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Do Slotting Allowances Enhance Efficiency or Hinder Competition?

K. Sudhir and Vithala R. Rao

Slotting allowances account for a large share of new product development costs, but their economic role is controversial. This study uses data on more than 1,000 new product offers to a retailer to examine whether and how slotting allowances facilitate new product introductions.

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Report Summary
Slotting allowances are lump-sum payments by manufacturers to retailers for stocking new products. There are diverging opinions on what economic rationale is at the root of slotting allowances. Several theoretical arguments have been suggested. Those based on efficiency considerations include theories that slotting allowances accomplish efficient allocation of scarce retail shelf space or equitable distribution of the risk of new product failure between manufacturers and retailers. Other efficiency theories suggest that slotting allowances let manufacturers communicate private information about potential product successes to retailers or that slotting allowances mitigate retail competition so as to increase retailer coverage.

Others have argued that slotting allowances are anticompetitive. They argue that retailers use slotting allowances to reduce retail competition and increase their profits by facilitating retail collusion or that slotting allowances represent an exercise of retailer power that lets retailers capture manufacturers' profits, thus adversely affecting smaller manufacturers and reducing consumer access to products.

Empirical research on slotting allowances has been virtually nonexistent due to the difficulty in obtaining data. Here, authors Sudhir and Rao use data on all new products that were offered to one retailer for a period of six months to empirically investigate support for the alternative rationales for slotting allowances mentioned above. Their analysis indicates that there is more support for the efficiency theories than for the anticompetitive theories. They find evidence that slotting allowances serve to allocate scarce retail shelf space efficiently, help balance the risk of new product failure between manufacturers and retailers, help manufacturers signal private information about the potential success of new products, and serve to widen retail distribution for manufacturers by mitigating retail competition. They find little support for the anticompetitive rationales in the data. They conclude that the support they find for the efficiency rationales suggests that the Federal Trade Commission was wise in being circumspect about banning slotting allowances outright. ■

Introduction

Slotting allowances are lump-sum payments by manufacturers to retailers for stocking new products. Either the manufacturer or the retailer may be the first mover when it comes to slotting allowances: the manufacturer may offer them (and the retailer may accept or decline), or the retailer may request them (and the manufacturer may agree or refuse to provide them). Over the past two decades, slotting allowances have gained increasing prominence and have come to account for a very major share of new product development costs. According to Deloitte & Touche (1990), slotting allowances account for over 16% of a new product's introductory costs, while R&D and market analysis expenditures account for about 14%. The magnitude of a slotting allowance for a stock keeping unit (SKU) varies from $75-$300 per store (Federal Trade Commission 2001), from $3,000-$40,000 for a regional chain (Fields and Fulmer 2000; Desiraju 2001), and from $1.4 to 2 million for a national introduction (Thompson 2000; Vosburgh 2001).

Even though substantial amounts of money are involved slotting allowances are extremely controversial, and there is very little consensus among practitioners, regulators, or researchers as to the true role of slotting allowances in facilitating new product introductions (Bloom, Gundlach, and Cannon 2000; Wilkie, Desrochers and Gundlach 2002). While some theorists and practitioners have suggested that slotting allowances are anticompetitive, others have argued that slotting allowances serve to enhance the efficiency of market outcomes. And they possibly could have both effects.

The controversial role of slotting allowances is evident in the contrasting positions taken by two regulatory authorities. The Bureau of Alcohol, Tobacco, and Firearms (now the Bureau of Alcohol, Tobacco, Firearms and Explosives, ATF) banned slotting allowances in the alcohol trade in 1995 (Gundlach and Bloom 1998). In contrast, the Federal Trade Commission (FTC), which regulates the grocery industry, refuses to provide guidelines for slotting allowances. It believes that slotting allowances can have both efficiency and anticompetitive effects and that further investigation is needed (Federal Trade Commission 2001). The U.S. Senate's Committee for Small Business and Entrepreneurship funded a full-scale public investigation of slotting allowances by the FTC, but the report was inconclusive, citing difficulties in obtaining information about slotting allowances from either manufacturers or retailers.

Those who believe slotting allowances enhance efficiency argue that (1) slotting allowances serve to efficiently allocate scarce retailer shelf space to the most valuable (profitable) new products, (2) they serve to share the risk of new product failure equitably between manufacturers and retailers, (3) they serve to signal private information that manufacturers may have about the potential success of the new product to the retailer, and (4) manufacturers use them to induce retailers to accept the product and increase distribution by mitigating the effects of retail competition. Those who believe that slotting allowances stifle competition argue that (1) slotting allowances are a means for retailers to mitigate retail competition and increase their own profits by facilitating retail collusion, (2) they are an exercise of retailers' power, adversely affecting smaller manufacturers and reducing consumer access to smaller manufacturers' products. The retail power argument suggests that in many local markets, high retail concentration results in just a few retailers controlling retail shelf space, enabling them to demand slotting allowances.

Despite the abundance of theoretical explanations concerning the purpose, mechanisms, and consequences of slotting allowances, the extant empirical research on this topic is inconclusive. Two survey-based studies (Bloom, Gundlach, and Cannon 2000; Wilkie, Desrochers and Gundlach 2002) show limited consensus between manufacturers and retailers on the reasons for the use of slotting allowances. The problem may be due to the use of the survey method; Bloom, Gundlach, and Cannon (2000) acknowledge the limitations of the survey method when they state "... although an anonymous survey targeted towards informed industry participants was used, manager perceptions, for a variety of reasons, may not accurately reflect reality and their opinions about slotting fees. Respondents may have had limited information and knowledge or their perceptions may have been distorted by self-interest" (p. 106). This problem does not seem to disappear even when the respondents (retailers and manufacturers) are instructed to focus on the characteristics of specific transactions in which they are involved and slotting allowances are offered; see Rao and Mahi (2003). Further, survey-based studies give limited insights into why the use of slotting allowances results in the market outcomes observed.

Sullivan (1997) uses correlational analysis on objective time series data at the market level (e.g., number of new products supplied by manufacturers, number of SKUs kept at retailers, quantities sold by retailers, and prices charged by manufacturers) and argues that the use of slotting allowances helps keep the number of products offered by the manufacturer and the number of products demanded by the retailer in equilibrium. But the aggregate-level data are not capable of distinguishing between competing explanations offered in the theoretical literature.

Given the state of empirical research in this area, a study that uses observational data on new product introductions and the associated terms of trade (including slotting allowances) offers a rare opportunity for an empirical investigation of the rationales for slotting allowances. In this paper, we use a unique data set with actual information on all new product offers (more than 1,000) presented to a retailer during a period of six months. The data set has a combination of objective information associated with the new product offer and retailer evaluations about the manufacturer and the product offered. The focal retailer is a medium-sized chain with about 100 stores. Manufacturers rarely bypass this retailer when introducing a product in its geographical region. Further, its headquarters is based in a market that is widely used as a test market due to its representative consumer profile.[1]

The analysis of a large number of offers to one retailer, while restricting generalizability, helps us address econometric difficulties involved in an analysis of a pooled group of small numbers of observations from multiple retailers. We are able to control for the retailer end of the transaction dyad and can see how slotting allowances vary across different manufacturers, a necessary ability if we are to develop appropriate tests of game-theory-based predictions. While rejecting signaling theories based on their analysis of data across multiple manufacturers and retailers, Rao and Mahi (2003) caution, "Slotting allowances paid for each transaction in our data may in fact be entirely consistent with a signaling story. . . . Hence each data point may be a consequence of particular levels of information asymmetry that are specific to that transaction. Only dyadic data would allow us to assess whether signaling is in fact occurring" (p. 265). It is plausible that some of the counterintuitive empirical results Rao and Mahi (2003) obtained arise due to this inability to control at least one end of the transaction dyad.

The 2003 FTC report on slotting allowances states, "While there is some research examining slotting allowances using highly aggregate data, see e.g., Sullivan (1997), to our knowledge no one has formally examined how highly disaggregated data like that collected in this study could be used to differentiate among the theories" (p. 62). We hope our research will serve as a first step in that process.

Rationales for Slotting Allowances and Empirical Testing Strategy

We discuss below the arguments behind alternative rationales for slotting allowances and the extant empirical evidence in support of or contradicting those rationales. A summary of the arguments and the empirical evidence is provided in Table 1, after the discussion (p. 126).

Efficiency-enhancing rationales

Efficient Allocation of Scarce Shelf Space. A typical supermarket carries about 35,000 SKUs (Food Marketing Institute 2003a), while the number of new products introduced by manufacturers ranges from about 10,000 to 16,000 SKUs (Food Marketing Institute 2003b). Given limited shelf space, introducing a new product invariably requires retailers to drop an existing product. Shelf space is therefore clearly a scarce resource with high opportunity cost. Further, growth in the share of private labels over the past two decades has further increased the opportunity cost for shelf space, since private labels tend to have higher retail margins than national brands (Cappo 2003). Sullivan (1997) shows that slotting allowances arise endogenously when the costs of developing new products fall, leading to a greater supply of new products, but consumer demand (and therefore resulting retailer demand) for variety does not rise proportionally. Sullivan labels this the demand-supply hypothesis. Lariviere and Padmanabhan (1997) and Desai (2000) include the opportunity cost of shelf space in their model and demonstrate that slotting allowances arise when the opportunity cost of shelf space is high and manufacturers have greater information than retailers about likelihood of product success. They both find that retailers will not accept a new product in the presence of high opportunity costs without slotting allowances.

Sullivan (1997) uses time series data on new product introductions and variables such as number of SKUs, shelf space, and revenues per SKU to find support for the shelf space explanation for the use of slotting allowance. Results from surveys of manufacturers and retailers, however, have been mixed. While manufacturers and retailers agree that the number of new products introduced is a key force in the widespread use of slotting fees (Bloom, Gundlach, and Cannon 2000; Wilkie, Descrochers, and Gundlach 2002), Bloom, Gundlach, and Cannon (2000) find that retailers do not believe that slotting fees are related to the opportunity cost of shelf space. Wilkie, Descrochers, and Gundlach (2002) also find no support for the theory that the growth of private-label brands is responsible for the growth of slotting allowances. Basically, in these survey-based studies, it appears that retailers do not want to accept their role in the emergence of slotting allowances, but want to blame manufacturers.

The theory that the opportunity cost of shelf space is responsible for slotting allowances is distinct from the theory that overall operating costs are responsible, which has also been proposed in the literature. The operating-cost rationale is that retailers use slotting allowances to cover new product introduction costs (e.g., the cost of entering changes in the inventory and accounting systems, setting slots in the warehouse, etc.). The current use of slotting allowances goes far beyond what is justifiable if the purpose of slotting allowances is merely to recover the true costs incurred by the retailer in introducing the product. Further, slotting allowances vary across most new products, which makes the operating-costs argument less tenable. Manufacturers do not believe operating costs to be a major reason for slotting allowances, though retailers claim they are.

Indeed, when Rao and Mahi (2003) tested the operating-cost rationale, they found that slotting allowances were *negatively* related to retailer operating costs. This result is easy to explain (as the authors themselves do) when it is recognized that Rao and Mahi's study analyzes data across multiple retailers. More-efficient retailers tend to have lower operating costs in the industry and are also likely to be among the larger retailers, with greater opportunity costs of shelf space. Hence the observed negative relationship between slotting allowances and operating costs may in fact imply a positive relationship between slotting allowances and opportunity costs.

A relevant method of testing this rationale is to estimate the relationship between the probability of offering slotting allowances and the opportunity cost of shelf space. A positive relationship implies support for the rationale.

Equitable Sharing of New Product Failure Risk between Manufacturer and Retailer. There is a general consensus that new product failure rates are very high. The estimates of failure rates vary from a little over 50% (Sachdev 2001) to around 80%-90% (Federal Trade Commission 2001). With a more restrictive definition of new products that excludes seasonal products, copies of existing products, and new package sizes, the Prime Consulting Group estimated the failure rate to be 25% (Food Marketing Institute 2003b). The bottom line is that new product failure risk is a major concern for both manufacturers and retailers.

The theory that new product failure risk is an important explanation for the use of slotting allowances has been supported in survey opinions of both manufacturers and retailers (Bloom, Gundlach, and Cannon 2000). The risk arises from two sources: a direct operating cost per store borne by retailers for new products that fail—estimated at $956,800 by the Food Marketing Institute (2001)—and costs of unsold inventory of failed products that retailers are left with. In addition, retailers also lose potential revenue from more profitable products. FTC Commissioner Deborah K. Owen stated in the Antitrust and Trade Regulation Report of 1994 that slotting allowances were a form of insurance for the retailer that reduced its risk or at least transferred some of the risk to the producer. She described the slotting allowance as "indemnification from the loss of profits that would arise if the new product fails to sell well" (*Federal Register* 1995, 20410).

Some retailers charge failure fees and require inventory buyback guarantees from manufacturers to ameliorate these risks. However, such requirements are not necessarily honored, especially by smaller manufacturers. Wilkie, Descrochers, and Gundlach (2002) quote a large wholesaler from their survey: "When a product fails, many small manufacturers are not around to clean up the residue, which is then discounted to salvage dealers/auctioneers" (p. 282). This suggests that retailers face greater risk when they deal with small manufacturers than they do when they deal with large manufacturers, who are more likely to be longer-term players. By that logic, one would expect that retailers would be more likely to demand slotting allowances from small manufacturers than from large ones. The challenge in empirically testing this theory is to distinguish the risk-based explanation for the slotting fees from a retail-power-based explanation (i.e., smaller manufacturers have to pay more slotting allowances because they lack power with respect to the retailer).

Further, large and small manufacturers may exhibit different levels of risk aversion when paying for slotting allowances. Large manufacturers with deep pockets can withstand a new product failure more easily than smaller manufacturers. By contrast, small manufacturers are likely to be far more risk averse and therefore less willing than large ones to pay slotting allowances unless they have a very high degree of confidence in their new product's potential for success.[2]

Thus, an appropriate empirical method of testing the risk-sharing rationale for slotting allowances is to specify the probability of offering slotting allowances for a new product as a function of the success potential of the new product. Since uncertainty about the outcome (and therefore risk) is greatest when the success potential is intermediate, support for the risk-sharing rationale should require an inverted-U relationship between the variables. Since the effects of risk vary with the size of the manufacturer, the model should allow for differences in the relationship for large and small manufacturers.

A Signal of Manufacturers' Private Information about New Product Success. In most new product introductions, it can be reasonably argued that manufacturers may have private information about the potential success of a new product. Lariviere and Padmanabhan (1997) and Desai (2000) argue that slotting allowances can serve as signals by which manufacturers can credibly communicate positive private information to the retailer. The argument essentially is that only manufacturers who have positive private information about the potential success of the product will pay slotting allowances.

Survey-based research has found little support for the signaling theory. According to Bloom, Gundlach, and Cannon (2000), neither manufacturers nor retailers believe that "slotting fees size is a good indicator of the likely success of a new product" (p. 101). Rao and Mahi (2003) also find little support for the signaling theory, but are equivocal when they state that the inability to control for dyadic information is a possible reason for their negative finding.

Practitioners tend to say that slotting allowances do not affect retailer's buying decisions; retailers accept excellent products with high brand equity without slotting allowances. However, this misses the point about signaling. Products rated highly by the retailer are likely to be accepted even without slotting allowances; products that are rated poorly by the retailer are likely to be rejected whether slotting allowances are offered or not. It is when there is a high degree of uncertainty for the retailer that slotting allowances can potentially communicate private information to the retailer that could influence the decision to accept or decline a new product. Hence, any empirical analysis of the signaling theory needs to account for the level of uncertainty that the retailer has about the likelihood of product success. We use two approaches to test the rationale. The first is based on the relationship between slotting allowances and the manufacturer's provision of test market results; the second is based on the relationship between slotting allowances and the manufacturer's use of advertising.

Test Market Results. Many researchers believe that test markets can serve as substitutes for slotting allowances because they can help manufacturers to communicate the potential success of the product and thereby obviate the need to use slotting allowances for the same purpose. For example, a large wholesaler is quoted in Wilkie, Descrochers, and Gundlach (2002) as saying, "'Slotting fees are the result of no test markets. It is a charge for testing the item's sales potential for a manufacturer. The higher the risk of failure, the higher the charge'" (p. 282). A similar view is expressed by the Food Marketing Institute (2001), which states, "Through slotting fees, manufacturers are, in effect, having the retailer conduct a live market trial instead of paying for test market research."

An alternative viewpoint is that test markets are unlikely to be a credible means by which manufacturers can communicate any private information about the potential success of a new product. Chu (1992) suggests several reasons for this. First, manufacturers may selectively report only positive test market studies out of multiple studies done. Second, manufacturers may choose test market locations where their brand equity is strong in order to generate more positive results than would be obtained in other areas. Third, although manufacturers adjust marketing mix in response to test markets in order to improve the chances of success, and therefore may believe in their product's potential for success, there is no way to truly verify manufacturers' claims about test market results.

An empirical test of whether slotting allowances serve to signal private information inherent in test market results should consider the credibility of test market information. If the retailer does not consider the test market results to be credible but the manufacturer believes they reflect the product's potential for success, then slotting allowances will be used as a complement to the test market results to signal the manufacturer's private information. Therefore, if the retailer does not trust the test market results and the manufacturer has private information to share, we can expect slotting allowances to be offered. However, if the retailer considers the test market information to be credible, then the manufacturer has no private information to convey to the retailer. Therefore, if the retailer trusts the test market results, the probability that the manufacturer will offer slotting allowances should be lower. Evidence of complementarity between slotting allowances and provision of test market results when test market information is not credible will therefore support the signaling rationale.

Advertising. Desai (2000) argues that manufacturers can use slotting allowances and advertising to signal potential new product success. In his view, when advertising is effective in raising demand, then manufacturers prefer to use advertising as a signal. Thus slotting allowances and advertising will be substitutes if advertising is effective. On average, we may expect that large manufacturers are more likely to be effective in their advertising than small manufacturers and that manufacturers to whom retailers give higher ratings of new product success will be more effective in their advertising than manufacturers with lower ratings.[3] Hence, we hypothesize that slotting allowances and advertising will be better substitutes for large manufacturers and for those whose products get high success ratings than for small manufacturers and for those whose products get lower ratings.

Further, although the level of advertising signals the manufacturer's commitment to the product, there is still some question regarding advertising's credibility as a signal: it is possible that a manufacturer may not deliver on the commitment to advertise. Here again, one might argue that larger firms' commitments are more credible because larger firms are more likely to have repeated interactions with the retailer and because larger firms have more to fear in terms of potential long-term negative impact on their reputations if they renege on their commitments. Smaller firms' commitments may be less credible because they have less to lose if they renege on their commitments and hence there is a problem of manufacturer moral hazard. As Desai and Srinivasan (1995) demonstrate, it is harder to detect signaling effects in the presence of moral hazard. This suggests that even if smaller firms are able to use slotting allowances to signal the effectiveness of their advertising, it might be hard to empirically detect such evidence of signaling by small firms.

Based on Desai (2000), we will treat evidence of substitution between advertising (when it is likely to be effective) and slotting allowances as evidence in support of the signaling rationale. On average, we expect larger firms and firms with products rated as highly likely to be successful also to have more effective advertising.

Manufacturer Desire to Mitigate Retail Competition to Enhance Market Coverage. Retail competition on price can reduce the profits of downstream retailers to a level lower than that of their opportunity costs. In such a scenario, retailers will not accept the product if a competitor has already accepted the product. Desai (2000) suggests that manufacturers would find it optimal to offer slotting allowances and raise the wholesale prices, so as to induce competing retailers to raise their retail prices and thus mitigate retail competition on price. This is not an anticompetitive argument because the new retailer would not have even agreed to sell the product without the slotting allowance.

Another interesting prediction of this theory is that manufacturers will seek to mitigate retail competition to induce retail participation only when the potential for the product is low. This is because, according to this theory, as the product's market potential increases, retailers will accept it despite retail competition. When this is the case, the likelihood of slotting allowances should fall.

Thus a test of this rationale has two components. First, the probability of slotting allowances should increase with the number of competing retailers that have accepted the product, and second, the likelihood that the manufacturer will offer a slotting allowance should go down as the market potential for the new product increases.

But, it should be noted that it is impossible to mitigate competition when there is a large number of retailers because it is impossible for a larger number of retailers to coordinate a high retail price. Therefore slotting allowances are not likely to be very effective in mitigating retail competition when the number of competing retailers becomes very large. Hence beyond a critical number of competing retailers, the likelihood of slotting allowances will decrease. Hence, it is possible that there can be an inverted U-shaped relationship between the probability of slotting allowances and the number of competing stores that have accepted the product.[4]

We could also argue for a negative relationship between slotting allowances and competing stores that is consistent with a pro-competitive efficiency rationale. The fact that other retailers are accepting the new product may induce the focal retailer to believe that the product is likely to be successful, and therefore the manufacturer will have less need to signal the product's potential success by offering a slotting allowance. Further, when many other retailers are carrying the product, the focal retailer may find itself at a competitive disadvantage if it does not carry the product too. We should therefore expect use of slotting allowances to fall as competing stores accept the product. Whether the mitigation-of-retail-competition hypothesis or the information provision hypothesis is appropriate can be tested empirically with suitable data.

Anticompetitive rationales

Retailer Desire to Mitigate Retail Competition to Increase Profits. Shaffer (1991) argued that retailers use slotting allowances to facilitate collusion and to mitigate retail competition. This is because in the presence of slotting allowances, wholesale prices can be higher, and this in turn commits retailers to less aggressive retail pricing.

Based on Shaffer's model, Bloom, Gundlach, and Cannon (2000) look at the correlation between slotting allowances and retail prices as a means to test the mitigation-of-retail-competition rationale. They find that both manufacturers and retailers agree that slotting allowances raise retail prices and take this as support for the mitigation-of-retail-competition rationale. However, such a test is by no means sufficient evidence: almost all equilibrium models of slotting allowances predict that slotting allowances are accompanied by higher retail prices. For example, the signaling models of Lariviere and Padmanabhan (1997) and Desai (2000) make similar predictions. Further, as discussed above, manufacturers may offer slotting allowances in the hopes of mitigating retail competition not with higher prices as the goal but in order to enhance retailer participation. In short, there is no empirical evidence for or against Shaffer's anticompetitive rationale in the extant literature.

In contrast to Desai's (2000) model, in which the manufacturer sets the terms of trade, Shaffer's model applies when manufacturers have limited power and the retailer sets the terms of the trade.[5] In both Desai (2000) and Shaffer (1991), the probability of slotting allowances should increase when a competing retailer accepts the product, and the slotting allowances should mitigate retail competition. But the key distinction between Desai's and Shaffer's models lies in how slotting allowances change as market potential increases, given that in Desai's model, the manufacturer sets the terms of trade and in Shaffer's, the retailer does so. The relationship between market potential and slotting allowances is not explicitly derived in Shaffer's model. We therefore develop a simple model that is similar in spirit to Shaffer's model (the retailer sets the terms of trade) and that takes the extra step of linking slotting allowances to market potential. This model is shown in the appendix. We find that in this setting, slotting allowances increase with market potential and the extent of retail competition. This prediction about the relationship between slotting allowances and market potential is the opposite of the prediction in Desai's (2000) theory, in which the manufacturer sets the terms of trade.

Thus, a test of the Shaffer-based rationale has two components: probability of slotting allowances should increase as a function of whether competing stores have accepted the product, and as the market potential increases, the likelihood of slotting allowances should increase.

Exercise of Retail Power. The rise in retail power has been widely suggested as an explanation for the use of slotting allowances. The wave of mergers in the supermarket industry has concentrated buying power in the hands of chain-level buyers. The top five firms' share of sales increased from 20% in 1993 to 42% in 2000 (Swenson 2000). Further, in 1998, in the top 100 markets, the top four firms had a retail concentration averaging 72% (Kaufman 2000).

Chu (1992) argues that retailer power is a primary reason for slotting allowances. In his screening model, retailers' power allows them to charge slotting allowances and extract all of the manufacturers' profits. This implies that as the market potential for a given product increases, a powerful retailer will increase the amount of the slotting allowance requested. It also becomes more likely that a slotting allowance will be requested. Bloom, Gundlach, and Cannon (2000) find that manufacturers believe that this is a primary reason why the use of slotting allowances has increased; retailers rate it much lower but still believe it is an important component. Rao and Mahi (2003) also find support for the retail power argument. By contrast, based on their empirical analyses of retailer profitability over time, Messinger and Narasimhan (1995) and Farris and Ailawadi (1992) find little evidence that power has shifted in the grocery channel.

Chu's model can be empirically tested using the strength of the relationship between probability of slotting allowances and the retailers' perception of the market potential for the product. Chu predicts a positive relationship: as perceived market potential increases, so should the likelihood of slotting allowances.

Data and Operationalization of the Empirical Tests

Data

We use data on all new product offers by manufacturers to a large supermarket chain over a six-month period from June 1986 to February 1987. Our data are unusual in that they include not just the products accepted by the retailer, for which data tends to be more readily available, but also those products the retailer rejected. Since we have data on all new product offers, we do not have any endogenous selection problems associated with using data on only accepted products.

The supermarket chain has approximately 100 stores and covers a large trading area in the northeastern United States. The region in which the chain's headquarters is located is frequently used by manufacturers for test marketing because of its representative consumer profile. Further, it is highly unlikely that any food manufacturer would bypass this retailer in the introduction of a new product. Hence, even though our data apply to one company only, we believe the representativeness of the retailer permits us to cautiously generalize to other large regional retailers.

We have two types of primary data from the retail chain: (1) objective data regarding the product and information such as the extent of promotional support (extent of advertising), market research (test market data), terms of trade (slotting allowance), and the retailer's decision to accept or reject the new product and (2) a one-page questionnaire completed by the retail buyer detailing his or her assessment of product and manufacturer attributes (e.g., extent of shelf space needed for the product, likelihood of product success based on past experience with the manufacturer or on the manufacturer's reputation in its industry). It is important to note

Table 1
Summary of Rationales and Extant Empirical Findings

Rationale	Logic and Source of Rationale	Empirical Findings
Efficiency Enhancing		
Efficient allocation of scarce shelf space	Slotting allowances serves as a pricing scheme to ration out the scarce resource (Desai 2000; Lariviere and Padmanabhan 1997; Sullivan 1997).	**Yes**: Wilkie, Descrochers, and Gundlach (2002) and Bloom, Gundlach, and Cannon (2000), who use surveys of manufacturers and retailers, and Sullivan (1997), who uses time-series data, find that new product proliferation (which creates shelf space scarcity) is a reason for slotting allowances. **No**: Bloom, Gundlach, and Cannon (2000) find no support for the opportunity cost rationale in retailer surveys. Wilkie, Descrochers, and Gundlach (2002) find no support for the private-label rationale in manufacturer and retailer surveys.
Equitable sharing of new product failure risk between manufacturer and retailer	Retailers bear a disproportionate share of the risk arising from new product failure. Slotting allowances insure retailers against the failure of accepted products.	**Yes**: Bloom, Gundlach, and Cannon (2000) find support among both manufacturers and retailers. **No**: None.
A signal of manufacturers' private information about new product success	Slotting allowances serve to communicate the manufacturer's private information about a product's potential success to the retailer (Desai 2000; Lariviere and Padmanabhan 1997).	**Yes**: None. **No**: Bloom, Gundlach, and Cannon (2000) and Rao and Mahi (2003) find no support among either manufacturers or retailers for this rationale.
Manufacturer desire to mitigate retail competition to enhance market coverage	Retail competition can reduce profits to a level that makes it impossible for retailers to recover opportunity costs, at which point they cannot afford to accept the new product. Manufacturers offer slotting allowances and higher wholesale prices to reduce retailer competition, making it possible for retailers to participate (Desai 2000).	**Yes**: None **No**: None
Anticompetitive		
Retailer desire to mitigate retail competition to increase profits	Retailers facing competition demand slotting allowances and accept higher wholesale prices to mitigate retail competition and facilitate collusion (Shaffer 1991).	**Yes**: None. **No**: None. **Note**: Past research that has claimed support for this theory tests a prediction that is not unique to this theory. See discussion in text.
Exercise of retail power	Increased retail power enables retailers to extract slotting allowances from manufacturers (Chu 1992).	**Yes**: Bloom, Gundlach, and Cannon (2000) and Rao and Mahi (2003) find that manufacturers believe that this is true. **Note**: There are some questions about the premise of increased retail power (Farris and Ailawadi 1992; Messinger and Narasimhan 1995).

Table 2
Product Details by Category

Category	Total Number of Products	Frequency of Slotting Allowance (%)
Baby foods	7	43
Baking ingredients	35	14
Beverages	85	16
Breads, cakes, cookies	31	3
Breakfast cereals	19	5
Candy/gum	52	8
Canned fruits/vegetables/juice/drinks	142	24
canned meat/fish	5	60
Dairy and refrigerated foods	124	2
Dessert powders/sugars/syrups/spreads	7	0
Frozen foods	219	17
Health and beauty aids	3	67
Household supplies	65	20
Diet foods	3	33
Macaroni, potatoes, rice	36	14
Paper products	7	14
Pet products	57	12
Sauces, spices, condiments, oils, dressings	62	5
Snacks, crackers, nuts	47	13
Soups	12	0
Tobacco products	3	0

that we do not have data on the magnitude of slotting allowances; we only know whether slotting allowances were provided with a particular product offer. Our information on manufacturer revenues in 1987 comes from the *Ward's Business Directory of Largest U.S. Companies*. To be included in this resource, companies must be either publicly traded or, if private, have a minimum of $11 million in sales. The set of firms in our data set is well represented in this directory.

Descriptive analysis

During the six-month period of data collection, manufacturers offered 2,186 products for retail buyers' consideration. Of these, only 1,021 observations were usable due to problems of missing data. Statistical tests based on differences between means and frequencies (two sample *t*-tests and χ^2 tests) were made on each of the variables to determine the degree of difference between the total sample of 2,186 products and the subsample of 1,021 products. We concluded that the selected subsample was not systematically different from the population of 2,186 products. Note that our analysis includes all the products that were offered to the retailer, not just the ones that were accepted.

The 1,021 products offered by manufacturers covered 21 different categories, as shown in Table 2. The three largest categories were frozen foods, canned products (such as fruits, vegetables, juice, and other drinks), and dairy and refrigerated foods. Of the 1,021 products, 143 products (14%) received slotting allowances. If we ignore categories with a small number of product introductions, the frequency of slotting allowances was highest in canned products (24%), household supplies (20%), and frozen foods (17%).

Table 3 shows the means for a number of variables that we study classified on the basis of whether or not slotting allowances were offered. Products for which slotting allowances were offered have considerably higher average opportunity costs, and private labels are more highly represented among them, suggesting preliminary support for the opportunity cost hypothesis. Products for which slotting allowances were offered also were carried by a substantially larger number of competing retailers than was the case for products for which slotting allow-ances were not offered, suggesting support for the mitigation-of-retail-competition hypothesis. It is harder to observe support for the signaling theories from these average numbers because one needs to account for interactions between variables. About 31% of all products were accepted by the retailer. Of products for which slotting allowances were offered, 30% were accepted; of products for which slotting allowances were not offered, 32% were accepted. Table 4 shows the correlation between variables of interest.

Table 3
Means by Slotting Allowance 1

	Slotting Allowance offered	Slotting Allowance not offered
Shelf space (average)	5.22	4.99
Private label (%)	85	75
Manufacturer's reputation rating (average)	5.67	5.77
Test market (%)	35	17
Advertising (%)	23	18
Competing stores (%)	52	33
Large manufacturers (%)	83	17
Small manufacturers (%)	87	13
Retailer acceptance (%)	30	32

Table 4
Correlations between Variables

	Shelf Space Rating	Private Label	Reputation	Test Market	Advertising	Competing Retailers	Large Manufacturers
Slot	.05	.08	–.02	.16	.04	.13	.05
Opportunity cost		.06	–.06	–.01	.02	–.13	.09
Private label			–.13	.02	–.05	.04	–.01
Manufacturer's reputation rating				.13	.13	.14	.19
GRP					.35	–.01	.18
Test market						–.06	.19
Number of competing retailers							.03

We divided firms introducing products into large and small manufacturers to study differences in slotting allowance offers between the two groups. We used manufacturer revenues to determine a firm's size classification. A natural cutoff in the data was $1 billion in 1987 revenue. The list of all manufacturers that we classified as large is provided in Table 5. These 32 large manufacturers introduced 308 of the 1,021 products that we have in our data. We also tested the robustness results with cutoffs ranging from $800 million to $1.2 billion.

It is important to recognize that the retailer does not provide high ratings even to well-known, large manufacturers for all products they introduce. Similarly, small manufacturers do not necessarily get low ratings. We illustrate this by providing sample ratings for products of some firms in Table 6. Large manufacturers such as Del Monte, General Foods, Kraft Foods, Procter & Gamble, and Quaker Oats have ratings that vary from 2 to 8. Seneca Foods, a small regional manufacturer, gets relatively high ratings for the three products it introduced.

Operationalization of the empirical tests

We employed logistic regression of the dependent variable (whether or not slotting allowances are offered for the new product) on different sets of predictor variables to test the six rationales, which we have labeled below as A1, A2, A3, and A4 for the efficiency-based rationales and B1 and B2 for the anticompetitive rationales. The predictor variables used for the tests are summarized in Table 7 (p. 130). We explain our reasoning behind these operationalizations below:

Efficient Allocation of Scarce Shelf Space (A1). The two proxy measures for opportunity cost of shelf space are: (1) the presence or absence of private labels in the category, because the higher margins for private labels in the category can increase the opportunity costs,[6] and (2) buyer's rating of shelf space (on a 1-10 scale)

Table 5

List of Large Firms in Data

(over $1 billion revenues in 1987)

American Cynamid	James River Corporation
Beatrice	Kellogg's
Borden	Kraft Foods
Campbell Soup Company	Land O' Lakes
Carnation	Lever Brothers
Castle & Cooke	Lipton
The Clorox Company	M&M/Mars
Coca-Cola	McCormick
Colgate-Palmolive	Nabisco
Dannon	Nestlé Foods
Del Monte	Pillsbury
General Foods	Procter & Gamble
General Mills	Quaker Oats
Geo. A. Hormel & Company	Ralston Purina
The H. J. Heinz Company	Scott Paper
The Hershey Company	Tyson Foods

chose to use the buyer's subjective rating of shelf space because that measure takes into account the constraints faced by the retailer in the category and therefore serves as a category-independent measure.

Equitable Sharing of New Product Failure Risk (A2). We use the retailer's rating of the manufacturer's likelihood of producing a successful product in the category based on the retailer's past experience with the manufacturer, the general reputation of the manufacturer in the industry, or both, as a measure of new product risk. This variable is on a 1-10 scale, where 1 indicates no chance of success and 10 indicates very high likelihood of success.

We use Rating and Rating^2 as explanatory variables in the logistic regression to test for the inverted U-shaped relationship between the probability of slotting allowances and ratings, as

Table 6

Rating of Products from Selected Manufacturers

Vendor Rating	Del Monte	General Foods	Kraft Foods	Procter & Gamble	Quaker Oats	Seneca Foods
8			Shredded Sharp Cheddar		Variety Pack Granola Bars	
7	Mexican Style Stewed Tomatoes	Birdseye Baby Broccoli Spears	Cremerie French Onion	Liquid Cheer 128, 96, 64 oz.	Ken-L Pupperonis Bacon	Cranberry Juice Cocktail
6	Cut Green Beans	Kool-Aid Koolers	Kraft Extra Thick American Singles	White Cloud	Aunt Jemina Family Waffles	64-oz. Cranberry-Apple Juice Cocktail
5	Sierra Trail Mix-Pineapple Nuggets	Stove Top Chicken Supper	Grated Parmesan Display Unit	Pampers Ultra-Small	Ken-L Hearty Chunks Chicken	Frozen White Grape Juice
4	Hawaiian Punch Lite-Tropical Fruit		Carroll Shellby's Texas Chili	Puffs Dispenser Pack	Quaker Oh's Honey Graham	
3				Duncan Hines Brownies		
2		Stove Top Flexible Serving Chicken				

needed for the product. Rather than use an objective measure of shelf space needed (which of course varies by category and does not take into account the constraints faced by the retailer with regard to shelf space for the category), we

discussed earlier. If, as argued earlier, smaller manufacturers are more risk averse, and retailers perceive smaller manufacturers to be more risky (for any given level of rating), we should find that the inverted U relationship between slot-

Table 7
Operationalization of the Empirical Tests

Rationale	Construct	Operationalization
Efficient allocation of scarce shelf space (A1)	Opportunity cost of shelf space	(1) the presence/absence of private labels in the category (2) buyer's rating of shelf space (on a 1-10 scale) needed for the product
Equitable sharing of new product failure risk (A2)	New product failure risk	(1) Retailer's rating of the manufacturer's reputation (2) Square of the rating
	Differential risk between large and small manufacturers	(3) Size of the manufacturer (4) Interaction between size and rating
A signal of manufacturers' private information about new product success (A3a): test markets as complements to slotting allowances	Test market	(1) Provision of test market results (dummy)
	Credibility of test markets	(2) Size of the manufacturer (3) Interaction of test market and size (4) Interaction of test market, size, and rating
A signal of manufacturers' private information about new product success (A3b): advertising as a substitute signal for slotting allowances	Advertising	(1) Advertising support for the new product (dummy)
	Effectiveness of advertising	(2) Size of the manufacturer (3) Interaction of advertising and size (4) Interaction of advertising, size, and rating
Manufacturer desire to mitigate retail competition to enhance market coverage (A4)	Retail competition	(1) Whether competing stores stock the new product (dummy)
	Factors moderating the need to mitigate retail competition	(2) Size of the manufacturer (3) Interaction of competing stores and size (4) Interaction of competing stores, size, and rating
Retailer desire to mitigate retail competition to increase profits (B1)	Same as A4	
Exercise of retail power (B2)	Market potential	(1) Retailer's rating of the manufacturer's reputation (2) Square of the rating
	Differential power between large and small manufacturers	(3) Size of the manufacturer (4) Interaction between size and rating

ting allowance probability and ratings peaks at a higher rating for small manufacturers than it does for large manufacturers; that is, the inverted U-shaped curve should be shifted to the right for small manufacturers relative to large manufacturers. To test this, we include the variables Large and Large × Rating in the logistic regression in addition to Rating and Rating^2. We have no specific hypothesis about the coefficient on Large (i.e., whether larger manufacturers will offer slotting allowances with greater probability), but Large × Rating should have a negative coefficient if the peak of the inverted U-shaped curve for small manufacturers is shifted to the right of large manufacturers.

A Signal of Manufacturers' Private Information about New Product Success (A3): Test markets as complements to slotting allowances (A3a). Since the need for slotting allowances as a signal can differ across large and small firms and also vary with ratings, we include the following variables to test the effects of test markets: (1) Test Market, (2) Test Market × Rating, (3) Large × Test Market, and (4) Large × Test Market × Rating. If the net effect of the Test Market and Test Market × Rating variables is positive in the regression, then we infer that slotting allowances serve as a signal from small manufacturers at that level of rating. If the net effect of all four variables at a given level of rating is positive, then we infer that slotting allowances serve as a signal from large manufacturers at that level of rating.

Advertising as a substitute signal for slotting allowances (A3b). Because the effectiveness of advertising as a signal may vary with the ratings and the size of manufacturers, we include the following variables as predictor variables for the test: (1) Advertising, (2) Advertising × Rating, (3) Large × Advertising, and (4) Large × Advertising × Rating, where Advertising is an indicator variable that indicates whether the manufacturer offers to advertise the product.[7] If the net effect of the Advertising and Advertising × Rating variables is negative (positive) at a given level of rating, then we infer that slotting allowances and advertising are substitutes (complements) for small manufacturers at that level of rating. Similarly, if the net effect of all four variables at a given level of rating is negative (positive), then it implies that slotting allowances and advertising are substitutes (complements) for large manufacturers at that level of rating. Based on Desai (2000), we will treat evidence of substitution between advertising and slotting allowances as evidence in favor of the signaling theory.

Manufacturer Desire to Mitigate Retail Competition to Enhance Market Coverage (A4). We treat whether a competing retailer has accepted the product as a proxy for retail competition. We treat the rating of the retailers as a measure of market potential, since that rating is related to the product's likelihood of success. As explained earlier, the relationship between slotting allowances and market potential in the presence of retail competition depends on whether manufacturers or retailers set the terms of trade. The relationship can be different depending on whether small or large manufacturers are involved. We therefore include the following variables as predictor variables in the regression: (1) Competing Stores, (2) Competing Stores × Rating, (3) Large × Competing Stores, and (4) Large × Competing Stores × Rating. Competing Stores is a dummy variable indicating whether a competing retailer has also accepted the product.[8] If the net effect of the Competing Stores and Competing Stores × Rating variables is positive (negative) at a given level of rating, then it suggests support for the retail competition mitigation (information provision) hypothesis among small manufacturers. Similarly, if the net effect of all four variables at a given level of rating is positive (negative), then it suggests support for the retail competition mitigation (information provision) hypothesis among large manufacturers. If we find support for the retail competition mitigation hypothesis, then we look at the relationship between probability of slotting allowances and ratings. If it is negative, then we treat it as support for the retailer participation argument of Desai (2000). If it is positive, it suggests support for the B1 rationale of Shaffer (1991).

Retailer Desire to Mitigate Retail Competition to Increase Profits (B1). The reasoning behind the operationalization of the variables for B1 is discussed in the section on the operationalization of the variables for A4, above.

Exercise of Retail Power (B2). Chu's (1992) screening model predicts that slotting allowances will be greater as market potential increases. As in A4, we will treat retailer rating as a proxy for market potential. Support for Chu (1992) implies that the probability of slotting allowances increases with ratings.

Results of Tests of Rationales

Table 8 presents the results of logistic regressions with the presence or absence of slotting allowances as the dependent variable and the appropriate variables of interest for each rationale as the explanatory variables. Columns A1, A2a, A2b, A3a, A3b, and A4 report the regression results with just the variables relating to the tests of the corresponding rationales. The test for B1 is the

Table 8
Results of Logistic Regressions

Variable	A1	A2a	A2b	A3a	A3b
	Estimate (s.e.)	**Estimate** (s.e.)	**Estimate** (s.e.)	**Estimate** (s.e.)	**Estimate** (s.e.)
Intercept	−2.70*** (.35)	−8.22*** (1.65)	−10.17*** (1.82)	−10.92*** (1.93)	−10.61*** (1.99)
Shelf Space	.07* (.04)				
Competing Private Label	.63*** (.25)				
Manufacturer Rating		2.55*** (.60)	3.01*** (.63)	3.49*** (.69)	2.97*** (.67)
Manufacturer Rating^2		−.24*** (.05)	−.26*** (.05)	−.33*** (.06)	−.24*** (.06)
Large			4.89*** (1.12)	3.03*** (1.39)	7.21*** (1.35)
Large × Rating			−.79*** (.19)	−.37 (.24)	−1.16*** (.24)
Test Market				−2.76* (1.55)	
Large × Test Market				5.69** (2.62)	
Test Market × Rating				.73*** (.26)	
Large × Test Market × Rating				−1.31*** (.46)	
Advertising					6.64*** (1.29)
Large × Advertising					−11.02*** (2.73)
Advertising × Rating					−1.04*** (.30)
Large × Advertising × Rating					1.74*** (.47)
Competing Stores					
Large × Competing Stores					
Competing Stores × Rating					
Large × Competing Stores × Rating					
ρ^2	.01	.04	.04	.12	.09

(*** $p < .01$; ** $p < .05$; * $p < .1$)

A4	All	All: Category-Level Fixed Effects	All: Endogeneity-Adjusted Rating
Estimate (s.e.)	**Estimate** (s.e.)	**Estimate** (s.e.)	**Estimate** (s.e.)
−9.85***	−13.56***	−13.78***	−13.91***
(1.83)	(2.39)	(2.55)	(2.45)
	.10*	.22***	.11*
	(.06)	(.10)	(.06)
	.45*	.04	.45*
	(.27)	(.30)	(.27)
3.07***	4.13***	4.18***	4.15***
(.65)	(.86)	(.90)	(.87)
−.29***	−.40***	−.40***	−.40***
(.06)	(.08)	(.08)	(.08)
2.96**	1.68	3.67	2.03
(1.47)	(2.65)	(2.71)	(2.64)
−.38	−.13	−.44	−.19
(.26)	(.46)	(.47)	(.46)
	−5.28***	−5.63***	−2.64*
	(1.73)	(1.91)	(1.40)
	15.59***	14.68***	12.59***
	(4.08)	(4.23)	(3.84)
	1.16***	1.19***	1.19***
	(.29)	(.32)	(.28)
	−3.03***	−2.91***	−3.03***
	(.72)	(.74)	(.72)
	8.55***	9.72***	11.26***
	(1.87)	(2.16)	(1.92)
	−15.78***	−17.03***	−18.53***
	(3.37)	(3.69)	(3.54)
	−1.47***	−1.62***	−1.83***
	(.33)	(.38)	(.37)
	2.68***	2.92***	3.01***
	(.58)	(.63)	(.62)
−2.06	−1.79	−1.38	.85
(1.36)	(1.49)	(1.64)	(1.28)
4.14*	5.94*	5.21*	3.79
(2.32)	(3.31)	(3.11)	(3.11)
.53**	.47*	.45*	.41*
(.24)	(.26)	(.26)	(.24)
−.84**	−1.09*	−.98*	−1.06*
(.40)	(.56)	(.59)	(.56)
.09	.19	.27	.19

same as for A4, and the test for B2 is the same as the test for A2a and A2b. In the column "All," we report the results of the regression with all of the variables included simultaneously. As reflected in our correlation matrix (Table 4), the relatively small correlations be-tween the different variables suggest that the coefficients under the separate regressions are unlikely to be very different from the coefficients under the simultaneous regression. To account for any category-level differences, we also re-port the results of a regression with all the variables in "All," but also include category-level fixed effects. Including the category-level fixed effects increased R^2 from .19 to .27, but the coefficients across the two regressions are very similar. We explain the few differences in our discussion below.

Since retail buyers provide their ratings of manufacturers at the same time that they are observing other factors associated with the product (whether test market results are shown, advertising is promised, and whether competing retailers have accepted the product), it is possible that their ratings are endogenously determined by these other variables. In the column "All: Endogeneity-Adjusted Rating," we include an endogeneity-adjusted rating measure in the regression to test the robustness of our conclusions.

Efficiency-enhancing rationales

Efficient Allocation of Scarce Shelf Space (A1). Looking at column A1 of Table 8, we find that the shelf space variable is significant at the 10% level, and the private label variable is significant at the 1% level. When all the variables are included (column "All"), both variables are significant at the 10% level. When the category-level fixed effects are included, we find that the shelf space is highly significant at the 1% level, and the magnitude of the shelf space effect increases threefold, suggesting that shelf space constraints vary by category and that accounting for it is important to obtain the true measure of its impact on the probability of slotting allowances. However, inclusion of category-level fixed effects makes the private label effect insignificant. This is because the presence of

Figure 1a
Risk Balancing

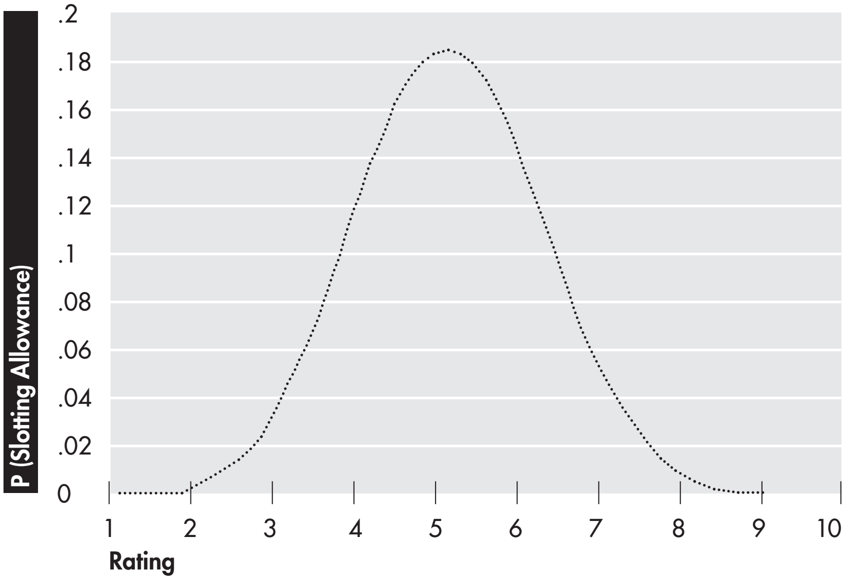
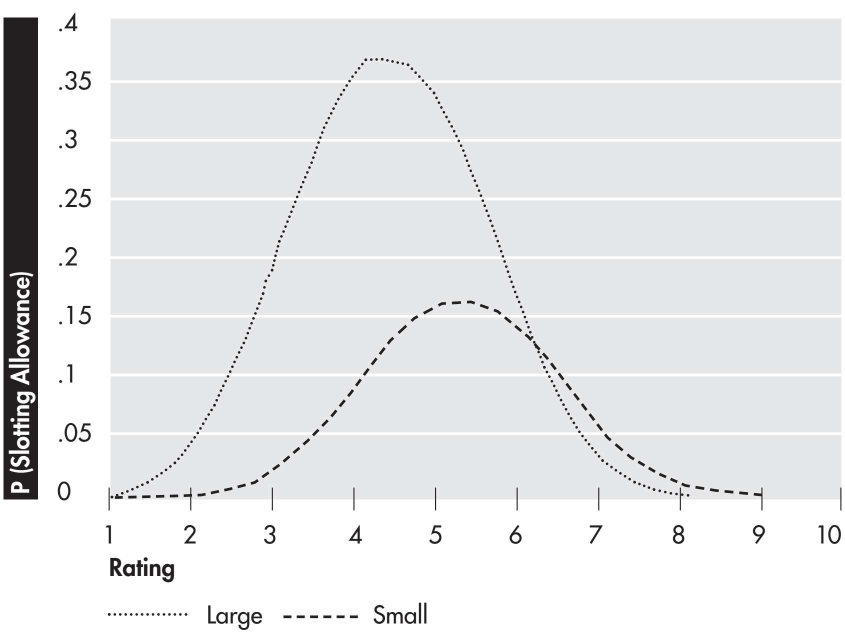


Figure 1b
Risk Balancing: Large Versus Small



private labels varies by category, and therefore category-level fixed effects absorb the effect that variation in private labels has on slotting allowances. Overall, we conclude that the opportunity cost of shelf space and the presence of private labels in a category are drivers of slotting allowances, in contrast to the findings of Bloom, Gundlach, and Cannon (2000) discussed earlier.

Equitable Sharing of New Product Failure Risk (A2). The positive coefficient on Rating and the negative coefficient on Rating^2 in column A2a of Table 8 provide evidence in favor of the inverted U-shaped relationship predicted for the risk-balancing rationale. The results are similar when we include all variables and when we include category-level fixed effects.

Figure 1a illustrates the inverted U-shaped curve graphically using the results from the "All" column.[9] The inverted U-shaped curve for the probability of slotting allowances peaks at around 5.4, around the region of maximum uncertainty. This suggests that balancing risk is indeed a rationale for slotting allowances.

The estimates in column A2b of Table 8 show a significant difference in the probabilities of large and small manufacturers' offering slotting allowances. Further, the negative coefficient for Large × Rating suggests that the peak of the inverted U-shaped curve for small firms is to the right of the peak for large firms, as predicted.[10] Figure 1b, based on the "All" column, is more revealing of how the probabilities differ depending on whether a firm is large or small. The peak in slotting allowances for large manufacturers occurs at a rating of 4.2, which is much lower than that for small manufacturers (at 5.8). This provides support for the theory that small manufacturers perceive greater risks in introducing new products and have greater aversion to offering slotting allowances at low ratings, thus providing evidence consistent with the risk-balancing explanation.

A Signal of Manufacturers' Private Information about New Product Success (A3) Test market results (A3a). The estimates relating to test markets shown in column A3a of Table 8 (Test Market and Test Market × Rating) indicate that the provision of test market information increases the probability of observing slot-

Figure 2a
Role of Test Markets: Large Manufacturers

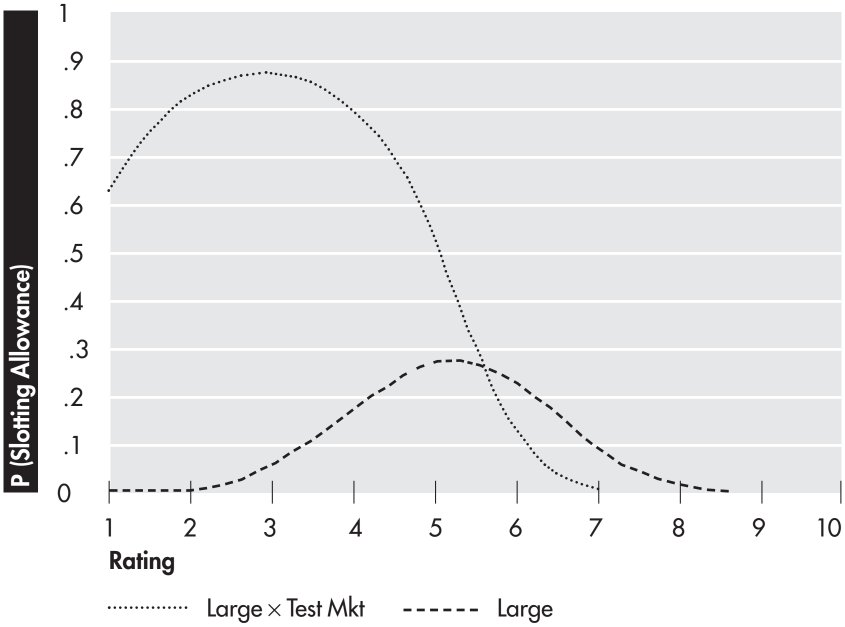
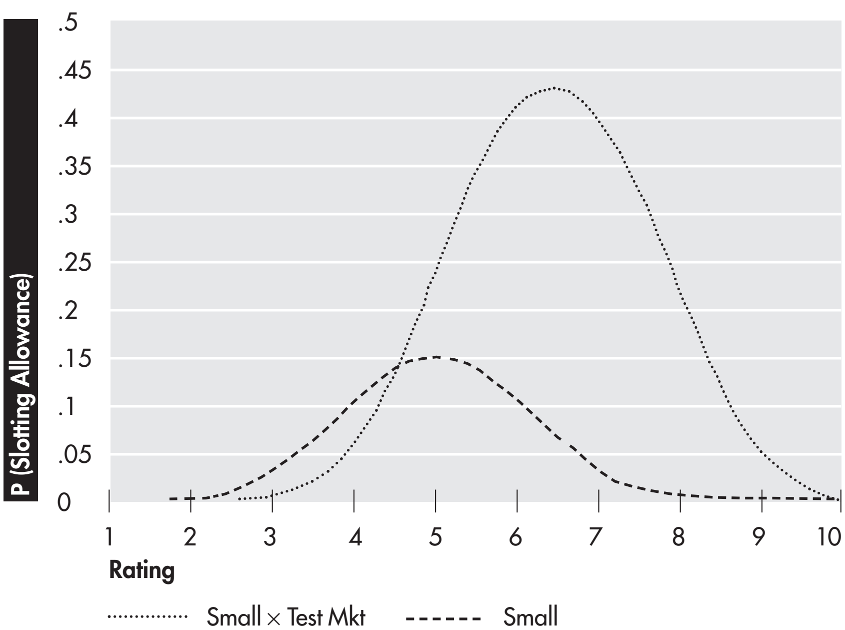


Figure 2b
Role of Test Markets: Small Manufacturers



ting allowances for small manufacturers when their ratings are over 4. The results are similar in the "All" variable regression. Thus, slotting allowances complement test markets rather than serving as substitutes—a result that supports the signaling theory.

The graphical representation of these results shown in Figure 2a indicates that the net effect of the presence of test markets on the presence of slotting allowances is negative for ratings over 5 for larger firms, while being clearly positive for larger firms with ratings below 5. If we consider ratings to proxy for credibility of the test market information, we see that at low levels of credibility, large firms use slotting allowances as a signal of private information and to complement test markets. However, at high levels of credibility (manufacturer rating > 5), large firms substitute test markets for slotting allowances because there is not much need to signal.

In contrast, the net effect of test markets on slotting allowances for small firms (Figure 2b) is positive even at high levels of ratings. This is consistent with the argument that retailers do not find test market information offered by small firms to be credible even at high levels of ratings, and that therefore small firms use slotting allowances as a signal even at those high levels.

Thus, our results serve to reconcile the conventional wisdom that slotting allowances are a price paid for not doing one's own market research with the theory that slotting allowances serve to signal private information. Only when retailers accept the market research information as credible (as with large firms with high ratings) do we find that slotting allowances and test markets are substitutes. Otherwise, they play a signaling role.

Advertising as a substitute for slotting allowances (A3b). The estimates for Advertising and Advertising × Rating reported in column A3b of Table 8 indicate that advertising decreases the probability of small manufacturers' offering slotting allowances as long as their ratings are high (above 7). The results based on estimates in the "All" column are similar. Thus,

Figure 3a

Role of Advertising: Large Manufacturers

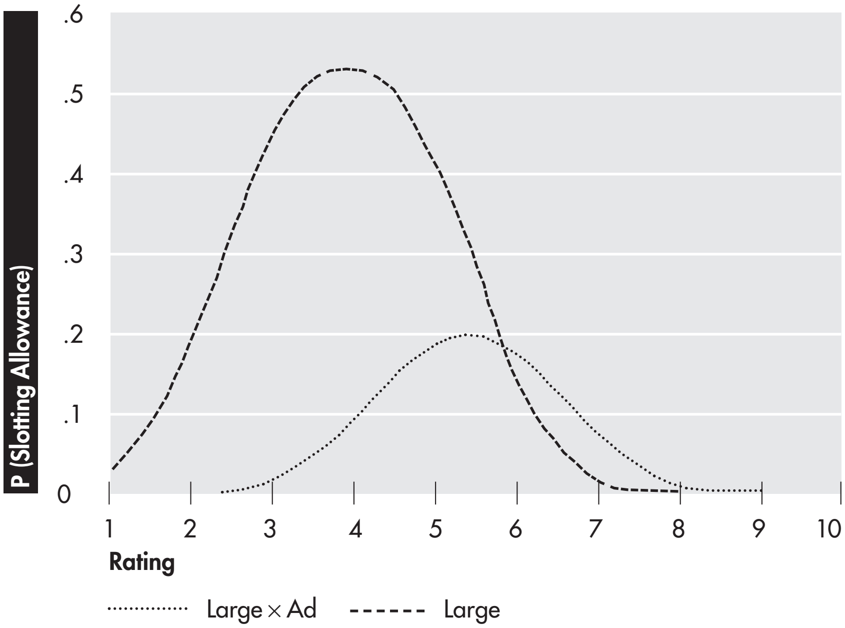
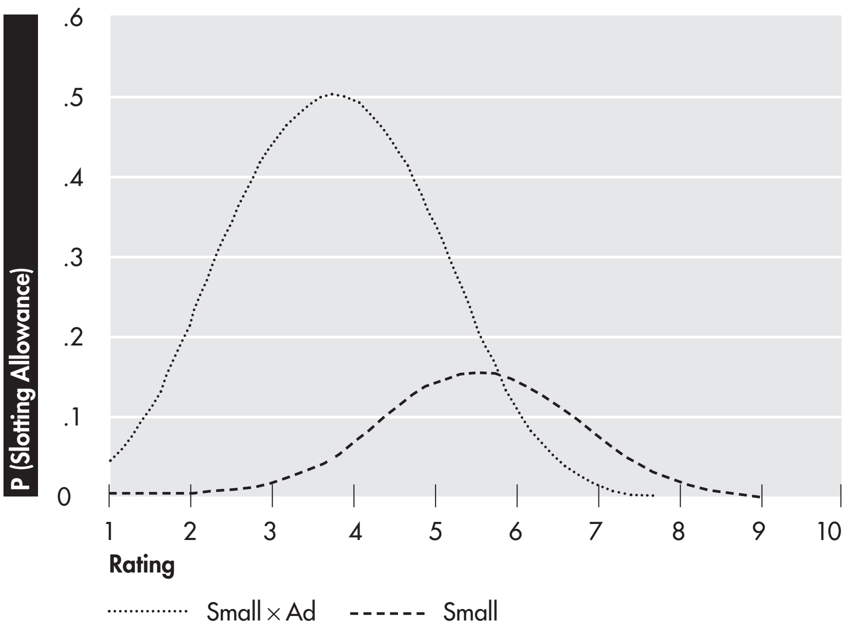


Figure 3b

Role of Advertising: Small Manufacturers



advertising and slotting allowances are substitutes for small firms only when the ratings are high. Hence, our results indicate that for small manufacturers, the signaling rationale applies only at very high levels of ratings. (See Figure 3b.)

In contrast, we find that larger firms substitute slotting allowances for advertising at low levels of ratings (see Figure 3a). In showing that large firms use advertising as an alternative to slotting allowances, our results are consistent with Desai's (2000) signaling theory prediction. At higher ratings (> 6), however, advertising and slotting allowances are complements, but the complementarity effect is very small and not significant. As was true in our investigation of large firms' use of test market results, it appears that when large firms receive high ratings, they do not need to use slotting allowances or advertising as a signal. If advertising is used, it is to *build* demand rather than to *signal* demand, and therefore advertising and slotting allowances are no longer substitutes.

Why is it that we find evidence for signaling only at high ratings for small manufacturers, even though signaling is more critical at lower ratings? There are two plausible reasons. One is that low ratings for the small manufacturer may be correlated with low advertising effectiveness. Hence, as Desai (2000) suggests, advertising and slotting allowances will not be effective signaling substitutes. Another reason is that there is the potential for manufacturer moral hazard with respect to advertising. When ratings are low, moral hazard concerns are likely to be higher (especially for small manufacturers), and, as Desai and Srinivasan (1995) point out, signaling distortions will be lower and therefore signaling will be harder to detect. The fact that we find evidence for signaling by small manufacturers in the presence of moral hazard problems, even if only at high ratings, is particularly gratifying, given the theoretical arguments in Desai and Srinivasan (1995).

In summary, our results are consistent with the signaling theory's predictions that advertising and slotting allowances will be substitutes when advertising effectiveness is high.

Figure 4a
Role of Competing Stores: Large Manufacturers

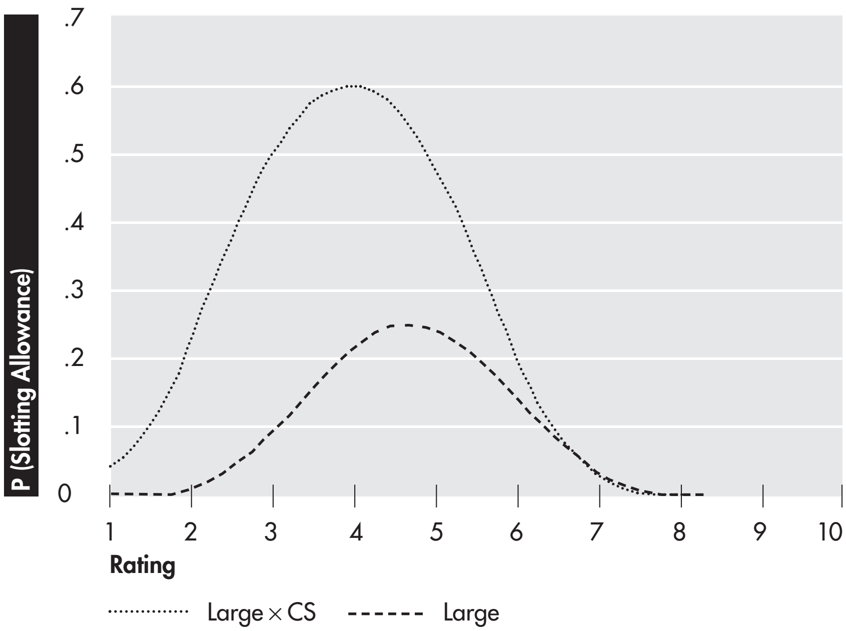
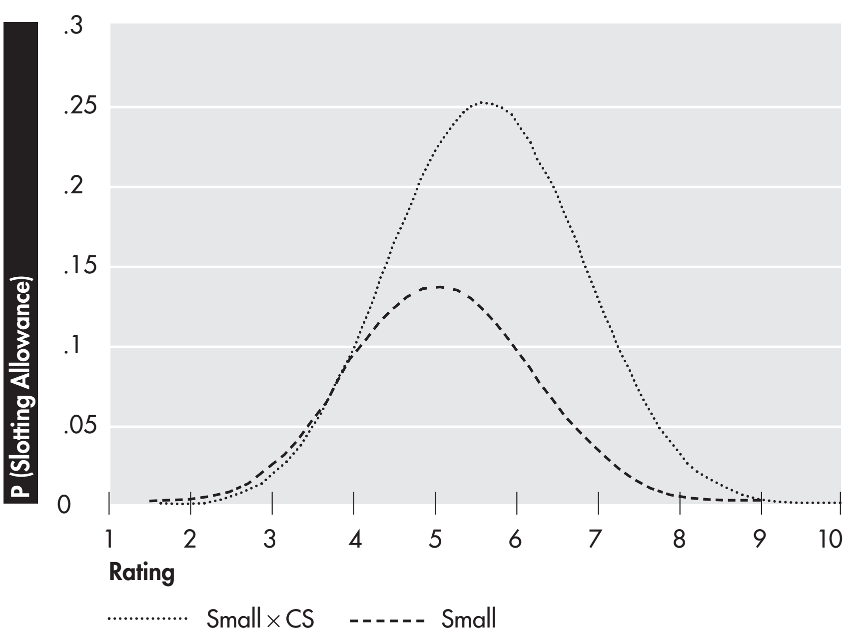


Figure 4b
Role of Competing Stores: Small Manufacturers



Manufacturer Desire to Mitigate Retail Competition to Enhance Market Coverage (A4). We report the effects of retail competition on the likelihood of slotting allowances in column A4 of Table 8. The results are similar in the "All" column, where we simultaneously control for the effects of the other variables. Figures 4a and 4b shows graphs of how the presence of competing retailers differentially affects large and small retailers, based on the estimates in the "All" column, holding fixed the effects of the other variables.

From figures 4a and 4b, we see that for both large and small retailers, the probability of slotting allowances is greater in the presence of retail competition. These results support the mitigation-of-retail-competition hypothesis as opposed to the information provision hypothesis.

Having found support for the mitigation-of-retail-competition hypothesis, we now test whether there is support for the retailer participation rationale (A4) or the retailer collusion rationale (B1). As discussed earlier, if the A4 rationale is at work, then the likelihood of slotting allowances should fall as ratings increase. In contrast, if the B1 rationale is at work, the likelihood of slotting allowances should rise as ratings increase. From figures 4a and 4b, we can see that for both large and small manufacturers, the likelihood of slotting allowances falls as ratings increase, suggesting support for the retail participation (A4) rationale offered in Desai (2000).[11]

Anticompetitive rationales

Retailer Desire to Mitigate Retail Competition to Increase Profits (B1)

See discussion above.

Exercise of Retail Power (B2). Our finding, represented graphically in Figure 1b, that the probability that manufacturers will offer slotting allowances falls at high levels of rating even for small manufacturers is not consistent with the retail power explanation (Chu 1992) for slotting allowances.

As we discussed earlier, the presence of private labels may indicate greater opportunity cost or greater bargaining power for the retailer. Both could cause the likelihood of slotting allowances to increase. Our analysis finds support for the argument that the opportunity cost of shelf space increases the likelihood of slotting allowances, but not for the retailer power argument. While the positive relationship between slotting allowances and private labels lends support for the opportunity cost hypothesis, further research is required to conclusively address this issue.

Though the data we used did not support the theory that slotting allowances represent an exercise of retailer power, we still view our conclusion about retailer power as preliminary. To conclusively rule out the retailer power hypothesis, we need to perform this analysis with data from a cross-section of retailers with different characteristics relating to power (such as market share) to make sure that there is no confounding of greater power and greater opportunity cost. For example, a large retailer may be considered powerful due to its size, but the opportunity cost of its shelf space will be greater as well, and both those factors could lead to slotting allowances.

Robustness check and validation

Endogeneity of Manufacturer Ratings. Our empirical analysis has focused on changes in the likelihood that manufacturers will offer slotting allowances depending on the retailer's ratings in the presence of test market information, advertising, and competing stores. The retailer's rating of the new product's likelihood of success is based on experience with the manufacturer and on the manufacturer's reputation in its industry. There-fore, it was reasonable to assume that these ratings would be independent of the characteristics of the transaction in question: whether test market information was shown, whether advertising gross rating points are promised, or whether competing stores have accepted the product. Nevertheless, because buyers rate the manufacturer after these terms of trade are revealed, it is possible that these terms of trade affect the ratings.

Table 9
Effect of Terms of Trade on Manufacturer Reputation

Variable	**Estimate** (s.e.)
Intercept	5.27*** (.07)
Large	.94*** (.16)
Test Market	.46*** (.16)
GRP Dummy	.50*** (.16)
Competing Store Dummy	.49*** (.11)
Large × Test Market	.57*** (.24)
Large × GRP	−.55*** (.25)
Large × Competing Stores	.40* (.21)
R^2	.08

(*** $p < .01$; ** $p < .05$; * $p < .1$)

We check for this potential endogeneity of retailers' ratings through a regression of ratings against the terms of trade. Table 9 reports the regression results. We find an interesting difference between small and large manufacturers. Test markets, advertising, and competing retailer acceptance all affect the ratings of small manufacturers, but the net effect on large manufacturers is close to zero. In hindsight, these results are not surprising, because the retailer has more past experience with large manufacturers, and large manufacturers' industry reputations are relatively strong, suggesting that the effect of the current transaction's trade terms on ratings is minimal. In contrast, the retailer is likely to have less experience with small manufacturers on average, and their industry reputations are not as well defined. Hence, from a Bayesian updating perspective, it makes sense that the current transaction's trade terms affect the ratings of small manufacturers to a larger extent.

This endogeneity suggests, however, that we need to rely on the retailer's a priori ratings of manufacturers rather than on the retailer's a posteriori ratings after the retailer learns what terms of trade the manufacturer is offering. Using the regression equation in Table 9 we compute the a priori ratings without the terms of trade, as follows:

$$\text{A priori Rating} = \text{Actual Rating} - \beta X$$

where X is the set of variables relating to the terms of trade for each offer in the regression in Table 9. Thus it includes all the variables in Table 9 except Intercept and Large. β is the vector of coefficients associated with the terms of trade variables.

The results using these a priori ratings are reported in the column "All: Endogeneity-Adjusted Rating" of Table 8. The coefficients are fairly similar, and the qualitative results are identical to the earlier results.

Which theoretical model is most consistent with the data?

Our conclusions on the applicability of the various rationales for slotting allowances have been based on whether we find support for one or more implications from either a formal game-theoretic model or an intuitively logical model that incorporates the rationale in question. Our testing approach is similar to that adopted in extant research on slotting allowances (Bloom, Gundlach, and Cannon 2000; Rao and Mahi 2003; Wilkie, Descrochers, and Gundlach 2002). We now go beyond the test of implications to examine the empirical support for the underlying model structure of the various theories. It is important to note that the models of competing rationales are not all mutually exclusive.

First Movers. A key difference between the various game-theoretic models that we have discussed in this paper is that they operationalize the balance of power between manufacturers and retailers in terms of different first movers.

Chu's (1992) screening model assumes that the retailer has power and first sets the terms of trade. Shaffer's (1991) model, which assumes that manufacturers are in a perfectly competitive market, also assumes that power, if present, rests with the retailers, who are interested in mitigating retailer competition. Since in Shaffer's model, manufacturers are assumed to be perfectly competitive, all their products must be assumed to be equally good, and therefore we cannot infer how the offer of slotting allowances changes with a particular product's potential. In order to examine how a product's potential affects the offer of slotting allowances, we developed a model in this paper that is similar in spirit to Shaffer's model (in terms of accepting the premise that retailers seek to mitigate retail competition). In the model we developed, the retailer has power to set the terms of trade, but slotting allowances vary with a product's potential. The essential conclusion is that when the retailer has the power to move first and to set the terms of trade, the offer of slotting allowances increases as a product's potential increases because the retailer seeks to extract the entire available surplus from the manufacturers.

In the models developed by Lariviere and Padmanabhan (1997) and Desai (2000), by contrast, the assumption is that manufacturers move first and set the terms of trade. In the models in which manufacturers set the terms of trade, the opportunity cost of shelf space is a critical element without which slotting allowances will not arise in equilibrium.[12] The key idea in both these models is that slotting allowances can arise because manufacturers have private information about the success of the product, and they are interested in signaling that information to the retailer. Desai (2000), however, shows that slotting allowances can occur even when manufacturers are not signaling private information. Desai suggests that when retail competition causes retailers' expected profits—and consequently their incentive to carry the product—to fall, then slotting allowances can be used to reduce competition and induce retailers to carry the product.

We summarize the relevant characteristics (for our purposes) of the different theoretical models and the nature of the empirical support for them in Table 10.

Empirical Evidence. The fact that we find that the likelihood of slotting allowances decreases as retailer ratings of the new product's chance of

Table 10
The Model Structure of Different Theories

	Manufacturer offers slotting allowances, i.e., manufacturer is first mover	Retailer extracts slotting allowances, i.e., retailer is first mover
Opportunity cost of shelf space	Sullivan (1997) models opportunity cost of shelf space endogenously. (Not tested) Lariviere and Padmanabhan (1997), Desai (2000) treat opportunity cost of shelf space as exogenous. (Supported)	
Slotting allowance as signal	Lariviere and Padmanabhan (1997), Desai (2000) (Supported)	
Slotting allowance and advertising as signaling substitutes	Desai (2000) predicts advertising will be used as a signal when advertising is effective; slotting allowances will be used when advertising is less effective. (Supported)	
Mitigation of retail competition	Desai (2000) predicts manufacturer will use slotting allowance to mitigate retailer competition so as to induce retailer participation (Supported)	Shaffer (1991) and this paper both suggest that retailers use slotting allowance to sustain retail collusion (Not supported)
Exercise retail power; demand slotting allowances for high-demand products		Chu (1992) theorizes that retailers use slotting allowance to screen high-demand products and extract manufacturer surplus (Not supported)

success increase contradicts the notion that the retailer uses its power to extract as great a slotting allowance as possible from the manufacturer. This relationship between slotting allowances and the ratings of new products' success potential is present even when one looks at new products introduced by small manufacturers, which suggests that the retailer power theory is not a reasonable explanation for the use of slotting allowances. We therefore argue that there is no support for models in which the retailer is the first mover, as in Chu (1992), Shaffer (1991), and this paper.

Overall our analysis finds support for the modeling structure in Lariviere and Padmanabhan (1997) and Desai (2000), in which the manufacturer is the first mover, because theories in which the manufacturer is the first mover predict that slotting allowances will fall as product potential increases. In addition, we find support for the opportunity cost prediction—a critical ingredient in the models of Lariviere and Padmanabhan (1997) and Desai (2000). As noted earlier, we do not explicitly test for empirical support for the opportunity cost rationale of Sullivan (1997) due to data limitations, but our results are not inconsistent with that theory. We also find support for the prediction in Desai (2000) that advertising will be a substitute for slotting allowances when advertising is effective. Finally, we find support for the retail competition mitigation hypothesis, but with intent to induce retailer participation, as predicted by Desai (2000).

The fact that we find support for multiple predictions in Desai (2000) suggests to us that his theoretical framework may be the most plausible of those that find support in our data. We note that the Desai model nests the modeling structure of Lariviere and Padmanabhan (1997) with respect to opportunity cost and manufacturer signaling using slotting allowances; therefore our results are consistent with the Lariviere and Padmanabhan model as well.

Analysis of the Retailer Product Acceptance Decision

The role of a slotting allowance is to increase the chance that the retailer will accept a new product. We use retailer acceptance data to address the following questions: (1) Do slotting allowances improve acceptance by the retailer? (2) Do slotting allowances moderate the effects of the variables that we considered in the analysis thus far on the probability of retailer acceptance?[13]

To address these questions, we perform a logistic regression with retailer acceptance as the dependent variable. The results are reported in Table 11. In column 1, we enter slotting allowance (the dummy variable) directly into the regression along with the other variables that we considered in the empirical tests of rationales. We find that the offer of a slotting allowance has a negative impact on the product acceptance decision up to a rating of 5 for small manufacturers, and up to a rating of 7 for large manufacturers. Such a negative effect is inconsistent with the theory that slotting allowances improve new product acceptance, as has been argued thus far. To see if this effect is due to the endogenous nature of ratings, we ran the regression with the endogeneity-adjusted ratings discussed earlier. The results are similar: slotting allowances have a negative effect on retailer acceptance until the retailer ratings of the chances of new product success are fairly high. This negative effect of slotting allowances is also reported in Rao and McLaughlin (1989), who suggest that it may be due to unobserved negative characteristics of products for which slotting allowances are offered, i.e., there is an endogeneity problem. We therefore need to correct for the endogeneity bias to obtain the true effect of slotting allowances.

Maddala and Lee (1976) suggest a two-step estimation (which they call 2SLS logit) procedure to obtain consistent estimates when there is an endogeneity problem with binary dependent variables. Suppose y_1 denotes the dichotomous variable "slotting allowance" and y_2 denotes the dichotomous variable "retailer acceptance." Suppose also there are two underlying latent variables capturing the need to offer slotting allowances (y_1^*) and the attractiveness of the product that determine retailer acceptance (y_2^*). Now suppose $y_1^* = X_1\beta_1 + \varepsilon_1$ and $y_2^* = \gamma y_2 X_2\beta_2 + \varepsilon_2$.

The 2SLS logit procedure involves two steps. First, estimate the logit model for slotting allowances, as in Table 8. Second, replace the dichotomous endogenous variable "slotting allowance" (y_1) with the estimated Prob (Slotting Allowance = 1) from the slotting allowance regression equation estimates reported in Table 8 into the retailer product acceptance equation, and then estimate the logit model of retailer product acceptance. Since we are using the endogeneity-adjusted measure of retailer rating for product, we use the estimates from the "Endogeneity-Adjusted Rating" column in Table 8 to compute Prob (Slotting Allowance = 1). The estimates are reported in the last column of Table 11.

We now find that slotting allowances increase the likelihood of product acceptance. The coefficient on slotting allowances is not significantly different from zero (it was significantly negative without the endogeneity correction), but the interaction coefficient for Slot × Manufacturer Rating is significantly positive and larger than without the correction. Hence slotting allowances have a positive effect on retailer acceptance for small manufacturers at all levels of ratings. For large manufacturers, slotting allowances have a positive effect when Rating > 3. Perhaps the reason for this difference between large and small manufacturers is that slotting allowances offered by small manufacturers have greater credibility than those offered by large manufacturers at low ratings due to small manufacturers' greater risk aversion.

Table 11
Dependent Variable: Retailer Acceptance

Variable	Slotting Allowance: No Endogeneity Correction Unadjusted Rating Estimate (s.e.) (1)	Slotting Allowance: No Endogeneity Correction Endogeneity-Adjusted Rating Estimate (s.e.) (2)	Slotting Allowance: Endogeneity Correction Endogeneity-Adjusted Rating Estimate (s.e.) (2)
Intercept	−4.46***	−4.44***	−4.63***
	(.49)	(.49)	(.56)
Manufacturer Rating	.42***	.42***	.44***
	(.06)	(.06)	(.08)
Large	.83***	.87***	.85***
	(.26)	(.26)	(.30)
Slotting Allowance	2.61*	−2.58***	−2.08
	(1.37)	(1.28)	(2.33)
Slot × Large	−.94*	−1.23***	−2.89***
	(.49)	(.51)	(1.25)
Slot × Manufacturer Rating	.47***	.51***	.93***
	(.23)	(.23)	(.43)
Shelf Space	.18***	.17***	.16***
	(.05)	(.05)	(.05)
Private label	−.07	−.07	−.09*
	(.05)	(.05)	(.05)
Test Market	−.34	−.09	−.79***
	(.27)	(.26)	(.36)
Large × Test Market	.09	−.22	.55
	(.41)	(.40)	(.47)
GRP Dummy	.96***	1.21***	1.39***
	(.25)	(.25)	(.28)
Large × GRP	−.03	−.31	−.54
	(.39)	(.39)	(.42)
Competing Store Dummy	.55***	.80***	.49***
	(.18)	(.18)	(.21)
Large × Competing Store	−1.29***	−1.49***	−1.15***
	(.34)	(.34)	(.36)
ρ^2	.12	.12	.13

(*** $p < .01$; ** $p < .05$; * $p < .1$)

The positive coefficient for Large demonstrates that when one controls for Rating, large manufacturers' products are accepted at a higher rate. This finding cross-validates the argument that we made earlier that the retailer also perceives greater risk from small manufacturers.

We continue to find that products that compete with private labels are less likely to be accepted, even after taking into account the moderating effect of slotting allowances. The effect of shelf space on retailer acceptance is positive, however, which we did not expect given the opportunity cost argument. It may be that the shelf space effect on likelihood of acceptance is a category-level effect, in that products with higher shelf space ratings may be systematically more profitable at the category level. Inclusion of category-level fixed effects made this coefficient insignificant, suggesting that this is a plausible hypothesis.

We find that after accounting for the moderating role of slotting allowances, advertising has a positive effect on product acceptance for both large and small manufacturers. Thus retailers like products with greater advertising support. The presence of competing stores has differential effects on large and small manufacturers. We find a negative effect of retailer competition for large manufacturers, consistent with the idea that retail competition has a negative impact on product acceptance. But we find a positive effect for small manufacturers, suggesting that there is an information effect for small manufacturers when competing stores accept a product.

Overall, the analysis of our retailer's acceptance decisions suggests that there is a direct effect of opportunity cost, advertising, and competing stores on retailer acceptance decisions in addition to their indirect effect through slotting allowances.

Conclusions and Future Research Directions

This paper provides the first empirical investigation of the multiple rationales presented in the literature for the use of slotting allowances in new product introductions. Overall we find support for the modeling framework developed in Desai (2000) and Lariviere and Padmanabhan (1997). Our empirical analysis suggests support for the efficiency-enhancing rationales for slotting allowances. We find little support for anti-competitive rationales. Specifically, we conclude that:

1. Slotting allowances serve to allocate scarce retail shelf space efficiently.

2. Slotting allowances help to balance risk by shifting the downstream risk of retailers upward toward manufacturers.

3. Slotting allowances are offered in a manner consistent with the predictions of signaling theories.

4. Though slotting allowances serve to mitigate retail competition, the impetus for this is to ensure broader retail distribution rather than purely to stifle competition.

5. We do not find support for the retailer power rationale, but this lack of evidence may be due to the characteristics of our data.

Implications for practitioners[14]

Our results offer interesting insights for manufacturers and retailers. In general, they suggest that both large and small manufacturers should get their salesforces to communicate credibly to retailers the success potential of their products as effectively as possible in order to reduce the need to offer slotting allowances. Based on our findings, it appears there is little danger that the retailer will try to extract the available surplus by making greater demands for slotting allowances upon realizing the success potential of the product.

Our results show that small manufacturers will obtain greater marginal impact for more favorable evaluations by offering information about test markets and committing to greater advertising (if advertising is likely to be effective), because the retailer has less experience with and knowledge about small vendors relative to larger manufacturers. Also, as seen in the results of the retailer product acceptance regression and the rating regression, small manufacturers will find it particularly effective to provide likely evidence of marketplace success and to build the product's credibility by first introducing it at smaller retailer stores that have lower profitability thresholds compared with larger chains. If the product becomes successful at these smaller local retailers, that success can help the manufacturer persuade larger retailers to accept the product.[15]

Small manufacturers often complain that their products do not get the same attention as larger manufacturers' products and that they are unable to afford slotting allowances. Our results suggest a possible solution to this problem. Retailers, who consider their shelf space to be valuable real estate, can consider opportunities for local success by evaluating product success information provided by small manufacturers and consider offering localized product assortments. This will reduce their opportunity cost threshold for participation and make the shelf space allocation more efficient on a store-by-store basis.

This approach would be particularly helpful for smaller manufacturers that typically offer products that target more localized tastes and that currently feel shut out of large supermarket chains because of the high threshold of profitability that large supermarket chains require when they accept products for all their stores rather than on a store-by-store or regional basis. As regional chains increasingly merge with larger chains and concentration in the industry increases, the issue of localized new product acceptance is becoming critical. As chains have become larger and buying has become more centralized, the ability of the buyers to discern local market tastes has eroded. Further, information systems set up for centralized buying decisions are unable to respond effectively to new product introductions from smaller manufacturers that are tailored to local markets because they use profitability thresholds that are averaged across the whole chain rather than on a regional basis. Retailers might therefore consider modifying their systems to be flexible in accepting products based on potential for localized success.

Finally, small manufacturers who are seeking an initial foothold in a market may consider offering the product on an exclusive basis (for an initial period of one to two years) to only one of the larger retail chains in any particular market to mitigate the problems of retailer competition and thus reduce the need to pay slotting allowances.

Implications for researchers

Our study suggests two major takeaways for any future empirical analysis of slotting allowances. First, the effect of critical variables (test markets, advertising, competing stores) on offers of slotting allowances are a function of the perceived likely success of the product. As we discovered, these effects are highly nonlinear and therefore must be controlled for carefully.

Second, the role slotting allowances play for large manufacturers is quite different from the role they play for small manufacturers. Extant opinion-based survey research does not make this distinction. Even though Bloom, Gundlach, and Cannon (2000) and Wilkie, Descrochers, and Gundlach (2002) collect information about the size of manufacturers, wholesalers, and retailers, they report only average estimates of survey responses across all respondents. Rao and Mahi (2003) also do not distinguish between large and small manufacturers in their analysis. Our results show that due to the disproportionate number of small manufacturers in any sample, the average results will be weighted towards the effects on small manufacturers, but small manufacturers' impact on econometric results is disproportionate to their economic impact. The several crossover interaction effects we discovered for large and small manufacturers over high and low values of ratings (see figures 1–4) clearly demonstrate the importance of these two ideas in the empirical analysis of slotting allowances.

Limitations and future research

One obvious limitation of our research is that we analyzed data from just one retailer. While we have suggested that it is possible to generalize cautiously to other large regional retail chains, it is important to investigate whether our results continue to hold at other retailers. Just as we found that the behavior of small and large manufacturers differed in many subtle and important ways, it is quite possible that the behavior of retailers differs depending on their strengths. National-level retailers might behave differently from our focal retailer, as might smaller independent grocery stores; this is one avenue of further study.

Another important caveat is that our data are from the period 1986-87. The use of slotting allowances has grown more and more intense since then, and it would require newer data to investigate whether our conclusions continue to hold. In that sense, our study provides a historical snapshot. However, these rationales are not new; they were examined and discussed in the trade press in the early nineties.

It is a common complaint of small manufacturers that larger manufacturers use slotting allowances to exclude them from markets. Farrell (2001) formalizes the argument. Essentially, if the dominant large manufacturer already has an exclusive position at one competing retailer, then it has a greater incentive to reduce competition in wholesale prices at the second retailer because its losses from competition on wholesale prices will also affect its sales at the first retailer. The large dominant manufacturer will therefore pay more slotting allowances to monopolize shelf space than a small manufacturer would. Most observers, however, believe that exclusive dealing is rare in grocery markets. A comprehensive analysis of whether large manufacturers pursue exclusion strategies is beyond the scope of this paper, given the lack of data. This topic is wide open for future research.

Future research should also investigate how the magnitude of slotting allowances changes in response to the variables studied. The 2003 study by the FTC has information on the actual magnitude of slotting allowances offered to the retailers in a few categories. A systematic investigation of the FTC data could lead to additional insights.

Another issue of interest is how retailers' ratings of products correlate with those products' actual market success. We used retail buyers' a priori ratings of a product's likelihood of success to measure uncertainty about a product's success. Given that small vendors claim that they are being treated unfavorably, it would be very useful to see how retailer ratings correlated with product success in the market. For instance, are small manufacturers systematically underrated relative to their actual performance in the market?

In conclusion, while the results of our study permit us to conclude that efficiency rationales provide better explanations for the presence of slotting allowances than anticompetitive rationales do, more work needs to be done using more recent data from a larger sample of retailers before our conclusions can be unequivocally accepted. Nevertheless, our findings supporting the efficiency-enhancing aspects of slotting allowances support the FTC's position that it would be unwise to ban the practice of slotting allowances in the grocery sector without additional empirical evidence of anticompetitive effects. ■

Appendix

Consider a market in which a manufacturer sells through two differentiated, competing retailers. Let the product demand for retailer j be given by: $q_j = a - p_j + bp_{3-j}$, where $j = 1, 2$, a indicates the market potential, and b (the cross-price coefficient) indicates the extent of competition between the two retailers.

Given the greater bargaining power of the retailers with respect to the manufacturers, the retailers set the contractual terms of trade with the manufacturers, i.e., they determine both wholesale prices and slotting allowances (w_j, S_j). These wholesale prices and slotting allowances are set by the retailers in order to maximize their profits. Conditional on these contractual wholesale prices and slotting allowances, the retailers then set retail prices in order to maximize retailer profits.

In the second stage, conditional on the contractual wholesale price and slotting allowances set by the retailer in the first stage, the retailers' objective is given by: $\max_{p_j} \Pi_j^R = (p_j - w_j)q_j$. Taking first-order conditions and given symmetry between the two retailers, it can be shown that $p^*_j = \frac{a + w_j}{2 - b}$.

In the first stage, the retailers choose wholesale prices and slotting allowances in order to maximize their profits. Since the retailer can extract the entire manufacturer surplus through the slotting allowances, the retailer's objective at this stage is given by:

$$\max_{w_j, S_j} \Pi_j^R = (p_j - w_j)q_j + S_j = (p_j - w_j)q_j + w_j q_j = p_j q_j.$$

Substituting the second-stage retail price $p^*_j = \frac{a + w_j}{2 - b}$, and taking the first-order conditions with respect to w_j, we can see that $w^*_j = \frac{ab}{2(1 - b)}$, The optimal slotting allowance is given by: $S^*_j = \frac{a^2 b}{4(1 - b)}$. When the *retailer* uses its bargaining power to set slotting allowances, slotting allowances increase as market potential (represented by a) and retail competition (represented by b) increase. This is in contrast to the situation when the *manufacturer* sets the slotting allowances, as in Desai (2000), where the slotting allowances decrease as a function of market potential. See the technical appendix of Desai (2000).

Notes

1. The 2001 Federal Trade Commission report discusses the difficulty in obtaining data on slotting allowances and in obtaining cooperation from large manufacturers and retailers. Taking into account the difficulties in obtaining data on this issue, Congress provided a budget of $900,000 to the FTC for an empirical study of slotting allowances (Federal Trade Commission 2001). In November 2003, the FTC completed a new report with detailed data about slotting allowances that they had collected from retailers. But the new FTC study did not test the alternative theoretical rationales for slotting allowances.

2. An FTC workshop participant described the problems smaller manufacturers have in obtaining finances for slotting allowances: "[B]anks do not finance marketing in any way, shape or form. They finance machinery, automobiles. They don't even like to finance your office building" (Federal Trade Commission 2001, p. 23).

3. Thus, we allow for the possibility that a small manufacturer rated highly by the retailer can have enough brand equity among consumers to make its consumer advertising effective and credible.

4. We thank a reviewer for suggesting that we consider this possibility.

5. In Shaffer's model (1991), the manufacturer sets the terms of trade, but the manufacturers are in a perfectly competitive market and therefore their actual power to set the terms of trade is limited. That model can be easily recast such that the retailer sets the terms of the trade, in which case it will be optimal for the retailer to set the contractual wholesale price at higher than marginal cost (to help mitigate retail competition), but also to demand a slotting allowance to transfer surplus from the manufacturers to the retailer. We thank Greg Shaffer for suggesting that we explore this alternative explanation.

6. We follow previous research by Bloom, Gundlach, and Cannon (2000) and Wilkie, Descrochers, and Gundlach (2002) in using private labels as a proxy for opportunity cost. However, private labels can also give greater bargaining power to retailers, relative to manufacturers. The fact that private labels can confer that advantage suggests that they may be indicative of retailer power rather than opportunity cost. Since other tests of retailer power show little evidence for the retail power rationale, we interpret the private labels result as supportive of the opportunity cost hypothesis.

7. In an earlier version of the paper, we showed that our results are robust to whether we use the actual advertising gross rating points (GRP) promised by the manufacturers or simply an indicator to show whether advertising GRP was promised or not. Since results based on the indicator variable are easier to interpret, we report only results with the indicator variable in this version for the sake of brevity.

8. As with advertising, we find that our results are robust to whether we use the actual number of competing retailers (or its square root to model a concave relationship) who have accepted the product or simply an indicator to show whether any competing retailer has accepted the product. We also included a squared term for the number of competing retailers to test for the inverted U-shaped relationship between slotting allowances and competing stores that we had hypothesized.

9. The graphs are similar whether we use the results from the separate regressions or the "All" regression. To be consistent across all our results, we report graphs based on the

"All" regression. When creating the graphs, we maintained the values of the variables that were not shown on the graph at their average values.

10. Note that while this variable is per se insignificant in the "All" regression, the net effect of Large on Rating in that regression is captured simultaneously by several other interaction variables that are also included in the regression.

11. We also included Competing Stores2 in the regression to test for the inverted U-shaped relationship between the probability of slotting allowances and the number of competing retailers that have accepted the product. We did not find evidence for such an inverted-U relationship.

12. While Lariviere and Padmanabhan (1997) and Desai (2000) treat the opportunity cost of shelf space as an exogenous parameter in their model, Sullivan (1997) models endogenously the scarcity of shelf space itself as a tradeoff between the value consumers place on variety and manufacturers' incentives to offer new products on the one hand and slotting allowances on the other. Given the cross-sectional nature of our data, we cannot test Sullivan's specific theory about how opportunity costs arise endogenously.

13. We thank a reviewer for encouraging us to perform this analysis.

14. A press release based on the previous version of the paper led to a number of articles in the trade press (e.g., *Progressive Grocer,* April 7, 2005; *Supermarket News,* April 18, 2005). These articles elicited a number of reactions from practitioners and experts in the retailing industry. Small manufacturers tended overwhelmingly to disagree with our conclusion about the efficiency-enhancing aspects of slotting allowances. The comments suggested that they perceive the system of slotting allowances to be structurally unfair to small manufacturers with few resources. Comments from the trade press and consultants were more balanced (though tilted towards disagreement). Not surprisingly, retailers tended to be positive and were in agreement. This section is inspired by comments we received and our responses to them.

15. Some practitioners mentioned that this possibility is becoming increasingly difficult as waves of mergers in the supermarket and drugstore formats have removed smaller retailers from the scene and caused regional chains to disappear. The smaller retailers that remain tend to be greater credit risks, and therefore small manufacturers tend to avoid them. Also it is extremely costly for salesforces to deal with the remaining small independent retailers, and this too puts small manufacturers at a disadvantage.

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