What Do Trade Allowances look like? Evidence from Actual Payments to a Big-Box Retailer*

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We study trade allowances –a key component of the contracts between retailers and manufacturers– using a novel panel dataset on allowance payments negotiated between a large retailer and its suppliers. The use of these instruments remains controversial with some practitioners and scholars arguing that they are efficiency-enhancing and others claiming that they are primarily associated to an increasing buyer power of retailers. We find that trade allowances are large in magnitude, are paid by the vast majority of suppliers –including both national brand and private label manufacturers– and vary substantially over categories and, especially, across suppliers within categories. In addition, we find evidence of positive cross-category spillovers on negotiated allowances by multi-category suppliers. Consistently with the "retail power view", we find that larger suppliers tend to pay lower trade allowances, after controlling for a rich set of fixed effects and accounting for alternative explanations. We also find supportive evidence for some aspects of the "efficient contracts" view, although they are likely to play a less important role in quantitative terms.

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1 Introduction

Typical contracts between retailers and suppliers are highly complex arrangements, as the parties not only negotiate over price and product quality but also over shelf-space allocation and product advertising. Trade allowances –also known as "vendor", "promotional" or "merchandising" allowances– have become a key component of these contracts. They can be defined as non-price incentives provided by manufacturers to retailers[1] and include, among others, payments to place new products on store shelves (slotting fees), amounts to maintain distribution of a product (pay-to-stay or placement fees) and discretionary promotional funds (street or push money).[2]

The amounts of negotiated trade allowances have risen sharply worldwide, making trade allowances a significant source of profitability for large grocery chains. By some estimates, US retailers received $18 billion per year in trade allowances by 2015, up from $1 billion per year in the 1990s (The Economist, 2015). A single US supermarket chain, Kroger, reported vendor allowances for $7.3 billion in 2015 (Choi, 2016) and payments from suppliers to UK retailer Tesco reached €5.6 billion ($ 7.4 billion) in 2013, accounting for approximately 81% of the retailer's operating profit (Butler and Farrell, 2014).[3]

The rationale for trade allowances remains a controversial issue. One view of allowances is that they reflect the greater power attained by retailers, vis-à-vis manufacturers, in recent decades (Cannon and Bloom, 1991, Bloom and Perry, 2001, Wilkie et al., 2002, Rao and Mahi, 2003). An alternative view, holds that allowances play a primarily efficiency-enhancing role by aligning incentives, facilitating risk-sharing, and solving asymmetric information problems along the vertical channel (Lariviere and Padmanabhan, 1997, Sullivan, 2002).

Empirical evidence shedding light on trade allowances rationales is lacking as hard data on these payments have been unavailable to researchers due confidentiality reasons. As a consequence, most empirical work on the topic comes from survey studies (Bloom et al., 2000; White et al., 2000b; Wilkie et al., 2002; Rao and Mahi, 2003). To our knowledge, only Sudhir and Rao (2006) have access to product-level data on the incidence (but not the amount) of slotting fees for new products and use them to test different hypotheses about slotting-allowance drivers. Further-

[1]More generally, trade allowances can be defined as non-price incentives provided to any downstream channel member (including wholesalers and other intermediaries). However, in this paper, as in most of the literature we focus specifically on trade allowances provided to retailers primarily by manufacturers.

[2]Some authors use trade allowances as a synonym of *trade promotions*, including non-price incentives as well as linear price payments such as off-invoice discounts, scan backs and quota incentives (Tellis, 1998). We use the term trade allowances in a narrower sense to include exclusively non-price incentives.

[3]Even retail chains such as Walmart and Wholefoods, traditionally known for relying on simple linear wholesale contracts, chose to introduce trade allowances into supplier agreements in recent years (Layne, 2015; Haddon and Nassauer, 2018). Furthermore, the practice of demanding trade allowances appears to be widespread. According to AC Nielsen, more than 85% of US grocery retailers had implemented trade allowances by the year 2000 (Wilkie et al., 2002).

more, prior literature has focused, for the most part, on specific trade allowances associated to the introduction of new products (slotting fees) instead of allowances paid on ongoing products.[4]

In this paper, we use proprietary data from a large retailer in Chile[5] to characterize trade allowances and study how they relate to potential determinants reflecting alternative views on the use of these instruments. In particular, we study how trade allowances relate to firm market size –a typical *proxy* for relative retail power– and variables capturing the opportunity costs of shelf space, prior supplier performance, and the strength of the retailer-supplier relationship.

Our data include trade allowances paid by the universe of suppliers[6] for both new and ongoing products at two supermarket chains owned by the retailer over a period of two years. Trade allowance data are available at the chain and category level –not at the product level– and were grouped by the retailer into five classes which we label (for expositional convenience) as "Slotting and placement fees" (including, in addition to slotting and placement fees, street money, quota incentives, restocking fees, cooperative advertising, and display allowances); "new store opening fees" (payments to secure distribution in new retail stores); "logistics fees" (payments for centralized delivery); "unsaleable fees" (payments for products delivered in unsaleable conditions); and "spot" allowances associated to specific promotional campaigns. In addition, our data include UPC-level quantities, retail prices, and wholesale prices.

We document several novel features of trade allowances. First, we confirm anecdotal evidence suggesting that these payments are economically meaningful. Suppliers pay on average total allowances equivalent to 15.2% of their gross revenue or approximately $128.5 per SKU per store per year.[7] Second, we find that trade allowances are paid by most suppliers, regardless of their market size. Approximately 73% of suppliers pay "slotting and placement" fees; nearly 64% pay "new-store-opening" fees; and, 52% of suppliers pay allowances negotiated on the "spot" and related to temporary campaigns. Furthermore, suppliers paying "slotting and placement" allowances account for more than 90% of supermarket revenues. Third, slotting and placement

[4]By some accounts, slotting fees might not be the most relevant class of trade allowances. In their survey of five product categories, FTC, 2003 note that "Interviews with suppliers and retailers, however, also suggest that the advertising and promotional allowances associated with new product introductions are more important (in terms of costs) than slotting allowances" (p. 64). Similarly, Choi (2016) reports that Kroger decided to move away from charging slotting fees and that "they represent a negligible part of the vendor allowances it reports."

[5]The Chilean supermarket industry offers an appealing setting for the study of trade allowances for a number of reasons. As in the US and other advanced economies, the supermarket industry in Chile is highly concentrated and the market size of manufacturers is highly variable in most product categories. In addition, several product categories are dominated by large multinational firms operating in the US, Europe and other regions. Thus, our setting shares important features with other markets where trade allowances are ubiquitous, and it offers useful variation in relevant supplier characteristics.

[6]We use indistinctly the terms *supplier* and *manufacturer* as intermediaries play a minor role in our setting.

[7]We report allowances per SKU to provide a rough sense of the order of magnitudes involved. One important caveat about the use of this metric of analysis is that, while it might be appropriate for specific lines of products, it may be misleading on a store-wide context as SKUs are highly heterogeneous both within as well as across categories.

(or pay-to-stay) fees account for the largest share of allowance payments –approximately 68%. In contrast, new-store-opening fees and logistics allowances are comparatively less relevant.

Fourth, we document that trade allowances are highly heterogeneous across categories and suppliers. The standard deviation of trade allowances as a share of gross revenue equals 16.9% and $410.2 in terms of SKUs per store per year. We show that most of the variation in trade allowances is driven by variation across suppliers within categories (approximately 80%). Cross-category variation in trade allowances is comparatively less relevant: Approximately 19% of total allowance variation is due to variation across categories. We interpret this result as evidence that trade-allowance explanations stressing category-specific characteristics (e.g., the cost of product stocking) are less likely to play a major role in explaining trade allowance behavior.

We analyze how trade allowances correlate with potential determinants suggested in the literature using fixed-effects panel regressions.[8] We focus our analysis both on the incidence and the magnitude of trade allowances. Conditioning on a rich set of controls, we find that, among suppliers paying strictly positive slotting and placement fees –and representing 91% of total supermarket revenues, trade allowance payments are negatively correlated with market size. We show that this result is robust to the use of alternative measures of firm size and different sets of fixed effects. Consistent with prior literature (e.g., Sudhir and Rao, 2006) we find that whether a manufacturer pays allowances is unrelated to market size. We interpret our findings as partially supportive of the view that trade allowances are related to the increasing buyer power of retailers.

Among variables capturing aspects of the efficient-contracts view of allowances, we study how these payments correlate with proxies for the opportunity cost of shelf-space, operating costs of shelving products, and the strength of the supplier-retailer relationship –which may be associated to a mitigation of asymmetric information problems. We find that the opportunity cost of shelf space plays an important role in trade allowance determination. As in Sudhir and Rao (2006), we use the average private label retail margin in the supplier's focal category as a *proxy* of the opportunity cost of shelf space.[9] We find that a one percentage point increase in the retail margin of private labels is associated with an increase of 0.03 percentage points in the ratio of trade allowances to gross manufacturer revenue. In contrast, we do not find evidence consistent with trade allowances being determined by the operating costs of stocking once the influence of other supplier and category characteristics are factored in.

Finally, we study the relationship between trade allowances and two *proxies* for the strength of the supplier-retailer relationship: The level of supplier engagement with the production of

[8]While our regressions include a rich set of fixed effects to preclude certain types of unobserved heterogeneity from biasing our estimates, we are nonetheless cautions about causally interpreting our results.

[9]Sudhir and Rao (2006) argue that private label retail margins tend to be larger than those of national brands (a fact that we confirm in our data), and use the presence of a private label in a given category as a *proxy* for the opportunity cost of shelf space.

private labels, and the duration of the supplier-retailer relationship. We distinguish between three types of suppliers in our data based on their level of engagement with the production of private labels: i) suppliers exclusively dedicated to national brands (*Full NBs*); ii) suppliers solely focused on producing private labels (*Full PLs*); and iii) *dual branders* supplying both national brands and private labels.[10]

We find that national brand suppliers paid the highest trade allowances relative to the other groups, although private label suppliers still pay non-negligible amounts.[11] *Dual branders* have a lower probability of paying allowances than national brand suppliers, even conditioning on a rich set of covariates and fixed effects. We also find evidence suggesting that among national brand manufacturers (both *Full NB* and *dual branders*), those suppliers who have stayed in a relationship with the retailer for a longer period tend to show a lower probability of paying allowances. However, as we discuss at greater length below, we are cautious about the interpretation of this effect, as in our setting, it is difficult to disentangle the relationship-duration effect from the fact that newer suppliers enter the relationship with one of the retail chains during or after the 2008-2009 global financial crisis.[12]

Our results speak to a number of differences audiences. First, managers of supplier firms can benefit from an empirically-based understanding of the main forces playing a role in allowance determination. Our analysis sheds light on the importance of decisions such as whether to produce a retailer's private labels and whether to expand a product line to other categories for the outcomes of trade allowance negotiations. In addition, our analysis should be useful to scholars seeking to inform models of different aspects of channel interactions such as pricing and optimal contracting. Our findings should also be of interest to researchers working on bargaining models, the shift in the balance of power within channels, and the relationship between retailers and private label producers.

The remainder of the paper is organized as follows. Section 2 revises related literature. Section 3 presents institutional background and introduces our data. Section 4 presents a description of trade allowances. Sections 5 and 6, which are the core of the paper, present our analysis of trade allowance determinants and a discussion of our main findings, respectively. Finally, Section 7 concludes.

[10]Studying *dual branders* has proved difficult to date as most manufacturers prefer to keep their involvement in private label manufacturing confidential (Sethuraman and Raju, 2012; ter Braak et al., 2013b).

[11]Anderson and Fox (2019) present anecdotal evidence that private label suppliers do make allowance payments to support their products in store.

[12]As in the case of market size, we do not find evidence consistent with the incidence of trade allowances being associated to variables capturing aspects of the efficient-contracts view of allowances.

2 Literature Review

Our paper is primarily related to empirical research on the contracts and pricing arrangements between upstream manufacturers and downstream retailers along the vertical channel. The literature on trade allowances and pricing arrangements along the vertical chain is predominantly theoretical, with empirical work mostly based on surveys due to the difficulty of accessing hard data on trade allowances and wholesale prices (Sudhir and Datta 2009).

We organize the discussion of previous literature around the leading explanations for the rise and use of trade allowances, which we group in two major classes, namely, "the efficient contracts view" and the "retail power view". Tables 1 and 2 present theoretical arguments about the drivers of trade allowances and list some of the most influential contributions. Specifically, the first column in Table 1 shows the arguments supporting that trade allowances are used to enhance efficiency, whereas the first column in Table 2 summarizes different rationales associated to the retail power view of trade allowances. In the second column of each table, we list some of the theoretical and empirical papers.

Among the first studies on slotting fees, Sullivan (1997) relies on anecdotal evidence of slotting allowances and general trends of profitability, number of products, and store size in the retail industry to conclude that allowances were probably driven by shelf-scarcity. Later on, most papers study the alternative views on slotting fees using surveys among retail industry practitioners. In effect, White et al. (2000b); Bloom et al. (2000); Wilkie et al. (2002); FTC (2001, 2003); Gómez et al. (2007) collect an impressive amount of survey data with the participants' views such as retailers and manufacturers managers in the US. Their evidence is not conclusive regarding the different view of trade allowances and reflects the natural contradiction between the viewpoints of retailers and manufacturers. Measurement error, selection, and low response rates are typical concerns of self-declared survey data.

In particular, Bloom et al. (2000) conduct a large-scale survey on slotting fees among managers in the US grocery sector to determine how industry participants rationalize practices in their industry. They find that neither retailers nor manufacturers perceive slotting fees as serving a signaling or screening role. Instead, their results indicate that "(1) greater retail influence is associated with slotting fees, (2) these fees are related to changes in the relative influence of manufacturers and retailers, and (3) larger, arguably more powerful retailers, are more likely to require and benefit from slotting fees" (p. 102). Thus, Bloom et al.'s (2000) findings suggest that the industry participants (mainly manufacturers) perceive the use of slotting allowances as conforming to the retail power view.

While Bloom et al. (2000) analyzed managers' opinions about the practice of charging slotting allowances, Rao and Mahi (2003) set out to "collect data on the actual practice and how it varied as a consequence of theoretically defensible drivers" (p. 264). Rao and Mahi (2003) conduct two survey studies among managers of the retail and manufacturing sectors. As in Bloom et al. (2000), their findings are at odds with the signaling hypothesis and are supportive of a power-related explanation for slotting fees. Importantly, they find that the relative magnitude of slotting fees paid is lower for those manufacturers who have a strong market share position.

Another stream of empirical literature infers allowance payments from structural econometric models. The models in Israilevich (2004) and Hristakeva (2019) seek the minimum amount of trade allowances that can rationalize profitable assortments that are not implemented.[13] Thus, these papers argue that trade allowances limit competition within a store shaping the mix of available products.

Beyond academia, the antitrust authorities have also been concerned about the role of slotting fees, and the Federal Trade Commission produced two relevant contributions in this literature. FTC (2001) collects opinions from experts and participants in the retail sector to describe and discuss the rationale of the slotting allowances and pay-to-stay-fees. The staff seemed inclined towards the anticompetitive view of the slotting fees but did not recommend their banning.[14] Also, FTC (2003) surveyed several retailers and manufacturers to obtain some ranges for trade allowances, finding a substantial heterogeneity and links to the stocking costs (e.g., frozen products) and logistics (e.g., direct store delivery). As previous surveyed-based articles, the FTC in both reports calls for more research and states that evidence is not conclusive.[15]

To the best of our knowledge, the only previous study using observational data on slotting fees for new products is Sudhir and Rao (2006). They study alternative rationales for slotting allowances using data on whether a US grocery retailer receives slotting payments from manufacturers wanting to introduce new products into its stores. Their product-specific data include a dichotomous variable on whether or not a manufacturer offers a slotting fee. Importantly, they also have extra information about the product introduction (e.g., test market data, promotional support) and survey data on judgments made by retail buyers. In contrast to studies based on survey data, they find evidence consistent with the signaling hypothesis.

[13]Israilevich (2004) estimates a demand system using purchase data from a US supermarket chain to compute slotting fees paid to the retailer in the "bath tissue" category. Hristakeva (2019) develops a novel approach to infer trade allowances estimating a demand model and allowing for endogenous retail competition. Using data for the US, she finds that allowances should be about 5.9% of retailers' revenues in the "yogurt" category.

[14]More specifically, the report recommends that the agency: (1) carefully review exclusive-dealing contracts to determine whether they threaten a harm to competition; (2) examine slotting allowances and pay-to-stay fees with particular attention to circumstances that could give rise to exclusionary effects; (3) revisit price discrimination issues in the context of appropriate investigations; (4) focus any inquiries into category captains primarily on situations that may involve anticompetitive exclusion or tacit or explicit collusion, and (5) ensure that supermarket merger policy continues to take account of the potential exercise of retail market power in an anticompetitive manner against suppliers.

[15]Klein and Wright (2007) argue that slotting will be positively related to manufacturer incremental profit margins, a fact that explains both the growth and the incidence across products of slotting contracts in grocery retailing. They found support for this view, mostly using the data in FTC (2001, 2003).

Unlike the limited data on slotting and pay-to-stay fees, data on price-based trade deals have been available to study trade promotions. For instance, Drèze and Bell (2003) use hard data on scan-back trade deals in the US. Narasimhan (2009) provides an excellent survey of this literature, where the focus has been on pass-through rates of trade promotions onto retail prices and the strategic behavior along the chain rather than anti-competitive practices.

A topic that to our knowledge has not been previously addressed in the literature is the relationship between trade allowances and the supply of private labels. Anderson and Fox (2019) provide anecdotal evidence that private label manufacturers offer trade funds, such as cooperative advertising and display allowances, to support their products in-store.[16] However, to the best of our knowledge, no empirical evidence has been produced to date to support these claims.

A further related issue involves the allowance payments made by national brand manufacturers who also produce the retailer's private labels (dual branders). Typically, the suppliers keep the dual branding status secret as it is considered confidential information (In the words of Sethuraman and Raju, Sethuraman and Raju, 2012, ter Braak et al., 2013b).[17] Among the few papers studying this phenomenon, ter Braak et al. (2013b) provide evidence that manufacturers of a discounter's private labels are more likely to obtain shelf-space in that category, suggesting potential additional incentives for manufacturers to become dual branders. However, there is no empirical evidence to date on the characteristics of dual branders' allowance payments and the comparison to those of suppliers manufacturing national brands only. Our paper contributes to this literature by providing a detailed description of the allowance payments made by dual branders and national-brand-only suppliers.

3 Institutional Background and Data Description

3.1 The Supermarket Industry in Chile

Over the last three decades and following a global trend, the Chilean supermarket industry underwent a major transformation. As in the US and other advanced economies (Bronnenberg and Ellickson 2015, Geyskens 2018), the supermarket sector transitioned rapidly from a highly fragmented industry to one dominated by a few big-box retailers. The consolidation process involved a series of mergers and acquisitions –some of which included the entry of large multinational

[16] According to Anderson and Fox, "A retail manager we spoke with indicated that private label manufacturers offer trade funds (e.g., cooperative advertising funds) to support their products in-store. When pressed about why this happens, it was noted that volume declines dramatically when products are not promoted (e.g., not in the weekly flyer, no in-store merchandising)." (Anderson and Fox, 2019, p. 544).

[17] "It is difficult to obtain data on dual branding because of the desire for manufacturers not to divulge the information. Nevertheless, we need better understanding of why a manufacturer would supply private labels and why a retailer would accept the same." Sethuraman and Raju (2012) p. 331

firms such as Carrefour and Walmart[18]– and resulted in massive levels of concentration. Today, the three largest grocery retailers in Chile (Walmart, Cencosud, and SMU) account for more than 90% of total supermarket sales. A similar trend is found in the supermarket industries of the US and Europe.[19]

Manufacturer concentration in Chile is also comparable to concentration levels reported for the US. In our data, the three largest manufacturers in a category account, on average, for 74% and 84% of the market in Chains A and B, respectively, and the Herfindhal-Hirschman Index (HHI) of concentration within categories ranges between 0.32 (Chain A) and 0.40 (Chain B). Similarly, based on 25 categories from a US supermarket chain, Pauwels (2007) reports that the top 3 manufacturers account, on average, for 87% of total category volume.

As the supermarket industry became more concentrated, conflicts between manufacturers and retailers came to public attention (Noton and Elberg, 2018). In a series of presentations to the Fiscalía Nacional Económica (FNE, the local competition agency) the trade association of supermarket suppliers (including both local as well as foreign firms such as Unilever, Pepsico, and P&G), accused large supermarket chains of anti-competitive conduct, based among other things on the increasing trade allowance payments demanded by the retailers. While the FNE ultimately ruled that trade allowances did not undermine competition (FNE, 2012), allowances and other fees in the retail industry have remained under the scrutiny of competition authorities.

3.2 Vertical Contracts[20]

In Chile, trade allowances and other components of the terms of trade (e.g., price-based promotions and communication activities) negotiated between large supermarket chains and their suppliers are specified in two types of contracts, commonly known as: i) the *Commercial Agreement (CA)*; and ii) the *Spot Contract, (SC)*.[21] The *Commercial Agreement* –analogous to the *Cooperative Marketing Agreement* used in the US retail industry (Rivlin, 2016)– is the main document governing the rela-

[18]Carrefour entered the Chilean market in December of 1998 and was acquired five years later by the local D&S. Walmart entered in 2009 through the acquisition of D&S.

[19]The top-5 grocery concentration ratio for the average US market rose from 30% to 60% between 1992 and 2009, while the top-5 concentration ratio is approximately equal to 81% in France and is around 85% in Switzerland and the UK (Bonnet and Dubois 2010, Hong and Li 2017).

[20]This subsection is based on interviews the authors conducted with managers of both large supermarket chains and supplier firms, actual wholesale contracts the authors had access to, and documents made publicly available by the three largest Chilean supermarket chains, namely: Walmart (Distribución y Servicio, 2007), Cencosud (Cencosud, 2018) and SMU (Supermercados Chile, 2014).

[21]A third type of contract known as the *Logistics Agreement* is sometimes used to specify payments related to the use of centralized delivery to a distribution center. Some supermarket chains include these agreements as part of the broader *Commercial Agreement*.

tionship between a supermarket chain and a supplier.[22] It is signed by the parties at the beginning of a given commercial period and it primarily establishes the trade allowances to be paid by the supplier over the following commercial period. The following are trade allowances commonly included in the *CA* (Distribución y Servicio, 2007, Supermercados Chile, 2014, Cencosud, 2018):

1. Slotting and placement allowances: Payments for introducing new products and exhibiting products in prominent areas of the store (e.g., eye-level shelf positions, endcaps, checkout aisles, etc.).
2. Street money: Discretionary funds for the retailer to run promotions on the suppliers' products.
3. Restocking fees: Payments for using the retailer's personnel to restock the supplier's products in store shelves.
4. Display allowances: Payments for exhibiting the supplier's products in special displays (e.g., shippers).
5. New store opening fees: Payments to extend distribution of the supplier's products to new stores opened by the retailer.
6. Logistics fees: Payments made to supermarket chains for centralized delivery to the retailer's distribution centers.
7. Unsaleable product fees: Payments for the retailer to assume the cost of products delivered in a condition unfit to be sold.[23]

In addition to trade allowances (broadly understood as non-price incentives), the *CA* also usually includes "quota incentives" (i.e., payments made to the retailer conditional on the achievement of certain sales growth targets) and "cooperative advertising" (i.e., payments for having suppliers' products featured in weekly circulars and newspaper inserts).[24]

The terms of the *CA* are agreed upon bilateral and private negotiations, and the contract has a duration ranging between six and twelve months, with re-negotiations usually taking place at the end of a semester or year. Payments agreed in the *CA* can be specified both as lump-sum payments or as variable payments indexed to the amount of wholesale purchases made by the supermarket over the corresponding commercial period. For instance, in the case of Cencosud (see footnote 22), payments associated to the opening of new stores are specified as a lump-sum fees while other payments are expressed as a fraction of future purchases. We note that, unlike practices reportedly

[22] The template of a *Commercial Agreement* at one of the large supermarket chains in Chile can be found at the following url: https://www.jumbo.cl/institucional/proveedores (Note: Accessed 27-01-20).

[23] These payments are also known as waste, spoils or swell allowances (Anderson and Fox, 2019).

[24] See Tellis (1998), Blattberg and Neslin (1990) and Anderson and Fox (2019) for a description of different types of trade allowances and promotions.

followed in the US supermarket industry for settling some trade allowances (e.g., slotting fees), payments specified in the *CA* take place over the duration of the contract instead of being made upfront.

The second type of contractual arrangement establishing trade allowances is the so-called *Spot Contract, SC*. While the *SC* primarily specifies short-term price incentives –which remain in place for a few weeks– such as off-invoice discounts and scan-backs, it may also include trade allowances, which were not negotiated as part of the *CA* at the beginning of the commercial period. Spot contracts are usually negotiated, in private and bilateral negotiations, several times over the duration of the *CA*.

Another key component of the terms of trade negotiated between supermarkets and suppliers are wholesale prices. Similar to short-term price incentives, wholesale prices are also negotiated on a spot basis. These negotiations only involve linear wholesale prices (i.e., no fixed fees are negotiated as part of these agreements) and do not involve agreeing on the level of retail prices. Typically, several wholesale price negotiations take place over the course of a commercial period (see Noton and Elberg 2018).

3.3 Data Description

Our primary dataset includes trade allowance payments made by suppliers to two supermarket chains operated by a large Chilean retailer over 26 months (July 2010 - August 2012). For each payment, we observe the identities of the paying supplier (mostly manufacturers) and the receiving supermarket chain, as well as the specific date when the payment was made and the corresponding product category. Our data contains 1571 suppliers and 178 product categories.[25]

Allowance payments in our primary dataset were grouped by the retailer into five different classes. First, we observe the aggregate amount of slotting and placement fees, street money, re-stocking fees, display allowances, quota incentives and cooperative advertising. For expositional simplicity, we refer to this first aggregate as "slotting and placement fees". Second, we observe the payments associated to the opening of new stores; the third group aggregates payments due to the centralized delivery ("logistics fees"); the fourth group comprises the payments related to "unsaleable" products; and, the fifth group contains primarily allowances associated to promotional campaigns.[26]

In a different department-level dataset (described below), we observe that the bulk of the first group of payments corresponds to slotting and placement allowances, with quota incentives and

[25] Appendix B provides a list of the 178 categories included in our analysis.

[26] The *Commercial Agreement* contains the first four classes of allowances while promotional campaigns are negotiated in the *Spot Contracts*.

cooperative advertising playing a minor role across all major departments. Note that the retailer chooses not to record slotting allowances separately from other recurring payments suggesting that these fees may not be the most critical line (FTC, 2003).

We also have access to less granular department-level data[27] on allowances which aggregate over suppliers. While this dataset does not identify specific suppliers, it has the advantage of allowing us to observe allowances for narrowly-defined components. In particular, we are able to decompose the aggregate "Slotting and Placement" fees into its component parts: slotting and placement, street money, restocking, display, quota incentives and cooperative advertising. These data are available monthly and cover the period 2011-2015. Although we cannot separately distinguish between slotting and placement fees, we note that previous literature has only used surveys to assess the relative importance of different types of allowances (e.g., FTC, 2003).

Finally, we use a third dataset containing scandata on quantities, retail and wholesale prices.[28] The data at the SKU-store-week level cover the same period as the primary dataset (i.e., July 2010 - August 2012) and allow us to observe supplier-level retail margins, and to compute measures of market size and the number of SKUs per store per supplier. In effect, we observe price and quantity data for all SKUs (> 148,000) sold in all stores (> 200) from both supermarket chains. Also, this dataset contains the entry date of each SKU at the retailer's computational system, allowing us to calculate the tenure of the relationship between suppliers and the retailer. Table 3 summarizes the main features of the three datasets we use in the analysis. Next, we describe our scandata on prices and quantities and present a detailed analysis of the data on trade allowances in Section 4.

Description of Retail Prices, Wholesale Prices, and Quantities. Using our scandata, Table 4 presents summary statistics of key characteristics of suppliers in specific product categories for each of the two supermarket chains.

We use the share of retail revenues for supplier s in chain c at time t, SRR_{sct}, as a measure of supplier market size:

$$SRR_{sct} \equiv \frac{\sum_{k \in \Gamma^s}^{K(s)} \sum_{i \in \mathcal{P}_{sckt}} p_i Q_i}{\sum_s^S \sum_{k \in \Gamma^s}^{K(s)} \sum_{i \in \mathcal{P}_{sckt}} p_i Q_i} \tag{1}$$

where Γ^s is the set of categories served by supplier s; $\mathcal{P}_{sckt}$ is the set that contains the corresponding products in category k for each (s, c, t) combination; p_i and Q_i are retail price and quantity of product i, respectively.

Table 4 shows that the upstream markets tend to be highly concentrated. The three largest

[27]Product departments in this dataset include: Frozen Foods, Groceries, Non Food, Non Perishables, Perishables, Pharmacy, Textiles, and All Departments.

[28]Wholesale prices are paid by the retailer to the supplier for an extra unit of a given SKU. This negotiated amount is unusually available to researchers and allow us to observe retail margins. See Noton and Elberg (2018) for further details.

suppliers in a category accounting for between 74% (Chain A) and 84% (Chain B) of total category sales and a Herdindahl-Hirschman Index ranging between 0.32 (Chain A) and 0.40 (Chain B). The typical market share is approximately 9% in Chain A and 14% in Chain B and present a large dispersion (the coefficient of variation is above one) which will prove useful in our analysis below.[29]

Private labels are present in approximately 48% of the categories. Among the categories including private labels, private label products command a market share of approximately 23% in Chain A and 30% in Chain B, which also exhibits an important degree of dispersion (coefficient of variation above 1) over categories.

Table 4 also shows the rate of introduction of new products, which is highly relevant to the study of slotting fees. The typical supplier introduces 22.4 SKUs in a given category per period in Chain A and 16.8 SKUs in Chain B. The number of new product introductions exhibits, however, a considerable variance across categories, with product categories such as "yogurts and desserts" introducing as many as 397 new SKUs in a given period and others such as "batteries" exhibiting no new product introduction activity.

An important variable in our analysis, is the duration of the relationship between the supplier and the retailer, measured as the number of months since an SKU from the supplier entered the supermarket chain's computational systems. The typical retailer-supplier relationship in our data has a duration of approximately 45 months in both supermarket chains and exhibits moderate variation across suppliers and categories.

Finally, Table 4 also shows retail margins based on the (gross) retail profitability (i.e., excluding allowance payments) with a given supplier. The retail margins, MK_{sckt}, are computed as follows:

$$MK_{sckt} \equiv \frac{\sum_{i \in \mathcal{P}_{sckt}} (p_i - w_i) Q_i}{\sum_{i \in \mathcal{P}_{sckt}} p_i Q_i} \tag{2}$$

where MK_{sckt} is the overall retail margin generated by the set $\mathcal{P}_{sckt}$ which contains the products of the supplier s in category k sold in chain c at time t; Q_i, p_i and w_i are the quantity, retail price and wholesale price of product (SKU) i, respectively.[30]

[29]Figure B.1 in the Appendix, shows the sizable variation of supplier's market size across chains.

[30]From here onward, unless indicated otherwise, we use the term "retail margin" to refer to gross retail margins.

4 Characterizing Trade Allowances

This section documents several aspects of trade allowance behavior. We begin by documenting their magnitude, incidence and heterogeneity –across categories, suppliers, supermarket chains and time. We further examine the extent to which trade allowance payments vary across different suppliers differing in their degree of involvement in the production of retailer's private labels, and the extent to which we observe spillovers in trade allowance payments of multi-category suppliers. We postpone the analysis of trade allowance drivers to the next section.

4.1 Incidence, Magnitude and Heterogeneity

Tables 5 and 6 present evidence on the magnitude, incidence and heterogeneity of trade allowance payments.[31,32] For each supermarket chain and allowance type, Table 5 reports the magnitude and dispersion of allowance payments measured either as a share of gross manufacturer revenue or in terms of dollars per SKU-store-year. Table 6 reports the fraction of suppliers of different size (large versus small)[33] that pay different types of allowances in the two supermarket chains. In line with the institutional convention of negotiating trade allowances at the end of a year or a semester, we choose to aggregate daily payments semiannually. Summary statistics for each chain are computed over suppliers, categories, and time periods.

Trade allowances are sizable in magnitude (Table 5). Adding up across all five classes, trade allowance payments represent approximately 14.4% and 17% of gross manufacturer revenue for Chains A and B, respectively.[34] The total amount of trade allowances per SKU per store per year is, on average, \$148.5 in Chain A and \$95 in Chain B, implying that annual trade allowances payments range between \$285 million and \$446 million for a mid-sized supermarket chain carrying 30,000 SKUs across 100 stores.[35] By far, the largest type of allowance payment is *Slotting and Placement* fees which accounts for 10.1% and 11.4% of gross manufacturer revenue in chains A and B, respectively. By comparison, other trade allowance classes are quantitatively less relevant.

[31]Table 5 describes trade allowances at the supplier-chain-category-period level. Aggregating over categories, Table B.5 in the Appendix shows the same figures at the supplier-chain-period level.

[32]As explained above, allowances in our main dataset are grouped by the retailer into five different classes: (1) *Slotting and Placement fees*, (2) *New Store openings*, (3) *Logistics*, (4) *Unsaleables* and (5) *Spot*.

[33]We define large (small) suppliers as those having a share of retail revenue above (below) the median share of retail revenue in a given chain and period.

[34]To put these numbers into perspective, Yuan et al. (2013) report that trade promotion spending (including both price and non-price incentives) by US manufacturers accounted for 18% of their gross sales in 2010. Along the same lines, Gómez and Rao (2009) report that trade promotions in Europe represented about 14% of total manufacturer's revenue in 2003.

[35]As noted in Section 1, allowance figures expressed in terms of dollars per SKU are primarily meant to provide a sense of the orders of magnitudes involves, as SKUs are highly heterogeneous across and within categories.

Allowances negotiated on a spot basis –which correspond primarily to short-term non-price promotional funds– represent approximately 2%-3% of manufacturers gross revenue, and payments associated to the opening of new stores (*New Store Opening fees*) account for approximately 1.5% of gross manufacturer revenue. Other allowance classes, including *Logistics fees* and *Unsaleables* fees account for less than 1% of gross supplier revenue.

Column (1) in Table 6 shows that the vast majority (approximately three fourths) of suppliers pay some form of trade allowance, and that larger suppliers are more likely to pay trade allowances relative to small suppliers.The fraction of suppliers paying a given type of allowance is similar across the two supermarket chains. The most frequently paid allowance classes are *Slotting and Placement* fees (73%), *New Store Opening fees* (64%) and allowances associated to *Spot Contracts* (50-53%). Payments of other allowance types are less frequently observed: *Logistics* in the range of 25%-33% and *Unsaleables* on the order of 25%. Across all allowance classes we observe that the fraction of suppliers paying trade allowances is larger among larger suppliers (those above the median share of retail revenue). Overall, approximately 90% of large suppliers pay some form of trade allowance versus approximately 60% of small suppliers.

To provide a sense of the relative importance of different allowance types included in the class *Slotting and Placement* fees, Figure 1 decomposes this allowance class into its individual components: Slotting and placement allowances, street money, quota incentives, restocking fees, cooperative advertising, and display allowances. The figure draws from our department-level dataset as our primary dataset does not distinguish among these specific components. The figure displays this decomposition for the supermarket as a whole, and four selected departments –groceries, non-food, frozen foods, and perishables. It is striking that the bulk of the *Slotting and Placement* aggregate is accounted for by slotting and placement fees which represent approximately 86% of trade allowance payments. Furthermore, slotting and placement fees account for more than 90% of *Slotting and Placement* allowances in sections which require refrigeration such as "frozen food" and "perishables." Other items included in the *Slotting and Placement* aggregate are comparatively minor. Street money represents about 6.7% of the total, quota incentives approximately 5.3%, while cooperative advertising account for approximately 1%, and restocking payments for 0.2% of *Slotting and Placement* payments.

We also observe a remarkably wide dispersion in trade allowance payments (Table 5). The coefficient of variation in trade allowances is larger than one across all allowance types and supermarket chains, regardless of whether allowances are measured as a share of revenues or in dollars per SKU-store. The standard deviation of overall allowances equals 0.15 and 0.20 in chains A and B respectively, and is similarly high (relative to their respective means) for all specific trade allowance types. As shown in Table 6, heterogeneity is less pronounced in payment incidence (coefficient of variation of 0.56-0.57 in overall allowances) and is greater for small suppliers (coefficient of variation of approximately 0.79) than for large suppliers (coefficient of variation of approximately 0.37).

Figures 2 and 3 provide a further perspective on allowance heterogeneity across supermarket chains. The two supermarket chains in our data differ along three dimensions relevant for trade allowance negotiations: store size, store location, and customer sociodemographics. Despite their joint ownership, the coefficient of correlation between allowances of different chains is rather low and equals 0.4. In effect, the allowances paid by a given supplier are far from identical across chains, suggesting that allowances are determined in chain-specific negotiations.

Figure 2 examines heterogeneity in trade allowances (measured as a share of gross manufacturer revenue) across suppliers and chains. Subfigures (a) to (e) consider different types of trade allowances, and the 45-degree line indicates points of identical allowance payments in both chains. We observe that most trade allowances tend to depart systematically from the 45-degree line showing a substantial dispersion across supermarket chains. The share of gross revenues that a supplier pays in Slotting and Placement allowances, for instance, ranges between 0 and 50% in Chain A and between 0 and nearly 80% in Chain B, consistent with suppliers paying a higher share of their gross revenues to Chain B than to Chain A. Figure 3 examines heterogeneity in trade allowances (measured as the share of gross manufacturer revenue) across categories and chains. While allowance variation across categories is more modest than across suppliers, it is still substantial. Trade allowances (as a share of gross manufacturer revenues) range between 1.4% (food supplements) and 30.7% (frozen hamburgers) in Chain A; and between 1.8% (school supplies) and 47% (vegetables) in Chain B.

Appendix C provides a more formal decomposition of trade allowance variation into its different sources, namely: categories, suppliers, chains and time. We find that variation across suppliers accounts for between 80% (Slotting and Placement fees) and 91% (Unsaleables) of the total variation in trade allowances measured as a share of gross manufacturer revenue. The category-level effect accounts for only between 5.1% (*Unsaleables*) and 19% (*Slotting and Placement*. In Appendix D we examine the degree of substitutability across different types of allowances and find no evidence of substitutability across allowance classes.

4.2 National Brands and Private Label Suppliers

We now turn to describe trade allowance payments associated to private labels and compare them with trade allowances paid by other suppliers. Importantly, most private labels are produced by third-party manufacturers (ter Braak et al., 2013a; ter Braak et al., 2013b; Ellickson et al., 2018; Anderson and Fox, 2019). Some of these third-party manufacturers are exclusively dedicated to the production of private labels and some of them are dual branders, manufacturing both private labels and national brands. In our data, private label manufacturers (the vast majority of whom are third-party vendors) represent 15.8% of the universe of suppliers and approximately 12.7%

of them are also manufacturers of national brands. Anderson and Fox (2019) provide anecdotal evidence that private label manufacturers offer trade funds, such as cooperative advertising and display allowances, to support their products in-store.

Table 7 breaks up trade allowance payments (measured as a share of gross manufacturer revenue) into payments made by suppliers of national brand products (*full NB*), suppliers fully dedicated to private label production (*full PL*) and suppliers of both national and private label brands (*dual branders*). We observe that *full NB* suppliers make substantially larger allowance payments than private label suppliers. On average, total allowance payments by *full NB* suppliers are approximately 18% of gross wholesale revenue versus 2% in the case of *full PL* and 1.6% in that of *dual* branders. Thus, consistent with Anderson and Fox (2019), trade allowances paid by private label suppliers are significant and non-negligible, although lower than those made by national brand manufacturers. Furthermore, as shown in Table 8, a relatively small fraction of private label suppliers pays trade allowances. Approximately 11% and 14.5% of *full PL* suppliers in Chains A and B (respectively) makes allowance payments in a given category (compared to 87% and 89% in the case of *full NB* suppliers), implying that overall payments *conditional* on actually making a payment can be quite substantial: Approximately equal to 14.4% in Chain A and 22.1% in Chain B.

We find that *dual* branders pay trade allowances less often (Table 8) in almost all allowance classes and pay smaller amounts than suppliers who do not engage in the production of private labels (Table 7). Conditional on paying allowances, overall payments by *dual* suppliers equal 13.2% of their gross revenues compared with 20.6% of gross revenues paid by *full NB* suppliers. The observed gap in incidence and payments may act as an incentive for national brand manufacturers to supply the retailer's store brand. In effect, the allowance gap may induce suppliers to product produce the retailer's store brands as a way to generate "goodwill" (ter Braak et al., 2013b). On the other hand, perhaps the allowance differences between *full NB* and *dual* suppliers only reflects the systematic differences in supplier size or the spell in a relationship with the retailer. We address these potential concerns in Section 5 below.

Examination of the relative importance of different allowance classes reveals that the ranking remains unchanged across suppliers with different levels of involvement in private label manufacturing. *Slotting and Placement* fees is by far the most important type of allowance, followed by allowances negotiated in *Spot contracts* and those related to *New Store Openings*. By contrast, *Logistics* or *Unsaleables* allowances are substantially less relevant and are rarely paid by private label manufacturers.

4.3 Cross-Category Spillovers

A potentially important issue in the analysis of trade allowances is the possible existence of inter-category spillovers arising from the negotiations between multi-category suppliers and the retailer. In effect, negotiated outcomes achieved by a multi-category supplier in a given category might not be independent from the results obtained by the supplier in other categories where she operates. For instance, multi-category suppliers who are substantially large in a category might be able to secure advantageous terms in other categories where their relative size advantage is less pronounced. Of course, other forms of bargaining heterogeneity might operate as well.

The potential for cross-category spillovers in allowances is important, as 39 percent of suppliers in our data operate in more than one category (614 out of 1,571 suppliers). Furthermore, multicategory suppliers include some of the largest manufacturers in our data: The median size of multi-category suppliers (measured by gross manufacturer revenue) is more than seven times the median size of single-category suppliers. Thus, treating trade allowances paid by a given supplier in different categories as outcomes of independent negotiations, in a context where the largest suppliers participate in more than one category, might understate the actual effect of supplier market size under negotiations with externalities across categories. This potential issue favors the category-level analysis we perform in this paper over a product-level analysis.

To explore the extent to which our data are consistent with cross-category spillovers, we examine how a given allowance type paid by a multi-category supplier comoves across the categories in which the supplier participates. In principle, we remain agnostic about the source and sign of these spillovers, and focus on providing evidence on whether negotiations are independent across categories for a given supplier. For ease of exposition and relevance, we focus on the most important type of trade allowance in our data (i.e., *Slotting and Placement* fees).

Figure 4 presents pairwise correlation coefficients between trade allowances paid by a multi-category supplier in a given category and her payments in other categories for the same chain-time combination.[36] Trade allowances are measured as a share of gross manufacturer revenue. The height of each bar represents the correlation coefficient in a given category. Lighter bars indicate that the correlation coefficient is significantly different from zero at the 5 percent level.

We find that trade allowances paid by a supplier in a given chain-period tend to be positively

[36] Each category-specific correlation coefficient is given by:

$$\rho_j = \frac{\text{cov}\left(a_{scjt}, a_{sc,-j,t}\right)}{\sqrt{\text{var}\left(a_{scjt}\right)\text{var}\left(a_{sc,-j,t}\right)}}$$

where a_{scjt} and $a_{sc,-j,t}$ are measures of trade allowances paid by the multi-category supplier s to chain c at time t in the category j and the other categories $-j$, respectively. When using the ratio of allowance payments, A_{scjt}, over supplier gross revenues, REV_{scjt}, i.e, $a_{scjt} = \frac{A_{scjt}}{REV_{scjt}}$ as the measure of allowances, we compute $a_{sc,-j,t}$ as follows: $a_{sc,-j,t} = \frac{\sum_{k,k\neq j} A_{sckt}}{\sum_{k,k\neq j} REV_{sckt}}$.

correlated across categories. Conditional correlations of allowances are statistically significantly different from zero in 74 percent of categories (118 out of 160)[37] at the 5 percent level and in 63 percent of categories (101 out of 160) at the one percent level. The average correlation coefficient across categories is approximately equal to 0.45 and it is approximately equal to 0.56 among those categories for which correlations are statistically significant (at the 5 percent level). We find cross-category correlations particularly high among categories such as Baby Diapers (0.87), Oatmeal (0.87), Laundry Detergents (0.80) and Paper Towels (0.74) –where large multinational firms such as Nestlé, P&G and Unilever operate.

We further investigate the extent to which the comovement in allowance payments reported above reflects spillovers from a supplier's focal (or most important) category. We define a supplier's focal category as the one where the supplier generates the largest revenues for the retailer in a given chain and period.[38] To shed light on the relationship between the allowances paid by a supplier in its focal category and those she pays in other categories, we estimate the following linear model:

$$a_{sk_{-f}ct} = \alpha + \beta\, a_{sk_{f}ct} + \delta_s + \theta_c + \xi_k + \tau_t + \varepsilon_{sckt} \qquad (3)$$

where the allowances paid by supplier s in chain c at time t in categories different from her focal category is denoted by $a_{sk_{-f}ct}$ and those from her focal category are denoted by $a_{sk_{f}ct}$; ε_{sckt} is the standard iid error term, and the supplier, chain, category and time fixed effects are denoted by δ_s, θ_c, ξ_k, and τ_t, respectively. The parameter β captures the comovement between allowances paid by a supplier in her focal category and allowances paid in the supplier's other (less relevant) categories.

Table 9 presents the OLS estimates of the parameters in Equation (3). Each column shows the estimates for different subsamples of suppliers. The estimates using the full sample of multicategory suppliers are in Column (1), while Columns (2) and (3) consider the subsample of small and large suppliers, respectively.[39]

We find a robust and highly significant positive correlation between the allowances paid by a supplier in her focal category and those she pays in her other categories. Based on the estimates in Panel A using all multi-category suppliers, a one percentage point increase in focal allowances (measured as a share of gross supplier revenue) is associated with a 0.43 percentage

[37] The total categories are 160 because 18 out of the 178 categories are served by single-category producers only.

[38] Formally, the focal category f_{sct} of supplier s in chain c at time t is defined as $f_{sct} \equiv \arg\max_{k\in\Omega_{sct}} \sum_j p_{jkct} q_{jkct}$, where Ω_{sct} is the set of all categories where the supplier s participates in each (c, t) combination.

[39] We rank the supplier's size based on the retail revenues generated in her focal category for each chain-time combination. Estimates in Column (2) use the suppliers below the 67th percentile in the size distribution, while those in Column (3) use the largest firms belonging to the top third of the size distribution. Our dependent variable is the log-transformed share of allowances to account for the fact that this variable is bounded between zero and one. Specifically, we use the log-transformation $a = \ln[1 + A/(1 - A)]$, where A is the ratio of trade allowances to gross supplier revenue.

points increase in the allowances paid in non-focal categories.[40] Also, we find evidence that the correlation between focal and non-focal allowances is stronger for suppliers who are larger in focal size when allowances are measured as a share of gross revenue (Panel A in Table 9). The magnitude of the estimated coefficient goes up from 0.45 to 0.83 when considering the largest manufacturers in the top third of the size distribution.

Thus, the evidence suggests that trade allowances paid by multi-category suppliers are not independent across categories. Furthermore, suppliers who manage to obtain better terms in a focal category tend to also achieve more favorable terms in other, less relevant, categories in which the firm operates. In line with this evidence, and to account for any contracting spillover effects we conduct our subsequent analysis (unless otherwise indicated) at the supplier-chain-period (as opposed to the supplier-category-chain-period) level of aggregation.[41]

5 Trade Allowance Drivers

In this section we examine how trade allowances correlate with factors suggested in the literature (and our previous analyses) as potentially important determinants of trade allowances. In line with prior literature (e.g., Bloom et al., 2000), we group potential drivers into two classes: Those associated to the "retail power view" and those related to the "efficient contracts view" of trade allowances.

Retail Power View. We use supplier market size as a *proxy* for the relative power of the retailer vis-à-vis suppliers. The relative size of players along a vertical channel has traditionally been viewed as a measure of their bargaining leverage (Draganska et al., 2010; Inderst and Valletti, 2011; Geyskens, 2018; Ailawadi and Farris, 2020).[42] Under this view, large suppliers, in relation to whom the retailer's buyer power is less pronounced, should be able to negotiate smaller allowances. As has been widely recognized (e.g., Ailawadi and Farris, 2020), market size is likely to reflect, in turn, the degree of brand equity achieved by a supplier's brand portfolio. In effect, suppliers displaying a large base of loyal customers enjoy greater bargaining leverage when negotiating with retailers as their products are important for retailer profitability.

Efficient-Contracts View. We use several proxies to capture different aspects of the efficient-contracts view of trade allowances. A first set of variables seeks to account for the operating cost

[40]Since the dependent variable in Panel A is the log-transformed share of allowance payments in non-focal categories, the marginal effect is given by $(1-a_{sk\_fct})\beta$. Using the actual average share of allowance payments in non-focal categories (0.14) yields a partial effect of 0.433.

[41]Our main results are robust to aggregation at the supplier or supplier-category levels.

[42]Ailawadi and Farris (2020) note the converging views of scholars and industry practitioners on the role of market size: "In this view of power, managers and economists are on the same page. One of the first things that economists look at in assessing market power is the firm's market share " p. 83.

of stocking both new and existing products. Several accounts suggest that product categories with greater refrigeration needs exhibit larger stocking costs and hence might, for this reason, involve larger allowance payments (e.g., FTC, 2003; Rivlin, 2016). We capture the notion of *intensity of refrigeration requirements* by defining a category-specific variable which takes four possible ordinal levels: zero, if a product category does not require refrigeration (e.g., cooking oil); one, if the product category requires *partial* refrigeration (e.g., soft drinks); two, if the category requires *full* refrigeration (e.g., yogurt); and three, if the category requires freezing (e.g., ice cream).[43,44]

A second set of cost-related variables we include in the analysis capture the opportunity cost of shelf space. As pointed out by Sudhir and Rao (2006), these costs should be treated differently from the direct operating costs incurred by retailers when stocking suppliers' products, as they are more likely to vary at the supplier (as opposed to the category) level. These authors use the presence of private labels in a category as a *proxy* for the opportunity cost of shelf space (in addition to a survey-based measure of the shelf space occupied by the product, as estimated by managers). The rationale for this *proxy* is that the retail margins of private labels are typically larger than those of national brands in a given category (a finding that we verify in our data, as shown in Table 4) and thus provide an approximation to the foregone profits from the inclusion of supplier's products in store shelves. In the spirit of Sudhir and Rao (2006), we use the interaction between the presence of a private label in the supplier's focal category and the average retail margin of private labels in a category as a *proxy* for the opportunity cost of shelf space.

A third proxy we include in the analysis measures how well the supplier performed in terms of revenue generation in the preceding period. Several theory papers argue that trade allowances paid on new products (i.e., slotting fees) serve to shift the risk of new product introductions from the retailer to the supplier (e.g., Kelly, 1991; White et al., 2000a). We conjecture that this "riskiness motive" might as well apply to suppliers' existing products and use our past supplier performance measure as a *proxy* for the riskiness of the supplier's broad product portfolio.

A fourth set of variables seeks to capture the strength of the relationship between the supplier and the retailer. We conjecture that stronger relationships between retailer and manufacturer may help mitigate asymmetric information problems. First, we consider the length of the supplier-retailer relationship. The *relationship marketing* literature points to the duration of the relationship between trading partners as a potentially important factor determining relationship performance (e.g., Anderson and Weitz, 1989, Doney and Cannon, 1997, Kumar et al., 1995). We construct a

[43] Table B.3 in the Appendix presents the mapping of the refrigeration requirements variable to the categories included in our data.

[44] We also explored including a variable capturing how voluminous the products in a given category tend to be. We identified categories that primarily contain non-voluminous products, such as different types of accessories, batteries, and categories involving low-volume audio-video items (such as CDs and DVDs). However we did not find any systematic relationship with allowance payments, possibly because bulkiness also proxies for other factors such as a product fragility.

measure of the length of the relationship between the supplier and a given supermarket chain based on the date a supplier's product entered a chain's information system for the first time.

Another set of variables capturing the strength of the retailer-supplier relationship involve the level of supplier engagement in the production of private labels. ter Braak et al. (2013b) present evidence consistent with dual branders (national brand suppliers of private labels) developing significant goodwill with the retailer.[45] Consistent with this interpretation, the evidence provided in Sections 4.1 and C in the Appendix suggests that the degree of supplier involvement in the production of private labels appears to correlate strongly with trade allowance payments, especially with *Slotting, Placement and Other fees*. Thus, we include as additional supplier characteristics a set of dummy variables indicating whether the supplier is either fully committed to the production of private labels, operates as a dual brander, or supplies national brands only.

Finally, we control for the supplier's activity in terms of new product introductions and withdrawals of previously introduced products. Successful suppliers may be able to introduce (withdraw) a larger (smaller) number of products. To the extent that the number of product introductions/withdrawals proxy for past supplier performance, we would expect a negative relationship between allowance payments and the number of product introductions (net of exits). On the other hand, a larger number of product introductions would involve larger allowance payments in the form of slotting fees implying, to the contrary, a positive association between trade allowances and product introductions. Our econometric specification below flexibly allows for a differential effect of product introductions and withdrawals on trade allowance payments.

Our baseline specification takes the following form:

$$y_{sct} = \alpha + \sum_{r=1}^{3} \beta_r \, Ref_{sct}^{r} + \mu \, PLMargin_{sct} + \lambda \, size_{sct} + \theta \, Duration_{sct} + \phi \, LowPerf_{sct} + \gamma_1 \, Intro_{sct} + \gamma_2 \, Exit_{sct} + \delta_1 \, Dual_{sct} + \delta_2 \, FullNB_{sct} + \sum_k \kappa_k \, \mathbb{1}(s \in \Omega_{kct}) + \xi_h + \zeta_c + \nu_t + \varepsilon_{sct} \quad (4)$$

where the dependent variable, y_{sct}, is either a dummy taking the value of one if the supplier pays strictly positive allowances[46] or the ratio of trade allowances to gross manufacturer revenue paid by supplier s to supermarket chain c at time t –conditional on the payment of strictly positive allowances; Ref_{sct}^1, Ref_{sct}^2 and Ref_{sct}^3 are dummies indicating whether the supplier's focal category requires partial refrigeration, total refrigeration, or freezing equipment, respectively; $PLMargin_{sct}$

[45] According to ter Braak et al. (2013b) "A major motivation for national-brand manufacturers to engage in private-label production is, as former CEO of Ontario Foods testified, 'to cultivate a better relation with retailers' (Littman 1992, p. 2)." ter Braak et al. (2013b) p. 343.

[46] We choose to estimate a linear probability model, as opposed to a nonlinear model (e.g., logit or probit) to avoid possible inconsistencies in our estimates due to the well-known incidental parameters problem afflicting a model that includes fixed effects.

is the average retail margin of the private labels in the focal category of supplier s; $size_{sct}$ is a measure of the supplier market size (the supplier's share of retail revenues); $Duration_{sct}$ is the length of the supplier-retailer relationship, in months; $LowPerf_{sct}$ is a dummy variable taking the value of one if the supplier ranks at the bottom decile of revenues in a given chain and period[47]; $Intro_{sct}$ and $Exit_{sct}$ are the number of supplier product introductions and withdrawals, respectively, in logs; $Dual_{sct}$ is an indicator variable on whether firm s supplies both national brands and private labels while $FullNB_{sct}$ indicates whether firm s supplies only national brands to chain c in period t; Ω_{kct} is the set of suppliers participating in category k, in chain c and time t; ξ_h, ζ_c and ν_t are cohort, chain and time fixed-effects, respectively; ε_{sct} is an idiosyncratic mean-zero error term that is uncorrelated with the explanatory variables.

The fixed effects included in Equation (4) allow us to further account for factors suggested in the literature as potentially influencing trade allowances. First, the inclusion of 178 category dummies captures time-invariant category-specific allowance determinants which might help to further control for the cost of stocking products. Second, we include chain fixed effects, ζ's, to account for the fact that the cost of stocking products may vary across store size and the different demographic profiles of customers. Third, the time-fixed effects, ν's, capture any potential environmental variables that are common across firms, categories, and chains such as economy-wide macroeconomic conditions. Finally, we include cohort fixed effects to account for the possibility that negotiated terms of trade might be sensitive to the overall market conditions prevailing at the time the supplier entered the relationship with one of the supermarket chains.[48]

We focus on the ratio of slotting and placement fees (the most relevant trade allowance class) to gross manufacturer revenue as our measure of trade allowances. An alternative measure reported above expresses allowances in terms of dollars per SKU-store. One important drawback of the latter metric is that SKUs are typically not comparable neither across nor within suppliers –particularly in the case of multi-category suppliers– making the necessary aggregation for our empirical exercise difficult.[49] In addition, the negotiation protocol described in Section 3.2 specifies that the bulk of trade allowances are negotiated on the basis of a share of gross supplier revenue.

Results. Tables 11 and 12 present the estimation results. While Table 11 reports results using the full sample of suppliers, Table 12 restricts manufacturers to those supplying national brands (i.e., NB and dual suppliers), as suppliers specialized in private labels may distort the analysis given

[47]We find similar, albeit weaker, results when we use the 25th percentile of the revenue distribution as a threshold, instead.

[48]In particular, cohort-level fixed effects help controlling for the fact that "newer" suppliers entered the relationship with the retailer around the time when the 2008-2009 financial crisis hit the Chilean economy. Chile's GDP began contracting in the third quarter of 2008 and experienced negative or zero growth for much of 2009 (https://si3.bcentral.cl/Siete/en).

[49]For instance, even within a category, SKUs of different sizes occupying different amounts of shelf space impose different opportunity costs of shelf space (and presumably operational costs of stocking products as well), and vary in visibility and salience (attributes that are likely to play a role in trade allowance negotiations).

their closer relationship with the retailer. Columns (1) and (2) in each table present the results for the amount of allowances paid conditional on suppliers paying strictly positive allowances –which account for over 90% of retail revenue– using alternative sets of fixed effects. Columns (3) and (4) show the estimates for the linear probability model using the same sets of fixed effects as in columns (1) and (2). Throughout, we report cluster-robust standard errors at the supplier level to account for potentially correlated errors within a given supplier. The identification of the supplier fixed effects comes from the variation across time over chains-category combinations. Since some firms' characteristics may remain time-invariant and constant across chains and categories, we present both specifications to show what findings are robust to this potential collinearity issue.

The results suggest that while the relationship between firm size and the incidence of allowance payments is inconclusive (i.e., we cannot reject the hypothesis of non-significance at any conventional significance level), firm size is strongly correlated with the amounts of trade allowances paid by suppliers –among suppliers who do pay allowances. The results suggest that larger suppliers tend to pay smaller allowances as a share of their revenues. The estimate is negative and highly significant regardless of whether supplier fixed effects are included in the estimation and independent of whether we focus on the full sample or the sub-sample that excludes PL suppliers. In our preferred specification –which estimates the firm-size coefficient using variation across suppliers (Column (1))– the estimated coefficient using the full sample of suppliers, $\hat{\lambda} = -2.38$, implies that a one percentage point increase in the supplier's share of retail revenues is associated to a fall of approximately 2.2 percentage points in the share of gross manufacturer revenue that the supplier pays as slotting and placement fees.[50] The coefficient is significant at any conventional significance level ($p = 0.004$). Table G.1 in the Appendix shows that these results are robust to the use of an alternative measure of firm size –namely the number of SKU-stores carried by the supplier. It is also clear from Column (3) in Tables 11 and 12 that correlation between the conditional amount of trade allowances and firm size is robust to the inclusion of supplier fixed effects which might help control for time-invariant factors such as brand equity.

Among variables related to the efficient contracts view of trade allowances, we do not find evidence that either the incidence of trade allowance payments nor conditional trade allowance amounts are correlated with the cost of stocking products. In our preferred specifications (Columns (1) and (3)) the relationship between allowance metrics and refrigeration requirement variables are either inconclusive or only weak (significance levels above 0.05). One possible explanation for this finding is that multi-category suppliers operating in categories requiring refrigeration are able to benefit from favorable negotiation spillovers coming from other categories in which they operate.

In contrast, we find evidence consistent with the opportunity cost of shelf space being posi-

[50]The partial effect of market size on log-transformed trade allowance payments is given by $\Delta\, a_{sct} = \beta\,(1 - a_{sct})\,\Delta\, srr_{sct}$, where a_{sct} is the share of allowances over gross revenue of supplier s in chain c at time t. Using the average ratio of slotting, placement and other allowances to gross manufacturer revenue at the supplier level yields: $-2.3806 \cdot (1 - 0.0872) = -2.173$.

tively correlated with the conditional amounts of allowance payments. In effect, the private label retail margin –a *proxy* for the opportunity cost of shelf space– is positively correlated with the conditional amount of trade allowances in our preferred specification (Column (1) in Tables 11 and 12). Furthermore, the results suggest that among national brand manufacturers, the conditional probability of paying allowances increases on the opportunity cost of shelf space (Column (3) in Table 12).

The results also suggest that suppliers who performed poorly in the immediately preceding period tend to show a higher probability of paying allowances and, conditional on paying allowances, they tend to pay larger amounts.[51] The estimated coefficients imply that suppliers who performed poorly in the previous period tend to pay 3.6 percentage points more allowances as a share of their gross revenues than better performing suppliers (Column (1) in Table 11)[52], and that being a low performing supplier increases the probability of paying allowances by 8.1 percentage points (Column (3) in Table 11.

Among variables capturing the strength of the retailer-supplier relationship we observe that suppliers of national brands pay significantly more allowances than firms producing private labels. The estimate, $\hat{\delta}_2 = 0.041$, is statistically significant ($p = 0.039$) and implies that, conditional on suppliers paying positive allowances, the share of gross revenue paid in slotting and placement fees by *full NB* suppliers is approximately 3.7 percentage points higher than those of suppliers who specialize in manufacturing private labels. Interestingly, *dual* branders appear to pay similar allowances compared to suppliers fully committed to the production of private labels. In addition, the results suggest that the conditional probability of paying allowances is significantly lower for dual branders than for NB suppliers (Column (3) in Table 12).

In contrast, we do not find evidence of a systematic relationship between the length of the supplier-retailer relationship and trade allowances when we use the full sample of suppliers. Among NB manufacturers, the probability of paying allowances decreases slightly the longer is the duration of the relationship between retailer and supplier (Column (3) in Table 12). We note that these estimates are conditional on the inclusion of cohort fixed effects. The estimated coefficients on the cohort dummies show a pronounced fall in trade allowance payments by suppliers entering the retailer's information systems around 2008, which we conjecture might be related to possible changes in conditions associated to the financial crisis. We further discuss these results in Section 6 below.

[51]One potential concern about the positive correlation between conditional allowances and poor past performance is that it might arise mechanically due to a negative correlation between poor past performance and current wholesale revenue (the denominator in the dependent variable). However, this concern is unjustified as poor prior performance and current wholesale revenue are partially (controlling for category, period and time fixed effects) uncorrelated in the data.

[52]The partial effect of the dummy variable *LowPerf* on trade allowance payments is given by $\Delta\, a_{sct} = (1 - a_{sct})(1 - exp(-\phi))$. Using the average ratio of slotting, placement and other allowances to gross manufacturer revenue at the supplier level yields: $(1 - 0.0872) \cdot (1 - \exp(-0.0407)) = 0.0364$.

Finally, we find some evidence suggesting that increases in the number of new product introductions is associated to larger allowance payments among allowance-paying suppliers.

6 Discussion

Retail Power View. Our results suggest that, among the set of firms who pay trade allowances, larger suppliers are indeed able to negotiate more favorable terms of trade with the retailer (i.e., smaller trade allowances as a share of their gross revenue). Furthermore, to the extent that brand equity varies primarily at the supplier level (as opposed to varying over time), the inclusion of supplier fixed effects should account for a substantial share of brand equity variation. Thus, the finding of a negative relationship between allowance payments and supplier size which is robust to the inclusion of supplier fixed effects, suggests that the leverage achieved by large suppliers should not be explained by brand equity alone.

Of course, market size might also be proxying for other factors, such as demand conditions and cost efficiencies. All our specifications aim at accounting for market-level demand conditions via time fixed effects and category-level demand conditions by including category fixed effects. Furthermore, we explore the potential effects of different assortments across retail chains by restricting the sample to suppliers offering similar brands across chains and also performing estimations separately for each chain (see Tables H.1 and I.1 in the Appendix). Our estimates showing a negative relationship between market size and trade allowances remain essentially unchanged.

Regarding cost arguments, larger firms are likely to be more efficient as they can exploit economies of scale. One possible consequence of greater efficiency is that larger, more efficient, suppliers are more likely to directly deliver to supermarket stores, allowing the retailer to save on logistics costs (FTC, 2003). This potential explanation, however, does not apply to our findings, as our measure of trade allowances (slotting, placement, and other fees) explicitly excludes logistics payments, which cover the provision of a centralized delivery service. Along the same lines, more efficient suppliers are arguably less likely to rely on the retailers' restocking services and preferring to rely, instead, on their own personnel. However, in our setting, the share of restocking allowances in total trade allowances is too small to be driving our results. Based on our department-level data, we observe that restocking allowances represent only 0.02 percent of total trade allowances.

Another possibility is that small suppliers pay larger allowances but also negotiate more favorable terms (e.g., better shelf positions, placement in promotional flyers, etc.). While we cannot rule this out, anecdotal evidence suggests that this is unlikely to be the case. Rivlin (2016), for instance, reports that retailers allocate their best positions in shelves to large suppliers, and feature them more often and more saliently in weekly features. However, if the willingness to pay for location is negatively correlated with market size (e.g., substantial advertising by large firms reducing their returns to better shelf positions), then we cannot disentangle the effect of "willingness to pay" from market size.[53]

Finally, an alternative interpretation of the negative relationship between allowances and the supplier's market size relates to reverse causality. In effect, higher allowance payments may allow the manufacturer to improve its visibility (through better shelf positions or appearance in weekly advertisements), boost a loyal customer base, and, ultimately, increase market shares. Under this reverse causality interpretation, our estimated coefficient on firm size should be biased towards zero and provides an upper bound to the actual parameter. To minimize this potential issue, we use the second lag of the market size variable as a regressor in our main specification (see Table J.1 in the Appendix). Consistent with the reverse causality story, the estimated coefficient on supplier size is significantly negative and slightly larger in magnitude than our main estimates presented in Table 11.

Overall, while we cannot completely rule out alternative explanations due to data limitations, our results are consistent with buyer power playing a significant role in trade allowance determination.

Efficient Contracts View. We find that suppliers operating in categories with higher private label margins tend to pay a higher share of trade allowances. We found less support for explanations that emphasize the importance of the cost of stocking supplier products. While we observe that categories requiring equipment to maintain products under freezing conditions do indeed tend to pay larger allowances on average (Appendix L), this is no longer the case once we control for other category and supplier characteristics. We find more compelling support for the notion that freezing requirements are relevant in determining logistics fees.

Overall, to the extent that the cost of stocking and shelf space opportunity costs tend to vary primarily at the category level, our results suggest that these might not be a primary factor explaining trade allowances. In effect, our data suggest that supplier-specific factors (as opposed to category-specific factors) explain most trade allowance variation (Appendix F). However, as stated above, we cannot rule out that shelf space's opportunity cost varies within categories due to different locations within a shelf (different height) or a store (e.g., some items from the same category can be exhibited in different aisles).

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[53]Outside the buyer power rationale, other models have also suggested a relationship between market size and allowances. Hristakeva (2019) presents a model where suppliers pay trade allowances to exclude rivals from the shelves. She infers allowances as the payments required to rationalize unobserved profitable assortments across different stores. Under her model, one could expect that large suppliers should pay more considerable allowances to exclude rivals, the opposite of our findings. However, our data are not informative about her model since we do not observe allowances at the store level. Also, Bonnet and Dubois (2010), and Bonnet et al. (2013) introduce theoretical models that relate upstream market concentration and the profitability of two-part tariffs contracts. Thus, one could argue that large firms may prefer two-part tariffs for certain market structures to avoid double marginalization. We show that, in our setting, most suppliers, regardless of their market sizes, engage in a two-part tariff arrangement, with non-linear payments made from the supplier to the retailer.

Our results suggest that suppliers who performed relatively poorly in the past tend to make larger allowance payments (as a share of their gross revenues) in the current period. As pointed out above, past supplier performance might be proxying for the riskiness of having the supplier's products on store shelves, with suppliers showing poor track records being considered riskier than more successful ones. In this view, allowance payments would act as compensation for the retailer to carry potentially unprofitable products. Our results would thus be consistent with relatively riskier suppliers paying more significant allowance amounts. [54,55]

If successful less-risky suppliers are more likely to introduce new products, this result might be at odds with the risk-sharing justification for allowances. However, it is difficult to disentangle the influence of past supplier success –and hence, riskiness– from the fact that retailers tend to demand specific allowance payments (namely, slotting fees) for the introduction of new products. It is highly plausible that the positive coefficient on the number of product introductions is due to larger payments in the form of slotting fees. Another interpretation consistent with the risk-sharing rationale is that given the high rate of new product failures during their first year after launch (e.g., Gielens and Steenkamp, 2007) suppliers introducing more significant numbers of new products are relatively riskier ones.

Regarding the strength of the retailer-supplier relationship the finding that firms that simultaneously supply national brands and private labels show a lower probability of paying trade allowances compared to pure national brand manufacturers is in line with the development of *goodwill* with the retailer (ter Braak et al., 2013b). However, we cannot rule out alternative explanations based on cost efficiencies (e.g., inventory management costs) or other profit-sharing behavior of the retailer. To the best of our knowledge, the characterization of dual branders is quite limited given the difficulty of distinguishing them from exclusive national brand manufacturers or independent (fringe) suppliers (Sethuraman and Raju, 2012). Thus, we document this important feature and leave the exploration of alternative explanations of this stylized fact for future research.

[54]Nonetheless, we acknowledge that our variable on poor past performance may also be capturing firm size, as smaller suppliers are likely to rank low in the revenue distribution. However, since the share of retail revenue (the market size proxy) and our supplier performance variable are significantly correlated with trade allowances, we infer that the poor past performance captures other aspects of the supplier-retailer relationship such as the risk-related explanation.

[55]One related question concerns the impact of supplier riskiness on trade allowances for introducing new products versus payments on existing ones. Unfortunately, we cannot say much on this point as our data do not allow us to separately identify allowance payments associated with new products (e.g., slotting fees) from those related to existing products (e.g., placement fees). We attempt to shed some light on this question by re-estimating our main specification for a subsample of suppliers introducing a smaller number of products in a given chain and period. For these suppliers slotting fees should play a relatively small role in driving their overall allowance payments. Table K.1 in the Appendix section replicates our main estimates for the subset of suppliers in the bottom 50% of the distribution of the number of product introductions (Column (1)) versus the remaining suppliers (Column (2)). We find that the positive effect of low past performance on allowance payments is not observed among suppliers who introduce a relatively small number of products, suggesting that supplier riskiness might be more relevant as a determinant of trade allowances in the case of slotting fees.

Second, using the subsample of national brand manufacturers that covers 80 percent of the suppliers, we find that those with a longer tenure with the retailer show a lower probability of paying allowances. This evidence supports that suppliers developing a more robust and experienced relationship with the retailer can decrease their allowance payments. However, as discussed above, we should be cautious in interpreting these results as they rely on intra-cohort variation. In the data, we observe allowance payments falling sharply after 2008 (see Table I.1 in the Appendix), perhaps related to the specific macroeconomic conditions prevailing at the time the suppliers began their relationships with the retail chains.

In summary, our findings suggest that the supplier-retailer relationship has a meaningful impact on determining allowances. National brand suppliers that agree to produce private labels or display a longer tenure with our retailer present a lower probability of paying slotting and placement allowances.

7 Concluding Remarks

In spite of trade allowances becoming a major source of retail profitability in recent years, a comprehensive characterization of these payments is lacking to date. This paper contributes in this direction by providing the first empirical analysis of actual trade allowance payments. Although our analysis is based on data from two supermarket chains belonging to a single parent company, it provides a more complete picture of the magnitude, variability, and potential determinants of trade allowances than has been possible to date.

Our findings suggest that trade allowances are indeed a substantial component of the contracts between suppliers and retailers. The vast majority of suppliers pay allowances, including both producers of national brands and private labels, and account for a substantial share of their gross revenues. Our results indicate that smaller suppliers tend to pay a larger share of their revenues in trade allowances, a result that is likely to be explained, at least in part, by the retailer's bargaining leverage. We also find that suppliers might be able to lower their allowance payments by showing a good track record of revenue generation and supplying the retailer's private labels.

The evidence documented in this paper suggests that managers of supplier firms may be able to reduce their allowance payments through expanding their product lines to different categories and via engaging in the production of the retailer's private labels.

In addition, our findings can inform the modeling of different aspects of vertical supplier-retailer relationships. First, the evidence is consistent with manufacturer-retailer contracts taking the form of two-part-tariff schemes with fixed fees paid by the supplier.[56] Second, we do not find

[56] Bonnet and Dubois (2010) find evidence consistent with this type of contract in their study of vertical relationships in the bottled water market in France.

empirical support to assume that PLs are directly produced by retailers and hence do not involve trade allowance payments. Our results suggest that the type of contracts entered into by both NB and PL suppliers are structurally identical. Third, our finding of positive spillovers in the allowance payments of multicategory suppliers suggests that allowance payments in specific categories might be driven by forces affecting other categories where a supplier operates. Thus, researchers studying wholesale contracts in individual categories which include relevant multicategory suppliers should exercise caution in the interpretation of their results, and should consider extending their analysis to other related categories.

Our findings also point to areas that require further research. First, our trade allowance data are not product-specific, precluding us from separately studying the determinants of slotting fees from those of allowance payments on existing products. Sudhir and Rao (2006) make progress on this front through the combination of observational data on whether suppliers make slotting payments and real-time survey responses from retail managers. This combination allows them to test different hypotheses on the determinants of slotting allowances. However, evidence on the determinants of the *amounts* of slotting fees is still lacking. Moreover, our evidence on spillovers across categories suggests that the product-level analysis may also miss other critical factors shaping trade allowances. Second, we found evidence of a robust relationship between the opportunity costs of shelf space and trade allowances. However, our data do not contain information on product location in store shelves and variation in assortments that may be important to characterize in more detail the association between the opportunity cost of shelf space and allowance payments. Third, our results on the relationship between trade allowances and private label sourcing indicate that *dual branders* tend to pay lower allowances than fully-committed NB suppliers. An interesting question relates to the mechanism through which *dual branders* are able to pay lower allowances than *Full NB* suppliers. While our results are consistent with suppliers developing goodwill through private labels' production, we would need further information to pin down this relationship (e.g., the actual shelf position of different products and production costs). Fourth, an important question relates to the relationship between trade allowances and prices, which would shed light on the issue of double marginalization. We do not address this point due to data limitations, as we do not observe product-specific trade allowances.

Finally, we acknowledge that our analysis involves observational data coming from two supermarket chains operated by a single retailer. Although we believe the Chilean supermarket industry shares essential features with other markets where trade allowances have become widespread, we cannot guarantee the external validity of our findings. We hope future research will gain access to appropriate data to extend the analysis to a cross-section of several retailers. Regarding the potential endogeneity due to using observational data, we are less optimistic about overcoming this problem as quasi-experiments (or experiments) in allocating allowances seem rather unlikely. We believe that our analysis of these observational data is quite an essential first step to understanding these payments.

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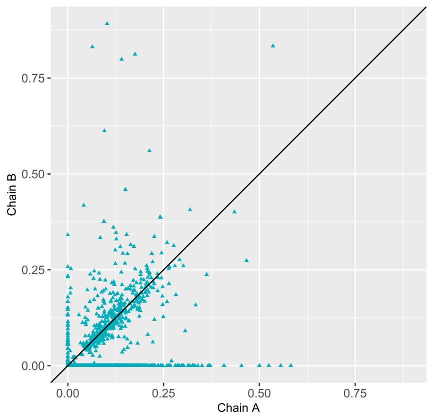
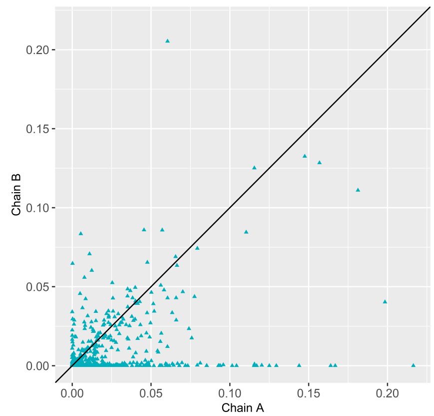
Figure 1: Trade Allowance Components

Notes: The figure decomposes "Slotting, Placement and Other" fees into specific types of trade allowances across product departments. The department-level data group allowances into the following eight product departments: Frozen Foods, Groceries, Non Food, Non Perishables, Perishables,Pharmacy, Textiles and All Departments.

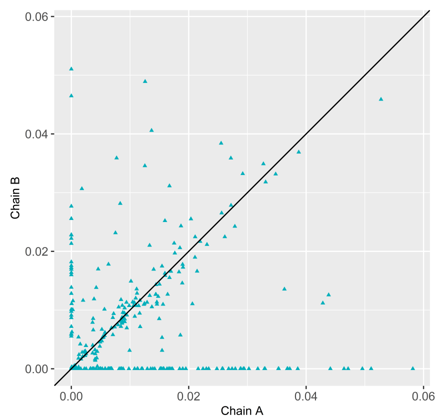
Figure 2: Heterogeneity in Trade Allowances Across Suppliers (Share of Gross Manufacturer Revenues)



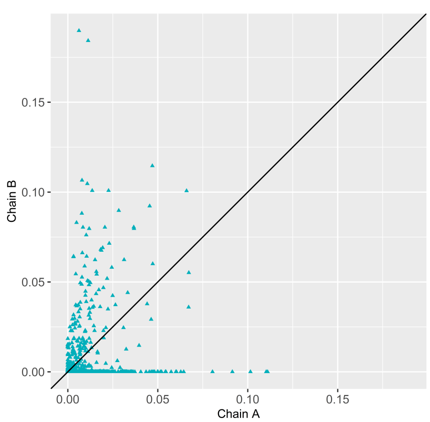
(a) Slotting and Placement Fees



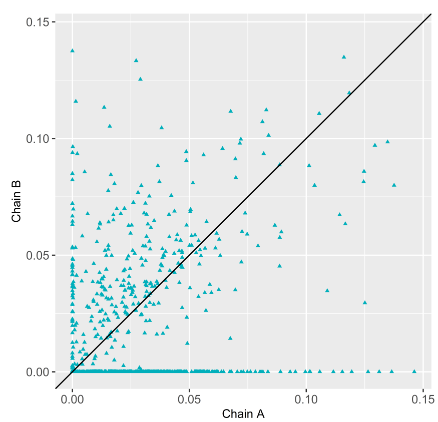
(b) New Store Opening Fees



(c) Logistics Fees



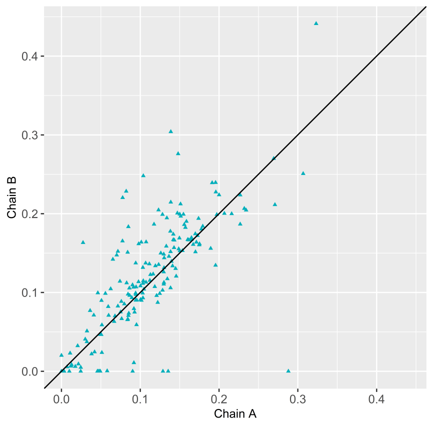
(d) Unsaleable Fees



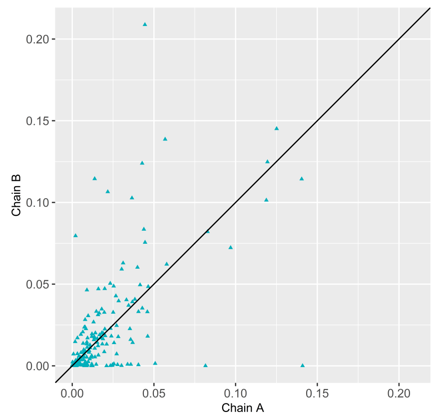
(e) Spot Fees

Notes: The scatter plots show different types of trade allowances as the share of manufacturer revenues across suppliers by supermarket chain. The 45 degree line is in black. Total number of observations, N = 1,571 using semi-annual time aggregation.

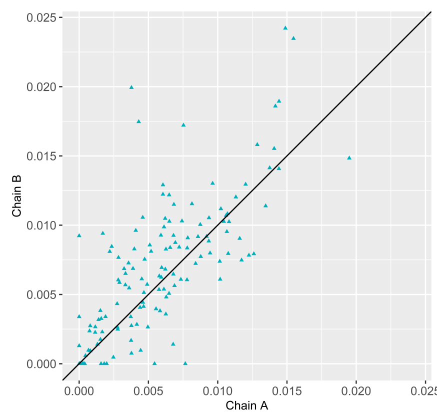
Figure 3: Heterogeneity in Trade Allowances Across Categories (Share of Gross Manufacturer Revenues)



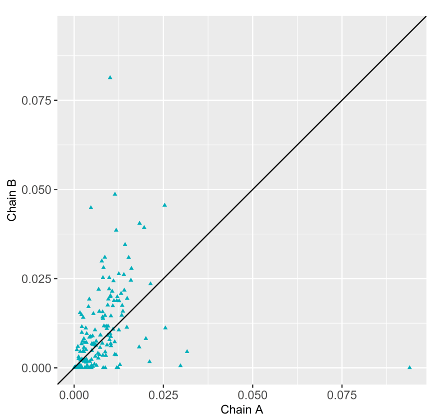
(a) Slotting and Placement Fees



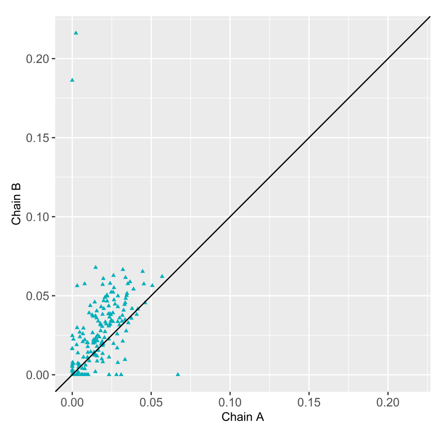
(b) New Store Opening Fees



(c) Logistics Fees



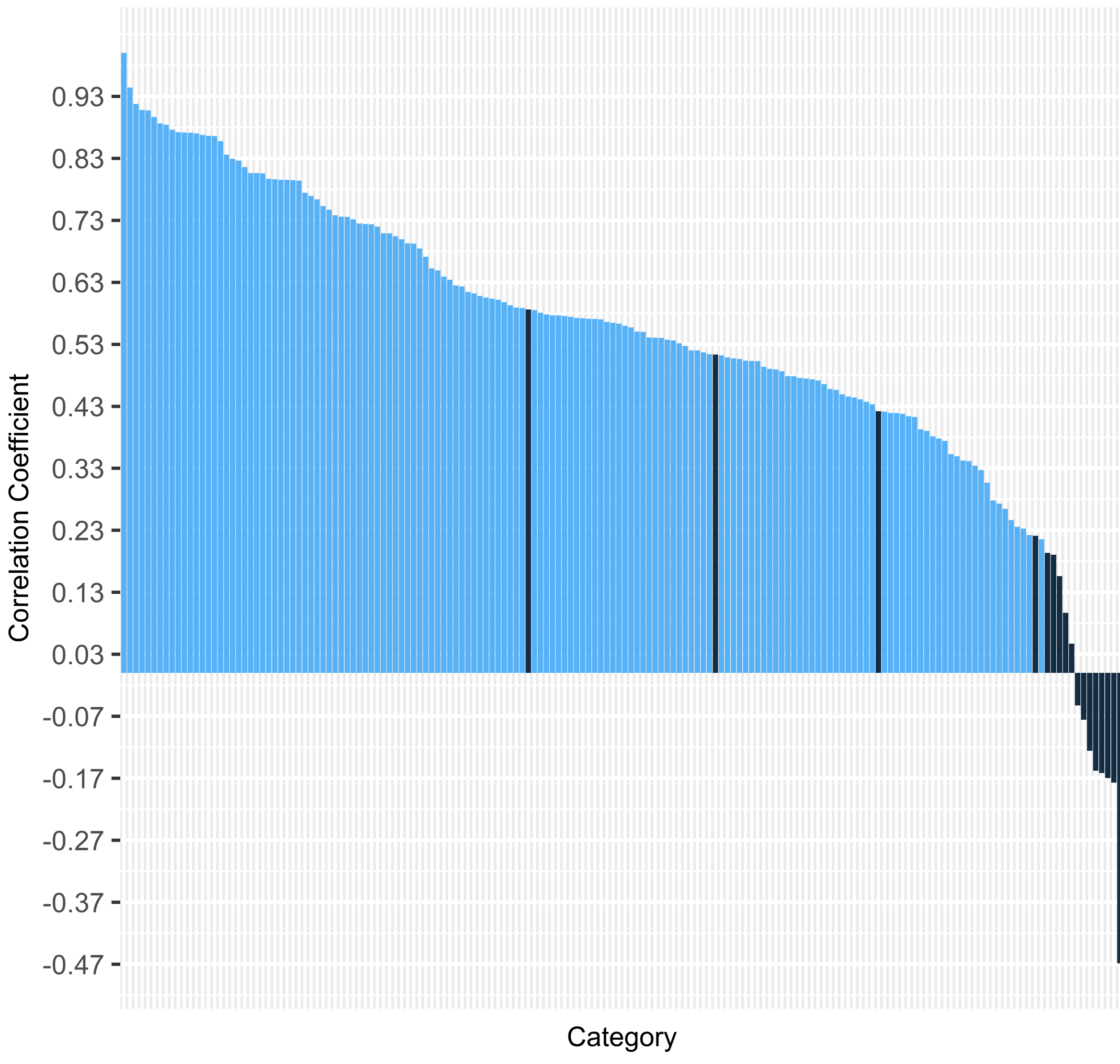
(d) Unsaleable Fees



(e) Spot Fees

Notes: The scatter plots show different types of trade allowances as the share of manufacturer revenues across categories by supermarket chain. The 45 degree line is in black.Total number of observations, N = 178 using semi-annual time aggregation.

Figure 4: Cross-Category Comovement of Trade Allowances (Slotting, Placement & Others, Multi-category Suppliers only)



Notes: The figure shows the correlation coefficients at the category level between Slotting, Placement & Other allowances paid in a category by multi-category supplier and those paid in other categories measured as a share of gross supplier revenue and using semi-annual time aggregation. Specifications include supplier, chain and time fixed effects. Sample restricted to multi-category suppliers (614 out of 1,571). Lighter bars denote statistically significant correlation coefficients (at the 5% level).

Table 1: Efficient Contracts Rationale for Trade Allowances

Rationale	List of Analytical (**A**) and Empirical (**E**) papers
Shelf-Space Allocation: Trade allowances enable efficient shelf-space allocation to more profitable products and to boost within store competition.	**A:** Toto (1990); Sullivan (1997); Lariviere and Padmanabhan (1997); Desai (2000) **E:** Sullivan (1997); Bloom et al. (2000); Wilkie et al. (2002); Sudhir and Rao (2006); Klein and Wright (2007)
Cost Sharing: Trade allowances compensate retailers for increasing costs of introducing and managing new products; plus the higher costs of certain product-categories (e.g., frozen and bulky products)	**A:** Lariviere and Padmanabhan (1997); Desai (2000); Kuksov and Pazgal (2007)
Risk Shifting: Trade allowances balance risk-exposure between suppliers and retailers when launching new products.	**A:** Kelly (1991) **E:** White et al. (2000b); Bloom et al. (2000); Sudhir and Rao (2006)
Signaling and Screening: Trade allowances allow suppliers to signal private information about their new products to the retailer. Also, trade allowances can be used as a screening device by retailers regarding product's riskiness.	**A:** Chu (1992); Desai and Srinivasan (1995); Sullivan (1997); Lariviere and Padmanabhan (1997); Desai (2000); Yehezkel (2014); Chambolle and Christin (2017); Gabrielsen et al. (2017) **E:** Wilkie et al. (2002); Rao and Mahi (2003); Sudhir and Rao (2006)
Efficient Pricing to avoid Double Marginalization: Trade allowances solve the double marginalization problem and reduce retail prices while meeting the retailer participation constraint.	**A:** Gerstner and Hess (1991); Kim and Staelin (1999); Smith (2016); Gabrielsen et al. (2018) **E:** Drèze and Bell (2003); Narasimhan (2009); Sudhir and Datta (2009)

Table 2: Market Power Rationale for Trade Allowances

Rationale	List of Analytical (**A**) and Empirical (**E**) papers
Buyer Power: Trade allowances allow retailers to extract surplus from manufacturers and consumers.	**A:** Chu (1992); Caprice and Von Schlippenbach (2013) **E:** Bloom et al. (2000); Rao and Mahi (2003); Sudhir and Rao (2006); Gómez et al. (2007)
Collusion and Market Power: Trade allowances mitigate upstream and downstream competition to facilitate price coordination (or collusion) yielding higher retail prices.	**A:** Shaffer (1991); Innes and Hamilton (2006, 2009); Kuksov and Pazgal (2007); Foros and Kind (2008); Miklós-Thal et al. (2011); Piccolo and Miklós-Thal (2012); Rey and Whinston (2013); Gilo and Yehezkel (2016) **E:** Bloom et al. (2000); Rao and Mahi (2003)
Foreclosure: Trade allowances enable more resourceful large suppliers to foreclose competitors from the shelves reducing product variety.	**A:** Shaffer (2005); Marx and Shaffer (2007, 2010); Asker and Bar-Isaac (2014) **E:** Gundlach and Bloom (1998); Israilevich (2004); Hristakeva (2019)

Table 3: Description of Datasets used in the Analysis

I. Primary Supplier-Category (Allowance) Data	
# of suppliers	1,571
# of multicategory suppliers	614
# of categories	178
# of sections	45
# of retail chains (banners)	2
Period	Jul/2010-Aug/2012
Frequency	Daily
II. Department-level (Allowance) Data	
# of product departments	8
# of retail chains (banners)	2
Period	2010-2015
Frequency	Monthly
III. Scandata	
# of SKUs	148,062
# of Stores	>200
# of retail chains (banners)	2
Period	Jul/2010-Aug/2012
Frequency	Weekly

Notes: The primary dataset includes allowances at the supplier-category level grouped by the retailer into five classes: (i) Slotting, placement and others; (ii) New store openings; (iii) Logistics; (iv) Unsaleable; and (iv) Spot contracts (essentially, promotional campaigns). The department-level dataset groups allowances into finer classes. In particular, the aggregate "slotting, placement and others" can be decomposed into slotting & placement, street money, quota incentives and cooperative advertising.

Table 4: Summary Statistics on Supplier and Category Characteristics

Chain A	Mean (1)	Median (2)	Std. Dev. (3)
Market Share	0.0934	0.0588	0.1217
# of SKU-store	1,009.9	338.5	2,064.6
Herfindahl-Hirschman Index	0.3168	0.2530	0.2115
Concentration Ratio - CR3	0.7431	0.7565	0.1898
PL Market Share[a]	0.2262	0.0830	0.3047
# Product Introductions per period	22.4	2.0	91.1
Length of Relationship (months)	44.9	49.0	14.6
NB Retail Margin	0.4819	0.4734	0.1227
PL Retail Margin	0.7000	0.6390	0.2506

Table 4: Summary Statistics on Supplier and Category Characteristics (continued)

Chain B	Mean (1)	Median (2)	Std. Dev. (3)
Market Share	0.1354	0.0909	0.1313
# of SKU-store	2,579.0	608.0	7,294.1
Herfindahl-Hirschman Index	0.3954	0.3463	0.2160
Concentration Ratio - CR3	0.8361	0.8666	0.1613
PL Market Share	0.2977	0.1361	0.3469
# Product Introductions per period	16.8	2.0	55.1
Length of Relationship (months)	45.4	49.0	14.2
NB Retail Margin	0.4631	0.4411	0.1415
PL Retail Margin	0.6680	0.6372	0.2320

Notes: Unit of analysis at the supplier-category-period level using semi-annual time aggregation. Total number of observations are 11,848 in Chain A and 6,572 in Chain B.

Table 5: Trade Allowance Amounts and Heterogeneity

Allowance Type	Share of Gross Supp. revenue		$ per SKU, store & year	
	Mean (1)	Std. Dev. (2)	Mean (3)	Std. Dev. (4)
Slotting & Placement				
Chain A	0.101	0.116	$107.0	$309.2
Chain B	0.114	0.152	$67.7	$368.4
New Store Openings				
Chain A	0.015	0.044	$21.2	$127.1
Chain B	0.016	0.057	$11.4	$254.8
Logistics				
Chain A	0.004	0.010	$4.2	$17.3
Chain B	0.005	0.011	$2.5	$10.8
Unsaleables				
Chain A	0.006	0.023	$4.6	$38.7
Chain B	0.009	0.033	$3.0	$14.3
Spot Contracts				
Chain A	0.018	0.029	$11.4	$46.6
Chain B	0.026	0.039	$10.3	$39.9
Total Allowances				
Chain A	0.144	0.148	$148.5	$377.1
Chain B	0.170	0.199	$95.0	$465.4
Overall	0.152	0.169	$128.5	$410.2

Notes: Unit of analysis at the supplier-chain-category-period level using semi-annual time aggregation. Total number of observations, N = 11,848 (Chain A) and N = 6,572 (Chain B). *Slotting & Placement* includes slotting fees, pay-to-stay fees, street money, quota incentives, restocking fees, cooperative advertising and display funds.

Table 6: Trade Allowance Payment Incidence

	Supplier Size					
Allowance Type	All		Small		Large	
	Mean (1)	Std. Dev. (2)	Mean (3)	Std. Dev. (4)	Mean (5)	Std. Dev. (6)
Slotting & Placement						
Chain A	0.731	0.443	0.609	0.488	0.854	0.353
Chain B	0.727	0.446	0.559	0.496	0.895	0.307
New Store Openings						
Chain A	0.636	0.481	0.470	0.499	0.803	0.398
Chain B	0.638	0.480	0.433	0.496	0.844	0.362
Logistics						
Chain A	0.252	0.434	0.113	0.317	0.392	0.488
Chain B	0.327	0.469	0.144	0.351	0.511	0.500
Unsaleables						
Chain A	0.238	0.426	0.150	0.357	0.326	0.469
Chain B	0.250	0.433	0.123	0.328	0.378	0.485
Spot Contracts						
Chain A	0.531	0.499	0.468	0.499	0.593	0.491
Chain B	0.504	0.500	0.409	0.492	0.600	0.490
Total Allowances						
Chain A	0.756	0.429	0.638	0.481	0.875	0.331
Chain B	0.747	0.435	0.579	0.494	0.917	0.276

Notes: Unit of analysis at the supplier-chain-category-period level using semi-annual time aggregation. Total number of observations, N = 11,848 (Chain A) and N = 6,572 (Chain B). Large (small) suppliers defined as those lying above (below) the median market share in a given chain and period. *Slotting & Placement* includes slotting fees, pay-to-stay fees, street money, quota incentives, restocking fees, cooperative advertising and display funds.

Table 7: Trade Allowance Payments by Private Label Engagement Status

Allowance Type	Supplier Type: Full NB		Full PL		Dual Branders	
	Mean (1)	Std. Dev. (2)	Mean (3)	Std. Dev. (4)	Mean (5)	Std. Dev. (6)
Slotting & Placement						
Chain A	0.116	0.117	0.009	0.038	0.005	0.043
Chain B	0.137	0.157	0.016	0.067	0.028	0.117
New Store Openings						
Chain A	0.017	0.047	0.003	0.019	0.000	0.001
Chain B	0.019	0.063	0.005	0.025	0.000	0.001
Logistics						
Chain A	0.005	0.011	0.000	0.003	0.000	0.000
Chain B	0.006	0.012	0.001	0.004	0.002	0.009
Unsaleables						
Chain A	0.008	0.025	0.000	0.001	0.000	0.000
Chain B	0.011	0.036	0.001	0.011	0.000	0.000
Spot Contracts						
Chain A	0.020	0.030	0.004	0.019	0.001	0.005
Chain B	0.030	0.040	0.009	0.031	0.003	0.009
Total Allowances						
Chain A	0.166	0.147	0.016	0.061	0.006	0.045
Chain B	0.204	0.200	0.032	0.111	0.033	0.124

Notes: Unit of analysis at the supplier-chain-category-period level using semi-annual time aggregation. Total number of observations, N = 11,848 (Chain A) and N = 6,572 (Chain B). Large (small) suppliers defined as those lying above (below) the median market share in a given chain and period. *Slotting & Placement* includes slotting fees, pay-to-stay fees, street money, quota incentives, restocking fees, cooperative advertising and display funds.

Table 8: Trade Allowance Payment Incidence by Private Label Engagement Status

	Supplier Type					
Allowance Type	Full NB		Full PL		Dual Branders	
	Mean (1)	Std. Dev. (2)	Mean (3)	Std. Dev. (4)	Mean (5)	Std. Dev. (6)
Slotting & Placement						
Chain A	0.842	0.365	0.088	0.283	0.033	0.180
Chain B	0.872	0.334	0.123	0.328	0.085	0.281
New Store Openings						
Chain A	0.732	0.443	0.082	0.274	0.033	0.180
Chain B	0.764	0.424	0.115	0.320	0.102	0.305
Logistics						
Chain A	0.290	0.454	0.033	0.177	0.000	0.000
Chain B	0.391	0.488	0.060	0.237	0.068	0.254
Unsaleables						
Chain A	0.277	0.447	0.011	0.103	0.008	0.091
Chain B	0.305	0.460	0.018	0.134	0.085	0.281
Spot Contracts						
Chain A	0.607	0.489	0.090	0.286	0.041	0.200
Chain B	0.596	0.491	0.120	0.326	0.119	0.326
Total Allowances						
Chain A	0.867	0.339	0.111	0.314	0.050	0.218
Chain B	0.892	0.311	0.145	0.352	0.220	0.418

Notes: Unit of analysis at the supplier-chain-category-period level using semi-annual time aggregation. Total number of observations, N = 11,848 (Chain A) and N = 6,572 (Chain B). Large (small) suppliers defined as those lying above (below) the median market share in a given chain and period. *Slotting & Placement* includes slotting fees, pay-to-stay fees, street money, quota incentives, restocking fees, cooperative advertising and display funds.

Table 9: Cross-Category Spillovers

	Full Sample (1)	Small Firms (2)	Large Firms (3)
Focal-Category Allowances	0.504***	0.451***	0.832***
	(0.0655)	(0.0763)	(0.0896)
Number of Observations	2322	1531	780
Adj. R-squared	0.258	0.202	0.483
Supplier FE	✓	✓	✓
Category FE	✓	✓	✓
Chain FE	✓	✓	✓
Time FE	✓	✓	✓

Notes: OLS estimates of Equation (3). As the dependent variable, the regressions the log-transformation of the ratio of allowances ("slotting, placement and other fees") over the gross manufacturer revenue. All specifications consider supplier, chain, and time fixed effects using semi-annual time aggregation. Column (1) uses the full sample of all multicategory suppliers. Columns (2) and (3) use the subsample of suppliers with market size below and above the 67 percentile within their chain-period combination, respectively. We had to drop some suppliers from the analysis by size due to a single observation in the data. Cluster-robust (at the supplier level) standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Constructs, Proxies and Rationales for Trade Allowances

Construct (1)	Covariate/Proxy (2)	Primary Rationale (3)	Findings (4)
Market size	**P:** Share of retail revenue	Buyer power	Supportive evidence
Opportunity cost of shelf space	**P:** PL Margin X Presence of PL	Shelf-space allocation	Supportive evidence
Operating cost of stocking	**P:** Refrigeration needs	Cost-sharing	No Support
Past performance	**P:** Poor revenue-generation performance **S:** # of product introductions/withdrawals	Risk-sharing	Supportive evidence
Strength of Relationship	**P:** Engagement with PL production, Length of relationship	Information asymmetries	Partial support

Notes: In Column (2), P and S stand for primary and secondary proxies for different constructs, respectively. Column (3) refers to primary rationales for explaining differences in allowance payments across suppliers.

Table 11: Trade Allowances and Potential Drivers
All Suppliers

	Conditional Amounts		Incidence	
	(1)	(2)	(3)	(4)
Share of Retail Revenue	-2.3806***	-2.1896***	-1.8075	1.4734
	(0.8285)	(0.7958)	(2.1058)	(2.0990)
Number of Introductions	0.0073**	-0.0075**	0.0075	0.0049**
	(0.0030)	(0.0033)	(0.0051)	(0.0022)
Number of Withdrawals	0.0001	-0.0014	-0.0092*	-0.0029
	(0.0032)	(0.0040)	(0.0052)	(0.0023)
Low Performance	0.0407***	0.0770***	0.0810***	-0.0019
	(0.0153)	(0.0224)	(0.0245)	(0.0085)
Duration	-0.0016	-0.0047	0.0005	0.0035
	(0.0021)	(0.0053)	(0.0031)	(0.0022)
Partial Refrigeration	-0.0263	-0.0781***	0.0441	0.0081
	(0.0187)	(0.0246)	(0.0524)	(0.0092)
Full Refrigeration	-0.0394*	-0.0325	-0.0070	0.0016
	(0.0210)	(0.0251)	(0.0700)	(0.0453)
Freezing Requirements	-0.0078	-0.0019	0.0570	-0.0422
	(0.0200)	(0.0241)	(0.0693)	(0.0516)
Full NB	0.0411**	0.1451*	0.5807***	-0.0115
	(0.0199)	(0.0860)	(0.0369)	(0.0104)
Dual	-0.0000	0.1058***	-0.0115	0.0029
	(0.0763)	(0.0270)	(0.0449)	(0.0035)
PL Margin	0.0412***	-0.0071	0.0283	-0.0029
	(0.0145)	(0.0185)	(0.0314)	(0.0066)
Supplier FE	✗	✓	✗	✓
Category FE	✓	✓	✓	✓
Chain FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Number of observations	3232	3151	4530	4343
Adj-R^2	0.1526	0.3377	0.5860	0.9692

Notes: OLS estimates of Equation (4). The dependent variable in Columns (1) and (2) is the log-transform of the ratio of *slotting and placement* allowances over the gross manufacturer revenue conditional on the supplier paying strictly positive allowances. The dependent variable in Columns (3) and (4) is a dummy variable taking the value of one if the supplier pays allowances (slotting and placement fees) in a given chain and period. Cluster-robust standard errors (at the supplier level) in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

Table 12: Trade Allowances, Category Characteristics and Supplier Characteristics
National Brand and Dual Suppliers

	Conditional Amounts		Incidence	
Share of Retail Revenue	-2.3562***	-2.1051***	-1.4957	1.5747
	(0.8419)	(0.7876)	(2.0036)	(2.1493)
Number of Introductions	0.0062**	-0.0082**	0.0090	0.0065***
	(0.0031)	(0.0035)	(0.0060)	(0.0025)
Number of Withdrawals	0.0009	-0.0018	0.0002	-0.0022
	(0.0033)	(0.0041)	(0.0061)	(0.0014)
Low Performance	0.0416***	0.0797***	0.0737***	-0.0031
	(0.0157)	(0.0231)	(0.0258)	(0.0103)
Duration	-0.0020	-0.0046	-0.0078**	0.0018
	(0.0022)	(0.0054)	(0.0039)	(0.0023)
Partial Refrigeration	-0.0262	-0.0794***	0.0673	0.0116
	(0.0188)	(0.0249)	(0.0514)	(0.0102)
Full Refrigeration	-0.0383*	-0.0326	0.0215	0.0063
	(0.0216)	(0.0249)	(0.0697)	(0.0515)
Freezing Requirements	-0.0038	-0.0012	0.0423	-0.0433
	(0.0204)	(0.0240)	(0.0679)	(0.0564)
Dual	-0.0395	—	-0.6162***	0.0030
	(0.0767)		(0.0580)	(0.0119)
PL Margin	0.0413***	-0.0045	0.0634**	-0.0005
	(0.0147)	(0.0187)	(0.0319)	(0.0066)
Supplier FE	✗	✓	✗	✓
Category FE	✓	✓	✓	✓
Chain FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Number of observations	3158	3079	3793	3661
Adj-R^2	0.1519	0.3355	0.3913	0.9633

Notes: OLS estimates of Equation (4). The dependent variable in Columns (1) and (2) is the log-transform of the ratio of *slotting and placement* allowances over the gross manufacturer revenue conditional on the supplier paying strictly positive allowances. The dependent variable in Columns (3) and (4) is a dummy variable taking the value of one if the supplier pays allowances (slotting and placement fees) in a given chain and period. The sample includes all suppliers fully dedicated to national brands (NB) and dual suppliers (i.e., dedicated to the manufacturing of both national brands and private labels). Cluster-robust standard errors (at the supplier level) in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

Appendix (For Online Publication)

A Data Processing

A.1 Data Sources

A.1.1 Primary Supplier-Category Allowance Data

The retailer maintains records of the allowance payments made by all its suppliers to the two supermarket chains included in our analysis. Each observation corresponds to a payment made by a supplier in a given product category of a given supermarket chain and includes the specific day when the payment was made. The panel includes payments made between July 2010 and August 2012. Trade allowances are grouped in this data set into the following five groups: 1) Slotting, placement and other fees; 2) Logistics fees; 3) New store opening fees; 4) Unsaleables fees and 5) Allowances negotiated in spot contracts.

A.1.2 Scandata

This dataset contains scandata including retail prices, wholesale costs and quantities at the SKU-store level for the two supermarket chains included in our analysis. The panel covers the period from week 32 of 2010 to week 32 of 2012. Each SKU is identified by its barcode (EAN-13) and also by a unique identifier used by the retailer. There are nearly 150,000 SKUs in more than 200 supermarket stores in the data.

A.1.3 Product Master Record

For each SKU identified both by its barcode (EAN-13) and the retailer internal unique identifier this dataset includes the category and section to which the SKU belongs to and the supplier that supplies the SKU. In addition, it includes the date when the SKU was added to the system for the first time, the SKU's brand name and whether it is a private label or not.

A.2 Data Preparation

We integrated the primary allowance data and the scandata using the supplier-SKU mapping provided by the product master record. Before merging the two datasets we aggregated data at the semi-annual level and removed some mismeasured values (e.g., negative prices and quantities) and removed outliers. We further removed some minor categories including seasonal products such as christmas decoration.

B Further Details on the Data

Product Departments: The Department-level (Allowance) Data (dataset **II** in Table 3) include the following eight departments: Frozen Foods, Groceries, Non Food, Non Perishables, Perishables, Pharmacy, Textiles and All Departments.

Product Sections and Categories: Our analysis based on the Primary Supplier-Category (Allowance) Data and the Scandata (datesets I and III in Table 3, respectively) include the 45 product sections listed in Table B.1 and the 178 product categories listed in Table B.2.

Category definitions are determined by the retailer on the basis of proximity on supermarket shelves. In our analysis, we excluded 10 out of the initial 188 categories which where either not closely related with the retailer's main business (e.g., "restaurant", "prepared meals"), were seasonal in nature (e.g., "Christmas decoration") or were poorly defined (e.g., "gift cases"). The 10 excluded categories are: *Christmas Decoration*, *Own Pastries*, *Gift Cases*, *Pasta Making*, *Pre-Wash*, *Pre-payments*, *Restaurant*, *Prepared Meals*, *Cards* and *Special Seasons*.

Table B.1: Product Sections Included in the Analysis

1	Audio-Video-Computing	24	Home Appliances
2	Automotive	25	Home Electronics
3	Bottled Products	26	Kitchenware
4	Cheese	27	Meat
5	Chicken	28	New Technologies
6	Cigarettes	29	Office Supplies
7	Cleaning	30	Outdoor Furniture
8	Clothing	31	Own Bakery
9	Cocktail	32	Packaged Bakery
10	Coldcuts	33	Pastas
11	Cookies and Candies	34	Pastries
12	Dairy	35	Perfumery
13	Decoration and Organization	36	Pets
14	Electronics	37	Pharmacy
15	Fish	38	Pork and Lamb
16	Frozen Foods	39	Spirits
17	Fruits and Vegetables	40	Sports and Leisure
18	Furniture	41	Takeout
19	Garden	42	Textiles and household
20	Garden accessories	43	Toys
21	Grills and Pools	44	Various
22	Groceries	45	Wines
23	Hardware		

Notes: The table reports all sections included in the analysis. These sections cover the 178 categories listed in Table B.2.

Table B.2: Product Categories Included in the Analysis

1	Pet accessories	46	Coloring	91	Eggs	136	Child perfumes
2	Computing accessories	47	Ethnic foods	92	Home insecticides	137	Frozen seafood
3	Bikes accessories	48	Prepared meals - Frozen	93	Baby nighttime	138	Fresh seafood
4	Bathroom accessories	49	Washing complements	94	Men nighttime	139	Batteries
5	Baby accessories	50	Spices	95	Women nighttime	140	Candles and matches
6	Hair accessories	51	Canned pate	96	Children nighttime	141	Swimming pools
7	Men accessories	52	Canned fruits and vegetables	97	Soap	142	Local spirits
8	Women accessories	53	Canned seafood	98	Garden	143	Pesticides
9	Child Accessories	54	Party items	99	Fresh juices	144	Chicken
10	Cooking oil	55	Creams	100	Toys	145	Desserts
11	Mineral waters	56	Body care	101	Dish-washing detergents	146	First aid
12	Dog food	57	Facial care	102	Milk powder	147	Paper products
13	Cat food	58	Men care	103	Milk UHT	148	Solar protection
14	Home ambience	59	Hair removal	104	Legumes	149	Instant mashed potatoes
15	Electric bulbs	60	Sports	105	Yeast	150	Cheeses
16	Sanitary sands	61	Milk derivatives	106	Office supplies	151	Powder drinks
17	Rice	62	Desktop-Notebook	107	Liquors	152	Pastries
18	Kitchen cleaning	63	Deodorants	108	Toilet cleaners	153	Milk flavoring
19	Manual cleaning	64	Laundry detergents	109	Home cleaners	154	Salt
20	Audio-Video	65	Sweeteners	110	Footwear cleaners	155	Dressings and sauces
21	Automotive	66	Home electronics	111	Tomato sauces	156	Health
22	Oat-meals	67	Cold cuts	112	Manicure-pedicure	157	Paper napkins
23	Sugar	68	School	113	Milk candy	158	Snacks
24	Functional drinks	69	Pharmacy	114	Lard	159	Dog snacks
25	Soft drinks	70	Hardware	115	Butter	160	Soups
26	Isotonic drinks	71	Auto Hardware	116	Makeup	161	Hair styling
27	Bikes	72	Delicatessen	117	Margarine	162	Clothing smoothers
28	Biscuits	73	Pasta	118	Medicines	163	Supplements
29	Trash bags	74	Photography	119	Kitchenware	164	Cards
30	Coffee	75	Perfumes	120	Jam and honey	165	Tea
31	Socks	76	Frozen fruits	121	Furniture	166	Telephony
32	Heat	77	Dried fruit	122	Fruit juice	167	Home textiles
33	Baby footwear	78	Fruits and vegetables	123	Child nutrition	168	Paper towels
34	Men footwear	79	Seeds	124	Other candies	169	TV-LCD
35	Women footwear	80	Cookies	125	Packaged bakery	170	Ventilation
36	Children footwear	81	Candies	126	Own bakery	171	Frozen vegetables
37	Camping and outdoors	82	Frozen hamburgers	127	Adult diapers	172	Baby clothing
38	Meats	83	Flour	128	Baby diapers	173	Men clothing
39	Wax-scrubs	84	Ice-cream	129	Cloths	174	Women clothing
40	Pork	85	Ice	130	Toilet paper	175	Children clothing
41	Breakfast cereals	86	Oral hygiene	131	Grill	176	Vinegar
42	Beers	87	Hair hygiene	132	Fresh pasta	177	Wines
43	Champagne	88	Women hygiene	133	Packaged pastries	178	Yogurts and desserts
44	Chocolates	89	Hypochlorites	134	Natural products		
45	Cigarettes	90	Vegetables	135	Films and music		

Notes: The table reports all categories included in the analysis.

Table B.3: Refrigeration Requirement Variable

Category	r	Category	r	Category	r	Category	r
Pet accessories	0	Coloring	0	Eggs	0	Child perfumes	0
Computing accessories	0	Ethnic foods	0	Home insecticides	0	Frozen seafood	3
Bikes accessories	0	Prepared meals - Frozen	3	Baby nighttime	0	Fresh seafood	2
Bathroom accessories	0	Washing complements	0	Men nighttime	0	Batteries	0
Baby accessories	0	Spices	0	Women nighttime	0	Candles and matches	0
Hair accessories	0	Canned pate	0	Children nighttime	0	Swimming pools	0
Men accessories	0	Canned fruits and vegetables	0	Soap	0	Local spirits	0
Women accessories	0	Canned seafood	0	Garden	0	Pesticides	0
Child Accessories	0	Party items	0	Fresh juices	2	Chicken	2
Cooking oil	0	Creams	0	Toys	0	Desserts	2
Mineral waters	0	Body care	0	Dish-washing detergents	0	First aid	0
Dog food	0	Facial care	0	Milk powder	0	Paper products	0
Cat food	0	Men care	0	Milk UHT	0	Solar protection	0
Home ambience	0	Hair removal	0	Legumes	0	Instant mashed potatoes	0
Electric bulbs	0	Sports	0	Yeast	0	Cheeses	2
Sanitary sands	0	Milk derivatives	0	Office supplies	0	Powdered drinks	0
Rice	0	Desktop-Notebook	0	Liquors	0	Pastries	1
Kitchen cleaning	0	Deodorants	0	Toilet cleaners	0	Milk flavoring	0
Manual cleaning	0	Laundry detergents	0	Home cleaners	0	Salt	0
Audio-Video	0	Sweeteners	0	Footwear cleaners	0	Dressings and sauces	0
Automotive	0	Home electronics	0	Tomato sauces	0	Health	0
Oat-meals	0	Cold cuts	2	Manicure-pedicure	0	Paper napkins	0
Sugar	0	School	0	Milk candy	0	Snacks	0
Functional drinks	1	Pharmacy	0	Lard	0	Dog snacks	0
Soft drinks	1	Hardware	0	Butter	2	Soups	0
Isotonic drinks	1	Auto Hardware	0	Makeup	0	Hair styling	0
Bikes	0	Delicatessen	1	Margarine	2	Clothing smoothers	0
Biscuits	0	Pasta	0	Medicines	0	Supplements	0
Trash bags	0	Photography	0	Kitchenware	0	Cards	0
Coffee	0	Perfumes	0	Jam and honey	0	Tea	0
Socks	0	Frozen fruits	3	Furniture	0	Telephony	0
Heat	0	Dried fruit	0	Fruit juice	2	Home textiles	0
Baby footwear	0	Fruits and vegetables	2	Child nutrition	0	Paper towels	0
Men footwear	0	Seeds	0	Other candies	0	TV-LCD	0
Women footwear	0	Cookies	0	Packaged bakery	0	Ventilation	0
Children footwear	0	Candies	0	Own bakery	0	Frozen vegetables	3
Camping and outdoors	0	Frozen hamburgers	3	Adult diapers	0	Baby clothing	0
Meats	2	Flour	0	Baby diapers	0	Men clothing	0
Wax-scrubs	0	Ice-cream	3	Cloths	0	Women clothing	0
Pork	2	Ice	3	Toilet paper	0	Children clothing	0
Breakfast cereals	0	Oral hygiene	0	Grill	0	Vinegar	0
Beers	1	Hair hygiene	0	Fresh pasta	2	Wines	1
Champagne	1	Women hygiene	0	Packaged pastries	2	Yogurts and desserts	2
Chocolates	0	Hypochlorites	0	Natural products	0		
Cigarettes	0	Vegetables	2	Films and music	0		

Notes: The refrigeration requirement variable, r, takes the values 0 if the category does not require refrigeration; 1 if the category requires partial refrigeration; 2 if the category requires total refrigeration; and 3 if the category requires freezing.

Table B.4: List of Non-Voluminous Categories

	Category
1	Computing accessories
2	Bikes accessories
3	Baby accessories
4	Hair accessories
5	Men accessories
6	Women accessories
7	Child accessories
8	Cigarettes
9	Films and Music
10	Batteries
11	Powder Drinks

Notes: The table lists categories which are labeled as containing non-voluminous products.

Table B.5: Summary Statistics on Trade Allowances - Supplier Level of Aggregation

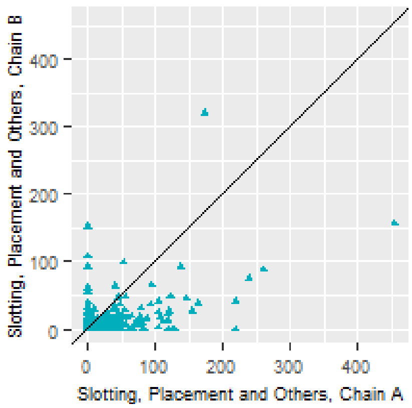
Allowance Type	Share of Gross Supp. revenue		$ per SKU, store & year	
	Mean	Std. Dev.	Mean	Std. Dev.
	(1)	(2)	(3)	(4)
Slotting & Placement				
Chain A	0.084	0.094	$120.0	$338.0
Chain B	0.098	0.118	$89.2	$332.4
New Store Openings				
Chain A	0.009	0.024	$10.9	$60.5
Chain B	0.008	0.020	$5.9	$21.7
Logistics				
Chain A	0.002	0.007	$3.7	$16.7
Chain B	0.004	0.008	$2.9	$14.5
Unsaleables				
Chain A	0.005	0.017	$5.5	$57.9
Chain B	0.009	0.024	$3.8	$12.2
Spot Contracts				
Chain A	0.015	0.024	$11.7	$50.6
Chain B	0.021	0.030	$9.6	$34.9
Total Allowances				
Chain A	0.116	0.120	$151.8	$380.5
Chain B	0.139	0.149	$111.5	$343.1

Notes: Unit of analysis at the supplier-chain-category-period level using semi-annual time aggregation. Total number of observations, N = 4,646 (Chain A) and N = 2,255 (Chain B). *Slotting & Placement* includes slotting fees, pay-to-stay fees, street money, quota incentives, restocking fees, cooperative advertising and display funds.

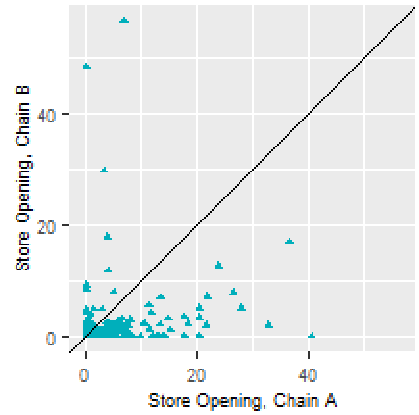
Figure B.1: Market Size across Supermarket Chains

Notes: The figure shows the overall share of retail revenues of each supplier-time combination across supermarket chains with semi-annual time aggregation. We observe a large dispersion on supplier market sizes in both chains (the coefficient of variation of SRR equals 4.35 and 6.37 in chains A and B, respectively) and a high degree of correlation between chains ($\rho = 0.98$). In addition, points in the figure tend to lie above the 45-degree line, implying that market sizes of a given supplier-time combination tend to be larger in Chain B relative to Chain A.

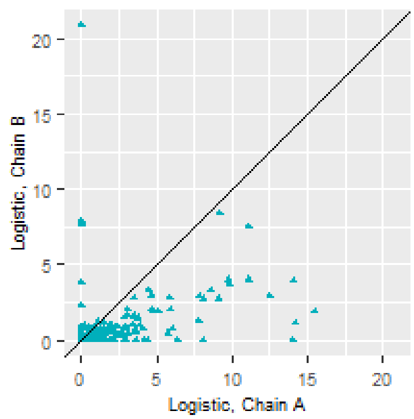
Figure B.2: Heterogeneity in Trade Allowances Across Suppliers (as amount per SKU-store-month)



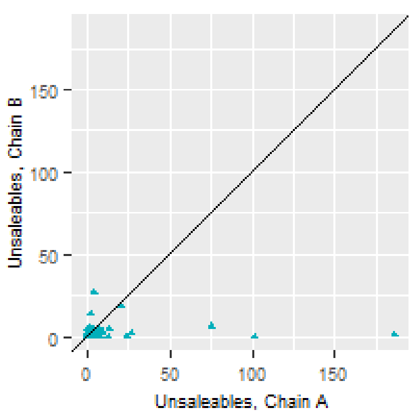
(a) Slotting and Placement Fees



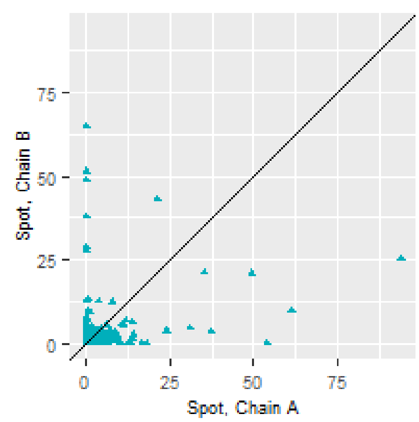
(b) New Store Opening Fees



(c) Logistics Fees



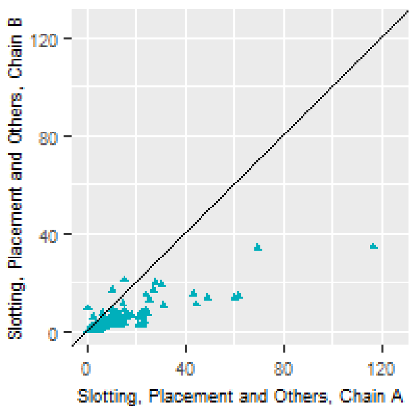
(d) Unsaleable Fees



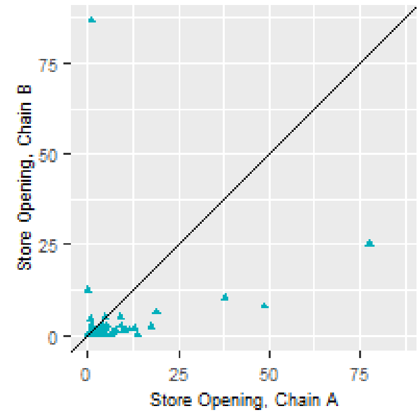
(e) Spot Fees

Notes: The scatterplots show the share of different trade allowances over gross manufacturer revenues across suppliers in different supermarket chains. The black line is in a 45 degree angle to the x-axis. Total number of observations is $N = 1,245$ using semi-annual time aggregation.

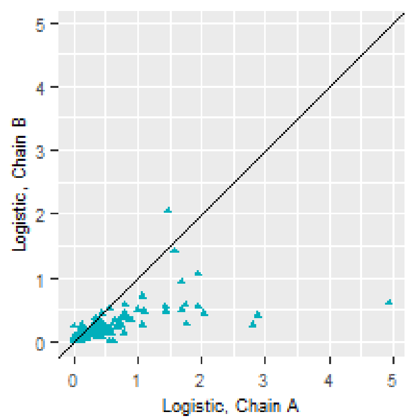
Figure B.3: Heterogeneity in Trade Allowances Across Categories (as amount per SKU-store-month)



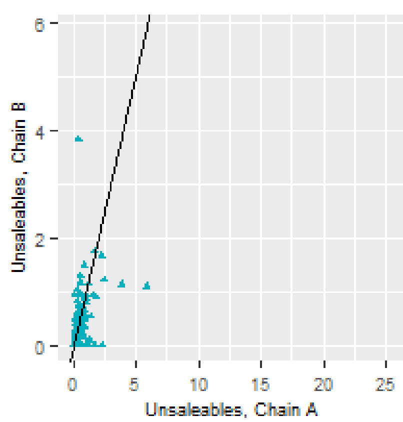
(a) Slotting and Placement Fees[a]



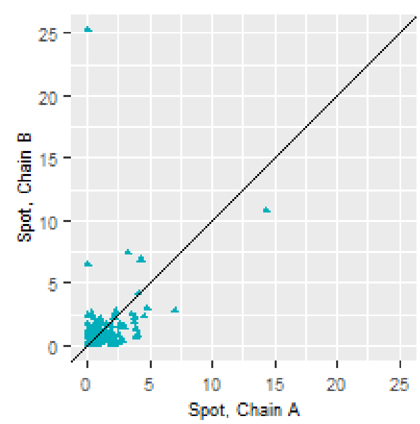
(b) New Store Opening Fees



(c) Logistics Fees



(d) Unsaleable Fees



(e) Spot Fees

Notes: The scatter plots show the amounts per SKU-store-period across categories in different supermarket chains using semi-annual time aggregation. The black line is in a 45 degree angle to the x-axis. [a] The chart excludes two extreme points (located at coordinates (235.7, 59.9) and (63.2, 127.9)) for ease of visualization. Total number of observations, N = 178 using semi-annual time aggregation.

Table B.6: Correlation Across Allowance Types (Incidence)

Chain A	Slotting	Spot	Logistics	Openings	Unsaleables
Slotting	1				
Spot	0.029***	1			
Logistics	0.223***	0.113***	1		
Openings	0.031***	0.119***	0.021**	1	
Unsaleable Fees	0.057***	0.095***	0.029***	0.032***	1

Chain B	Slotting	Spot	Logistics	Openings	Unsaleables
Slotting	1				
Spot	0.171***	1			
Logistics	0.263***	0.228***	1		
Openings	-0.007	0.081***	-0.001	1	
Unsaleable Fees	0.064***	0.058***	0.075***	0.062***	1

Notes: The table presents the correlation matrix between the incidence of different types of allowances (i.e. whether the allowance is paid or not) after removing supplier, category and time fixed effects. "Slotting" stands for "Slotting, Placement and Other" allowances; "Openings" stand for "New Store Opening" allowances. P-values notation: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Total number of observations, N = 10,248 (Panel A) and N = 5,786 (Panel B) using semi-annual time aggregation.

C Variance Decomposition of Trade Allowances

We investigate the sources of variation in trade allowance payments using the following non-nested variance components model:

$$a_{sckt} = \alpha + \tau_t + \theta_c + \xi_k + \varepsilon_{sckt} \tag{5}$$

where the dependent variable, a_{sckt}, is a given type of trade allowance (measured as the share of gross manufacturer revenue); and the explanatory variables are time (τ_t), chain (θ_c), and category (ξ_k) random effects. We assume that the random effects are *iid* and normally distributed: $\tau_t \sim \mathcal{N}(0, \sigma_\tau^2)$, $\theta_c \sim \mathcal{N}(0, \sigma_\theta^2)$, $\xi_k \sim \mathcal{N}(0, \sigma_\xi^2)$, $\varepsilon_{sckt} \sim \mathcal{N}(0, \sigma_\varepsilon^2)$. Since, as we discuss in Section 4.3, a non-trivial number of suppliers in our data participate in multiple categories, the model does not impose a nesting structure in which suppliers are nested within categories.[57] Our aim is to identify the fraction of the observed variance of a given trade allowance type that can be explained by the variation in common-time shocks (τ_t); chain-specific factors (θ_c), category-specific factors (ξ_k) and the residual variation capturing supplier-specific factors. We estimate the model by maximum likelihood.

Panel A of Table C.1 presents the fraction of the total variance in a given type of trade allowance due to time, chain, category and supplier-specific factors. All variance components are statistically significant at the five percent level for each of the five types of trade allowances in our data (*Slotting, Placement, and Others*; *New Store Openings*; *Logistics*; *Unsaleables*; and *Spot*). We use the share of gross manufacturer revenue as a metric for trade allowance payments, since, as described in Section 3, allowance payments agreed between retailers and suppliers are typically expressed as a share of supplier revenue (an exception being new-store-opening fees).

The estimation results show that variation across suppliers explains most of the variance in all trade allowance types, while category-specific factors account for a lower fraction of the variation (compare Columns (3) and (4) in Panel A of Table C.1). In effect, Panel A in Table C.1 shows that the variation across suppliers accounts for between 80% (Slotting, Placement, and Others) and 91% (Unsaleables) of the total variation in trade allowances measured as a share of gross manufacturer revenue. The category-level effect accounts for only between 5.1% (*Unsaleables*) and 19% (*Slotting, Placement, and Others*). We also estimate a similar variance components model for the subset of single-category suppliers. In this case, the model accounts for the fact that suppliers are nested within categories in a given chain. The results of the estimation, presented in Panel B of Table C.1 paint a very similar picture to the one arising from the analysis of the full sample of suppliers: The bulk of the variation in trade allowances, across all trade allowance types, is explained by

[57]We did explore alternative nesting structures which considered categories nested within chains and time, and found that results are very similar to the ones we find using the non-nested model. We also find very similar results if, instead of a random-effects model, we estimate a mixed-effects model in which time and chain components are treated as fixed effects.

supplier-specific factors.

A potential concern with the previous analysis is that it does not account for the type of negotiation spillovers discussed in Section 4.3 which may cause allowances paid by a given (multi-category) supplier to be correlated across categories. We investigate how the presence of multi-category suppliers affects our findings using the following alternative specification:

$$\widetilde{a}_{sct} = \alpha + \sum_{k=1}^{K} \beta_k \, \mathbb{1}(s \in \Omega_{kct}) + \varepsilon_{sct} \tag{6}$$

where $\widetilde{a}_{sct}$ is the *residualized* trade allowance, obtained by partialling out the effects of chain and time components from the corresponding trade allowance variable. The indicator variable, $\mathbb{1}(s \in \Omega_{kct})$, takes the value 1 if firm s supplies products in category k and chain c in period t. We use the R-squared of this regression equation as a measure of the fraction of the allowance variation that is explained by category-specific characteristics. As before, we conduct the decomposition for each type of trade allowance measured as a share of gross manufacturer revenue. The results presented in Table C.2 confirm that supplier-specific effects explain most of the variation in trade allowances. Category-specific factors explain only between 5.1% (Unsaleables) and 20% (New store openings) of the total variation of trade allowances measured as a share of gross manufacturer revenue (Panel A), after controlling for time and chain fixed effects.[58]

We further investigate the extent to which the variation in allowance payments across suppliers is related to differences in suppliers' level of engagement with the production of private labels ("private label engagement status"). As before, we distinguish between three levels of engagement, which we label *Full NB* (no engagement at all), *Dual* (partial engagement) and *Full PL* (complete engagement). We estimate the following variance components model:

$$a_{spckt} = \alpha + \tau_t + \theta_c + \xi_k + \phi_p + \varepsilon_{spckt} \tag{7}$$

where ϕ_p is a private-label status component and the residual term captures variation specific to suppliers having a given level of engagement with private label manufacturing.

The results of the maximum likelihood estimation of Equation (7) are summarized in Table C.3. We observe substantial heterogeneity in the importance of private-label status among allowance types. Private label status is more relevant in the determination of Slotting, Placement and other trade allowances, explaining 11.2% of its total variation. While not a major source of variation of *Slotting, Placement and Other* fees, private-label engagement status accounts for approximately half

[58]We obtain similar results in Panel B that limit the analysis to single category suppliers. We find that more than 81% of the variation in "slotting, placement and other fees" is explained by variation across suppliers, and category-specific effects explain approximately 19%. The variation across suppliers within categories explains a more significant fraction of total variance in other allowance classes.

the share accounted for by category-specific factors. In contrast, private-label engagement status explains only a tiny fraction of the variation in other allowance types. The variation accounted by supplier-specific factors within a given level of private label engagement remains above 75% across all trade-allowance types.

Table C.1: Variance Decomposition of Trade Allowances
(% of total variance)

Variance Component:	Supplier (1)	Category (2)	Chain (3)	Time (4)
Slotting, Placement and Others	0.796	0.188	0.004	0.012
New Store Openings	0.804	0.195	0.000	0.000
Logistics	0.828	0.169	0.002	0.002
Unsaleables	0.906	0.051	0.004	0.039
Spot	0.841	0.140	0.018	0.001
Panel B. Single-Category Suppliers Only				
Slotting, Placement and Others	0.703	0.273	0.012	0.012
New Store Openings	0.924	0.071	0.005	0.000
Logistics	0.663	0.330	0.006	0.000
Unsaleables	0.668	0.310	0.002	0.020
Spot	0.729	0.253	0.017	0.000

Notes: Variance decomposition following the model in Equation (5) for each type of allowance. Entries in Columns 1-4 indicate the fraction of the total variance due to supplier, category, chain and time-specific factors, respectively. All components are significant at the 5% significance level. Number of observations in each panel N= 24,153 using semi-annual time aggregation.

D Correlation Across Allowance Classes

Cross-Class Substitutability. A potentially important question in the characterization of trade allowances is whether larger payments in specific allowance class are compensated by smaller payments in other types of allowances. Suppose the different classes of allowances correspond to specific retailer's distribution services (such as shelf space, use of warehouse facilities, presence in new stores, etc.). In that case, we should expect to observe limited substitution across allowances.

To assess the substitution between different allowance classes, we compute partial correlation coefficients between different types of allowances paid for a given supplier-category-time-chain combination. Table D.1 presents correlation matrices (by chain) of the bivariate associations between different types of allowances (measured as a share of gross manufacturer revenue),

Table C.2: Variance Decomposition of Trade Allowances Accounting for Multi-Category Suppliers (% of total variance)

Panel A. All Suppliers

Variance Component:	Supplier (1)	Category (2)	Chain (3)	Time (4)
Slotting, Placement and Others	0.796	0.188	0.004	0.012
New Store Openings	0.804	0.195	0.000	0.000
Logistics	0.828	0.169	0.002	0.002
Unsaleables	0.906	0.051	0.004	0.039
Spot	0.841	0.140	0.018	0.001

Panel B. Single-Category Suppliers Only

Allowance Type (1)	Supplier (2)	Category (3)	Chain (4)	Time (5)
Slotting, Placement and Others	0.809	0.188	0.002	0.000
New Store Openings	0.939	0.060	0.001	0.001
Logistics	0.902	0.098	0.000	0.000
Unsaleables	0.981	0.018	0.001	0.002
Spot	0.941	0.059	0.000	0.000

Notes: Entries indicate the fraction of the total variance due to time, chain, category and supplier-specific factors for each allowance type. Estimates obtained from R-squared of residualized allowances, following the model of Equation (6). As the dependent variable, Panel A uses the log-transformation of the ratio of allowances over the gross manufacturer revenue, while Panel B uses the allowance amount per SKU-store-period, respectively. All components are significant at the 5% significance level. Number of observations is $N = 12,604$ using semi-annual time aggregation.

controlling for supplier, category, and time fixed effects.[59] We also replicate the same analysis but considering incidence (i.e., whether a supplier pays allowance or not) instead of amounts.[60]

Overall, we observe positive correlations in terms of incidence and amounts paid, providing no evidence of substitution across classes. On the contrary, we observe some complementarities across allowance types. In particular, *Slotting, Placement, and Others* positively correlates with *Logistics* allowances in both supermarket chains (the correlation coefficient is approximately 0.25 in both chains). Moreover, we observe a positive correlation between *Slotting, Placement, and Other* fees and *Spot* allowances in both chains. Finally, we also examine whether these patterns vary between large and small suppliers and do not find evidence that supplier size influenced the

[59] We remove fixed effects by using the residuals of auxiliary regressions of different allowance types on supplier, category, and time fixed effects.

[60] The correlation matrix of incidence is in Table B.6 in the Appendix.

Table C.3: Variance Decomposition of Trade Allowances: Role of Private Label Engagement (% of total variance)

Variance Component:	Supplier (1)	PL Status (2)	Category (3)	Chain (4)	Time (5)
Slotting, Placement and Others	0.745	0.112	0.120	0.008	0.016
New Store Openings	0.805	0.007	0.187	0.000	0.000
Logistics	0.831	0.009	0.155	0.003	0.002
Unsaleables	0.901	0.012	0.041	0.005	0.041
Spot	0.778	0.080	0.112	0.028	0.001

Notes: Variance decomposition following the model in Equation (7) for each type of allowance. Entries in Columns (1)-(5) indicate the fraction of the total variance due to supplier, private label status (full national brand, full private label or dual), category, chain and time-specific factors, respectively. All components are significant at the 5% significance level. Number of observations in each panel *N*= 18,420 using semi-annual time aggregation.

relationship between different allowance classes.[61]

[61] The results from this analysis are available from the authors upon request.

Table D.1: Correlation Across Allowance Types (Amounts)

Chain A	Slotting	Spot	Logistics	Openings	Unsaleable Fees
Slotting	1				
Spot	0.101***	1			
Logistics	0.250***	0.108***	1		
Openings	0.051***	0.078***	0.048***	1	
Unsaleable Fees	0.043***	0.035***	0.042***	0.046***	1
Chain B	Slotting	Spot	Logistics	Openings	Unsaleable Fees
Slotting	1				
Spot	0.239***	1			
Logistics	0.247***	0.243***	1		
Openings	0.027**	-0.017	-0.018	1	
Unsaleable Fees	-0.021*	-0.019***	-0.015	0.073***	1

Notes: The table presents the correlation matrix between different types of allowances (as a share of wholesale revenue) after removing supplier, category and time fixed effects. "Slotting" stands for "Slotting, Placement and Other" allowances; "Openings" stand for "New Store Opening" allowances. P-values notation: *** p<0.01, ** p<0.05, * p<0.1. Total number of observations, N = 11,848 (Chain A) and N = 6,572 (Chain B), using semi-annual time aggregation.

E Analysis of Refrigeration Requirements

Table E.1: Trade Allowances and Refrigeration Requirements

	slotting, placement & other fees (1)	Logistics fees (2)	Opening fees (3)	Unsaleables fees (4)	Spot fees (5)
Panel A: Excluding Category Fixed Effects					
Partial Refrigeration	0.0090	0.0002	-0.0028***	0.0039***	-0.0024*
	(0.0056)	(0.0004)	(0.0008)	(0.0013)	(0.0014)
Full Refrigeration	-0.0305***	0.0024***	-0.0060***	-0.0014**	-0.0153***
	(0.0039)	(0.0004)	(0.0006)	(0.0007)	(0.0007)
Freezing Requirements	0.0241*	0.0033***	-0.0030**	0.0022*	-0.0077***
	(0.0127)	(0.0006)	(0.0012)	(0.0013)	(0.0015)
Number of observations	6900	6900	6900	6900	6900
Adj-R^2	0.0049	0.0140	0.0066	0.0029	0.0332
Panel B: Including Category Fixed Effects					
Partial Refrigeration	0.0117	0.0002	-0.0046***	0.0007	0.0025
	(0.0099)	(0.0008)	(0.0017)	(0.0018)	(0.0020)
Full Refrigeration	0.0033	0.0038***	-0.0084***	0.0009	-0.0097***
	(0.0129)	(0.0009)	(0.0014)	(0.0018)	(0.0018)
Freezing Requirements	0.0295	-0.0006	-0.0080***	0.0027	-0.0103***
	(0.0203)	(0.0011)	(0.0025)	(0.0027)	(0.0024)
Number of observations	6900	6900	6900	6900	6900
Adj-R^2	0.1415	0.2313	0.2149	0.0898	0.2186

Notes: OLS estimates of Equation (4). The dependent variable is the log-transform of the ratio of allowances to gross manufacturer revenue. Heteroskedasticity-robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

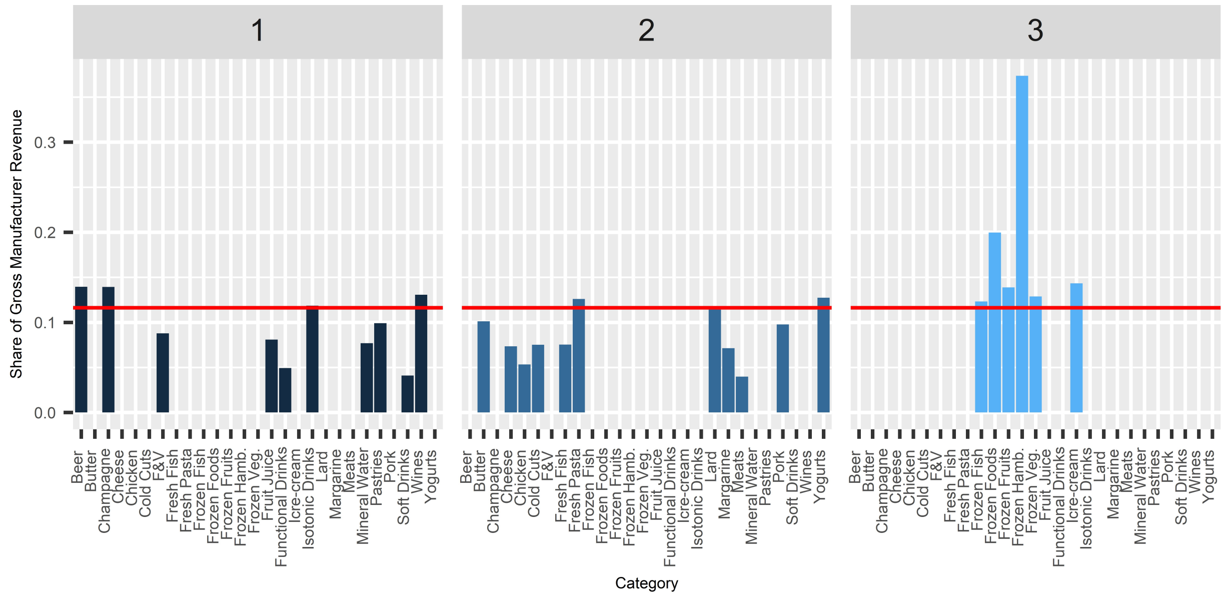


Figure E.1: Slotting, Placement and Other Fees

Notes: The charts show the share of different trade allowances over gross manufacturer revenues by refrigeration requirement status: 1 = Partial refrigeration requirements; 2 = full refrigeration requirements; 3 = freezing requirements. The horizontal line indicates the level of mean allowances paid in categories which do not require refrigeration.

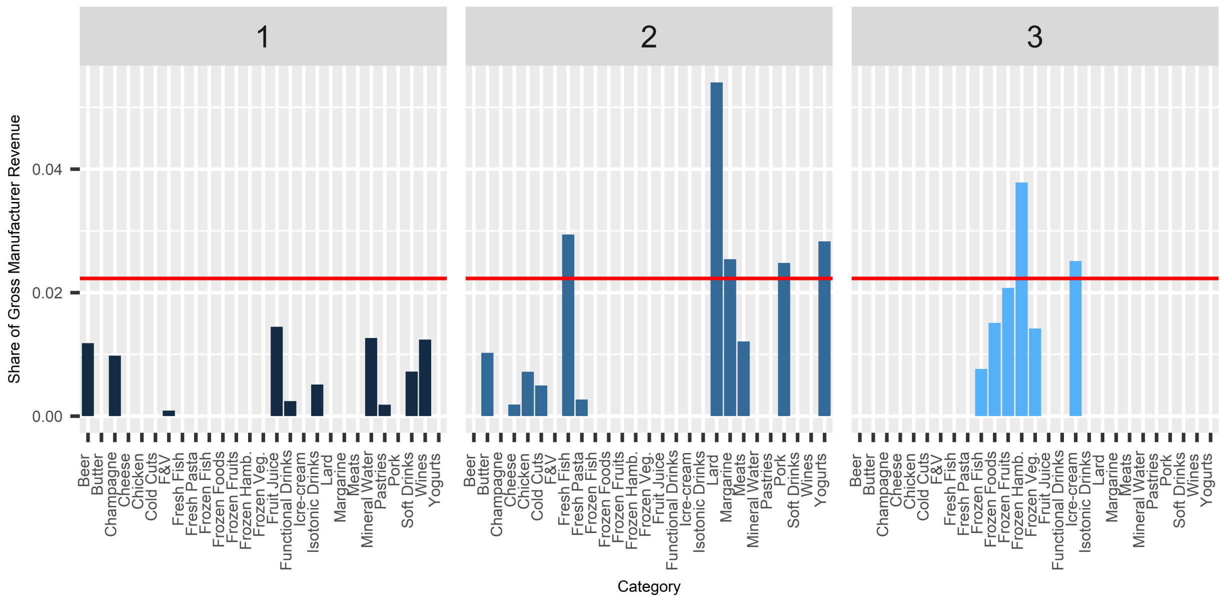


Figure E.2: New Store Opening Fees

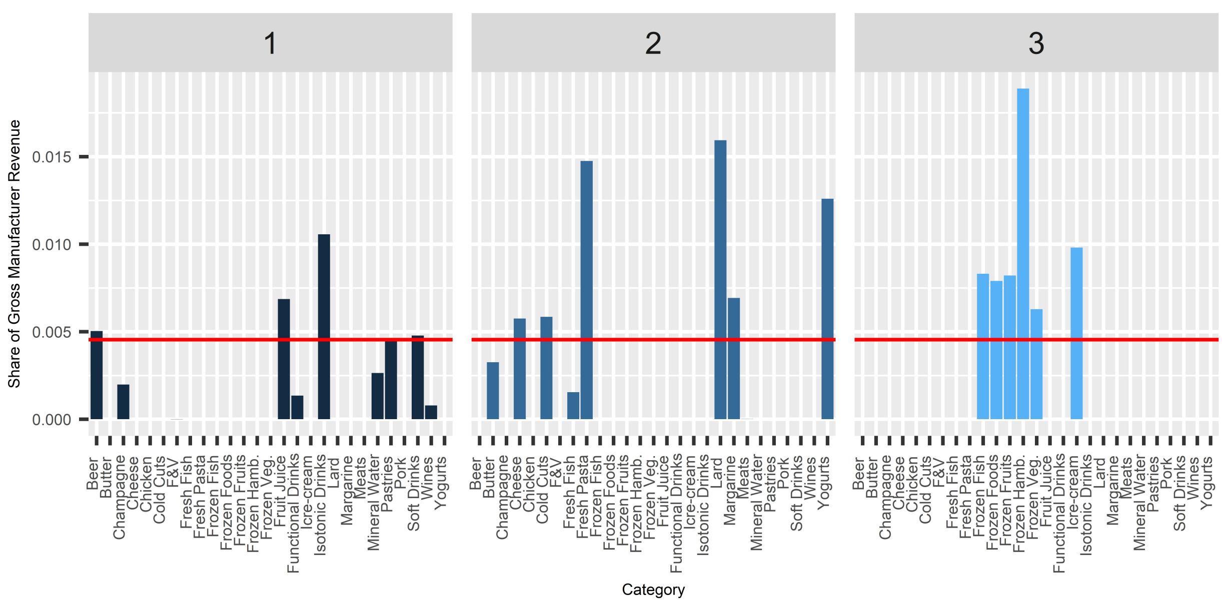


Figure E.3: Logistics Fees

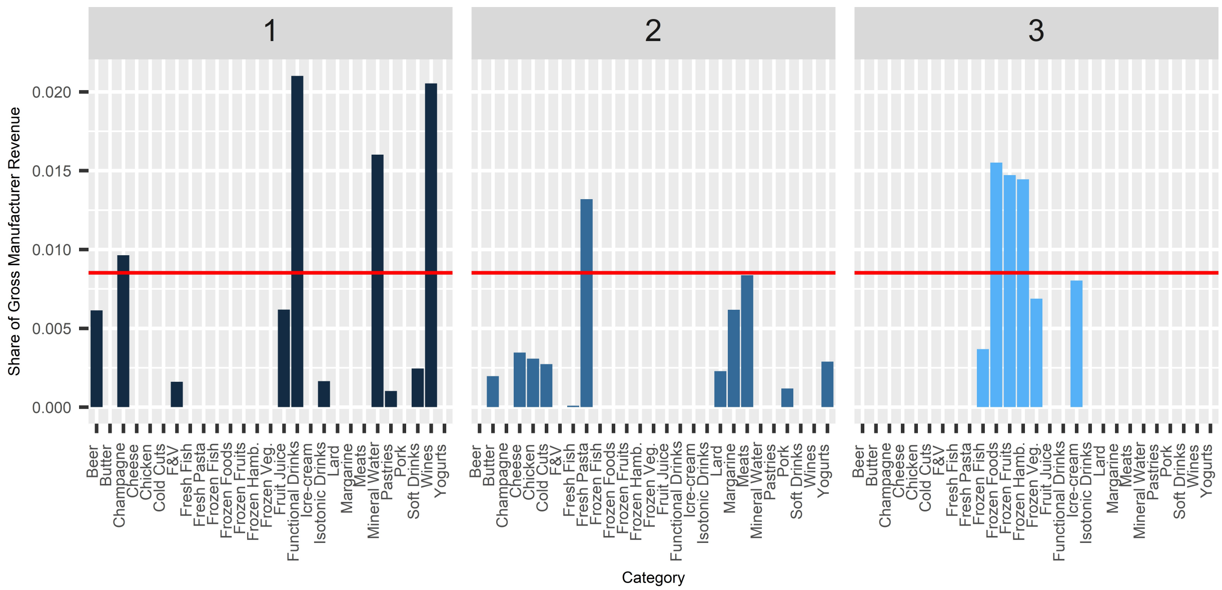


Figure E.4: Unsaleables Fees

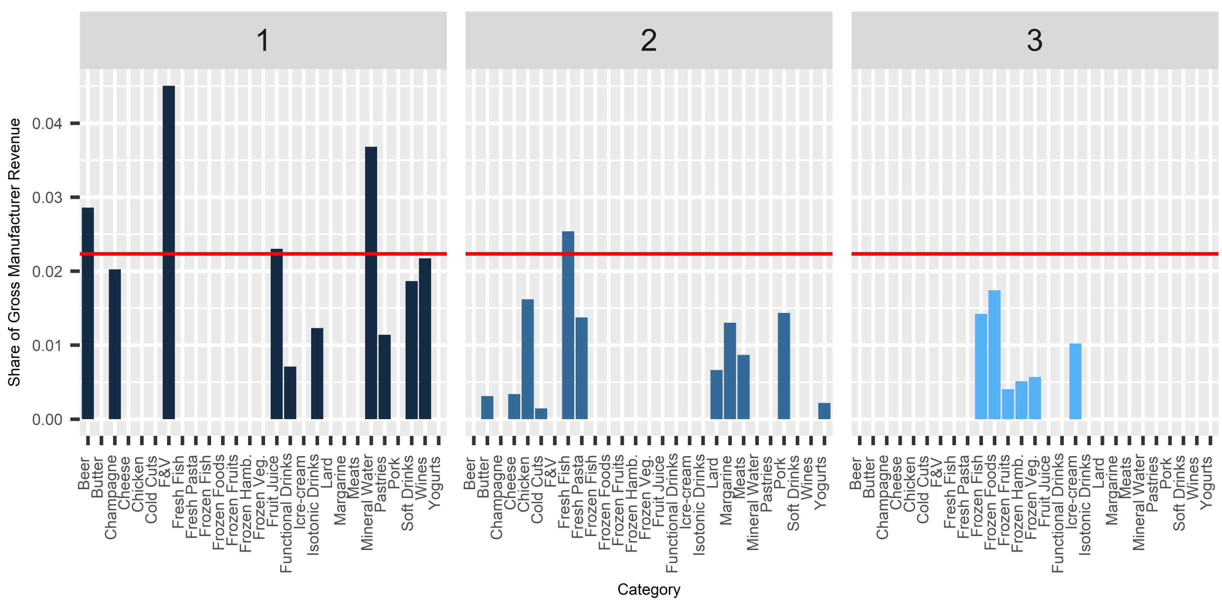


Figure E.5: Spot Fees

F Variance Decomposition of Trade Allowance Covariates

Table F.1: Variance Decomposition of Trade Allowance Covariates
(% of total variance)

Dependent Variable	Variance Component: Across chains (1)	Variance Component: Within chains (2)
Share of Retail Revenue	0.221	0.779
Tenure	0.015	0.985
PL Share	0.011	0.989
PL Margin	0.086	0.914

Notes: The table presents the fraction of variation of a given covariate explained by across-chain and within-chain variation, accounting for supplier, category and time fixed effects. Estimates obtained by maximum likelihood from the following standard non-nested mixed model: $x_{sct} = \alpha + \tau_t + \lambda_s + \sum_k \kappa_k \mathbb{1}(s \in \Omega_{kct}) + \theta_c + \varepsilon_{sct}$, where x_{sct} denotes a given covariate, τ_t, λ_s, $\mathbb{1}(s \in \Omega_{kct})$ are time, supplier and category fixed effects; θ_c are random effects capturing variation across chains and ε_{sct} capture variation within chains for a given supplier, category and time period. Ω_{kct} denotes the set of supplier participating in category k, in chain c and time t. All random components are assumed normally distributed and are estimated to be significant at the 5% significance level. Number of observations is $N = 6,900$ using semi-annual time aggregation.

G Robustness to Alternative Measure of Supplier Size

Table G.1: Trade Allowances and Potential Drivers
Alternative Measure of Market Size

	Conditional Amounts		Incidence	
	(1)	(2)	(3)	(4)
Number of SKU-Stores	-0.0146***	-0.0488***	0.0244**	0.0134***
	(0.0056)	(0.0102)	(0.0115)	(0.0049)
Number of Introductions	0.0120***	-0.0016	-0.0004	0.0038*
	(0.0041)	(0.0035)	(0.0050)	(0.0020)
Number of Withdrawals	0.0045	0.0108***	-0.0173**	-0.0061**
	(0.0034)	(0.0041)	(0.0069)	(0.0029)
Low Performance	0.0319**	0.0524**	0.0938***	0.0042
	(0.0151)	(0.0213)	(0.0250)	(0.0088)
Duration	-0.0012	-0.0032	-0.0001	0.0030
	(0.0021)	(0.0052)	(0.0031)	(0.0022)
Partial Refrigeration	-0.0250	-0.0707***	0.0450	0.0061
	(0.0189)	(0.0255)	(0.0524)	(0.0092)
Full Refrigeration	-0.0443**	-0.0510	0.0098	0.0060
	(0.0212)	(0.0317)	(0.0706)	(0.0460)
Freezing Requirements	0.0057	-0.0137	0.0697	-0.0385
	(0.0207)	(0.0302)	(0.0685)	(0.0520)
Full NB	0.0337*	0.1600*	0.5810***	-0.0145
	(0.0202)	(0.0818)	(0.0366)	(0.0106)
Dual	-0.0118	0.1264***	-0.0098	0.0012
	(0.0765)	(0.0281)	(0.0449)	(0.0037)
PL Margin	0.0415***	-0.0112	0.0286	-0.0024
	(0.0146)	(0.0180)	(0.0314)	(0.0066)
Supplier FE	✗	✓	✗	✓
Category FE	✓	✓	✓	✓
Chain FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Number of observations	3232	3151	4530	4343
Adj-R^2	0.1527	0.3469	0.5869	0.9693

Notes: OLS estimates of Equation (4). The dependent variable in Columns (1) and (2) is a dummy variable taking the value of one if the supplier pays allowances (slotting and placement fees) in a given chain and period. The dependent variable in Columns (3) and (4) is the log-transform of the ratio of *slotting, placement and other* allowances over the gross manufacturer revenue conditional on the supplier paying strictly positive allowances. Cluster-robust standard errors (at the supplier level) in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

H Robustness to Similar Assortments Across Chains

Table H.1: Trade Allowances and Potential Drivers
Similar Assortments Across Chains

	All Suppliers		NB + Dual Suppliers	
	(1)	(2)	(3)	(4)
Share of Retail Revenue	-1.9905**	-1.9317**	-1.8449**	-1.8583**
	(0.7893)	(0.7764)	(0.7896)	(0.7726)
Number of Introductions	0.0049	-0.0086**	0.0031	-0.0094**
	(0.0034)	(0.0039)	(0.0035)	(0.0043)
Number of Withdrawals	0.0007	-0.0030	0.0021	-0.0032
	(0.0044)	(0.0045)	(0.0045)	(0.0047)
Low Performance	0.0358*	0.0675***	0.0410**	0.0694***
	(0.0200)	(0.0223)	(0.0209)	(0.0232)
Duration	-0.0001	-0.0033	-0.0005	-0.0031
	(0.0026)	(0.0063)	(0.0027)	(0.0064)
Partial Refrigeration	-0.0331	-0.0883***	-0.0332	-0.0895***
	(0.0209)	(0.0267)	(0.0210)	(0.0272)
Full Refrigeration	-0.0394	-0.0312	-0.0375	-0.0313
	(0.0255)	(0.0278)	(0.0265)	(0.0276)
Freezing Requirements	-0.0089	-0.0080	-0.0024	-0.0070
	(0.0217)	(0.0252)	(0.0218)	(0.0252)
Full NB	0.0473**	0.0567***		
	(0.0232)	(0.0174)		
Dual	0.0813	0.0995***	0.0381	—
	(0.0801)	(0.0265)	(0.0808)	
PL Margin	0.0411**	-0.0112	0.0427**	-0.0087
	(0.0181)	(0.0186)	(0.0185)	(0.0190)
Supplier FE	✗	✓	✗	✓
Category FE	✓	✓	✓	✓
Chain FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Number of observations	2459	2398	2386	2326
Adj-R^2	0.1867	0.4180	0.1871	0.4154

Notes: OLS estimates of Equation (4). The dependent variable is the log-transform of the ratio of *slotting, placement and other* allowances over the gross manufacturer revenue conditional on the supplier paying strictly positive allowances. Sample restricted to suppliers with similar assortments (at least 50% brand coincidence) across the two supermarket chains. Cluster-robust standard errors (at the supplier level) in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

I Estimations by Chain

Table I.1: Trade Allowances and Potential Drivers
Chain-Level Estimations

	Chain A		Chain B	
	All (1)	NB+Dual (2)	All (3)	NB+Dual (4)
Share of Retail Revenue	-2.6177**	-2.6265**	-3.1764***	-3.0564***
	(1.1316)	(1.1489)	(1.0173)	(1.0681)
Number of Introductions	0.0071***	0.0065***	0.0200**	0.0176**
	(0.0023)	(0.0023)	(0.0082)	(0.0087)
Number of Withdrawals	0.0024	0.0026	-0.0081	-0.0044
	(0.0023)	(0.0023)	(0.0091)	(0.0096)
Low Performance	0.0179	0.0155	0.0727*	0.0891**
	(0.0110)	(0.0109)	(0.0373)	(0.0404)
Duration	0.0005	-0.0001	-0.0035	-0.0026
	(0.0019)	(0.0019)	(0.0039)	(0.0041)
Partial Refrigeration	-0.0214	-0.0203	-0.0115	-0.0094
	(0.0150)	(0.0151)	(0.0330)	(0.0335)
Full Refrigeration	-0.0320*	-0.0308*	-0.0186	-0.0142
	(0.0165)	(0.0169)	(0.0300)	(0.0317)
Freezing Requirements	-0.0152	-0.0100	0.0087	0.0168
	(0.0206)	(0.0210)	(0.0338)	(0.0371)
Full NB	0.0190		0.0585**	
	(0.0233)		(0.0269)	
Dual	-0.0589	-0.0718***	0.1419	0.0814
	(0.0360)	(0.0277)	(0.0941)	(0.0917)
PL Margin	0.0365***	0.0360***	0.0521	0.0582
	(0.0117)	(0.0117)	(0.0392)	(0.0406)
Supplier FE	✗	✗	✗	✗
Category FE	✓	✓	✓	✓
Chain FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Number of observations	2126	2094	1106	1064
Adj-R^2	0.1749	0.1731	0.2373	0.2389

Notes: OLS estimates of Equation (4). The dependent variable is the log-transform of the ratio of *slotting, placement and other* allowances over the gross manufacturer revenue conditional on the supplier paying strictly positive allowances. Sample restricted to suppliers with similar assortments (at least 50% brand coincidence) across the two supermarket chains. Cluster-robust standard errors (at the supplier level) in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

Table I.2: Variance Decomposition of Assortments
(% of total variance)

Dependent Variable	Variance Component		
	Time	Chain	Store
	(1)	(2)	(3)
Log Number of SKUs	0.000	0.481	0.519

Notes: The table presents the fraction of variation of the number of SKUs available in a given category-store-chain-period (in logs) explained by time, chain and store components, accounting for category fixed effects. Estimates obtained by maximum likelihood from the following standard non-nested mixed model: $assortment_{koct} = \alpha + \kappa_k + \tau_t + \lambda_o + \theta_c + \varepsilon_{koct}$, where $assortment_{koct}$ denotes assortments (in logs); κ_k are category fixed effects; τ_t, λ_o, $\mathbb{1}(s \in \Omega_{kct})$ are time, store and chain random effects; ε_{koct} capture variation across stores within chains and time periods for a given category. All random components are assumed normally distributed and are estimated to be significant at the 5% level. Number of observations is $N = 112,356$ using semi-annual time aggregation.

J Robustness to Endogeneity

Table J.1: Robustness to Endogeneity: Lagged Market Size Regressor
All Suppliers

	Conditional Amounts		Incidence	
	(1)	(2)	(3)	(4)
Share of Retail Revenue	-2.4013***	-3.4109***	-1.7691	2.2368
	(0.8552)	(1.1068)	(2.2735)	(3.4017)
Number of Introductions	0.0119***	-0.0089	0.0023	0.0030
	(0.0034)	(0.0061)	(0.0072)	(0.0040)
Number of Withdrawals	-0.0026	-0.0052	-0.0154**	-0.0040
	(0.0036)	(0.0059)	(0.0068)	(0.0031)
Low Performance	0.0427	0.0908**	0.0409	0.0006
	(0.0277)	(0.0373)	(0.0340)	(0.0028)
Duration	-0.0019	-0.0041	-0.0038	0.0075
	(0.0032)	(0.0068)	(0.0045)	(0.0050)
Partial Refrigeration	-0.0157	-0.0854***	0.0439	0.0067
	(0.0232)	(0.0317)	(0.0578)	(0.0112)
Full Refrigeration	-0.0378	-0.0083	-0.0244	-0.1361
	(0.0241)	(0.0320)	(0.0761)	(0.1165)
Freezing Requirements	0.0088	0.0436	0.0171	-0.1390
	(0.0259)	(0.0372)	(0.0769)	(0.1177)
Full NB	0.0566***	0.0599***	0.6109***	-0.0202
	(0.0211)	(0.0178)	(0.0415)	(0.0190)
Dual	0.0218	0.1389***	-0.0078	0.0204*
	(0.0792)	(0.0419)	(0.0500)	(0.0119)
PL Margin	0.0398**	-0.0033	0.0257	0.0016
	(0.0177)	(0.0231)	(0.0346)	(0.0044)
Supplier FE	✗	✓	✗	✓
Category FE	✓	✓	✓	✓
Chain FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Number of observations	1998	1886	2686	2497
Adj-R^2	0.1500	0.3527	0.5600	0.9689

Notes: OLS estimates of Equation (4). The dependent variable in Columns (1) and (2) is the log-transform of the ratio of *slotting, placement and other* allowances over the gross manufacturer revenue. The dependent variable in Columns (3) and (4) is a dummy for whether the supplier pays strictly positive allowances. All specifications include the second lag of the share of retail revenue as a regressor to account for the possibility of endogeneity due to reverse causality. Cluster-robust standard errors (at the supplier level) in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

K New Product Introductions

Table K.1: Main Estimates by Product Introduction Intensity

	Bottom 50% (1)	Top 50% (2)
Share of Retail Revenue	-3.1746***	-1.2838
	(1.1948)	(0.8381)
Number of Introductions	0.0069	0.0072
	(0.0046)	(0.0063)
Number of Withdrawals	0.0033	-0.0046
	(0.0039)	(0.0063)
Low Performance	-0.0000	0.0773***
	(0.0151)	(0.0235)
Duration	-0.0024	-0.0030
	(0.0033)	(0.0030)
Partial Refrigeration	-0.0092	-0.0686**
	(0.0250)	(0.0272)
Full Refrigeration	-0.0575***	-0.0152
	(0.0205)	(0.0356)
Freezing Requirements	-0.0212	0.0280
	(0.0226)	(0.0230)
Full NB	0.0472*	0.0306
	(0.0271)	(0.0240)
Dual	-0.0410	0.1254*
	(0.0748)	(0.0712)
PL Margin	0.0208	0.0592***
	(0.0238)	(0.0185)
Supplier FE	✗	✗
Category FE	✓	✓
Chain FE	✓	✓
Time FE	✓	✓
Cohort FE	✓	✓
Number of observations	1681	1551
Adj-R^2	0.1873	0.1664

Notes: OLS estimates of Equation (4) for two subsamples of suppliers broken up by the number of product introductions. Column (1) presents estimates for the subsample of suppliers in the bottom 50% in terms of number of product introductions and Column (2) presents estimates for those in the top 50%. The dependent variable is the log-transform of the ratio of *slotting, placement and other* allowances over the gross manufacturer revenue. Cluster-robust standard errors (at the supplier level) in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

L Wholesale Cost Comparison: Dual Branders versus Full PL Suppliers

Table L.1: Wholesale Costs versus PL Engagement Status

	(1)	(2)
Dual Brander	0.0159	0.0374
	(0.1806)	(0.0835)
Category FE	✗	✓
Chain FE	✓	✓
Time FE	✓	✓
Number of observations	58407	58407
Adj-R^2	0.0073	0.2560

Notes: The dependent variable is the log of the wholesale price and the right hand side variable is a dummy indicating whether the supplier is a dual brander (i.e., produces both national brands and private labels). The sample includes all suppliers who produce private label brands. Cluster-robust standard errors (at the supplier level) in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

M Trade Allowances by Cohort

Table M.1: Wholesale Costs versus PL Engagement Status

Cohort 1 = 2007	0.1134***
	(0.0015)
Cohort 2 = 2008	0.0549***
	(0.0047)
Cohort 3 = 2009	0.0311***
	(0.0024)
Cohort 4 = 2010	0.0292***
	(0.0025)
Cohort 5 = 2011	0.0358***
	(0.0042)
Cohort 6 = 2012	0.0084
	(0.0075)
Number of observations	6901
Adj-R^2	0.4934

Notes: The dependent variable is the ratio of trade allowances (slotting, placement and other fees) to gross manufacturer revenue. Heteroskedasticity-robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.