

Are Slotting Allowances Efficiency-Enhancing or Anti-Competitive?*

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Abstract

Slotting allowances are lump-sum payments by manufacturers to retailers for stocking new products. The economic rationale for slotting allowances is controversial. Some argue that slotting allowances are efficiency-enhancing; others argue that they are anti-competitive. However, there is no empirical research on this issue due to the difficulty in obtaining data about these transactions. Using data on all new products that were offered to one retailer for a period of six months, we empirically investigate support for the alternative rationales for slotting allowances. Our analysis indicates that broadly there is more support for the efficiency theories than for the anti-competitive theories. We find that slotting allowances (1) serve to efficiently allocate scarce retail shelf space; (2) help balance the risk of new product failure between manufacturers and retailers; (3) help manufacturers signal private information about potential success of new products; and (4) serve to widen retail distribution for manufacturers by mitigating retail competition. We find little support for the anti-competitive rationales in our data. The empirical support we find for the efficiency rationales suggests that the FTC was probably correct in being circumspect about banning slotting allowances outright.

1. Introduction

Slotting allowances are lump-sum payments by manufacturers to retailers for stocking new products. Over the last two decades, they have gained increasing prominence and have emerged to be a very major share of new product development costs.¹ According to Deloitte and Touche (1990), slotting allowances account for over 16% of a new product's introductory costs², while R&D and market analysis expenditures account for about 14%. Even though substantial amounts of money are involved, slotting allowances are extremely controversial and there is very little consensus either among practitioners, regulators or researchers as to the true role of slotting allowances in facilitating new product introductions (Bloom et al. 2000 and Gundlach et al. 2002). While some theorists and practitioners have suggested that slotting allowances are anti-competitive, others have argued that slotting allowances serve to enhance efficiency of market outcomes.

The controversial role of slotting allowances is evident in the contrasting positions taken by two regulatory authorities. The Bureau of Alcohol, Tobacco and Firearms (BATF) 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 given that slotting allowances can have both efficiency and anti-competitive effects and therefore believes that further investigation is needed (FTC 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 from either manufacturers or retailers about slotting allowances.

The major efficiency arguments cited in favor of slotting allowances are: (1) that they serve to efficiently allocate scarce retailer shelf space to the most valuable (profitable) new products; (2) that they serve to allocate risk of new product failure in a balanced manner between manufacturers and retailers; (3) that they serve to signal private information that manufacturers may have about the potential success of the new product to the retailer; and (4) that manufacturers use them to induce retailers to accept the product and increase distribution by

¹ The date of origin of slotting allowances is ambiguous. According to Supermarket News, slotting allowances per se did not exist before 1984 (August 27 1984). PROMO: The Magazine for Promotional Marketing, (January, 1989) notes the prevalence of slotting allowances starting 1982 in a report based on surveys of manufacturers and retailers.

² The magnitude of slotting allowance for an SKU varies from \$ 75-\$300 per store (FTC 2001, p.11), 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).

mitigating the effects of retail competition. The main anti-competitive explanations for slotting allowances are: (1) they are a means for retailers to mitigate retail competition to increase their own profits by facilitating retail collusion and (2) they are the result of retailers exercising retail power, adversely affecting smaller manufacturers and reducing consumer access to these products. The retail power argument suggests that in many local markets, high retail concentration results in few retailers controlling retail shelf-space, enabling them to demand slotting allowances.

Despite the abundance of theoretical rationales for slotting allowances, the extant empirical research on this topic is inconclusive. Two survey-based studies (Bloom et al. 2000 and Gundlach et al. 2002) show limited consensus between manufacturers and retailers on the reasons for the use of slotting allowances. The problem may be because the survey method may not reflect accurate reality and their opinions about slotting fees as acknowledged by Bloom et al. (2000). This problem does not seem to disappear even when the respondents (retailers and manufacturers) were instructed to focus on the characteristics of specific transactions in which the participants were involved and slotting allowances are offered; see Rao and Mahi (2003). Further, the survey-based studies give limited insights into the rationales for observed market outcomes involving slotting allowances.

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 results in an equilibrium in which the number of products offered by the manufacturer equals the number of products demanded by the retailer. But, the aggregate level data are not capable of distinguishing between competing predictions 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) can be insightful in resolving contradictions in the opinions of manufacturers and retailers. In this paper, we use a unique dataset with objective information associated with the new product offer and retailer evaluations about the manufacturer and the product offered on all new products (over 1,000) presented to a retailer during a period of six months. We believe our detailed dataset on

over 1000 products offers a rare opportunity for an empirical investigation of the rationales for slotting allowances.³

The analysis of a large number of offers to one retailer, while restricting generalizability helps us address econometric difficulties involved in an analysis of pooled (a small number of) observations across multiple retailers. We are able to control for the retailer end of the transaction-dyad and see how slotting allowances vary across different manufacturers. This strategy is critical in developing appropriate tests of game theoretic predictions. While rejecting signaling theories based on their analysis of data across multiple manufacturers and retailers, Rao and Mahi caution (p. 265), "... 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." It is plausible that some of the counter-intuitive empirical results of Rao and Mahi (2003) 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." We hope our research would serve as a first step to investigate support for the alternative theoretical rationales.

We provide a brief overview of the efficiency and anti-competitive rationales in Section 2. In Section 3, we present the data that we use and give a brief descriptive analysis and our testing approach. Section 4 develops the empirical tests of the different rationales and describes the empirical results. Section 5 concludes.

2. Rationales for Slotting Allowances and Empirical Testing Strategy

We discuss below the arguments behind the alternative rationales for slotting allowances and the extant empirical evidence in support or against these rationales. A summary of the arguments and the empirical evidence is provided in Table 1. We also briefly discuss our

³ The 2001 FTC report discusses the difficulty in obtaining data on slotting allowances and in obtaining cooperation from large manufacturers and retailers. Congress provided a budget of \$900,000 to the FTC for an empirical study of slotting allowances, considering the difficulties in obtaining data on this issue (FTC, 2001). In November 2003, around the time the first version of this paper was completed, the FTC completed a new report with detailed data about slotting allowances that they had collected from retailers. But the study does not test the alternative theoretical rationales for slotting allowances.

empirical testing strategy for each of these rationales. After discussing the available data, we provide more details about the operationalization of the tests in Section 3.

A. Efficiency-Enhancing Rationales

A1. 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 range from about 10,000 to 16,000 SKUs (Food Marketing Institute, 2003b). Given the limits to expanding shelf space, introducing a new product invariably requires retailers to drop an existing product. Further due to the growth of private labels with higher margins than national brands (Coppa, 2003), shelf space is therefore clearly a scarce resource with high opportunity cost. Sullivan (1997) shows that slotting allowances arise endogenously when the costs of developing new products fall leading to greater supply, but consumer demand (and therefore resulting retailer demand) for variety does not rise as much. She labels this the demand-supply hypothesis. Lariviere and Padmanabhan (1997) and Desai (2000) include 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 about likelihood of product success. They both find that retailers will not accept the 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 efficient allocation of shelf-space hypothesis for the use of slotting allowance. But, results from surveys of manufacturers and retailers 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 (Wilkie et al. 2002; Bloom et al. 2000), Bloom et al. (2000) find that retailers do not believe that slotting fees are related to the opportunity cost of shelf-space. Wilkie et al. (2002) also find no support for the growth of private label brands as a rationale 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 *opportunity cost of shelf-space* rationale is distinct from an *operating cost-based rationale* that has been offered in the literature. The operating cost rationale is that retailers use slotting allowances to cover new product introduction costs (e.g., 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 the original purpose of recovering the true costs incurred by the retailer for introducing the product. Manufacturers do not believe operating costs to be a major reason for slotting allowances, though retailers claim otherwise. Further, slotting allowances vary across most new products rendering the operating costs argument less reasonable.

In fact, Rao and Mahi (2003) test the operating cost rationale and find the “surprising” result that slotting allowances are negatively related to retailer operating costs. However, the surprise is easy to explain (as the authors themselves do), when it is recognized that their study analyzes data across multiple retailers. Retailers who consider that they are more efficient tend to have lower operating costs in the industry and are also likely to be the larger retailers who have greater opportunity costs of shelf-space. Hence the negative relationship between slotting allowances and operating costs may in fact imply a positive relationship between slotting allowances and opportunity costs.

A relevant model to test 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.

A2. Balance 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 over 50% (Sachdev 2001) to around 80-90% (FTC 2001). With a more restrictive definition of new products (excluding seasonal products, existing product copies and new package sizes) the estimate is around 25% (Food Marketing Institute 2003b). The bottom line is that new product failure risk is a major concern for both manufacturers and retailers.

Survey opinions of both manufacturers and retailers (Bloom et al. 2000) support the notion that new-product failure risk is an important explanation for the use of slotting allowances. The risk arises from two sources for retailers: a direct operating cost per store on new products that fail (estimated at \$956,800 by The Food Marketing Institute 2001) and costs of unsold inventory of failed products. Additionally, there is the opportunity cost of lost potential revenue from more profitable products. The FTC Commissioner, Deborah K. Owen (Antitrust and Trade Regulation Report, 1994 p. 703; 60 Federal Register 20409) states that slotting allowances “provide a form of insurance for the retailer...[that] reduce, and perhaps eliminate

[its] risk— or at least transfer some of it to the producer— by charging a fee that essentially provides indemnification from the loss of profits that would arise if the new product fails to sell well.”

Some retailers charge failure fees and require buyback guarantees from manufacturers to refund the cost of unsold inventory to ameliorate these risks. However such requirements are not necessarily honored, especially by smaller manufacturers.⁴ This suggests that the risk from small manufacturers is greater than those from large manufacturers who are more likely to be longer-term players. The greater risk might imply that slotting allowances will be demanded more from smaller firms. The challenge in empirical testing is to distinguish the risk-based explanation from a retail power-based explanation, which suggests that smaller manufacturers would have to pay more slotting allowances due to their relatively low 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. Given this, small manufacturers will be far more risk averse to pay upfront slotting allowances and may require a higher degree of confidence in success of their products than larger manufacturers before “betting the bank.”⁵

Thus, an appropriate empirical model to test this rationale 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 balancing rationale should imply an inverted- U relationship between the variables. Since the effects of risk vary by size of the manufacturer, the model should allow for differences in the relationship for large and small manufacturers.

A3. Signaling Manufacturers’ Private Information about New Product Success to Retailer

In most new product introductions, it is fair to suggest that manufacturers have private information about the potential success of a new product. Lariviere and Padmanabhan (1997) and Desai (2000) argue that slotting allowances serve as signals by which manufacturers can credibly communicate positive private information to the retailer. The argument essentially is

⁴ Wilkie et al. (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).

⁵ The problems of smaller manufacturers in obtaining finances for paying slotting allowances are described by a FTC workshop participant quite well: “[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.” (FTC 2001, p. 23)

that only manufacturers who have positive private information about the potential success of the product will pay slotting allowances, while others with negative private information will not pay slotting allowances. Survey-based research has found little support for the signaling theory. (Bloom et al. 2000, p.101 and Rao and Mahi, 2003),

In empirically testing a signaling theory, one should distinguish between observable and unobservable aspects of product success. 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 add value to the retailer by communicating private information. Hence, any empirical analysis needs to account for the level of uncertainty that the retailer has about product success.

Do slotting allowances serve as a signal to communicate positive private information that a manufacturer has? We use two approaches based on the relationship between slotting allowances and (1) provision of test market results and (2) manufacturer 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 without using slotting allowances as a signal. For example, a large wholesaler is quoted in Wilkie et al. (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) when they state: "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 market results reported by manufacturers cannot credibly communicate private information about the potential success of a new product. Chu (1992) suggests several reasons for this: (1) manufacturers may selectively report only positive test market studies out of multiple studies done; (2) they may choose test market locations where their brand equity is strong in order to make the results appear more favorable than they truly are; and (3) manufacturers adjust marketing mix in response to test markets in order to improve and therefore may believe the potential for success, but this is not truly verifiable.

An empirical test of whether slotting allowances serve to signal private information inherent in the test market results should consider the credibility of test market information. If test market results do contain private information for manufacturers, but are not credible to the retailer due to the potential for manufacturer misrepresentation, then slotting allowances will be used to signal as a complement to test markets, and the probability of offering slotting allowances should be greater in the presence of test market information. However if test market information is credible to the retailer, then there is no need to signal private information. In this case, slotting allowances are substitutes for test markets, and the probability of offering slotting allowances should be lower in the presence of test markets. If we see evidence of complementarity between slotting allowances and provision of test markets when test market information is not credible, we treat it as support for the signaling rationale.

Advertising: Desai (2000) argues that manufacturers can use either slotting allowances and advertising to signal potential new product success. However, manufacturers would prefer to use advertising as a signal, if advertising is effective in raising demand. So 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 with higher ratings of new product success by the retailer may be more effective than manufacturers with lower ratings.⁶ Hence, we hypothesize that slotting allowances and advertising will be better substitutes for large manufacturers than for small manufacturers and for those products with higher ratings.

Further, at the stage of retailer product acceptance, manufacturers commit to a level of advertising. They may not deliver on that commitment and therefore there is some doubt about the signal's credibility. Again, one might argue that commitments by larger firms are more credible due to their repeated interactions and potential long-term negative impact on their reputations due to renegeing on their commitments. Smaller firms may be less credible because they are potentially more likely to 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

⁶ 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.

able to use slotting allowances to signal when their advertising is more effective, it might be hard to empirically detect such evidence of signaling by small firms.

Based on Desai (2000), we 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 new products rated as highly likely to be successful also to have more effective advertising.

A4. Manufacturers seek to Mitigate Retail Competition to Enhance Retailer Participation

If retail competition reduces the profits of downstream retailers to a level lower than that of their opportunity costs, then retailers will not accept the product. Desai (2000) suggests that manufacturers will offer slotting allowances and raise wholesale prices, to induce retailers to raise their retail prices and thus mitigate retail competition. Even though retail prices rise, slotting allowances are efficiency enhancing (and not anti-competitive) in this scenario because slotting allowances serves to enhance distribution coverage. A corollary prediction is that manufacturers need to mitigate retail competition to induce retail participation only when the market potential is low. As market potential increases, retailers will participate despite retail competition and the likelihood of slotting allowances should fall.

Thus, a test of this rationale has two components: the likelihood of slotting allowances should increase as (1) the number of competing stores that have accepted the product increases and (2) as the market potential decreases.⁷

Another plausible argument is that when a competing retailer accepts the new product, it can be informative to the focal retailer that the new product is likely to be successful and therefore the need for slotting allowances as a signal is reduced (the “information provision” hypothesis). If this hypothesis were true, we would expect a negative relationship between slotting allowances and number of competing stores.

B. Anti-Competitive Rationales

B1. Retailers seek to Mitigate Retail Competition to Increase Retail Profits

⁷ As the number of competing stores that have accepted the product increases, the effectiveness of slotting allowances to mitigate retail competition through higher retailer prices may fall. Hence there may be an inverted U-shaped relationship between probability of slotting allowances and number of competing stores who have accepted the product. We thank an anonymous JMR reviewer for suggesting that we consider this possibility.

Shaffer (1991) argued that slotting allowances are a facilitating practice by which retailers seek to collude and 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 prediction, Bloom et al. (2000) estimate the correlation between slotting allowances and retail prices to test the "mitigation of retail competition" rationale. They find that both manufacturers and retailers agree that slotting allowances raise retail prices and conclude this to be support for the anti-competitive "retail competition mitigation rationale." However, this is not sufficient evidence for Shaffer's mitigation of retail competition rationale, because almost all equilibrium models of slotting allowances (including the signaling models of Lariviere and Padmanabhan 1997 and Desai 2000) predict that slotting allowances are accompanied by higher retail prices. Further, as discussed in A4, manufacturers may also seek to mitigate retail competition in order to enhance retailer participation. In short, there is no empirical evidence for or against Shaffer's anti-competitive rationale in the extant literature.

In contrast to Desai (2000) where 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.⁸ In both Desai (2000) and Shaffer (1991), the probability of slotting allowances should increase when a competing store accepts the product in order to mitigate retail competition. But the key distinction lies in the relationship between slotting allowances and market potential. The relationship between market potential and slotting allowances is not explicitly derived in Shaffer's model. Hence, we develop a simple model that is similar in spirit to Shaffer's model in that retailer sets the terms of trade, but where slotting allowances are linked to market potential. This model is shown in the Appendix and 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 A4, when the manufacturer sets the terms of trade.

⁸ The model in Shaffer (1991) is formulated such that the manufacturer sets the terms of trade, but the manufacturers are in a perfectly competitive market and therefore have limited power to set the terms of trade. That model can be recast easily such that the retailer sets the terms of the trade. In this 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 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.

Thus, a test of this rationale has two components: the likelihood of slotting allowances should increase as (1) the number of competing stores that have accepted the product increases and (2) as the market potential increases.

B2. Exercise of Retail Power

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

Chu (1992) argues that retailer power is a primary reason for slotting allowances. He develops a screening model by which retailers charge slotting allowances and extract all of the manufacturer's profits due to its power. This implies that as the market potential for the product increases, the powerful retailer will increase slotting allowances. Bloom et al. find that manufacturers believe that this is a primary reason for the increased use of slotting allowances; retailers rate it much lower but still believe it has an important impact. Rao and Mahi (2003) also find support for the retail power argument. Nevertheless, Messinger and Narasimhan (1995) and Farris and Ailawadi (1992) find little evidence that power has shifted in the grocery channel based on their empirical analysis of retailer profitability over time.

Chu's model can be empirically tested by estimating the relationship between probability of slotting allowances and the retailers' perception of the market potential for the product. Chu predicts a positive relationship; i.e., as market potential increases, the likelihood of slotting allowances should increase.

Insert Table 1 here

3. Data and Operationalization of the Empirical Tests

Data

We use data on *all new product offers* by manufacturers to a large supermarket chain⁹ over a six-month period from June 1986 to February 1987. Since we have data on all new

⁹ The supermarket chain has approximately 100 stores and covers a large trading area in the northeastern United States. The headquarters' region of this chain is frequently used by manufacturers for test marketing, because of its

product offers, we do not have any endogenous selection problems associated with using data on only accepted products.

We have two types of primary data from the retail chain: (a) 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), the acceptance/rejection decision of the retailer and (b) a one-page questionnaire completed by the retail buyer assessing his/her judgments of product/manufacture attributes (e.g., extent of shelf space needed for the product, likelihood of product success based on past experience with manufacturer/industry reputation). It is important to note that we do not have data on the magnitude of slotting allowance; we only know whether slotting allowances are provided or not with a particular product offer. We also have information on which of these offered products are accepted by the retailer. We supplement these data with information on manufacturer revenues in 1987 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 dataset is well represented in this directory.

Descriptive Analysis

During the six-month period of data collection, 2186 products were introduced by manufacturers and considered by the retail buyers of the supermarket chain. Of these, only 1021 observations were usable due to missing data problems. We employed statistical tests based on differences between means and frequencies (two sample t-tests and χ^2 tests) on each of the variables between the total sample of 2186 products and the sub-sample of 1021 products and concluded that the selected sub-sample is not systematically different from the population of 2186 products.

The 1021 products covered 21 different categories. 143 products (14%) received slotting allowances. The three largest categories in terms of product introductions were (1) frozen foods, (2) canned products such as fruits, vegetables, juice and drinks and (3) dairy and refrigerated foods. Ignoring categories with small number of product introductions, the frequency of slotting

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 applies to one company, we believe the representativeness of the retailer permits us to cautiously generalize to other large regional retailers.

allowances was particularly high in canned products such as fruits, vegetables, juice and drinks (24%), household supplies (20%) and health and beauty aids (20%).

Table 2 shows the means for a number of variables that we study classified on the basis of whether slotting allowances were offered or not. The averages show some preliminary support for the hypotheses of opportunity cost and retail competition mitigation 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 the products are accepted by the retailer (30% of products with slotting allowances versus and 32% without slotting allowances).

Insert Table 2 here

We divide firms introducing products into large and small manufacturers to study differences in slotting allowance offers between the two groups. We used a cut off of \$1 billion in 1987 revenues classify firms into large versus small firms.¹⁰ There were 32 large manufacturers and they introduced 308 of the 1021 products that we have in our data. We also tested the robustness of our results with cutoffs ranging from \$800 million to \$1.2 billion.

It is important to recognize that the retailer does not provide high ratings to even well-known large manufacturers for all products they introduce. Similarly small manufacturers do not necessarily get low ratings. The range of ratings (on a 1-10 scale, where 1 is low and 10 is high) for products from an illustrative sample of large manufacturers is: Del Monte: 4-7; General Foods: 2-7; Kraft: 4-8; Proctor and Gamble: 3-7 and Quaker Oats: 4-8. Seneca Foods, a small regional manufacturer, gets relatively high ratings (5-7) for the three products it introduced.

Operationalization of the Empirical Tests

We employ 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 (A1, A2, A3, A4, B1, and B2). The predictor variables used for the tests are summarized in Table 3. We explain our reasoning behind these operationalizations below:

Insert Table 3 Here

A1. Efficient Allocation of Scarce Shelf Space

¹⁰ The large manufacturers based on this classification are: A.M. Cynamid, Beatrice, Borden, Campbell, Carnation, Castle & Cooke, Clorox, Coca Cola, Colgate-Palmolive, Dannon, Del Monte, General Foods, General Mills, Geo. A. Hormel, H.J. Heinz, Hershey, James River Corporation, Kellogg's, Kraft, Land O' Lakes, Lever Brothers, Lipton, M&M/Mars, McCormick, Nabisco, Nestle Foods, Pillsbury, Procter & Gamble, Quaker Oats, Ralston Purina, Scott Paper, Tyson Foods.

The two proxy measures for opportunity cost of shelf space are: (i) the presence/absence of private labels in the category, because the higher margins for private labels in the category can increase the opportunity costs¹¹ and (ii) buyer's rating of shelf space (on a 1-10 scale) needed for the product. The buyer's rating of shelf space takes into account the constraints faced by the retailer in the category and therefore serves as a category independent measure.

A2. Balance New Product Failure Risk between Manufacturer and Retailer

We use the retailer's rating of the manufacturer in launching a successful product in the category based on either the *retailer's past experience with the manufacturer, general industry reputation or both* as a measure of new product risk measured on a 1-10 (high) scale.

We use "Rating" and "Rating²" as explanatory variables in the logistic regression to test for the inverted U-shaped relationship between the probability of slotting allowances and ratings, as discussed earlier. Further (for reasons discussed earlier), the inverted U relationship between slotting allowance probability and ratings should peak at a higher rating for small manufacturers compared to large manufacturers. To test this, we include the variables "Large" and "Large×Rating" in the logistic regression in addition to "Rating" and "Rating²". We have no specific hypothesis about the coefficient on "Large" (i.e., whether larger manufacturers would offer slotting allowances with greater probability). But "Large×Rating" should have a negative coefficient, if the peak of the U-shaped curve for small manufacturers is shifted to the right of large manufacturers.

A3. Signaling Manufacturers' Private Information about New Product Success to Retailer

A3a: Test Markets as Complements to Slotting Allowances to Communicate Private Information

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 (1) Test Market and (2) Test Market×Rating variables is positive in the regression, then we infer that slotting allowances serves as a signal for small

¹¹ We follow previous research by Bloom et al (2000) and Wilkie et al. (2002) in using private labels as a proxy for opportunity cost. However, private labels can also give greater bargaining power to the retailer, relative to manufacturers. This suggests that this may be due to retailer power. Other tests of retailer power show little evidence for the retailer power argument, so we interpret this result as supportive of the opportunity cost hypothesis.

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 serves as a signal for large manufacturers at that level of rating.

A3b: Advertising as a Substitute Signal for Slotting Allowances

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 indicating if the manufacturers offers to advertise for the product.¹² If the net effect of (1) Advertising and (2) Advertising×Rating variables are negative (positive) at a given level of rating, then 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.

A4. Manufacturers seek to Mitigate Retail Competition to Enhance Retailer Participation

We treat whether a competing store has accepted the product as a proxy for retail competition and the rating of the vendors as a measure of market potential, since rating is related to the likelihood of success for the product. As explained earlier, the relationship between slotting allowances and potential in the presence of retail competition depends on whether manufacturers or retailers set the terms of trade. This can be different for small versus large manufacturers. 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 an indicator variable indicating if a competing retailer has also accepted the product.¹³ If the net effect of (1) Competing Stores and

¹² In an earlier version of the paper, we have shown that our results are robust to whether we use the actual 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 only report results with the indicator variable in this version for the sake of brevity.

¹³ 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 an inverted U shaped relationship between slotting allowances and competing stores that we had hypothesized.

(2) Competing Stores×Rating variables are 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) at a given level of rating, 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).

B1. Retailers seek to Mitigate Retail Competition to Increase Retail Profits

See discussion in A4.

B2. Exercise of Retail Power

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 probability of slotting allowances increase with ratings.

4. Results of Tests of Rationales

We report the results of logistic regressions with presence/absence of slotting allowances as the dependent variable and the appropriate variables of interest for each rationale as the explanatory variables in Table 4. The first set of columns with headings 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 same as A4 and the test for B2 is the same as in A2a and A2b. In the column "All", we report the results of the regression with all of the variables simultaneously included. Since the correlations between the different variables are fairly small, we do not expect the coefficients in the separate regressions to differ much from the simultaneous regression. To account for any category-level differences, we also report the results of a regression with all of the variables in "All", but also includes category level fixed effects. Including the category level fixed effects increased R^2 from 0.19 to 0.27, but the coefficients across the two regressions are similar. We explain the few differences in our discussions below.

Since ratings of manufacturers are provided by the retail buyers at the same time when they have observed other characteristics associated with the product (whether test market results are shown, advertising is promised and whether competing retailers have accepted), it is possible that the ratings are endogenously determined by these other variables. In the column, “All - Endo Adj. Rating”, we include an endogeneity adjusted rating measure in the regression to test the robustness of our conclusions.

Insert Table 4 here

A. Efficiency Enhancing Rationales

A1. Efficient Allocation of Scarce Shelf Space

We find that opportunity cost of shelf space is significant at the 10% level, and private label is significant at the 1% level (Table 4, Column 1). When all of 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 three-fold, suggesting that shelf space constraints vary by category and 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 private labels varies by category and therefore category level fixed effects absorb the effect of variation in private labels on slotting allowances. Overall, we conclude that the opportunity cost of shelf-space and presence of private labels in a category are drivers of slotting allowances in contrast to the findings of Bloom et al. (2000) discussed earlier.

A2. Balance New Product Failure Risk between Manufacturer and Retailer

The positive coefficient on Rating and the negative coefficient on Rating² in Column A2a of Table 4 provide evidence in favor of the inverted-U shaped relationship predicted for the risk balancing rationale. The results continue to be similar even when we include all variables as well as when we include category level fixed effects. Figure 1a illustrates the inverted U-shaped curve graphically using the results from “All” column.¹⁴ The inverted U shaped curve for the

¹⁴ 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. The values of the variables that are not included in the graph are maintained at their average values, when creating the graphs.

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.

We find significant difference between large and small manufacturers in the probabilities of offering slotting allowances (Column A2b). As predicted, the negative coefficient for Large×Rating, indicates that the peak of the inverted U shaped curve for small firms is to the right of large firms.¹⁵ Figure 1b based on the “All” Column is more revealing. 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 greater perceived risk of small manufacturers as well as their greater risk aversion to offer slotting allowances at low ratings, thus providing evidence consistent with the risk-balancing explanation.

Insert Figure 1 here

A3. Signaling Manufacturers’ Private Information about New Product Success to Retailer

Test Market Results: The estimates of Test Market and Test Market×Rating (Column A3a) indicate that the provision of test market information increases the probability of observing slotting allowances for small manufacturers when their ratings are over 4. The results are similar in the “All” variable regression. Thus, slotting allowances serve to complement test markets rather than serve as substitutes, providing support for the signaling theory.

A graphical representation of these results shown in Figure 2 indicates that the net effect of test markets on observing slotting allowances is negative for ratings over 5 for larger firms, while being clearly positive for 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 complement test markets with slotting allowances. However, at high levels of credibility (manufacturer rating > 5), large firms substitute test markets for slotting allowances because there is not much of a need to signal.

In contrast, the net effect of test markets on slotting allowances for small firms 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 as credible even at high levels of ratings, and therefore small firms use slotting allowances as a signal even at high levels of ratings.

Insert Figure 2 here

¹⁵ 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.

Thus, our results serve to reconcile the conventional wisdom that slotting allowances are a price paid for not doing one's own market research, versus the theory that slotting allowances serve to signal private information. Only when the market research information is deemed credible by retailers (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: The estimates for Advertising and Advertising×Rating (Column A3b) indicate that advertising decreases the probability of offering slotting allowances for small manufacturers as long as their ratings are high (above 7). The results are similar based on estimates in the “All” column. Thus, advertising and slotting allowances are substitutes for small firms only when the ratings are high. Hence, our results are consistent with the signaling rationale only at very high levels of ratings for small manufacturers.

In contrast to smaller firms, larger firms substitute slotting allowances for advertising at low levels of ratings (see Figure 3). Thus, large firms use advertising as an alternative to slotting allowances consistent with the signaling theory prediction in Desai (2000). At higher ratings (> 6) however, advertising and slotting allowances serve to be complements, but the complementarity effect is very small and not significant. This result is consistent with our test market results in that at high levels of ratings, large firms do not need to use slotting allowances or advertising as a signal. Advertising if any is used to build demand, rather than to signal high demand and therefore advertising and slotting allowances are no longer substitutes.

Insert Figure 3 here

Why is 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 for this. One is that low ratings for the small manufacturer for this product may be correlated with low advertising effectiveness. Hence as per Desai (2000), advertising and slotting allowances will not be effective substitutes as a signal. Another reason is due to 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 pointed by Desai and Srinivasan (1995), signaling distortions will be lower and therefore signaling will be harder to detect. The fact that we find evidence for signaling if only at high ratings, even in the presence of moral hazard problems by small manufacturers is particularly gratifying, given the theoretical arguments in

Desai and Srinivasan (1995). In summary, our results are consistent with the predictions from the signaling theory that advertising and slotting allowances will be substitutes when advertising effectiveness is high.

A4. Manufacturers seek to Mitigate Retail Competition to Enhance Retailer Participation

We report the retail competition results in Column A4. The estimates are similar to the “All” column where we simultaneously control for the effects of the other variables. Figure 4 shows the 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.

Insert Figure 4 here

Figure 4 shows that the probability of slotting allowances is greater in the presence of retail competition for both large and small retailers. These results support the “mitigation of retail competition” hypothesis as opposed to the “information provision” hypothesis.

Having found support for the “mitigation of the retail competition” hypothesis, we now test whether there is support for the pro-competitive “retailer participation” rationale (A4) or the anti-competitive “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 Figure 4, 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).¹⁶

B. Anti-Competitive Rationales

B1. Retailers seek to Mitigate Retail Competition and Increase Retail Profits

See Discussion in A4.

B2. Exercise of Retail Power

Our finding in Figure 1 that the probability of offering slotting allowances falls at high levels of rating even for small manufacturers, suggests that our results are not consistent with the retail power explanation (Chu 1992).

¹⁶ 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 who have accepted the product. We did not find evidence for an inverted-U relationship.

As 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. We find support for the opportunity cost of shelf space argument (with the shelf space variable), but not for the retailer power argument (Figure 1). Hence we will interpret the positive relationship between slotting allowances and private labels as support for the opportunity cost hypothesis. Further research is required to conclusively address this issue.

Though the “exercise of retailer power” is inconsistent with data from this particular retailer, we still view the conclusion about retailer power as preliminary. To conclusively rule out the hypothesis of retailer power, we need to perform this analysis with data from a cross-section of retailers with different characteristics (relating to power, such as market share), making sure that there is no confounding between 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, both of which could lead to slotting allowances.

Robustness Check and Validation

Robustness Check: Endogeneity of Manufacturer Ratings

Our empirical analysis has focused on how the likelihood of offering slotting allowances changes with the retailer’s ratings of small and large manufacturers in the presence of test market information, advertising and competing stores. The retailer’s rating of likelihood of success of the new product is based on experience with the manufacturer and industry reputation. Therefore, we assumed that ratings are independent of the characteristics of the transaction in question (i.e., whether test market results are shown, promises about advertising, acceptance by competing stores). Nevertheless, because buyers rated the manufacturer after the terms of trade are revealed, it is possible that the terms of trade affect manufacturer ratings.

Table 5 reports the regression results of ratings against terms of trade variables. We find an interesting difference between small and large manufacturers. Test markets, advertising and competing store 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 their industry reputations are relatively strong, suggesting that the effect of the current transaction’s trade terms on ratings are minimal. In contrast, the retailer’s experience is likely to be lower with small manufacturers on

average and their industry reputations are not as well defined. Hence, from a Bayesian updating perspective it makes sense that current transaction's trade terms affect the ratings provided by small manufacturers to a larger extent.

Insert Table 5 here

We therefore check if the results change if we work with retailer's *a priori* ratings of the manufacturers rather than the posterior ratings after the terms of trade are revealed to the retailer. We compute the *a priori* ratings without the terms of trade as follows: $A \text{ priori Rating} = \text{Actual Rating} - \beta X$, where X is the set of variables relating to the terms of trade for each offer in the regression in Table 5 (i.e., excludes "Intercept" and "Large") and β are the estimated coefficients. The results using these *a priori* ratings are reported in the column "All-Endo. Adj. Rating" of Table 4. The coefficients are fairly similar and the qualitative results are identical to the earlier results.

Which of the theoretical models is most consistent with the data?

Thus far, we have evaluated empirical support for the implications of alternative models. We now examine the support for the underlying model structure of the various theories in order to evaluate the modeling assumptions that are most consistent with the data.

Model Structure

A key difference in the structure among the game theoretic models of slotting allowances is in the way they operationalize the balance of power between manufacturers and retailers in terms of *who moves first* in the model. Chu (1992)'s screening model assumes that the retailer has power and first sets the terms of trade. Shaffer (1991)'s model assumes that manufacturers are in a perfectly competitive market and the power if any rests with the retailers who are interested in mitigating retailer competition. Since manufacturers are perfectly competitive, Shaffer's model does not predict a relationship between slotting allowance offers and product potential. To address this issue, we developed a model similar in spirit to Shaffer (in terms of (i) objective of mitigating retail competition; (ii) retailer sets terms of trade), but where slotting allowances vary with a product's potential. The essential conclusion is that when the retailer has the power to set the terms of trade, slotting allowances increases with product potential because the retailer seeks to extract the entire available surplus from the manufacturers.

In contrast to the above papers, Lariviere and Padmanabhan (1997) and Desai (2000) assume that manufacturers move first and set the terms of trade. In these papers the opportunity cost of shelf space is a critical element without which slotting allowances will not arise in equilibrium. The key idea in both these papers is that slotting allowances can arise due to the private information available to manufacturers about the success of the product and the manufacturers' interest in "signaling" that information to the retailer. Desai (2000) also shows that signaling of private information is not necessary for slotting allowances to occur. When expected profits for retailers fall due to retail competition, slotting allowances can be used to reduce retail competition and induce retailers to participate.

We summarize relevant characteristics of the different theoretical models for our purpose and the nature of the empirical support for the different models (rather than the rationales that we had discussed earlier) in Table 6.

*** Insert Table 6 Here***

Empirical Evidence

As discussed earlier, we find that the likelihood of slotting allowances can decrease as the retailer ratings of new product success increases. This negates the possibility that the retailer uses its power to extract as much slotting allowances as possible from manufacturers. The finding that this is true for even small manufacturers suggests that the retailer power story is not a reasonable explanation for the use of slotting allowances. We therefore conclude that there is no support for the underlying model structure of retailer as the first mover (Chu 1992; Shaffer 1991; this paper).

We find support for the opportunity cost prediction – a critical ingredient in the models of Lariviere and Padmanabhan (1997) and Desai (2000).¹⁷ 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).

Thus we find support for multiple predictions in Desai (2000) suggesting that his theoretical framework may be the most plausible in explaining our data. Since Desai (2000)

¹⁷ In contrast to Lariviere and Padmanabhan (1997) and Desai (2000) who treat 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 consumer's value for variety and the manufacturer's incentives for new products and slotting allowances is an equilibrium outcome of this scarce shelf space. Given the cross-sectional nature of our data, we cannot test for Sullivan's specific theory about how opportunity costs arise endogenously, but our result could be consistent with her theory.

nesses the modeling structure of Lariviere and Padmanabhan (1997) with respect to opportunity cost and manufacturer signaling, our results are also consistent with the Lariviere and Padmanabhan model.

5. Analysis of the Retailer Product Acceptance Decision

The role of slotting allowances is to increase the chances of new product acceptance by the retailer. We use retailer acceptance data to address the following questions: (1) Do slotting allowances help 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?¹⁸

To address these questions we perform a logistic regression with retailer acceptance as the dependent variable on the same set of products we studied earlier. The results are reported in Table 7. In Column (1), we directly enter slotting allowance (dummy variable) into the regression along with the other variables that we considered in the empirical tests of rationales. We find that offer of slotting allowances 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 role of slotting allowances in improving 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 continue to be similar in that slotting allowances have a negative effect on retailer acceptance until the retailer ratings are fairly high. This negative effect of slotting allowances is also reported in Rao and McLaughlin (1989), who suggest that this is possibly due to unobserved negative characteristics of products for which slotting allowances are offered, i.e., there is an endogeneity problem.

*** Insert Table 7 Here***

To obtain the true effect of slotting allowances, we need to correct for the endogeneity bias. 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

¹⁸ We thank a reviewer for encouraging us to perform this analysis.

variables capturing the need to offer slotting allowances (y_1^*) and attractiveness of the product, that determines retailer acceptance (y_2^*). Now suppose $y_1^* = X_1\beta_1 + \varepsilon_1$ and $y_2^* = \gamma y_1 + X_2\beta_2 + \varepsilon_2$. Maddala (1983, p. 122-123) and Maddala and Lee (1976) suggest the following two-stage logit procedure (2SLS logit) to obtain consistent estimates of γ and β_2 .

This 2SLS logit procedure involves two steps: First, estimate the logit model for slotting allowances as in Table 4. 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 4 and then estimate the logit model of retailer product acceptance. Since we use the endogeneity adjusted measure of retailer rating for product, we use the estimates of “Endogeneity Adjusted Rating” column in Table 4 to compute Prob (Slotting Allowance=1).

The estimates are reported in the last column of Table 7. Now 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); further the interaction coefficient for Slot \times 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 larger and smaller manufacturers is that slotting allowances offered by smaller manufacturers have greater credibility than those offered by larger manufacturers at low ratings due to their greater risk aversion.

The positive coefficient for “Large” demonstrates that large manufacturers’ products are accepted at a higher rate controlling for rating. This cross-validates the argument that we made earlier that the retailer also perceives greater risk from small manufacturers.

We continue to find that products with competing 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 however is positive, which is not as expected given the opportunity cost argument. It is plausible 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 retailers. Thus retailers like products with greater advertising support. The presence of competing stores has differential effects on large and small manufacturers. Consistent with the negative impact of the retail competition effect, we find a negative effect for large manufacturers. 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. While we do not have an explanation for the unexpected negative effect of test markets on product acceptance for small manufacturers, it may be due to the lack of credibility of such information from small manufacturers.

Overall the analysis of retailer's acceptance decisions suggests that there is both a direct effect of opportunity cost, advertising and competing stores on retailer acceptance decisions, in addition to their indirect effect through slotting allowances. Further, we find that acceptance by competing stores provides a positive information value to retailers for products from small manufacturers, but the negative effect of competition is dominant for large manufacturers.

5. Conclusions and Future Research Directions

This paper provides the first empirical investigation of multiple rationales presented in the literature for the use of slotting allowances in new product introductions. For this purpose, we use a unique dataset that consists of all new products that were offered to a retailer during a period of 6 months (some of which had slotting allowances and others that did not). Our empirical analysis suggests that slotting allowances are efficiency-enhancing and not anti-competitive. Specifically, we conclude that:

- (1) Slotting allowances serve to efficiently allocate scarce retail shelf space.
- (2) Slotting allowances help to balance risk by shifting the downstream risk of retailers towards manufacturers.
- (3) Slotting allowances are offered in a manner consistent with predictions of signaling theories.
- (4) Though slotting allowances serve to mitigate retail competition, the impetus is not anti-competitive, but to enhance *retail distribution*.

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

Implications for Practitioners¹⁹

Our study offers useful insights for manufacturers and retailers. In general, it suggests that both large and small manufacturers should train their sales forces to communicate credibly and effectively the success potential of their products to retailers in order to reduce the need to offer slotting allowances. Our results suggests that there is little danger that the retailer will ask for more slotting allowances upon realizing the success potential of the product.

Our results show that small manufacturers have greater marginal impact for more favorable evaluations by offering information about test markets and committing to greater advertising (if indeed it is likely to be effective), because the retailer has less experience/knowledge about these vendors relative to larger manufacturers. Also as seen in the retailer product acceptance regression results as well as with the rating regression, small manufacturers will find it particularly effective to provide likely evidence of marketplace success. One approach would be to first introduce the product at smaller retailers that have lower profitability thresholds than larger chains. If indeed the product becomes successful at these smaller retailers, this can help the manufacturer persuade the retailer to accept the product.²⁰

Small manufacturers who do not operate on the same scale as large manufacturers often complain that their products do not get the same attention as larger manufacturer's products and they are unable to afford slotting allowances. Our results about opportunity costs and retailer participation suggest a possible solution to this problem. Retailers, who consider their shelf-space as valuable real estate, need to evaluate product success information provided by small manufacturers and consider offering localized product assortments. This will reduce their opportunity cost thresholds for participation, and make the shelf space allocation more efficient

¹⁹ 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 to be overwhelmingly negative about our conclusion that slotting allowances have efficiency-enhancing aspects, and indicated that they perceived the system of slotting allowances to be structurally unfair to small manufacturers with fewer resources. The trade press and consultants were more balanced (though tilted to the negative). Not surprisingly, retailers tended to be positive. This section is inspired by comments we received and our responses to them.

²⁰ Some practitioners mentioned that this possibility is increasingly becoming difficult for small manufacturers with the waves of mergers in the supermarket and drugstore format, as regional chains increasingly disappear. The currently existing smaller retailers tend to be greater credit risks and therefore small manufacturers tend to avoid them. Also it is extremely costly for sales forces to deal with the very small remaining independents and thus puts small manufacturers at a disadvantage.

on a store-by-store basis. This approach would be particularly helpful when dealing with smaller manufacturers who typically offer products that tend to cater to more localized tastes and who currently feel shut out of supermarkets because of the high threshold of profitability that a large supermarket chain may enforce if it only will be stocked at all of their stores. Retailers need to consider modifying their systems to be flexible in accepting products based on potential for localized success.

Finally, small manufacturers who are initially seeking a foothold in a market should 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 require to be carefully controlled.

Second, the role of slotting allowances is quite different for large versus small manufacturers. Extant opinion-based survey research does not make this distinction. Our results show that due to the disproportionate number of small manufacturers in any sample, the average results reported in prior studies will be weighted towards the effects of small manufacturers. Their impact on the econometric results is disproportionate relative to their economic impact. The several cross-over interaction effects we discover for large and small manufacturers over high and low values of manufacturer ratings (see Figures 1-4), clearly demonstrates the importance of using size and interactions in the empirical analysis of slotting allowances.

Limitations and Future Research

Admittedly, we analyze 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. It is quite possible that behavior of retailers (national level retailers or smaller independent grocery stores) would differ depending on their strengths and therefore this would require further study.

Another important caveat is that the data are from the period 1986-87. It is a fact that the intensity of slotting allowances has been rising over the last 15 years. It would require newer

data to investigate whether these rationales continue to hold. In that sense, our study provides a historical snapshot. However, we note that many of these rationales are not entirely new and are discussed in many articles in the trade press during the early nineties.

Small manufacturers often complain that larger manufacturers use slotting allowances to exclude them from markets. Farrell (2001) formalizes the argument. Essentially, a dominant large manufacturer with an exclusive position at one competing retailer has a greater incentive to reduce competition in wholesale prices at the second retailer also because its losses from competition on wholesale prices will also include its sales at the first retailer. The large dominant manufacturer will therefore pay more slotting allowances to monopolize shelf space, compared to the small manufacturer. While most observers believe that exclusive dealing is rare in grocery markets, a comprehensive analysis of whether large manufacturers pursue exclusion strategies should be investigated in 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 provide additional insights and refinements on the evidence for alternative rationales we find in this paper.

Another issue of interest is how retailer's ratings of products correlate with market success of the product. We have currently used retail buyer's *a priori* ratings of a product's success as the basis of uncertainty about a product's success. It would be very useful to see how retailer ratings correlated with product success in the market. For instance, are small manufacturers systematically under-rated relative to their actual performance in the market?

In conclusion, our study provides the first systematic empirical approach to test alternative rationales for the use of slotting allowances. While our analysis permits us to conclude that efficiency rationales are more at work than anti-competitive rationales, research using more recent data from a larger sample of retailers is needed before this is conclusively accepted. Nevertheless, our findings supporting the efficiency enhancing aspects of slotting allowances show that the FTC was perhaps correct in its reluctance to ban the practice of slotting allowances in the grocery sector, without additional empirical evidence about the anti-competitive effects.

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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 to the manufacturers, i.e., they set both wholesale prices and slotting allowances (w_j, S_j) to the manufacturer. 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).

Table 1: Summary of Rationales and Extant Empirical Findings

| Rationale | Logic and Source of Rationale | Empirical Findings |
|--|--|--|
| A. Efficiency-Enhancing | | |
| A1. Help retailers to efficiently allocate shelf space | Slotting allowances serves as a pricing scheme to ration out the scarce resource. (Sullivan 1997, Lariviere and Padmanabhan 1997, Desai 2000) | Yes: Wilkie et al. (2002), Bloom et al. (2000) using surveys of manufacturers and retailers and Sullivan (1997) using time-series data find that new product proliferation (which creates shelf space scarcity) is a reason for slotting allowances. No: Bloom et al. (2000) find no support for opportunity cost rationale in retailer surveys. Wilkie et al. (2002) find no support for the private label rationale in manufacturer and retailer surveys. |
| A2. Balance risk between manufacturer and retailer | Due to the high risk of new product failure, retailer bears disproportionate risk. Slotting allowance insures retailer against the failure of accepted product. | Yes: Bloom et al. (2000) find support among both manufacturers and retailers. No: None. |
| A3. Manufacturers Signal private information to retailer | Slotting allowances serve to communicate manufacturer's private information about potential success to the retailer. (Lariviere and Padmanabhan 1997, Desai 2000). | Yes: None. No: Bloom et al. (2000) and Rao and Mahi (2003) find no support among either manufacturers or retailers for this rationale. |
| A4. Manufacturers Mitigate Retail Competition to Enhance Retailer Participation | Retail competition can reduce profits to a level that may not help them to recover the opportunity costs. Manufacturers offer slotting allowances and higher wholesale prices, to reduce retailer competition, enabling the retailer to participate. (Desai 2000). | Yes: None No: None |
| B. Anti-competitive | | |
| B1. Retailers demand slotting allowances in order to mitigate retail competition | 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, test a prediction which is not unique to this argument. See discussion in text. |
| B2. Exercise of retail power | Increased retail power enables retailers to extract slotting allowances from manufacturers. (Chu, 1992) | Yes: Bloom et al. (2000) and Rao and Mahi (2003) find that manufacturers believe that this is true. Note: Some questions about the premise of increased retail power (Messinger and Narasimhan 1995; Farris and Ailawadi 1992). |

Table 2: Means by Slotting Allowance

| | Slotting Allowance | |
|---------------------------|--------------------|-------------|
| | Offered | Not Offered |
| Shelf Space | 5.22 | 4.99 |
| Private Label (Y/N) | 0.85 | 0.75 |
| Manufacturer's Reputation | | |
| Rating | 5.67 | 5.77 |
| Test Market (Y/N) | 0.35 | 0.17 |
| Advertising (Y/N) | 0.23 | 0.18 |
| Competing Stores (Y/N) | 0.52 | 0.33 |
| Large Manufacturers (%) | 83 | 17 |
| Small Manufacturers (%) | 87 | 13 |
| Retailer Acceptance (%) | 30 | 32 |

Table 3: Operationalization of the Empirical Tests

| Rationale | Construct | Operationalization |
|---|--|---|
| A1: Efficient Allocation of Scarce Shelf Space | Opportunity cost of shelf space | (i) the presence/absence of private labels in the category (ii) buyer's rating of shelf space (on a 1-10 scale) needed for the product |
| A2: Balance New Product Failure Risk | New product risk | (i) Retailer's rating of the manufacturer's reputation (ii) Square of the rating |
| | Differential Risk between large and small manufacturers | (iii) Size of the manufacturer (iv) Interaction between size and rating |
| A3a: Communicate Manufacturers' Private Information: Test Markets as Complements to Slotting Allowances | Test market | (i) Provision of test market results (dummy) |
| | Credibility of Test Markets | (ii) Size of the manufacturer (iii) Interaction of test market and size (iv) Interaction of test market, size and rating |
| A3b: Communicate Manufacturers' Private Information: Advertising as a substitute Signal for Slotting Allowances | Advertising | (i) Advertising support for the new product (dummy) |
| | Effectiveness of Advertising | (ii) Size of the manufacturer (iii) Interaction of advertising and size (iv) Interaction of advertising, size and rating |
| A4: Manufacturers Mitigate Retail Competition to Enhance Retailer Participation | Retail competition | (i) Whether competing stores stock the new product (dummy) or number of competing stores |
| | Factors moderating the need to mitigate retail competition | (ii) Size of the manufacturer (iii) Interaction of competing stores and size (iv) Interaction of competing stores, size and rating |
| B1: Retailers demand slotting allowances in order to mitigate retail competition | Same as A4 | |
| B2: Exercise of Retail Power | Market Potential | (i) Retailer's rating of the manufacturer's reputation (ii) Square of the rating |
| | Differential Power between large and small manufacturers | (iii) Size of the manufacturer (iv) Interaction between size and rating |

Table 4: Results
 (***: p < 0.01; ** p < 0.05; * p < 0.1)

| | A1 | A2a | A2b | A3a | A3b | A4 | All | All-Cat Fixed Eff | All- Endo. Adj.Rating |
|-----------------------------------|--------------------|--------------------|---------------------|---------------------|---------------------|--------------------|---------------------|----------------------|--------------------------|
| Variable | Estimate (s.e.) | Estimate (s.e.) | Estimate (s.e.) | Estimate (s.e.) | Estimate (s.e.) | Estimate (s.e.) | Estimate (s.e.) | Estimate (s.e.) | Estimate (s.e.) |
| Intercept | -2.70*** (0.35) | -8.22*** (1.65) | -10.17*** (1.82) | -10.92*** (1.93) | -10.61*** (1.99) | -9.85*** (1.83) | -13.56*** (2.39) | -13.78*** (2.55) | -13.91*** (2.45) |
| Shelf Space | 0.07* (0.04) | | | | | | 0.10* (0.06) | 0.22*** (0.10) | 0.11* (0.06) |
| Competing Private Label | 0.63*** (0.25) | | | | | | 0.45* (0.27) | 0.04 (0.30) | 0.45* (0.27) |
| Manufacturer Rating | | 2.55*** (0.60) | 3.01*** (0.63) | 3.49*** (0.69) | 2.97*** (0.67) | 3.07*** (0.65) | 4.13*** (0.86) | 4.18*** (0.90) | 4.15*** (0.87) |
| Manufacturer Rating ² | | -0.24*** (0.05) | -0.26*** (0.05) | -0.33*** (0.06) | -0.24*** (0.06) | -0.29*** (0.06) | -0.40*** (0.08) | -0.40*** (0.08) | -0.40*** (0.08) |
| Large | | | 4.89*** (1.12) | 3.03*** (1.39) | 7.21*** (1.35) | 2.96** (1.47) | 1.68 (2.65) | 3.67 (2.71) | 2.03 (2.64) |
| Large * Rating | | | -0.79*** (0.19) | -0.37 (0.24) | -1.16*** (0.24) | -0.38 (0.26) | -0.13 (0.46) | -0.44 (0.47) | -0.19 (0.46) |
| Test Market | | | | -2.76* (1.55) | | | -5.28*** (1.73) | -5.63*** (1.91) | -2.64* (1.40) |
| Large * Test Market | | | | 5.69** (2.62) | | | 15.59*** (4.08) | 14.68*** (4.23) | 12.59*** (3.84) |
| Test Market * Rating | | | | 0.73*** (0.26) | | | 1.16*** (0.29) | 1.19*** (0.32) | 1.19*** (0.28) |
| Large * Test Market * Rating | | | | -1.31*** (0.46) | | | -3.03*** (0.72) | -2.91*** (0.74) | -3.03*** (0.72) |
| Advertising | | | | | 6.64*** (1.29) | | 8.55*** (1.87) | 9.72*** (2.16) | 11.26*** (1.92) |
| Large * Advertising | | | | | -11.02*** (2.73) | | -15.78*** (3.37) | -17.03*** (3.69) | -18.53*** (3.54) |
| Advertising * Rating | | | | | -1.04*** (0.30) | | -1.47*** (0.33) | -1.62*** (0.38) | -1.83*** (0.37) |
| Large * Advertising * Rating | | | | | 1.74*** (0.47) | | 2.68*** (0.58) | 2.92*** (0.63) | 3.01*** (0.62) |
| Competing Stores | | | | | | -2.06 (1.36) | -1.79 (1.49) | -1.38 (1.64) | 0.85 (1.28) |
| Large * Competing Stores | | | | | | 4.14* (2.32) | 5.94* (3.31) | 5.21* (3.11) | 3.79 (3.11) |
| Competing Stores * Rating | | | | | | 0.53** (0.24) | 0.47* (0.26) | 0.45* (0.26) | 0.41* (0.24) |
| Large * Competing Stores * Rating | | | | | | -0.84** (0.40) | -1.09* (0.56) | -0.98* (0.59) | -1.06* (0.56) |
| ρ^2 | 0.01 | 0.04 | 0.04 | 0.12 | 0.09 | 0.09 | 0.19 | 0.27 | 0.19 |

Table 5: Effect of Terms of Trade on Manufacturer Reputation

(***: $p < 0.01$; ** $p < 0.05$; * $p < 0.1$)

| Variable | Estimate (s.e.) |
|-----------------------------|--------------------|
| Intercept | 5.27*** (0.07) |
| Large | 0.94*** (0.16) |
| Test Market | 0.46*** (0.16) |
| Advertising Dummy | 0.50*** (0.16) |
| Competing Store Dummy | 0.49*** (0.11) |
| Large * Test Market | -0.57*** (0.24) |
| Large * Advertising | -0.55*** (0.25) |
| Large * Competing Stores | -0.40* (0.21) |
| R^2 | 0.08 |

Table 6: The Model Structure of Different Theories

| | Manufacturers 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; <i>(Not Tested)</i> Lariviere and Padmanabhan (1997), Desai (2000) treat this as exogenous. <i>(Supported)</i> | |
| Slotting Allowance as Signal | Lariviere and Padmanabhan (1997), Desai (2000) <i>(Supported)</i> | |
| Slotting Allowance and Advertising as signaling substitutes | Desai (2000) predicts advertising will be used as a signal when it is effective; slotting allowances will be used when advertising is less effective. <i>(Supported)</i> | |
| Mitigation of Retail Competition | Desai (2000) predicts retailer will use slotting allowance to mitigate retailer competition so as to induce retailer participation <i>(Supported)</i> | Shaffer (1991) This paper Retailers uses slotting allowance to sustain retail collusion <i>(Not Supported)</i> |
| Exercise Retail Power; demand slotting allowances for high demand products | | Chu (1992): Retailers use slotting allowance to screen high demand products and extract manufacturer surplus <i>(Not Supported)</i> |

Table 7: Dependent Variable: Retailer Acceptance
 (***: p < 0.01; **: p < 0.05; * p < 0.1)

| | Slotting Allowance- No Endogeneity Correction | Slotting Allowance- No Endogeneity Correction | Slotting Allowance- Endogeneity Correction |
|----------------------------|--|--|---|
| | Unadjusted Rating | Endogeneity Adjusted Rating | Endogeneity Adjusted Rating |
| Variable | Estimate (s.e.) (1) | Estimate (s.e.) (2) | Estimate (s.e.) (2) |
| Intercept | -4.46*** (0.49) | -4.44*** (0.49) | -4.63*** (0.56) |
| Manufacturer Rating | 0.42*** (0.06) | 0.42*** (0.06) | 0.44*** (0.08) |
| Large | 0.83*** (0.26) | 0.87*** (0.26) | 0.85*** (0.30) |
| Slotting Allowance | -2.61* (1.37) | -2.58*** (1.28) | -2.08 (2.33) |
| Slot * Large | -0.94* (0.49) | -1.23*** (0.51) | -2.89*** (1.25) |
| Slot * Manufacturer Rating | 0.47*** (0.23) | 0.51*** (0.23) | 0.93*** (0.43) |
| Shelf Space | 0.18*** (0.05) | 0.17*** (0.05) | 0.16*** (0.05) |
| Private label | -0.07 (0.05) | -0.07 (0.05) | -0.09* (0.05) |
| Test Market | -0.34 (0.27) | -0.09 (0.26) | -0.79*** (0.36) |
| Large * Test Market | 0.09 (0.41) | -0.22 (0.40) | 0.55 (0.47) |
| GRP Dummy | 0.96*** (0.25) | 1.21*** (0.25) | 1.39*** (0.28) |
| Large * GRP | -0.03 (0.39) | -0.31 (0.39) | -0.54 (0.42) |
| Competing Store Dummy | 0.55*** (0.18) | 0.80*** (0.18) | 0.49*** (0.21) |
| Large * Competing Store | -1.29*** (0.34) | -1.49*** (0.34) | -1.15*** (0.36) |
| ρ^2 | 0.12 | 0.12 | 0.13 |

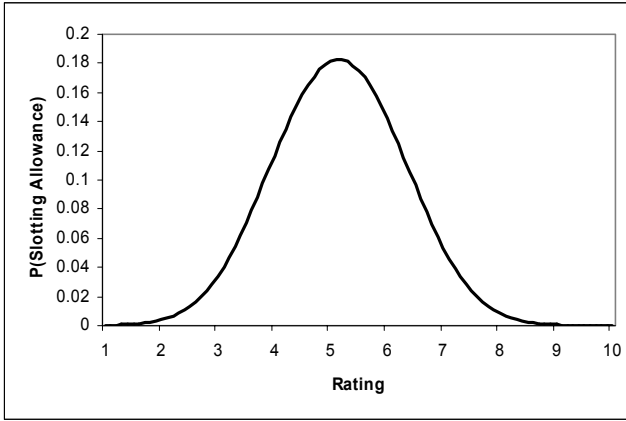


Figure 1a: Risk Balancing

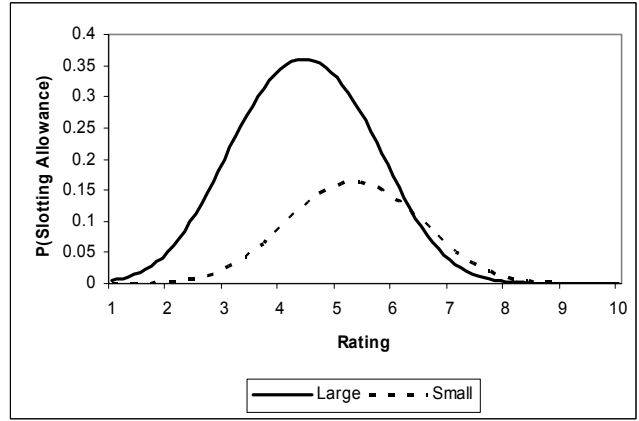


Figure 1b: Risk Balancing: Large Versus Small

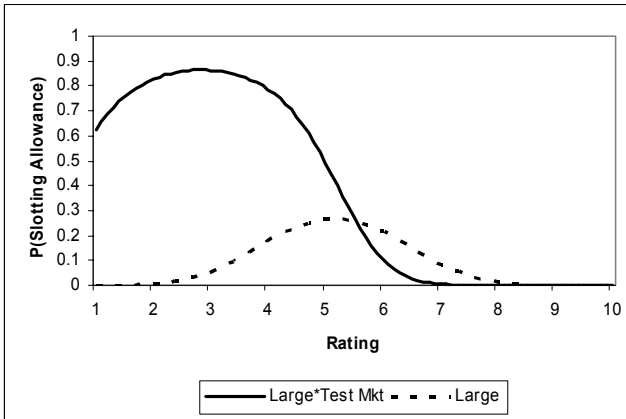


Figure 2a: Role of Test Markets: Large Manufacturers

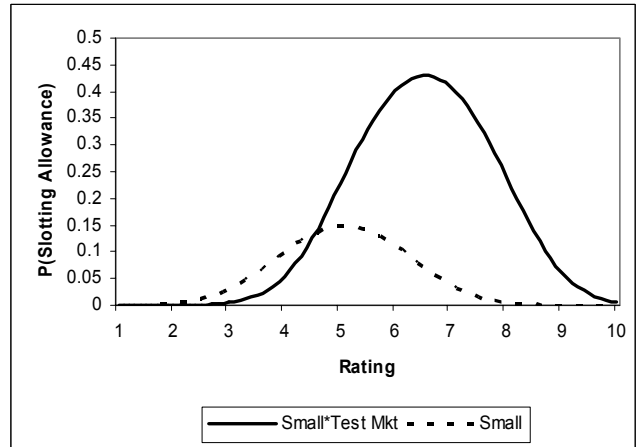


Figure 2b: Role of Test Markets: Small Manufacturers

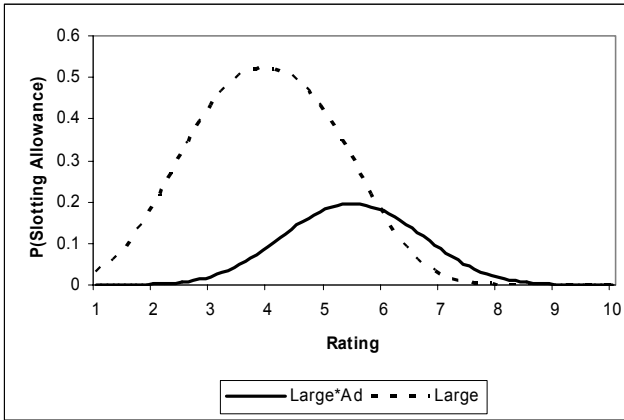


Figure 3a: Role of Advertising:
Large Manufacturers

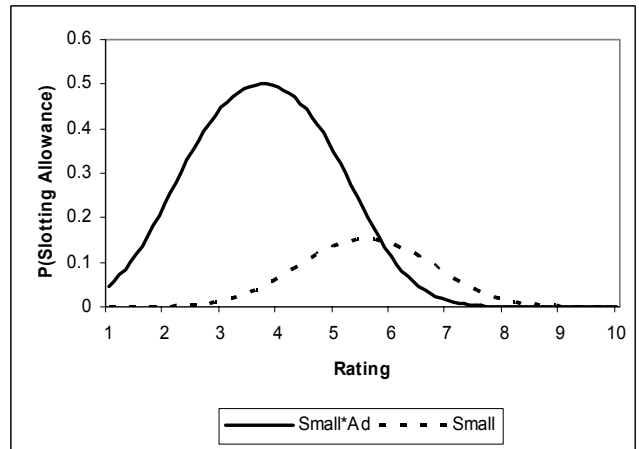


Figure 3b: Role of Advertising:
Small Manufacturers

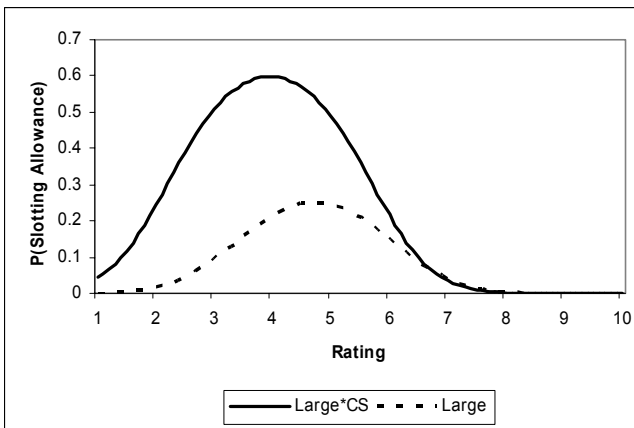


Figure 4a: Role of Competing Stores:
Large Manufacturers

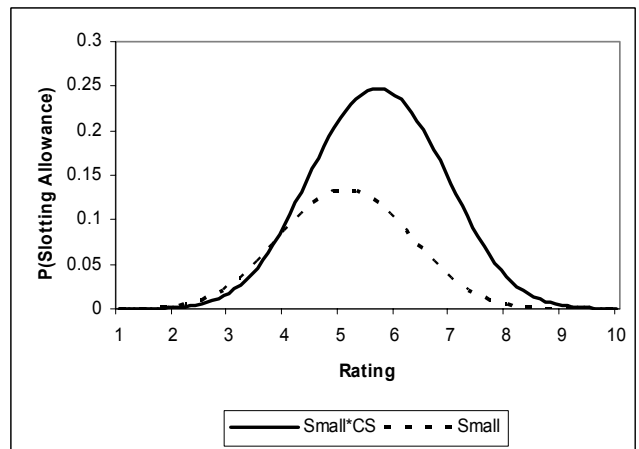


Figure 4b: Role of Competing Stores:
Small Manufacturers