesale prices may change with the motive of price discrimination and not necessarily as a result of changes in demand or costs. In contrast to the models that are concerned with demand functional forms (or models like the Hotelling model that generate linear demands), the analytical literature on price discrimination explicitly models consumer segments in terms of their price sensitivity and loyalty.

Lal and Villas-Boas (1998) study price promotions in the context of two competing retailers. Consumers may be loyal to manufacturers, retailers, both or none. A retailer is guaranteed retailer-loyal customers (denoted by R) and the brand-retailer-loyal customers who are committed to the brand (manufacturer) and the retailer (MR). But the retailer has to compete for brand- or manufacturer-loyal customers (M) who are not loyal to a particular retailer, and the completely price-sensitive customer group who are neither loyal to a brand nor to a retailer (S). Whether to promote a high-priced brand is based on the relative ratio of the customers the retailer has to fight for (M), relative to the guaranteed customers (MR). In contrast, the decision to promote a low-priced brand is based on the relative ratio of the customers the retailer has to fight for ($M + S$), relative to the guaranteed customers ($MR + R$). The main insight of the paper is that the retailer has the incentive to promote the higher-priced brand when $(M/MR) > (M + S/MR + R)$.

Thus the decision to pass through a trade deal for the retailer is based on the extent of both retailer and brand loyalty. Interestingly, retailer loyalty has the opposite effect of brand loyalty. Greater brand loyalty allows greater pass-through, while greater retailer loyalty reduces pass-through. Note that these results about how brand loyalty affects

pass-through are critically dependent on retail competition. If there were no retail competition, brand loyalty would not lead to greater pass-through, because the retailer would find the brand-loyal customer to be captive and only the price-sensitive customer needs to be wooed by price promotions.

Kumar et al. (2001) suggest that information asymmetry between customers and firms might be a reason for low pass-through. In a model where customers differ in their valuations and have search costs to find the lowest price, they argue that retailers will pass through a trade promotion only probabilistically in a mixed-strategy equilibrium. This is because in any given week, the consumer may not know if a better price may be available at another retailer who may pass through the trade promotion. The authors show that manufacturers can increase pass-through by advertising their trade promotions to consumers. This relationship between asymmetry and pass-through is consistent with the findings in Busse et al. (2006), who show that pass-through increases when asymmetric information is reduced in the context of trade promotions versus consumer promotions in the car market.

Another suggestion about how to improve pass-through is made in Gerstner and Hess (1991, 1995). They show that manufacturers can use consumer rebates (pull promotion), targeted towards the low-valuation segment, in combination with trade promotions (push promotions) to improve pass-through. Consumer promotions increase the low-valuation segment's willingness to pay. This encourages retailers to participate in trade promotions and serve this segment. Also, consumers are better off with retail price reductions motivated by trade promotions than with large consumer rebates alone. With only consumer rebates, the retailer increases the retail price by the value of the rebate so that the consumer has to pay a higher price in addition to the transaction cost of using the rebate.

3.3   *Empirical results on pass-through*

Empirical research on pass-through has mostly been on grocery markets, because of the availability of data. Theoretical models show that pass-through is affected by retail competition. But for groceries, even though there is retail competition at the basket level (Bell et al., 1998; Gauri et al., 2007), retail competition is not as strong at the individual-product level (Walters and MacKenzie, 1988). Hence a significant body of empirical research on pass-through has assumed a monopoly retailer.

Based on research in Chevalier and Curhan (1976), Curhan and Kopp (1987/88), Walters (1989) and Blattberg and Neslin (1990), Blattberg et al. (1995) conclude that the finding, 'pass-through rates are less than 100 percent', is an empirical generalization. However, Armstrong (1991), Walters (1989) and Besanko et al. (2005) find that pass-through rates can be greater than 100 percent for certain products. While Armstrong and Walters use a multiplicative functional form for demand (which, as we discussed earlier, leads to greater than 100 percent pass-through), Besanko et al. estimate a reduced-form regression for pass-through across products in several categories without making any assumptions about the functional form of demand or retailers' objectives (category or brand profit maximization). For a single store chain, they find that pass-through rates are greater than 100 percent for 14 percent of the products. In most categories, brands with larger market shares get greater pass-through, suggesting the effect of differences in manufacturers' bargaining power on pass-through. Pass-through rates are also found to

be greater in markets with older and more ethnic populations and in markets with larger households and greater home values. This may be an evidence for the findings of Lal and Villas-Boas (1998) if consumers in these markets have low retailer loyalty.

Does retail competition affect pass-through? Besanko et al. find that distance from the competitor does not affect pass-through. While one possible interpretation of this result is that retail competition has no impact on pass-through, the more likely explanation is that retailers of the same store chain do not adjust their prices across stores because of practical difficulties of having different specials at different stores. In fact, Besanko et al. find that only 2 percent of their pass-through variations can be explained by price zones. But the result that brands with greater market shares have greater pass-through offers indirect support for the role of retail competition. If market shares are correlated with strong brand loyalty, then the result that brands with stronger market share get greater pass-through suggests that retailers do consider retail competition when deciding on pass-through (see the discussion in Lal and Villas-Boas, 1998). Alternatively, this could be because the retail chain is weaker for the brands with the larger market share (Moorthy, 2005). Additional research needs to resolve these alternative reasons for the empirical results.

How do retailer objectives affect pass-through? The retailer objective affects the magnitudes of own and cross pass-through, and, in case of a logit demand specification, even the sign of the cross pass-through. Sudhir (2001) shows that, without retail competition, the cross pass-through is negative for category profit maximization and positive for brand profit maximization. He finds that category profit maximization by the retailer fits the price data better than brand profit maximization for the analyzed categories. Basuroy et al. (2001) evaluate how pricing behavior changed when a retailer shifted from a brand management to a category management behavior. They find that retail pricing in terms of own and cross pass-through changed in a manner predicted by the theory, suggesting that a manufacturer should take into account the retailer's price-setting rules when setting optimal wholesale prices.

A retailer could strategically vary its pricing strategy over high and regular demand periods. Chevalier et al. (2003) show that retail margins for specific goods fall during peak demand periods for that good. Meza and Sudhir (2006) account for the differences in levels of demand and price sensitivity between regular and high demand periods, and show that pass-through varies over the year and the average measures of pass-through for the entire year may be misleading. They use two categories: tuna, which has peak demand during Lent, and beer, which has peak demand during holiday and major sports weekends, to study differences in pass-through between high- and low-demand periods. They find an interesting difference between the two categories. Tuna's peak demand is not correlated with peak purchases in other complementary categories. Hence, while a tuna promotion can draw customers into the store, it does not provide many spillover benefits. In contrast, peak beer demand is correlated with peak purchases in complementary high-margin categories such as snacks. Hence the benefit of passing through promotions is greater for beer than for tuna during peak periods, and accordingly pass-through is greater for beer than for tuna during peak demand. Further, they find that retailers follow a narrow but deep pass-through strategy (only pass-through for the most popular size/brand 'pull items') in regular periods, but a broad but shallow pass-through strategy (lower but similar pass-through for all items) in peak periods.

With respect to cross pass-through, Besanko et al. (2005) find that about two-thirds of the cross pass-through effects are statistically different from zero. Slightly more than one-third of these effects are negative, while slightly less than one-third are positive. However, McAlister (2007) shows that these significant effects do not exist once we account for the high correlation in prices (0.9) across the stores in the data. Essentially, she argues that these significant effects are an artifact of the additional degrees of freedom due to using repeated price observations at the zone level (that do not vary independently over time). Hence further research is required on cross pass-through effects. One possibility as to why the cross pass-through effects are insignificant could be because extant pass-through research has not included prices from competing retailers in the model (as argued by Moorthy, 2005). Future research needs to study cross pass-through effects in greater detail.

Busse et al. (2006) show support for the information asymmetry effect on pass-through in the car market and may be considered indirect support for the findings of Kumar et al. (2001). They show that consumers obtain about 70–90 percent of the value of a consumer rebate, while they get only about 30–40 percent of a dealer promotion. As the authors acknowledge, the result is also consistent with a prospect theory argument. When consumers see a consumer promotion, the reference price shifts downwards, but with a trade promotion, the consumer is unaware of the price discount and the reference price is not affected. This differential effect on consumers' reference prices may explain the differences in pass-through. Future research needs to separate the role of consumer reference point effects and information asymmetry on pass-through.

3.4   Future research

In practice, price discrimination and demand and cost changes both affect wholesale prices. The extant analytical literature on pass-through has studied these cases separately, but it would be worthwhile to see how the predictions might change when both of these effects coexist, as in real markets. This can help create better hypotheses of pass-through in future research. In terms of empirical research, structural models that simultaneously develop both the demand side and the supply side (e.g. Villas-Boas and Zhao, 2005) could potentially incorporate heterogeneity in consumers' price sensitivity or brand and retailer loyalty, and thus tie in the price discrimination motive along with cost changes on the supply side. As we discuss in a subsequent section, a structural model to this effect would not only enable us to test some of the theoretical predictions but would also allow us to perform counterfactual simulations to understand channel member reactions and their impacts under different scenarios.

Several issues are important to address in empirical research on pass-through, for example: (1) how does retail competition affect pass-through?; (2) how does demand specification (brand/retailer loyalty; functional forms etc.) affect pass-through?; (3) how does pass-through behavior vary across categories?; (4) how does pass-through change over time?; (5) how is pass-through measured?; (6) how does pass-through behavior differ across types of trade promotions?

Moorthy (2005) and Lal and Villas-Boas (1998) have shown how pass-through is critically dependent on the extent of retail competition. Empirical research on pass-through has mostly assumed that retail competition is not strong at the individual product level (Walters and MacKenzie, 1988). Further, data from multiple competing retailers are hard

to obtain. Hence empirical evidence for the effects of competition is scarce. However, there could be variations in shopping behavior, across categories within consumers' shopping baskets. For example, a consumer might always buy her produce from the same retailer but search across retailers for best prices on paper goods. Such category-based consumer shopping behavior would be critical for a retailer whose objective is to maximize profits across categories. The issue of share-of-wallet across retailers and its influence on pass-through, for different categories and different retail formats, has not been sufficiently explored. Such analysis would of course require a rich dataset that has information on consumer behavior at a disaggregate level, and across retail chains and retail formats. Future research needs to investigate the implications of retail competition either directly, by acquiring data across competing retailers, or indirectly, by appropriately approximating retail competition in terms of geographical locations of consumers and retail stores of the same or different formats in the market.

For retail competition it is important to consider the differences in retail formats. On the cost or the supply side, this is important because manufacturers could use nonlinear pricing contracts (as we discuss in the next section) which could result in different marginal costs for different retailers and, hence, different pass-through behaviors. In addition, manufacturers could time trade deals synchronously or asynchronously to different retailers, which has different implications for pass-through (Moorthy, 2005). Also, as we have seen, pass-through varies over regular and peak demand periods. The extant literature on pass-through has assumed that the manufacturer and the retailer marginal costs are independent of order quantities and frequencies. If the operating costs of the manufacturer and the retailer are misaligned, or if they are different for different retailers (as may be the case for supermarkets versus club stores), this could have implications for pass-through when demand varies over time.

On the demand side, brand and retailer loyalty and competition could vary across store formats. For example, consumers who tend to visit supermarkets may be less price sensitive, and more retailer or brand loyal, whereas consumers who frequent discount or club stores could be more price sensitive, and less retailer and brand loyal. There could be such idiosyncratic differences in consumers across retail formats because of the different assortment of products in different store formats or because of their different pricing policies (e.g. small pack sizes versus bulk quantities and Hi-Lo versus EDLP). This could have some interesting implications for the nature of competition between different formats and the resulting pass-through behavior across retail formats and brands. Further, retailer and brand loyalty may differ over time as infrequent customers enter markets in peak periods. Systematic research needs to be done across store formats and time to test some of the existing theories and to present managers with descriptive insights into pass-through. For instance, most store chains have a loyalty program. Analysis of store loyalty card data, in conjunction with the overall sales data, could be used to test some of the conclusions in Lal and Villas-Boas (1998).

As the analytical literature has shown, results on pass-through are conditional on the demand-functional forms. Hence adopting specific structural models in empirical research could impose specific constraints on possible pass-through rates. A systematic investigation of which functional forms are supported in the pricing and pass-through data in a given setting can be useful to understand which models should be used for decision support systems for setting wholesale and retail prices.

Pass-through has been measured in many ways. Much of the theoretical literature has focused on the comparative static $\partial p_i / \partial w_i$ to study pass-through (e.g. Tyagi, 1999a), while some has looked at the proportion of trade deals passed through (Kumar et al., 2001). In the context of forward buying and consumer stockpiling, one may need a different definition of pass-through such as the fraction of the total discount that gets passed through to the consumer. Meza and Sudhir (2006) show that using the weighted average wholesale price (rather than the true current promotional price) gets us closer to a true estimate of pass-through in the presence of forward buying and stockpiling than the actual prices. Testing this using data on true marginal wholesale price and actual shipping data as in Abraham and Lodish (1987) and Blattberg and Levin (1987) would be useful validation of extant research using readily available weighted average wholesale price.

Lal et al. (1996) study forward buying, merchandising and trade deals in a single retailer context. They find that while such forward buying reduces pass-through for manufacturers, it is beneficial for manufacturers because it reduces competition among them. Future research should look at how these effects manifest in terms of pass-through when there is retail competition.

Pass-through research has mostly been on grocery markets. It is obvious that there are interesting issues in the context of durable goods, services, industrial buying situations etc. As discussed earlier, Busse et al. (2006) is an exception. Bruce et al. (2005) note that secondary markets matter with durable goods. They find that trade promotions can mitigate the double marginalization problem better for manufacturers of more durable goods. In their model, retailers do not compete with each other. Hence, how these results translate in markets with retail competition needs to be investigated.

Much research on pass-through is based on off-invoices, with unconditional wholesale price reductions. Gomez et al. (2007) study different types of trade deals. They find that only 25.9 percent of discounts are off-invoices. Scanbacks and accruals (31 percent) are negotiated with retailers; these require retailers to attain a quantity level to get the allowance. Scanbacks and accruals may therefore be considered similar to a quantity discount in terms of our discussion of pricing contracts below. Billbacks (3.1 percent) are similar to scanbacks, but based on items that are purchased, not sold, and therefore leave open the option for forward buying. A systematic investigation of how pass-through changes when different pricing contracts are used would be a very useful area of research.

4.   Optimal pricing contracts

Manufacturers (or upstream firms) can decide the pricing contract they offer to the retailer (or downstream firm). Researchers have evaluated a number of pricing contracts such as linear wholesale price, quantity discounts, two part-tariffs and resale price maintenance. Typically, the upstream manufacturer structures the pricing contract in a way that is most profitable for it. When the upstream firm does not have the power (for example with large retailers), either the downstream player will set the terms of the pricing contract or it may be an outcome of bargaining negotiations.

4.1   Linear wholesale prices

The simplest and most common pricing contract is the linear wholesale price. This leads to the familiar double marginalization problem discussed in the illustrative example of Section 2. The double marginalization problem results in lower total channel profits (the

size of the pie) than what it could have been under channel coordination. A long stream of literature on channels of distribution has emphasized pricing contracts where the double marginalization problem can be minimized and the channel can be coordinated.[3] We discuss these contracts below.

4.2   Quantity discounts and two-part tariffs

Quantity discounts and two-part tariffs can coordinate the channel. With quantity discounts, the per-unit costs to the retailer fall with quantity purchases. Jeuland and Shugan (1983) show that quantity discounts can be used as a means by which a manufacturer can coordinate the channel in a bilateral monopoly setting.

Moorthy (1987) argues that the Jeuland–Shugan quantity–discount coordination requires only that the retailer's marginal cost equal the marginal revenue at the channel's optimal quantity; its value at quantities other than the channel's optimal quantity can be almost anything. This leeway in choosing the retailer's effective marginal cost away from the channels' optimal quantity leads to a variety of potential pricing schemes (e.g. two-part tariff) that can also be optimal. In a two-part tariff, the retailer makes a fixed payment and pays a per-unit charge for the product. The fixed fee and the per-unit charge are set such that the sales volume and total profit of the channel members is the same as when maximizing total channel profit. For instance, in the bilateral monopoly model discussed in Section 2, the manufacturer can set the wholesale price (w) equal to his marginal cost (c) and then extract the retailer's profit completely with a fixed fee. This will maximize total channel profit and also help the manufacturer maximize his profit.

Researchers have shown that two-part tariffs can be optimal in a wide range of market scenarios such as (1) when retailers have to provide non-contractible services as with franchising services with potential for moral hazard as in Lal (1990); (2) when retailers have to complement the product with another input and then sell a composite output (Vernon and Graham, 1971); (3) when retailers carry a product line (Villas-Boas, 1998); (4) when there is demand uncertainty (e.g. Rey and Tirole, 1986); (5) when manufacturers and retailers have private information (e.g. Desai and Srinivasan, 1995; Tirole, 1988, p. 176).

Iyer and Villas-Boas (2003) however argue that two-part tariffs are not optimal if the product is not completely specifiable. They show that in a model of bargaining between manufacturers and retailers when products are not completely specifiable and demand is uncertain (as is typical in almost all channel models, they also assume retail actions are unobservable), two-part tariffs will not be a part of the market contract even in a simple one manufacturer–one retailer channel. This is because the fixed fee in the two-part tariff does not affect the opportunistic behavior on the part of the manufacturer and, therefore, will not be accepted by the retailer. In their bargaining model, a linear wholesale price contract emerges as the equilibrium outcome. They also note that empirically the use of

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[3]   Channel coordination can also be brought about by non-pricing mechanisms. For a simple bilateral monopoly case, Shugan (1985) shows that implicit understandings between channel members can be a partial substitute for formal agreements. Also see Fugate et al. (2006) for a discussion on the different types of coordination mechanisms.

two-part tariffs is considerably small, despite prior findings in the theoretical literature about the optimality of two-part tariffs in a broad range of settings.[4]

When else might a two-part tariff or a quantity discount not work? Ingene and Parry (1995a, 1995b, 1998, 2000) have studied the case of a manufacturer setting a wholesale price schedule for its retailers who differ in their demand and cost structures. They show that when these non-identical retailers compete on price, channel coordination can still be achieved with an appropriately specified quantity discount schedule but not with a simple two-part tariff. A quantity discount schedule can be designed such that the effective marginal cost is different for different retailers and is equal to their marginal revenue, given their differences. In contrast, a two-part tariff offers each retailer the same per-unit charge. Since the Robinson–Patman Act does not allow manufacturers to discriminate between different retailers by charging retailer-specific wholesale prices, a menu of two-part tariffs, where retailers can select whichever tariff they want, can overcome this legal problem, and also coordinate the channel. Interestingly, the authors show that, from the perspective of a profit-maximizing manufacturer, a non-coordinating 'Sophisticated Stackelberg' two-part tariff that simultaneously optimizes the per-unit fee and the fixed fee in light of the difference in retailers' fixed costs may be preferred over channel coordination. The optimal pricing policy is dependent on (1) the retailers' fixed costs, (2) the relative size of the retailers, and (3) the degree of retail competition.

Models in marketing typically assume the manufacturer and retailer marginal costs as constant and fixed. There is a literature at the interface of marketing and operations that addresses optimal pricing contracts when it affects retailer operating costs. When the operating costs of the retailer and the manufacturer are a function of the order quantities, the manufacturer needs to motivate the retailer to choose both retail prices and order quantities that will simultaneously maximize the retailer's profit and the joint profit of the retailer and the manufacturer (Weng, 1995). A simple quantity discount cannot achieve this, and the manufacturer will have to use a fixed franchise fee in combination with the quantity discount. When a supplier caters to multiple non-identical retailers, Chen et al. (2001) show that the same optimum level of channel-wide profits as in a centralized system can be achieved in a decentralized system, but only if coordination is achieved via a unique wholesale pricing policy – periodically charged fixed fees, and a discount pricing scheme under which the discount given to a retailer is the sum of three discount components based on the retailer's (i) annual sales volume, (ii) order quantity, and (iii) order frequency.

4.3   Resale price maintenance (RPM)
RPM is a method of vertical control where the upstream firm dictates pricing policies at subsequent stages of the distribution channel. By setting a price ceiling (maximum RPM), the upstream firm can control the retailer's margin, so that it can eliminate the double marginalization problem and reduce the retail price. Setting a price floor (minimum RPM) can also achieve channel coordination by reducing price competition

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[4]   Through a laboratory experiment, Ho and Zhang (2008) show that, with a reference-dependent utility function, retailers perceive the up-front fixed fee in a two-part tariff as a loss, and the subsequent sales proceeds as a gain. Hence, if retailers are loss averse, a two-part tariff may not be able to coordinate the channel.

among retailers and diverting competition into non-price dimensions such as service (Telser, 1960; Mathewson and Winter, 1984; Iyer, 1998) or product quality (Marvel and McCafferty, 1984).[5]

The issue of RPM is pertinent in cases of demand uncertainty, information asymmetry and moral hazard: (1) when retailers have private information about an uncertain state of the demand (Gal-Or, 1991); (2) both the upstream and downstream firms make a non-price choice (e.g. advertising, sales effort, etc.) subject to moral hazard – double or two-sided (Romano, 1994); and (3) when the manufacturer faces uncertain demand (Butz, 1997).

Iyer (1998) examines a channel with two symmetric retailers engaging in price and non-price competition (e.g. provision of product information, after-sales service etc.). Consumers are heterogeneous in their locations (as in the spatial models of horizontal differentiation) and in their willingness to pay for retail services (as in the models of vertical differentiation). When the diversity in willingness to pay is relatively greater than locational differentiation, neither quantity discounts nor a menu of two-part tariffs are sufficient to coordinate the channel. A complicated menu of contractual mechanisms is necessary that can induce retail differentiation so that all retailers don't compete only for consumers with low willingness to pay (by engaging in price competition) or only for consumers with high willingness to pay (by engaging in non-price competition). An example of such a menu is one consisting of retail price restraints linked to particular wholesale prices and fixed fees.

In general, RPM restricts the resellers' freedom to set prices. Minimum RPM can be anticompetitive by acting as a monitoring or an enforcing mechanism that facilitates collusion of an upstream or downstream cartel or by facilitating third-degree price discrimination by a monopolistic manufacturer (Gilligan, 1986). Although maximum RPM is traditionally viewed as reducing retail price,[6] it could reduce consumer welfare by reducing the number of retailers (Perry and Groff, 1985) or facilitate manufacturer opportunism, whereby it may drive prices down enough so that the retailers almost fail and then the manufacturer may exploit such retailers (Blair and Lafontaine, 1999). Hence both forms of RPM are viewed unfavorably by the US Supreme Court.

Since 1911, and until recently, either form of RPM was *per se* illegal under Section 1 of the Sherman Antitrust Act. This meant that a violation of Section 1 had been established once the government or private plaintiff proved that the defendant manufacturer had implemented an explicit or implicit plan to maintain a resale price. However, the last few years have seen legal cases where a price maintenance agreement between an upstream supplier and a downstream distributor is judged on its unique circumstances. In its *State Oil Company, Petitioner v. Barkat U. Khan and Khan & Associates, Inc.* decision of 1997, the Court returned the antitrust treatment of maximum RPM to the 'rule of reason', so that now a defendant manufacturer can defend itself by demonstrating that, in its case, maximum RPM has pro-competitive effects that benefit the consumers (Roszkowski,

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[5]   On a different note, Perry and Porter (1990) show that minimum RPM can result in excessive retail service or induce new entry because of the reduced price competition.

[6]   When the manufacturer can set both a franchise fee and a wholesale price, Perry and Besanko (1991) show that the traditional view that maximum RPM will lower retail prices and that minimum RPM will raise retail prices may be reversed.

1999). More recently, in June 2007, the Supreme Court's decision in *Leegin Creative Leather Products Inc. v. PSKS Inc.* established that courts should also evaluate minimum RPM according to the 'rule of reason'.[7]

4.4   Slotting allowances

Unlike fixed fees that retailers pay to manufacturers in two-part tariffs, slotting allowances are payments made by manufacturers to retailers. They include a wide assortment of fixed transfers from manufacturers to retailers that are not linked to quantities sold. These have been variously called pay-to-stay fees, failure fees, premium shelf-placement fees, share of shelf-space fees etc.

Sullivan (1997) argues that as the cost of developing new products falls, more new products are supplied; slotting allowances emerge as a means by which to ration shelf space efficiently to the most profitable products. Another argument often used is that when shelf space is a scarce resource, slotting allowances serve to shift the risk of failure from the retailers to the manufacturer. This risk-shifting becomes particularly important in the presence of private information about the success of the product in the hands of the manufacturer. Lariviere and Padmanabhan (1997) and Desai (2000) argue that slotting allowances are means by which manufacturers signal to retailers their private information about the quality of their products. Desai (2000) shows that slotting allowances can be pro-competitive as it serves to enhance retailer participation because it reduces the demand uncertainty of retailers and increases their profitability. But Shaffer (1991) argues that slotting allowances are anticompetitive because they reduce retail competition and increase prices.

While Shaffer assumes that manufacturers are in a perfectly competitive market and therefore have no power and the retailer sets the terms of trade, in Desai's model, the manufacturer sets the terms of trade. In both models, wholesale prices are higher in the presence of slotting allowances. But with manufacturers setting the terms of trade and using slotting allowances as a signaling device, the likelihood of slotting allowances falls when there is greater market potential (as understood by both manufacturers and retailers). This is because retailers find it worthwhile to participate in the market even without slotting allowances when the market is profitable. However, when the retailer seeks to exercise power, the retailer can extract the manufacturers' entire surplus through slotting allowances. Then slotting allowances should increase with market potential.[8]

In terms of empirical research, Bloom et al. (2000) and Wilkie et al. (2002) use surveys of manufacturers and retailers to identify key reasons why slotting allowances are used. However, the results are inconclusive because retailers and manufacturers have somewhat opposing views. Rao and Mahi (2003) survey manufacturers and retailers about each transaction they were involved in. They find that slotting allowances increase with greater retailer power, but acknowledge that the results may be due to their inability to control for manufacturer–retailer power at the level of each transaction due to pooling transactions across a wide range of manufacturers and retailers.

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[7]   *Source*: Knowledge@Wharton, 08 August 2007.

[8]   Chu (1992) develops a screening model where retailers use slotting allowances to screen new products for their potential. Again, with this model where the retailer has power, slotting allowances increase with the potential of the product.

Sudhir and Rao (2006) use a database of all new products offered to a particular retailer, some of which received slotting allowances and others that did not. By using such a universe of accepted and non-accepted products, they are able to control for any potential issues of selection involved in using only accepted products. They also had internal ratings data of retailer buyers on the potential for success. These data enabled them to study which of the rationales are supported in their data by sidestepping the common problems of selection and levels of information asymmetry for any new product. Broadly, Sudhir and Rao find support for the efficiency rationales: opportunity costs, information asymmetry, signaling and retail participation. They do not find support for the retail power and retail competition mitigation (with an anticompetitive rationale) hypotheses.

Israelevich (2004) shows evidence based on a policy analysis using a structural model that slotting allowances (pay to fees) serve to put products on retailer shelves that may not be profitable purely through the revenues they generate for the retailer; thus slotting allowances may serve to increase consumer variety. The question of whether other better products that could be more in demand by consumers are being pushed out from the shelves due to slotting fees is yet to be resolved.

Slotting allowances for existing products may also be given to enhance retailer participation in activities such as in-store service or merchandising. These allowances may be called display allowances or advertising allowances, and may fall under the broad rubric of slotting allowances. Kim and Staelin (1999) show that with greater store substitutability, manufacturers will 'freely' give retailers side payments to increase merchandising. If a retailer passes through a greater portion of these side payments to the consumer, then the manufacturer increases the side payment to this retailer. In addition, the competing retailers will react by lowering their retail margin and, thus, regular retail price. The authors present comparative static results for how changes in consumer sensitivity to pricing and promotional activities affect prices, side payments, and both retailer and manufacturer profits.

4.5   Future research

As we have seen, manufacturers might use any of the several possible pricing schemes or they could even use a combination of pricing schemes. Future research needs to address: (1) what are the implications of different pricing contracts for pass-through?; (2) how does retail competition, manufacturer competition and the overall channel structure influence the choice of pricing contract?; and (3) what combination of pricing schemes might be used under what market situations?

Different pricing schemes would have different implications for how pass-through is defined and measured. Specifically, when wholesale prices are not observed, the researcher should be wary that, with a nonlinear pricing scheme, the marginal cost could be different for different retailers. This could, in turn, result in different pass-through behaviors across competing retailers. Also, researchers should be cautious about using directly observed wholesale prices if, say, side payments or slotting allowances, which are not observed by the researcher, change the effective wholesale price for the retailer. Inferring pass-through behavior through a structural model that tests different hypotheses on the contracting and pricing relationships between manufacturers and retailers could be one potential solution.

It would be interesting to see if retailers' pass-through behavior might influence the pricing contract set by manufacturers. While the causality between the pricing contract

and the pass-through behavior may be difficult to tease out, it is nonetheless interesting to explore this issue. For instance, it is known that pass-through behavior changes between regular and peak demand periods. What terms might a manufacturer want to incorporate in the pricing contract (e.g. RPM) to guard itself against these variations? How might a manufacturer want to set the contract differently when retailers' objective is brand profit maximization versus when retailers' objective is category profit maximization?

Heterogeneity among retailers (Ingene and Parry, 2000), and the relative bargaining power of manufacturers and retailers (Iyer and Villas-Boas, 2003; Shaffer, 1991; Desai, 2000) have implications for the terms of the pricing contract. Different retail formats (supermarkets versus discount stores or club stores) carry an assortment of products and attract different kinds of consumers, and hence face very different demand structures. Hence the bargaining power of a retailer may not only depend on the extent of retail competition in the market but also on the store format. Future research should analyze pricing contracts in the context of differences in demand structures and bargaining power of competing retailer formats.[9]

Chen (2003) studies the situation where an upstream supplier uses two-part tariffs for its downstream retailers, which include a dominant retailer and competitive fringe retailers. The dominant retailer is more efficient at a large scale of operation (i.e. it has a cost advantage). In order to offset the reduction in profits caused by the rise in the dominant retailer's power, the manufacturer seeks to boost the fringe retailers' sales by lowering wholesale prices to them. This in turn leads to greater retail competition and lower prices. Dukes et al. (2006) consider a bilateral bargaining situation of competing manufacturers and competing multiproduct retailers. In this setting, manufacturers raise prices to the weaker retailer in order to boost sales through the more efficient retailer, which is also more profitable. This in turn reduces retailer competition and raises retail prices. Manufacturers' increased bargaining power over the weaker retailer allows them to accrue, in part, the additional extracted consumer surplus. These findings need to be empirically tested in view of their implications for pass-through behavior of dominant versus weak retailers, with and without manufacturer competition.

Both Chen (2003) and Dukes et al. (2006) assume that the manufacturers can charge different prices to the powerful and weak retailers, but, as pointed out earlier, manufacturers could instead use menu pricing schemes to overcome the limitations imposed by the Robinson–Patman Act. While the Robinson–Patman Act does not allow a manufacturer to discriminate between retailers, different manufacturers might offer different contracts to the same retailer. Hence, with regard to upstream competition, it would be interesting to understand when competing manufacturers might offer different pricing contracts or pricing schemes to their retailers. For example, would a national brand and a local brand always offer the same pricing scheme to a retailer? If not, then when might they differ?

Future research should investigate how different channel structures influence pricing contracts. For instance, as will be discussed in the next section, the presence of a direct channel that is owned by the manufacturer (a partially integrated channel) could strain

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9   One source of retail power has been the emergence of store brands. We refer the reader to the companion chapter on store brands in this handbook for a survey of issues relating to store brands.

the manufacturer–retailer relationship. What is the optimal pricing contract under such a scenario? Also a distribution channel could evolve over time because of mergers or because manufacturers and retailers enter or exit the market. This would change the extent of competition upstream or downstream, and also the demand for individual retailers. How should the pricing contract be designed to adjust for such potential changes in the channel structure?

Iyer and Villas-Boas (2003) note that empirically the use of two-part tariffs is considerably small despite findings in the theoretical literature about the optimality of such tariffs. While bargaining between the channel members could be a possible reason, an alternate reason could be that the real-world settings are far more complex, and as the findings of Chen et al. (2001) and Iyer (1998) suggest, manufacturers might be using more complicated pricing schemes. Future research thus needs to incorporate more efficiently the characteristics of channel members, characteristics of the product and consumer behavior in analyzing the issue of setting a wholesale pricing contract, while allowing for the use of a combination of different pricing schemes.

5.   Channel structure

The channel structure is a long-term decision where managers decide on the structure of the distribution channel given the market characteristics. Managers can decide whether to have an integrated channel (sell directly to the consumer) or a decentralized channel (use intermediaries such as retailers, dealers etc.) or a combination of both – a partially integrated channel (e.g. use a direct online channel and traditional retailers). For a channel with intermediaries, managers can not only decide the number of players at each level; they can also choose among different options such as exclusive dealers (EDs), exclusive territories (ETs) and independent profit-maximizing retailers. While making such a decision, managers need to take into account the optimal pricing strategy that can be implemented in the resulting channel structure, given the market characteristics (e.g. competition, demand uncertainty, power structure).

5.1   *Vertical integration and decentralization*

In the illustrative model of Section 2, we found that vertical integration (VI) can solve the double marginalization problem and the associated pricing inefficiency from an independent retailer (Jeuland and Shugan, 1983). VI can lower retail prices for other channel structures as well – upstream monopolists selling through multiple downstream monopolists (Romano, 1987), a duopoly channel structure with exclusive dealers (McGuire and Staelin, 1983; Coughlan, 1985), and a 'full channel' structure with two competing manufacturers both selling through both competing retailers (Trivedi, 1998).[10]

Although VI can internalize the double marginalization problem, when the retail market is highly competitive (as a result of, say, high product substitutability[11]), manufacturers may be better off if they can shield themselves from the competitive environment by inserting privately owned profit-maximizers (retailers) between themselves and the

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[10]   The integrated structure has two manufacturers selling directly to consumers.
[11]   Product substitutability is defined as the ratio of the rate of change of quantity with respect to the competitor's price to the rate of change of quantity with respect to own price.

ultimate retail markets (McGuire and Staelin, 1983; Coughlan, 1985; Lin, 1988).[12] This is because marketing middlemen soften manufacturer competition as the effect of a price change by a manufacturer on final retail demand is weakened by the intermediary. Other channel restraints such as exclusive dealing (Trivedi, 1998) and exclusive territories (Rey and Stiglitz, 1995) can also reduce manufacturer competition.

Moorthy (1988) showed that retail competition is not necessary for decentralization to be a Nash equilibrium. What is critical is the nature of coupling between demand dependence and strategic dependence. The author shows that decentralization is a Nash equilibrium only if one of the following (mutually exclusive) conditions are satisfied: (1) the manufacturers' products are demand substitutes at the retail level and strategic complements at the manufacturer or retailer levels; (2) the manufacturers' products are demand complements at the retail level and strategic substitutes at the manufacturer or retailer levels.

In general, with pure price competition, a mixed channel structure where one firm vertically integrates while another decentralizes is not an equilibrium. However, when retailers engage in price and non-price competition (e.g. provision of product information, after-sales service etc.), Iyer (1998) shows that a mixed channel structure can be an equilibrium in markets with weak brand loyalty. Although the decentralized retailer will charge higher prices than those chosen by the vertically integrated firm, adopting a high-end service position helps the retailer to differentiate and support the higher price. Hence the corresponding manufacturer's incentive to decentralize is reinforced in equilibrium.

We have already mentioned that demand functional form and manufacturer–retailer interactions affect pass-through. Choi (1991) and Trivedi (1998) analyze the effect of demand functional forms and manufacturer relationship on channel structure. The two papers find a rich set of results on how channel structure decisions are affected by functional form and manufacturer–retailer interactions.

The channel structure may also evolve over time with the entry of new players into the market. Tyagi (1999b) shows demand conditions where, contrary to conventional wisdom, entry of a new downstream firm lowers the downstream market output and increases the consumer price. This is because the upstream firms gain bargaining power with downstream entry, raising their wholesale price, and this effect can overcome the competitive effect of entry. But he also shows that for a class of widely used demand functions – linear, constant elasticity and a variety of convex and concave demand functions – the supplier's optimal price is invariant to the entry/exit of downstream firms. Similarly, Corbett and Karmarkar (2001) model competition and entry into different levels of a multiple-tier serial channel structure with a price-sensitive linear deterministic demand and find that price per unit, in a tier, falls with the number of entrants in any upstream tier, but is unchanged with the number of entrants in a downstream tier.

Desai et al. (2004) discuss the role of the intermediary in the context of durable goods. There are two issues with durable goods: (1) the presence of secondary market competition; and (2) the Coase problem, where the manufacturer's inability to commit to a future price causes consumers to wait and the market to fail. Desai et al. show that by pre-committing the retailer to a two-part contract that covers both periods, the manufacturer can solve

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[12]   They all find conditions under which decentralization is a Nash equilibrium strategy of manufacturers.

both problems. With pre-committed wholesale prices, the channel can replicate the sales schedule under a consumer-pricing commitment. Interestingly, in this contract, the manufacturer charges a wholesale price above marginal cost in both periods and earns higher profits by selling through a retailer than by selling the product directly to the consumers.

5.2   Partial integration

Manufacturers may also consider partial integration (PI) – taking over part of the downstream industry – as a channel design strategy. The popular argument for this strategy is the manufacturer's incentive to raise rivals' (independent retailers') costs. Romano (1987) considers the case when an upstream monopolist services two downstream monopolists. Through PI, the upstream monopolist can not only (partially) eradicate the pricing inefficiency associated with successive monopolies, but also practice implicit price discrimination towards the non-integrated downstream firm. Hastings and Gilbert (2005) focus on the 1997 acquisition by Tosco of Unocol's West Coast refining and retail assets. They empirically examine the reaction of Tosco's wholesale prices in 13 metropolitan areas to differential increases in competition with independent retailers resulting from the merger. The upstream firms (refineries) have market power and the downstream products (gasoline from different refineries) are strategic complements. The authors find that an increase in the degree of integration is associated with higher wholesale prices to competing retailers.

The emergence of the Internet as a sales channel has brought the issue of partial forward integration into focus again in recent years. The growth of the Internet has made it very easy for manufacturers to directly connect with the final consumer through an online store (direct channel). While the direct channel reduces the manufacturer's dependence on retailers and eliminates pricing inefficiencies due to double marginalization, it is also likely to steal customers from retailers. This might strain the manufacturer–retailer relationship and may cause retailers to react in a way that adversely affects the manufacturer. It has been shown that firms can control the competition between the online channel and the traditional retailers by controlling the amount of information made available on the online channel (Balasubramanian, 1998; Zettelmeyer, 2000; Brynjolfsson and Smith, 2000).

The online channel, however, may not always be detrimental to the non-integrated retailers. Chiang et al. (2003) analyze the price-setting game between a direct channel of a manufacturer and its independent retailer. They find that, depending on consumers' acceptance of direct channel purchases (for low acceptance), the introduction of the direct channel may be accompanied by a wholesale price reduction (as a result of low direct channel prices).

Kumar and Ruan (2006) consider the case when a retailer carries products of competing manufacturers and maximizes category profits. Consumers in the market are one of two types – they are either brand loyal or store loyal. In addition to the retail price, the retailer is also allowed to set the level of merchandising support, which impacts the demand for the manufacturer's product. They find conditions under which a manufacturer may get higher margins from brand-loyal customers online, and then offer higher margins to the retailer to get better merchandising support and a greater share of the store-loyal consumers. Thus, under certain conditions, the online channel not only serves to increase the level of retail support and manufacturers' profits, but it may also increase retailers' profits.

The literature on channel structure in marketing has typically assumed that consumer demand is deterministic. However, the operations literature typically highlights the variability in consumer demand. Small levels of consumer demand variability are amplified across a channel and lead to the well-known 'bullwhip effect', and harm channel efficiency (Lee et al., 1997). Thus a decentralization decision may depend on demand variability, which is typically abstracted away from in the traditional channel structure literature in marketing. It is critical to understand the tradeoffs when designing channels in the presence of demand uncertainty, retailer/manufacturer moral hazard etc.

While there has been a large volume of theoretical research on issues of channel structure, the volume of empirical research on this issue has been very limited. This is partly because channel structure decisions tend to be long term and therefore researchers cannot get variation in the data. The emergence of the Internet has provided opportunities to study the effect of a change in channel structure, and empirical researchers should take advantage of this natural variation in the data.

6.   Structural econometric models of pricing in a channel

In this section, we discuss the emerging literature on structural econometric models of channels. We begin by discussing an illustrative model. In recent years, a number of papers have used the structural econometric framework to model the marketing channel. Such models serve to (1) depict manufacturer–retailer interactions that best describe the market and (2) perform policy analysis in markets where a channel intermediary needs to be modeled. We discuss these two types of models in turn.

6.1   An illustrative structural econometric model of channels

We illustrate a basic structural econometric model of the channel using a logit demand model to highlight the key aspects of developing a structural econometric model of the marketing channel.

Demand   Consider a market where households can choose between two brands (sold by two different manufacturers) denoted by $i = 1, 2$ and a no-purchase option denoted by $i = 0$. The utility for a brand i to household h in period t is given by

$$\begin{aligned} U_{hit} &= \beta_{0i} + X_{it}\beta - \alpha p_{it} + \xi_{it} + \varepsilon_{hit}, \quad i = 1, 2 \\ &= \delta_{it} + \varepsilon_{hit}, \quad i = 1, 2 \end{aligned} \tag{15.1}$$

where X_{it} is a vector of observable (to the firm and the econometrician) attributes and marketing variables (for, e.g., display and feature activity for the brand) and p_{it} is the retail price. β_{0i} is the intrinsic preference of consumers for brand i, and ξ_{it} is the unobservable (to the econometrician, but observable to the firm and the consumer) component of utility. This term captures the variation in consumer preferences for brands across time that is induced by manufacturer advertising and consumer promotions. ε_{hit} is household h's idiosyncratic component of utility which is unobserved by the firm and is assumed to be independent and identically distributed as a Type I extreme value distribution across consumers. This assumption leads us to the familiar multinomial logit model of demand. Denote the deterministic part of the utility that is observed by the firm by the term δ_{it} and,

normalizing the deterministic component of utility for no purchase (δ_{0t}) to zero, we have the familiar equation for market share for the brand

$$s_{it} = \frac{\exp(\delta_{it})}{1 + \sum\limits_{k=1}^{2} \exp(\delta_{kt})}, \quad i = 0, 1, 2 \tag{15.2}$$

It is therefore easy to see that

$$\ln(s_{it}/s_{0t}) = \delta_{it} = \beta_{0i} + X_{it}\beta - \alpha p_{it} + \xi_{it}, \quad i = 1, 2$$

This equation serves as the demand-side estimation equation. The term ξ_{it} serves as the error term in the estimation equation. It can capture the effects of manufacturer advertising and consumer promotions, and other unobserved demand shocks that are not explicitly modeled.

The supply (or channel) model
Assume that the two manufacturers set wholesale prices and the retailer then sets retail prices to maximize its category profits in period t. Then the retailer's objective function is given by

$$\Pi^R_t = (p_{1t} - w_{1t})s_{1t}M_t + (p_{2t} - w_{2t})s_{2t}M_t$$

where p_{1t} and p_{2t} are the retail prices of products 1 and 2, w_{1t} and w_{2t} are the wholesale prices of products 1 and 2 set by the manufacturers, and s_{1t} and s_{2t} are the shares of products 1 and 2 defined in the demand model (note that $s_{0t} = 1 - s_{1t} - s_{2t}$ is the share of the outside good) and M_t is the size of the market. The t subscript refers to the period t.

The first-order conditions for the retailer are given by

$$\frac{\partial \Pi^R_t}{\partial p_{it}} = s_{it} + (p_{1t} - w_{1t})\left[\frac{\partial s_{1t}}{\partial p_{it}}\right] + (p_{2t} - w_{2t})\left[\frac{\partial s_{2t}}{\partial p_{it}}\right] = 0, \quad i = 1, 2$$

Taking the derivatives of market share with respect to prices, we have

$$\frac{\partial s_t}{\partial p_t} = \begin{pmatrix} \dfrac{\partial s_{1t}}{\partial p_{1t}} & \dfrac{\partial s_{2t}}{\partial p_{1t}} \\ \dfrac{\partial s_{1t}}{\partial p_{2t}} & \dfrac{\partial s_{2t}}{\partial p_{2t}} \end{pmatrix} = \alpha \begin{pmatrix} -s_{1t}(1 - s_{1t}) & s_{1t}s_{2t} \\ s_{1t}s_{2t} & -s_{2t}(1 - s_{2t}) \end{pmatrix} \tag{15.3}$$

Solving the first-order conditions, we get the formula for retail prices that is written in matrix form.

$$p_t = w_t + \frac{1}{\alpha(1 - s_{1t} - s_{2t})} \text{ where } p_t = \begin{pmatrix} p_{1t} \\ p_{2t} \end{pmatrix} \text{ and } w_t = \begin{pmatrix} w_{1t} \\ w_{2t} \end{pmatrix} \tag{15.4}$$

If the wholesale prices can be observed, the equation above can serve as the supply side equation for the retailer. One could potentially capture unobservable retailer costs as an error on the supply equation.

Alternatively one may wish to actually write out an equation to describe the wholesale

prices in order to structurally model the wholesale price choices. In that case, one will write out the manufacturers' pricing model. To illustrate different types of manufacturer pricing behavior, consider the two alternatives of (1) tacit collusion and (2) Bertrand competition. The objective function of manufacturer i selling brand i in period t is given by

$$\Pi^{M_{it}} = (w_{it} - c_{it})s_{it}M_t + \theta(w_{jt} - c_{jt})s_{jt}M_t - F_{it}, \quad i = 1, 2; j \neq i$$

where w_{it} is the wholesale price for brand i that the manufacturer charges the retailer and c_{it} is the marginal cost of brand i. F_{it} is the fixed cost to the manufacturer (it can include costs that are not related to the marginal sales of the brand, for, e.g., slotting allowances). Note that $\theta = 1$ for the case of tacit collusion and $\theta = 0$ for the case of Bertrand competition. Let the marginal cost of brand i be $c_{it} = \gamma_i + \omega_{it}$, where γ_i is the brand-specific marginal cost, and ω_{it} is the brand-specific unobservable marginal cost at time t. Note that ω_{it} is unobservable to the researcher, but observable to the manufacturers.

The first-order conditions for the manufacturer are given by

$$\frac{\partial \Pi_{it}^M}{\partial w_{it}} = s_{it} + (w_{it} - c_{it})\left[\frac{\partial s_{it}}{\partial p_{1t}}\frac{\partial p_{1t}}{\partial w_{it}} + \frac{\partial s_{it}}{\partial p_{2t}}\frac{\partial p_{2t}}{\partial w_{it}}\right] +$$
$$\theta(w_{jt} - c_{jt})\left[\frac{\partial s_{jt}}{\partial p_{1t}}\frac{\partial p_{1t}}{\partial w_{it}} + \frac{\partial s_{jt}}{\partial p_{2t}}\frac{\partial p_{2t}}{\partial w_{it}}\right] = 0, \quad i = 1, 2; j \neq i$$

$$s_t + \left[\left(\frac{\partial p_t}{\partial w_t}\frac{\partial s_t}{\partial p_t}\right).*\Theta\right](w_t - c_t) = 0$$

where

$$\Theta = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \text{ for tacit collusion and } \Theta = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \text{ for Bertrand competition. The } .*$$

operator denotes element by element multiplication of a matrix.

We can thus solve for the wholesale prices as

$$w_t = c_t + \left[\left(-\frac{\partial p_t}{\partial w_t}\frac{\partial s_t}{\partial p_t}\right).*\Theta\right]^{-1} s_t \tag{15.5}$$

where the term in brackets after c_t is the vector of margins that manufacturers choose for their brands. The retailer's reactions to manufacturers' wholesale prices are obtained by taking the derivatives of the retail prices in (15.4). It can be shown that (see Sudhir, 2001 for the proof)

$$\frac{\partial p_t}{\partial w_t} = \begin{pmatrix} \dfrac{\partial p_{1t}}{\partial w_{1t}} & \dfrac{\partial p_{2t}}{\partial w_{1t}} \\ \dfrac{\partial p_{1t}}{\partial w_{2t}} & \dfrac{\partial p_{2t}}{\partial w_{2t}} \end{pmatrix} = \begin{pmatrix} 1 - s_{1t} & -s_{1t} \\ -s_{2t} & 1 - s_{2t} \end{pmatrix}$$

If we observe wholesale prices and retailer prices, we can model the supply side by fitting both equations. However, typically, wholesale prices are not observed and most

researchers in marketing substitute the wholesale price equation into the retail pricing equation and fit the following retailer pricing equation to the data:

$$p_t = \underbrace{c_t}_{\text{Manufacturer cost}} + \underbrace{\left[\left(-\frac{\partial p_t}{\partial w_t}\frac{\partial s_t}{\partial p_t}\right).*\Theta\right]^{-1} s_t}_{\text{Wholesale margin}} + \underbrace{\frac{1}{\alpha(1 - s_{1t} - s_{2t})}}_{\text{Retail margin}}$$

$$\underbrace{\phantom{c_t + \left[\left(-\frac{\partial p_t}{\partial w_t}\frac{\partial s_t}{\partial p_t}\right).*\Theta\right]^{-1} s_t}}_{\text{Wholesale price } (w_t)}$$

(15.6)

There are some key aspects that should be highlighted in the derivation of the structural econometrics models. First the demand-side error is incorporated into the supply-side equations through the observed market shares. Note that, in contrast to the game-theoretic models of Section 2.1, where the retailer and wholesale pricing equations are characterized completely in terms of the primitive demand and cost parameters, the pricing equations here (15.4 and 15.5) are characterized in terms of the observable market shares. The advantage of incorporating observed market shares is that demand-side errors (which are observable to the consumers and firms) are allowed to affect prices. In this sense, the structural econometric specification acknowledges that econometric errors have structural meaning and are accounted for in the specification.

In summary, a standard structural econometric model of channels is a simultaneous equation model with demand and supply pricing equations (could be one equation for manufacturer and retailer each or combined into one), both specified in terms of behavioral primitives. The demand equation relates quantity purchased to retail price, product characteristics and unobserved demand determinants. While many types of demand models can be used, the random coefficients logit model remains the most popular because of its flexibility in capturing substitution patterns, while still providing closed-form solutions that do not require integration for individual-level choice probabilities (see Dubé et al., 2002 for discussion). The supply equation relates prices to a markup and to observed and unobserved cost determinants. The structural econometric model can be used to either infer the consumers' and firms' decision rules from observable retail price–quantity pairs, or to perform policy simulations on how the equilibrium will evolve in response to actions by firms.

6.2   Descriptive models of channels

Sudhir (2001) demonstrated how to construct a structural econometric model of the channel under alternative assumptions of manufacturer–retailer interaction. In his analysis of competition among manufacturers selling through a single retailer, he finds that the manufacturer Stackelberg model of vertical interactions fits the data better than the vertical Nash model. He also finds that the category profit maximization objectives fit the data better than brand profit maximization objectives. He finds that the logit model fits the data better than a constant elasticity multiplicative model of demand, suggesting that even though multiplicative models fit the data well, they are less useful in retail decision support systems, because the implied markups are less consistent with the data.

Berto Villas-Boas (2007) expands the analysis to vertical interactions between multiple manufacturers and multiple retailers using a general random coefficients logit model. She finds that wholesale prices are close to marginal cost, but retailers have pricing power in the market. This could be consistent with either retail power or nonlinear pricing contracts. Bonnet and Dubois (2008) explicitly model nonlinear contracts involving two-part tariffs and resale price maintenance, and find that manufacturers use two-part tariffs with RPM.[13] Unlike Berto Villas Boas, they find that retailers price at marginal cost.

Berto Villas-Boas, and Bonnet and Dubois do not observe wholesale prices. Using a conjectural variations framework, Kadiyali et al. (2000) take advantage of the fact that wholesale prices can be observed in their data and estimate the extent of channel power. Their findings suggest that channel participants deviate from the prices predicted by 'standard' games such as manufacturer–retailer Stackelberg and vertical Nash, and retailers have power in that they obtain the larger share of channel profits. While this is consistent with a two-part tariff, they find that neither manufacturers nor retailers charge zero markups. Similar to Kadiyali et al., Meza and Sudhir (2007) estimate both a retail and wholesale price equation, but explicitly look for departures from the short-term profit-maximizing prices predicted by the standard models. They find that retailers strategically deviate from short-term profit-maximizing retail prices to support their store brands, but manufacturer margins are consistent with a manufacturer-Stackelberg model. Again both manufacturers and retailers have non-zero markups.

There appears to be a discrepancy in extant research: when wholesale prices are observed, Kadiyali et al. and Meza and Sudhir observe positive markups by manufacturers and retailers; when wholesale prices are not observed, Berto Villas-Boas and Bonnet and Dubois find evidence of zero markup for either manufacturer or retailer. While the differences may be artifacts of the specific markets studied, the differences in inference of markups when wholesale prices are not observed should be explored systematically in future work.

In contrast to the above analysis using aggregate data, Villas-Boas and Zhao (2005) use household-level data in a particular local market to evaluate the degree of manufacturer competition, retailer–manufacturer interactions, and retailer product category pricing in the ketchup market in a certain city using household level data. Che et al. (2007) also use individual data to model manufacturer and retailer behavior in the presence of consumer state dependence. Given the dynamics involved, they study the extent to which firms are forward looking in their pricing behavior. They find that firms are boundedly rational in that they look only one period ahead when setting prices.

6.3   Policy analysis within a channel setting

Several papers have also applied the structural econometric framework of channels in performing policy simulations on a wide range of marketing mix questions. These analyses have addressed product, pricing, promotions and channel issues.

Goldfarb et al. (forthcoming) use the structural econometric channel framework to measured brand equity. They estimate a demand model and then assess how prices and profits will change within a competitive setting in the presence of a channel when a brand

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[13]   They study the market for bottled water in France.

loses its intangible equity (as represented by the relative value of the intercept with respect to a base brand such as the store brand).

Israelevich (2004) addresses the issue of product variety and the role of slotting fees within a distribution channel. As discussed earlier, he finds that slotting fees have served to enhance the available product variety at a retailer, because the policy analysis indicates that retailers do not find all products to be intrinsically profitable. This result, suggesting two-part tariffs, where manufacturers are offering retailers allowances, is different from the pricing strategies suggested in the analysis of Berto Villas-Boas and Bonnet and Dubois. Clearly more research on the types of pricing contracts used for different types of products is required.

Besanko et al. (2003) study optimal targeted pricing on the part of manufacturers in the presence of retailers, using aggregate data within a competitive setting. Pancras and Sudhir (2007) study the optimal marketing strategies of a customer data intermediary, which needs to consider the value of its target pricing services to manufacturers in the presence of a retailer who sets retail prices. Hartmann and Nair (2007) estimate a demand system for tied good (razors and razor blades) when consumers shop across stores with different retail formats. Consumers buy razors disproportionately at grocery and drug stores, but the razor blades at club stores. As cross-elasticities between the two products are moderated by the retail channel, a policy analysis requires modeling the retail channel behavior. Chu et al. (2007) study the pricing behavior in the PC market and are able to assess the value of different distribution channels. They perform a variety of policy analyses on how dropping a distribution channel will affect firms. They also investigate the effect of the HP–Compaq merger using their estimates.

6.4   Future research

In summary, the structural models of channels literature has been able to map game-theoretic models to the data to both provide descriptions of the equilibrium interactions in the market, and perform policy analysis. As we pointed out earlier, there are some discrepancies in the inferences of power within the channel, depending on whether wholesale prices are observed or not. Further, there has been limited research on describing channel behavior in the presence of nonlinear contracts, because fixed transfers are typically not observed. More empirical research is needed in describing channel behavior in such markets.

While much extant research has focused on pricing as the key variable, future research should address other strategic variables such as manufacturer advertising and push versus pull promotions. Also current methodologies can deal with continuous strategic variables such as price, but new methodologies need to endogenize discrete decisions such as the retailer's decision to carry a product, introduce a new store brand etc. This would be in contrast to Israelevich's model, where he takes product acceptance decisions as exogenous. Such models can shed additional light on aspects such as how pricing contracts such as slotting allowances and trade deals affect product attractiveness and the decision to carry the product. Such advances not only require modeling advances, but also additional data on retailer product acceptance and rejection decisions (e.g. Sudhir and Rao, 2006) that would help us to learn about market behavior.

Far more challenging would be to model asymmetric information among channel members and how this may affect pricing contracts within a channel. This would require

us to have access to a variety of contracts entered into by a firm at alternative levels of information asymmetry. Such data, however, are hard to obtain. But detailed data from a particular retailer (manufacturer) about the pricing contracts it enters with different manufacturers (retailers) can be very useful in developing appropriate methodologies and obtaining insights into how channel members arrive at pricing contracts.

Overall, the ratio of empirical to theoretical research on pricing across channels is low. This situation is being remedied as more data on both consumer choices across channels and retailer pricing become available and new empirical tools for analyzing retailer behavior are being developed. We hope these tools will provide greater insights into consumer behavior across channels, channel structure and relationships, and the behavior of channel participants in the near future.

7. Conclusion

This chapter surveyed the analytical and structural econometric literature on pricing in a channel. We described the analytical literature on channels in terms of the time horizons of decision-making: pass-through, pricing contracts and channel structure. We described the econometric literature in terms of its two major applications: description and policy analysis. The chapter also discussed gaps in the literature in each of the areas, and offered suggestions for future research.

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