What Drives Trade Allowances? New Evidence from Actual Payments to a Big-Box Retailer*

Andrés Elberg† and Carlos Noton‡

Over the last few decades, trade allowances –non-price incentives provided by manufacturers to retailers– have become increasingly pervasive in the retail sector. Despite their importance, unavailability of hard data on allowances has severely limited empirical work. We analyze a proprietary panel dataset containing trade allowances paid by manufacturers to a large retailer in Chile. We document that trade allowances are economically meaningful in magnitude (on average, 15% of gross supplier sales) and highly heterogeneous across suppliers and categories (standard deviation of 12%). Most variation in allowances occurs across suppliers within a product category, suggesting that the category-specific costs are unlikely to be a significant driver of these payments. Furthermore, we find that larger suppliers pay lower trade allowances and that suppliers pay higher allowances in categories with a stronger presence of retailer's private labels. These findings support the view that bargaining leverage drives trade allowances.

JEL codes: L14, L81, M31

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†Andrés Elberg, School of Management, Pontificia Universidad Católica de Chile, Vicuña Mackenna 4860, Macul, Santiago, Chile; Email: aelberg@uc.cl

‡Carlos Noton, Center for Applied Economics, Dept of Industrial Engineering, University of Chile, Beauchef 851, Santiago, Chile; cnoton@dii.uchile.cl

1 Introduction

Over the last few decades, trade allowances –non-price incentives provided by manufacturers to retailers[1]– have become increasingly pervasive in the retail sector (Bloom et al. (2000), Rao and Mahi (2003), Sudhir and Rao (2006), Rivlin (2016)). Trade allowances include payments to place new products on store shelves (slotting fees), amounts to maintain distribution of a product (pay-to-stay fees) and discretionary promotional funds (street or push money).[2] As reported in Wilkie et al. (2002), approximately 85% of grocery retailers had implemented slotting allowances by the year 2000.

The rationale for trade allowances remains a highly controversial issue as both scholars and commentators support two competing views, which we dub "the retail power hypothesis" and "the efficient contracts hypothesis" (Bloom et al. (2000), Wilkie et al. (2002), Rao and Mahi (2003)). Advocates of the "retail power hypothesis" argue that the existence of trade allowances is due to a recent shift in bargaining power from manufacturers toward retailers. According to this view, allowances permit retailers to *extract* a larger share of the channel surplus at the expense of manufacturers (Farris and Ailawadi (1992), Messinger and Narasimhan (1995); Ailawadi (2001); Gomez et al. (2007); Donthu and Poddar (2011)). An alternative view, the "efficient contracts hypothesis", holds that allowances play a primarily efficiency-enhancing role by aligning incentives and facilitating risk and (stocking) cost-sharing along the vertical channel (Lariviere and Padmanabhan (1997), Sullivan (1997)). For instance, slotting fees may efficiently allocate scarce shelf space to new products seeking distribution. For advocates of this view, the increasing use of trade allowances is due to the proliferation of new products launched by manufacturers in recent years.

Despite their importance and the ongoing debate about their role in vertical channels, evidence on the magnitude and main drivers of trade allowances is severely lacking. The scarcity is primarily because hard data on trade allowances have been largely unavailable to researchers.[3] Most empirical evidence on trade allowances comes from survey studies (Bloom et al. (2000), Wilkie et al. (2002), Rao and Mahi (2003)) except for Sudhir and Rao (2006), who observe incidence but not the amounts of these payments.

In this paper, we analyze a novel proprietary panel dataset containing trade allowances paid

[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 on trade allowances provided specifically to retailers.

[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]Bloom et al. (2000), for instance, point out that slotting fees "...are usually negotiated in secrecy and required upfront without public disclosure of their terms (Bloom et al. 2000, p. 92). Similarly, Shaffer (1991) writes that "...there seems to have been an increase in the magnitude of the allowances during the last ten years. Unfortunately, these fees are negotiated orally, and in private, hence public data is nonexistent (Shaffer (1991), p. 121).

by manufacturers to a large retailer in Chile. We characterize the magnitude of trade allowances and how they vary across product categories, suppliers, and time. Furthermore, we test the "retail-power hypothesis" by studying how the relative bargaining leverage of the suppliers affects trade allowance payments.

Our primary dataset includes trade-allowance payments made by the universe of suppliers[4] to two supermarket chains (owned by a large retailer in Chile) in all product categories over the 2010-2012 period. We highlight three significant advantages of our data to study trade allowances relative to prior literature. First, we observe the actual amounts of trade allowance payments, not only incidence. Second, we have access to a comprehensive measure of trade allowances which includes slotting and placement fees, street money, quota incentives, restocking fees, cooperative advertising, and display allowances, as well as logistic allowances (payments for centralized delivery), and new-store-opening fees.[5] Third, we have panel data on trade allowances at the chain-supplier-category level that includes all the 176 product categories and more than 1,200 suppliers over two years.[6] Moreover, we identify specific types of allowances aggregated at the section level (e.g., perishables, frozen foods, etc.). Finally, we use weekly quantities, retail and wholesale prices at the stock-keeping-unit (SKU) level to compute firm size based on gross revenue, market shares, and the number of products per supplier.

We believe the Chilean supermarket industry offers an appealing setting for studying trade allowances and their relationship to bargaining strength. As in the US, the supermarket industry in Chile is highly concentrated with the top three retailers accounting for approximately 90% of the market (Euromonitor (2016)). Also, and in line with what is observed in advanced economies, the market size of manufacturers is highly variable in most product categories. Thus, our setting shares essential features with other markets where trade allowances are pervasive, and it offers useful variation in the relative bargaining leverage of manufacturer-retailer dyads.

Our analysis uncovers several novel features of trade allowances. First, we find that these payments are economically meaningful and highly heterogeneous. Suppliers pay on average allowances equivalent to 15% of manufacturers gross revenue with a standard deviation of 12% (approximately $97 US dollars per SKU per store per year with and a standard deviation of $242). By way of comparison, previous survey-based research has reported that trade promotion spending is about 18% of gross sales in the US (Yuan et al. (2013)) and 14% of manufacturer revenues in

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

[5] Namely, for each supplier-category-chain combination, we observe the following three groups of payments: (i) total trade allowances including slotting and placement fees, street money, quota incentives, restocking fees, cooperative advertising, and display allowances; (ii) logistic allowances (payments for centralized delivery); and (iii) payments due to new stores opening.

[6] We conducted in-depth interviews with industry insiders, including former retail and manufacturer managers, who provided us with information on the structure (and samples) of the contracts where trade allowances are specified. Regarding the time dimension we see that most trade allowances are agreed upon in annual or semiannual bilateral negotiations between a given supplier and the retailer.

Europe (Gomez and Rao (2009)). Second, we find that 85% of the variation in allowances occurs across suppliers within a product category, as opposed to between categories. This evidence suggests that category-specific costs (like the costs of stocking new products) are unlikely to be a significant driver of trade allowances. Also, we find that about 86% of total allowances correspond to ”slotting and placement fees”, whereas other items such as street money and quota incentives only account for 6% and 5%, respectively.

We perform two empirical tests to assess the ”retail power hypothesis“, according to which trade allowances are determined by the relative bargaining leverage between suppliers and retailers. First, we estimate a panel regression of trade allowances as a function of a supplier's market size, which we take as a good proxy for the supplier's bargaining power (as in Draganska et al. (2010)). Second, we study product categories with relevant retailer's private labels, as the importance of private labels should reduce the bargaining leverage of suppliers (as in Scott-Morton and Zettelmeyer (2004); Meza and Sudhir (2010); Ellickson et al. (2018)). Our econometric specifications account for systematic variation of the costs of stocking products across categories (high-cost section dummies), stores of different sizes and locations (chain fixed effects) and time periods (time fixed effects). We also account for brand loyalty through the inclusion of a set of supplier fixed effects.

Our results support the “retail power hypothesis”. First, we find that suppliers who exhibit a more substantial market share of retail revenues tend to pay lower trade allowances. Our estimates suggest that a one percent increase in the market share implies at least 2 percent less of gross revenues paid in allowances, which is equivalent to a $10 reduction in yearly allowances per SKU per store. Further evidence comes from the fact that trade allowances are higher in categories in which private labels account for at least 25% of category sales. Our results are robust to potential endogeneity concerns associated with reverse causality and hold for alternative measures of trade allowances and market size. Also, our estimated negative effect of market size on trade allowances is not explained by differences in perceived risk or speed of introduction of new products across suppliers.

We believe our results should be of interest to several different audiences. First and foremost, researchers and practitioners interested in the relationship along the vertical chain between upstream suppliers and downstream retailers, where trade allowances are pervasive. Our reported measures of trade allowances can be useful to scholars seeking to inform models of different aspects of channel interactions such as pricing and optimal contracting. Also, our findings should be of interest to researchers working on bargaining models and the shift in the balance of power within channels in recent decades.

The remainder of the paper is organized as follows. Section 2 revises related literature. Section 3 provides institutional and data description. Section 4 characterizes the features and variation of trade allowances. Section 5 studies the relationship between trade allowances and bargaining power and Section 6 concludes.

2 Related Literature

Our paper is primarily related to a literature focusing on the relationship between upstream manufacturers and downstream retailers along the vertical chain. Research on trade allowances is predominantly theoretical, with empirical work limited by the difficulty in gaining access to hard data on these payments. In effect, most empirical analyses are based on cross-sectional survey studies (Kuksov and Pazgal (2007)).

The theoretical side of the literature has advanced two broad classes of explanations for the emergence and increasing use of trade allowances (Bloom et al. (2000)). First, some authors argue that trade allowances play an efficiency-enhancing role. Since a typical supermarket only carries about 30,000 SKU's out of roughly 100,000 available products (Marx and Shaffer (2010)), Sullivan (1997) suggests that slotting allowances arise as a mechanism to efficiently allocate the scarce shelf space. In Sullivan's (1997) model, slotting fees work as a mechanism to balance manufacturers demand for and retailers supply of shelf space. If retailers and manufacturers share the same information about products potential demand, then an increase in the number of products leads to a rise in equilibrium slotting fees. Another stream of the literature emphasizes the role of information asymmetries as an explanation for slotting fees. Under the assumption that manufacturers possess an informational advantage about the potential demand of new products, the slotting fees can act as signaling (Lariviere and Padmanabhan (1997)) or screening (Chu (1992)) devices to overcome the information asymmetry. Another efficiency-enhancing argument for the existence of slotting fee points out their capacity to shift the risk of new product introductions to manufacturers (Kelly (1991)) and their potential to share the costs of stocking new products (Lariviere and Padmanabhan (1997), Desai (2000)).

The second class of explanations emphasizes the role played by retail bargaining power and the potentially anticompetitive implications of trade allowances. Shaffer (1991) shows that, in the context of a differentiated retail duopoly dealing with a perfectly competitive manufacturer industry, the slotting allowances soften retail competition allowing retailers to set higher prices.[7] Furthermore, Marx and Shaffer (2007) present a model in which trade allowances demanded by a dominant retailer lead to manufacturer exclusion from competing retailers to avoid the risks of losing participation in the dominant retailer.

Empirical work aimed at characterizing trade allowances and discriminating among alternative explanations for their use is scant and mostly restricted to survey-based studies. Bloom et al. (2000)

[7] Shaffer (1991) uses the terms slotting allowances in a broad sense, including placement allowances or lump-sum street money.

conduct a large-scale survey on slotting fees among managers in the US grocery sector. As the authors state, their goal is to determine how industry participants rationalize practices in their industry rather than a formal test of alternative explanations on trade allowances. 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) results strongly suggest that industry participants (especially manufacturers) perceive the use of slotting allowances as conforming to the "retail power hypothesis". 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.

To the best of our knowledge, the only previous study using observational data on slotting fees 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 data include a dichotomous variable on whether or not a manufacturer offers a slotting fee, characteristics of the product introduction (e.g., test market data, promotional support) and survey data on judgements made by retail buyers. In contrast to studies based on survey data, they find evidence consistent with the signaling hypothesis. The authors, however, warn about two limitations of their research. First, while they analyze data for the 1986-1987 period, the intensity of allowances has been rising. Thus "newer data are needed to investigate whether these rationales still hold" (p. 153). Second, their data do not include information on the magnitude of slotting payments.[8,9]

[8] A third limitation acknowledged by Sudhir and Rao (2006) which is shared by the present study (and duly acknowledged in Section 6 below) is that they analyze data from a single retailer.

[9] Another stream of empirical literature attempts to infer allowance payments in specific categories using structural econometric models. Israilevich (2004) uses purchase data from a US supermarket chain to infer slotting fees paid to the retailer in the "bath tissue" category. His empirical strategy involves comparing the counterfactual equilibrium assortment in the absence of slotting fees with the actual observed assortment and obtain slotting fees as the payments that would make the retailer break even in those periods and products for which the absence of slotting fees results in a loss for the retailer. Hristakeva (2018) develops an approach to infer trade allowances in the absence of wholesale price data while allowing for endogenous retail competition. She estimates trade allowances as those payments needed to rationalize observed assortments. Using data for the US, she finds that allowances amount to 5.9% of retailers' revenues in the "yogurt" category. Furthermore, using counterfactual simulations she finds that trade allowances are welfare reducing.

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 that resulted in a shift from an atomistic industry to a modern one dominated by a few big-box retailers. As in the US and other advanced economies, the transition took place at a rapid pace over the 1990s and was characterized by multiple waves of mergers and acquisitions which led to massive levels of concentration (Bronnenberg and Ellickson (2015), Geyskens (2018)). Today, the three largest grocery retailers in Chile (Walmart, Cencosud, and SMU) account for more than 90% of total supermarket sales. By way of comparison, 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 ratios in Switzerland and the UK are around 85% (Hong and Li (2017)).

Upstream, manufacturer concentration within product categories is comparable to concentration levels reported for the US. In our data, the three (five) largest manufacturers in a category account, on average, for 81% (91%) of the market. The Herfindhal-Hirschman Index (HHI) of concentration within categories equals 0.38 with a standard deviation of 0.21. By way of comparison, Pauwels (2007) studies 25 product categories in a US supermarket chain and reports that the top 3 manufacturers account, on average, for 87% of total category volume.

As concentration in the supermarket industry increased, conflicts between manufacturers and retailers came to public attention (Noton and Elberg (2018)). The trade association of supermarket suppliers[10] (including both local as well as foreign firms such as Unilever, Pepsico, and P&G), accused supermarket chains of anticompetitive conduct, based among other things on the increasing trade allowance payments demanded by the retailers. Since the accusation, allowances and other fees in the retail industry have been under the scrutiny of competition authorities.

3.2 Trade Promotion Contracts

In Chile, trade allowances negotiated between manufacturers and large supermarket chains are specified in two types of contracts: i) the *Commercial Agreement (CA)*; and ii) the *Spot Contract, (SC)*. The *Commercial Agreement* is the main arrangement that governs the relationship between the supermarket chain and the supplier. In addition to trade allowances, it specifies price incentives (e.g., off-invoice discounts, scan-backs) and communication-oriented actions (e.g. cooperative advertising) the two parties agree upon.[11] The *CA* is similar to the *Cooperative Marketing Agreement*

[10] AGIP for its acronym in Spanish

[11] Tellis (1998) and Blattberg and Neslin (1990) describe different types of trade promotions.

commonly used by US retailers (Rivlin (2016)). Specifically, the *CA* includes:

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. Quota incentives: Payments made to the retailer conditional on the achievement of sales growth targets.
4. Restocking fees: Payments for using the retailer's personnel to restock the supplier's products in store shelves.
5. Cooperative advertising: Payments for having suppliers' products featured in weekly circulars and newspaper inserts.
6. Display allowances: Payments for exhibiting the supplier's products in special displays (e.g., shippers).
7. Logistic fees: Payments made to supermarket chains for centralized delivery to the retailer's distribution centers.
8. New store opening fees: Payments to extend distribution of the supplier's products to new stores opened by the retailer.

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.

The second type of contractual agreement defining trade allowances is the so-called *Spot Contract*, *SC*. The *SC* typically specifies price incentives (e.g. off-invoice discounts and scan backs), and some other non-price promotions, which were not negotiated as part of the *CA*. *SCs* are usually arranged several times during the duration of the *CA*. We note that trade allowance payments negotiated both under the *CA* and the *SC* typically include both fixed fees as well as payments expressed as a fraction of future purchases.

3.3 Data Description

Our primary dataset includes all trade allowance payments[12] made by suppliers to two supermarket chains operated by a large Chilean retailer over a 26-month period (July 2010 - August 2012).

[12] Allowance payments in our data are negotiated under both the *Commercial Agreement* and the *Spot Contract* described above.

For each allowance payment, we observe the identities of the paying supplier (mostly manufacturers) and the receiving supermarket chain, as well as the product category and specific date of the payment. The data contain more than 1,200 suppliers and 176 product categories.[13]

The two chains (banners) mainly differ along three dimensions relevant for trade allowance negotiations: store size, store location, and customer sociodemographic profile. Despite their joint ownership, allowances paid by a given supplier (either as a share of gross revenues or as dollars per SKU, per store, per period) are far from identical across chains, suggesting that allowances are determined in chain-specific negotiations (the coefficient of correlation between allowances of different chains is low and equals 0.36). We provide further discussion on this point below.

We group allowances into three broad classes: (1) An aggregate comprising slotting and placement fees, street money, quota incentives, restocking fees, cooperative advertising and display allowances; (2) logistic fees; and (3) new store opening fees. As we show below, the bulk of payments contained in the trade allowance aggregate we observe correspond to slotting and placement fees, other types accounting for a minor share of these payments.

We complement our analysis with an auxiliary dataset containing narrowly defined types of allowances. Namely, we observe monthly trade allowances categorized in specific types (e.g., slotting and placement fees, street money, etc.) at the section level (e.g., frozen products, perishables, groceries) over the 2011-2015 period. We note that previous studies assessing the relative importance of different types of allowances have used surveys instead of observational data (e.g., FTC (2003)).

Among these sections, we identify specific categories that are likely to carry higher stocking costs as documented, for instance, in Shaffer (1991) and Rivlin (2016). As these higher costs should affect the negotiated allowances in those categories, we use section-dummies to control for this feature. In particular, we construct a dummy variable that takes on the value of one if the manufacturer's products require refrigeration and a dummy variable which takes on the value of one if the manufacturer's products belong to the set of items that are typically exhibited near the checkout aisle (see Appendix A for details).

Finally, to build market size measures, we have scan data on quantities, retail, and wholesale prices at the store-week-SKU level. We rely on this information to compute gross revenues, market shares, and the number of SKU's per supplier per store. Also, the dataset contains the entry date at the retailer's system of each SKU, allowing us to calculate the tenure of the relationship between suppliers and the retailer.

[13] Appendix A provides a list of the categories included in the data.

4 Characterizing Trade Allowances

4.1 How Trade Allowances Look Like

Table 1 presents summary statistics on the trade allowances we observe measured both as a share of gross manufacturer revenue and in US dollars per SKU per store per period. In line with the institutional convention of negotiating trade allowances at the end of a year or a semester we choose to aggregate the daily payments we observe semiannually.[14] Summary statistics for each chain are computed over suppliers, categories, and time periods. As described in subsection 3.3, allowances are grouped into three classes: *Trade allowances*, *Logistic fees* and *New store opening fees*

Trade allowances are sizable and represent between 14% and 16% of gross manufacturers revenues, as shown in Table 1. The average amount per SKU per store per year is $138.5 in Chain A and $78.8 in Chain B. Thus, annual trade allowances payments range between $236 million and $415 million for a mid-sized supermarket chain carrying 30,000 SKU's with over 100 stores.[15] Logistic and New Store Opening fees are comparatively less important with 1 percent and 1.6 percent of supplier's revenues in both chains, respectively. 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, Gomez and Rao (2009) report trade promotions in Europe being about 14% of total manufacturer's revenue in 2003.

The relative importance of specific types of trade allowances is depicted in Figure 1. Namely, the figure decomposes the payments into slotting and placement fees, street money, quota incentives, restocking fees, cooperative advertising, and display allowances. Figure 1 displays the decomposition for the supermarket as a whole, and four selected sections –groceries, non-food, frozen foods, and perishables.

Overall, trade allowances reported in Table 1 are composed primarily by slotting and placement fees. In effect, slotting and placement fees represent approximately 86% of trade allowance payments. Furthermore, allowances account for more than 90% of total trade allowances in sections which require refrigeration such as "frozen food" and "perishables." Other items included in the trade allowance aggregate are comparatively minor. Street money represents about 6.7% of trade allowances, quota incentives approximately 5.3%, while cooperative advertising account for approximately 1% and restocking payments for 0.2% of trade allowances.

Besides being large in magnitude, trade allowances are also highly variable, especially across

[14]Main results are substantially unaffected if, instead, we consider annual amounts as shown in Appendix B.

[15]All three largest grocery retail chains in Chile operate more than 200 stores. According to USDA (2018) in 2017, Walmart Chile operated 253 stores, Cencosud 246 stores, and SMU 289 stores.

suppliers and categories. The standard deviation of trade allowances as a share of gross manufacturer sales equals 10.3% in Chain A and 13.2% in Chain B, as shown in Table 1.

Figure 3 depicts the high heterogeneity in trade allowances across suppliers. Each point in the figure corresponds to the allowances paid by a given supplier in both supermarket chains. Equal payments in both chains should lie along the 45-degree line. On average, trade allowances are a substantially larger share of their gross revenues in Chain B than in Chain A, ranging between 0% and approximately 50% in Chain A and between 0% and 85% in Chain B.

Figure 4 depicts the heterogeneity in trade allowances across categories. While allowance variation across categories is more modest than across suppliers, it is still substantial. Trade allowances (as the 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.

Despite having common ownership, Figures 3 and 4 show that the allowances vary considerably across chains (the coefficient of correlation of trade allowances across chains equals 0.36) lending support to consider each negotiation separately. We know that the two supermarket chains differ in terms of store size and customer's income, which are critical determinants of trade allowances. The substantial gap in average allowances across chains (\$138.5 vs. \$78.8), may be explained in part by different assortments, bargaining leverage, and real estate costs.

Next, we provide a formal decomposition of the variation of trade allowances to establish how allowances vary across suppliers, categories, chains, and time.

4.2 Explaining Trade Allowance Variation

We investigate the sources of variation of trade allowances to provide a more formal characterization of these payments. Trade allowance variation across versus within categories provides a first approximation to the question of how to rationalize the widespread use of these instruments. Different hypotheses about trade allowances are consistent with different patterns of variation. Notice that previous survey data on allowances did not allow for this type of analysis.

We specify the following standard variance component model to investigate the sources of variation in trade allowances:

$$a_{skct} = \alpha + \tau_t + \theta_c + \xi_k + \varepsilon_{skct} \tag{1}$$

where the dependent variable is a measure of trade allowances, a_{skct}, (either trade allowances as a share of gross manufacturer revenue or expressed in US dollars per SKU-store-period); and the explanatory variables are time (τ_t), chain (θ_c), and category (ξ_k) random effects. We assume that the random effects are *i.i.d* and normally distributed: $\tau_t \sim \mathcal{N}(0, \sigma_\tau^2)$, $\theta_c \sim \mathcal{N}(0, \sigma_\theta^2)$, $\xi_k \sim \mathcal{N}(0, \sigma_\xi^2)$, $\varepsilon_{skct} \sim \mathcal{N}(0, \sigma_\varepsilon^2)$.

The underlying idea is to identify the fraction of the observed variance of trade allowances that can be explained by the variation of common-time shocks (τ_t); chain-specific factors (θ_c) and category-specific factors (ξ_k). Different decompositions of the variance are consistent with alternative hypotheses regarding the explanation of trade allowances.

The results of the maximum likelihood estimation of Equation (1) for both trade allowance metrics are presented in Tables 2 and 3. Variance component estimates are all significant at the 5% level. We find that variation across suppliers within categories explains most of the total variation in trade allowances regardless of the metric we use. This finding is particularly evident when using the share of gross manufacturers sales as a measure of trade allowances. Table 2 shows that the variation across suppliers within categories accounts for approximately 85% of the total variation in trade allowances versus 12% percent of the variation across categories. When using the variation in trade allowances per store-month-SKU (in Table 3) we find that the variation across suppliers within categories accounts for 64% versus the 34% coming from the variation across categories. Time and chain components account for a minor fraction of trade allowance variation, regardless of the trade allowance metric we use.

Notice that the previous analysis abstracts from the multi-category nature of some suppliers as trade allowances are aggregated at the supplier-category-chain-time level. We investigate whether the presence of multi-category suppliers affects our findings using the following alternative specification:

$$\widetilde{a}_{sct} = \alpha + \sum_{k=1}^{K} \gamma_k 1(s \in \Omega_k) + \varepsilon_{sct} \tag{2}$$

where $\widetilde{a}_{sct}$ is the *residualized* ratio of trade allowances to gross manufacturer revenue, obtained by partialling out the effects of chain and time dummies from the trade allowance variable. The indicator variable, $1(s \in \Omega_k)$, takes the value 1 if firm s supplies products in category k.

The multi-category robust estimates in Table 4 are consistent with the findings reported above. We confirm that supplier-specific effects explain most of the variation in trade allowances. Only 13 percent (23 percent) of the variation in trade allowances measured relative to gross revenue (in terms of dollars per SKU, per store, per period) is due to category characteristics, after controlling for time and chain fixed effects.

Discussion: The results presented in this subsection establish that trade allowances are mostly explained by firm-specific factors rather than category-specific characteristics. This finding is relevant for discriminating among alternative hypotheses on the emergence and increasing use of trade allowances.

One commonly advanced explanation for the use of trade allowances is that they provide a mechanism to compensate retailers for the cost associated to stocking new products. Sullivan (1997), for instance, reports that Kroger –the largest US supermarket chain, and the first one in admitting the use of such payments– argued that slotting allowances are charged as a compensation for the cost of incorporating a new product in the retailer's computational systems, warehouses and shelves.

Our results are inconsistent with allowances being explained by the cost associated with stocking new products, as those costs should vary across categories. The cost of stocking new products is higher, for instance, for product categories that require refrigeration (Shaffer (1991)). Similarly, the cost of stocking products on the checkout aisle is typically higher than in other locations within a store (Rivlin (2016)). Our estimates suggest that the cost of stocking products plays a minor role in determining trade allowances. Instead, our estimates indicate that a successful explanation for trade allowances should account for the substantial variation observed across suppliers within categories. In the next section, we explore whether the influence of relative bargaining power between retailer and supplier can rationalize the data.

5 Testing the Retail Power Hypothesis

One major explanation for the increasing reliance on trade allowances in recent decades relates this phenomenon to the shift in bargaining power from manufacturers to retailers which, as the argument goes, took place over the last few decades (Messinger and Narasimhan (1995), Kim and Staelin (1999), Bloom et al. (2000), Bloom and Perry (2001), Ailawadi (2001), Wilkie et al. (2002), Ailawadi et al. (2010)). According to this view, which we dub the "retail power hypothesis", the consolidation in the retail sector improved retailers' bargaining leverage and allowed them to negotiate better terms of trade, including more substantial trade allowances. Wilkie et al. (2002) report that manufacturers perceive "greater retail influence" as the most important causal force explaining slotting fees in the national survey they study. Bloom et al. (2000) and Rao and Mahi (2003) reach similar conclusions.

In this section, we assess the "retail power hypothesis" using two separate but complementary empirical strategies. We examine whether trade allowances are explained by (i) supplier market size and (ii) the presence of the retailer's private labels. We estimate panel regressions to test whether the relative bargaining leverage of the suppliers can explain differences in trade allowances controlling for a rich set of fixed effects. A negative impact on allowances of firm size and the presence of private labels would support the retail power hypothesis.

5.1 Trade Allowances and Market Size

Our first approach consists in examining whether larger suppliers are able to negotiate lower trade allowances as predicted by the "retail power hypothesis".

Several authors (e.g., Draganska et al. (2010), Inderst and Valletti (2011)) have argued that firm size is a critical determinant of bargaining leverage. As Draganska et al. (2010) point out, "A small manufacturer has less of an impact on a retailer's profitability and is, therefore, more likely to offer the retailer better terms than a large manufacturer" (p. 63). Accordingly, many authors (e.g., Gomez et al. (2007), Gomez and Rao (2009)) have found that firm size is a relevant determinant of trade promotion spending.

Our econometric specifications follow the literature on trade allowances and trade promotions to test the "retail power hypothesis". We estimate a linear panel model where trade allowances are explained by market size and a rich set of fixed-effects. Our baseline specification is as follows:

$$a_{sct} = \alpha + \beta\, size_{sct} + \sum_{s} \gamma^{j} 1(s \in \Omega^{j}) + \xi_s + \zeta_c + \theta_t + \varepsilon_{sct} \tag{3}$$

where a_{sct} is a measure of trade allowances paid by supplier s to supermarket chain c at time t; $size_{sct}$ is the share of retail revenues of supplier s; Ω^{j} is the set of suppliers present in high-cost stocking sections $j \in$ {Refrigerated, Checkout}; ξ_s, ζ_c, and θ_t are supplier, chain and time fixed-effects, respectively. ε_{sct} is an idiosyncratic mean-zero error term that is uncorrelated with other explanatory variables.

Our econometric estimation uses the two alternative measures for trade allowances and supplier market size. As introduced in Subsection 4.1, we use the following two definitions for a_{sct}: i) the share of gross manufacturer revenues, and ii) the amount in USD paid per SKU per store per period. Also, supplier market size, $size_{sct}$ is defined as i) the ratio of the revenues generated by supplier s's products over total retail revenues (*Share of Retail Revenues*)[16]; and, ii) the number of SKU's sold by supplier s in a given supermarket chain. Based on the evidence of different negotiation outcomes across chains presented above, we consider chain-specific supplier size as a determinant of trade allowances within that chain.[17]

Regarding other covariates, we include high-cost of stocking dummies, supplier, chain, and time fixed effects to account for alternative determinants of trade allowances. The literature on

[16] The *Share of Retail Revenues*, *SRR*, can be written as

$$SRR_s \equiv \frac{\sum_{k \in \Gamma^s}^{K(s)} R_{sk}}{\sum_{s}^{S} \sum_{k \in \Gamma^s}^{K(s)} R_{sk}}$$

where R_{sk} are the (retail) revenues generated by supplier s in category k and Γ^s is the set of categories served by supplier s. This can alternatively be written as the sum (over categories served by the supplier) of two terms, the market share of supplier s in category k, m_{sk}, and the share of category k on total retail revenues, ω_{kc},

$$SRR_s = \sum_{k \in \Gamma^s}^{K(s)} m_{sk} \cdot \omega_k$$

[17] Although the supplier-fixed effect is common across chains, this specification precludes any cross-chain size effect.

slotting and placement allowances has emphasized the cost of stocking new products as a potentially important determinant of those allowances. Thus, we include dummy variables for sections with high-costs of stocking new products such as frozen products and products located near the checkout-aisle. Also, supplier fixed-effects should account for time-invariant firm characteristics that affect trade allowances such as consumers' brand loyalty to certain manufacturer-specific products as pointed out by Kasulis et al. (1999), Kim and Staelin (1999) and Gomez et al. (2007). We also include chain fixed effects to account for the fact that the cost of stocking products may vary across store size and the different demographic profiles of customers. Finally, the time-fixed effects capture any potential environmental variables that are common across firms, categories, and chains such as macroeconomic variables.

Tables 5 and 6 present the OLS estimates of Equation (3) using the share of gross manufacturer revenues, and the amount per SKU per store per period as trade allowance metrics, respectively. In all estimations, we report robust standard errors.

We find a consistent negative relationship between market size and trade allowances. Our estimates are fairly stable across different sets of fixed effects and alternative metrics of trade allowances and size. The results are also consistent when using contemporaneous and lagged measures of the supplier market size. Given that the trade allowances paid on a given period are negotiated at the end of the previous one, we believe the lagged market size specification should be preferred.

The estimates imply that a one percent increase in the supplier market size (i.e., the share of retail revenues) is associated to a decrease of roughly 1.5 percentage points in the ratio of trade allowances to gross manufacturer revenue and to a reduction of \$5 in monthly trade allowances per SKU per store.

Our main results are robust to conducting the analysis at the annual (as opposed to the semiannual) level and to an alternative market size definition, as shown in the Appendices B and C, respectively. In effect, Tables B.1 and B.2 present OLS estimates of Equation (3) when instead of aggregating our data at the semiannual level we aggregate the data at the annual level. Also, Table C.1 shows the robustness of our results to the use of the (log) of the total number of SKU's commercialized by a supplier in a given supermarket chain as an alternative measure of market size. The negative relationship between supplier size and trade allowances remains unaffected by the change in temporal aggregation and the measure of market size.

Endogeneity Concerns. We need to address the potential endogeneity of the market size variable in Equations (3) and (4). In effect, despite controlling for several fixed effects, the shock ε_{sct} might still include factors that are correlated with market size, $size_{sct}$.

To tackle the endogeneity issue, we use the market size variable in one chain, $size_{sct}$, as an instrumental variable for the same measure in the other chain, $size_{sc't}$. We believe this instrument is relevant as certain structural factors of the firm, such as consumer brand loyalty, create correlation across chains of the supplier market size in a given category. Figure 6 shows the high correlation (0.89) of size between the two chains of our retailer. Furthermore, the instrument seems quite strong (as reported by the Kleibergen-Paap F-stat).

Regarding the exclusion restrictions, we assume that allowance shocks at chain c, ε_{sct}, are uncorrelated with the market size of the same supplier in the other chain c', $size_{sc't}$, once we control for supplier, section, chain and time fixed effects. Implicitly, our exclusion restriction implies that conditional on supplier-chain-time fixed effects, the allowance shocks ε's are uncorrelated across chains.[18]

The IV estimates in Tables 5 and 6 are in line with the previous findings. Our results show that tackling the endogeneity issue implies more negative coefficients, which is consistent with a plausible negative correlation between market size and shocks. Thus, we confirm that larger suppliers can negotiate lower allowances.

Alternative Explanations. The estimated negative relationship between market size and allowance payments is consistent with the "retail power hypothesis". However, competing explanations based on efficiency-enhancing contracts might also be consistent with this finding. One possibility is that smaller suppliers might pay more allowances due to a faster rate of product introduction relative to that of larger suppliers. We account for this possibility by including the number of new products introduced by a supplier in a given period and chain as an additional regressor.

Another alternative explanation, suggested by Sudhir and Rao (2006), is that smaller suppliers might be charged a higher allowance to compensate the retailer for their perceived higher risk. To account for this possibility, we need to include a proxy for the supplier's risk. We argue that the length of the relationship between supplier and retailer approximates the perception of the supplier's risk by the retailer. The longer the retailer trades with a given supplier, the lower should be the supplier risk. We define an "established" supplier a firm that has remained in a relationship with the retailer for at least four years.[19]

Thus, including the additional regressors yields the following augmented specification:

$$a_{sct} = \alpha + \beta\, size_{sct} + \sum_{j \in \Omega} \gamma^j 1(s \in \Omega) + \delta\, NewIntro_{sct} + \rho\, Established_{st} + \xi_s + \zeta_c + \theta_t + \varepsilon_{sct} \quad (4)$$

where $NewIntro_{sct}$ is the number of new products (at the SKU level) introduced by supplier s in chain c at time t, and dummy $Established_{st}$ takes the value one if the supplier s has remained in a relationship with the retailer for at least four years, and zero otherwise.

[18] Also, we conduct the OLS estimation using the second lag of the market size variable. The results, presented in Table D.1, show that our estimates of the impact of market size on trade allowances are almost unaffected.

[19] The results remain substantially unaltered when considering different thresholds.

Table 7 presents the results of estimating Equation (4). OLS estimates in Column (1) and Column (3) use as the dependent variable the share of trade allowances over gross manufacturer revenue and the trade allowances expressed in dollars per SKU per store per period, respectively. The coefficient on the (lagged) market share remains remarkably stable, and highly statistically significant, across both specifications suggesting that neither the number of introduced products nor suppliers' riskiness can explain the negative relationship between market size and trade allowances.

5.2 Trade Allowances and Private Labels

The second approach we adopt to assess the "retail power hypothesis" relies on a positive relationship between a retailer's bargaining power and the categories with a stronger presence of private labels (e.g., Narasimhan and Wilcox (1998), Meza and Sudhir (2010), and Ellickson et al. (2018)). Under the null hypothesis, we expect to observe higher trade allowances in those product categories where private labels (or store brands) account for a larger share of the market. Thus, we estimate a model in which trade allowances are explained by the presence of private labels and a rich set of fixed-effects. A positive coefficient of private labels "strength" on trade allowances supports the retail power hypothesis.

Scott-Morton and Zettelmeyer (2004), Meza and Sudhir (2010), and Ellickson et al. (2018) indicate that retailers tend to enjoy higher bargaining power in those product categories where private labels command a relatively large market share. Scott-Morton and Zettelmeyer (2004) argue that store brands allow retailers to gain bargaining power in a category because they can increase their disagreement payoff in negotiations with suppliers by imitating the national brands. Meza and Sudhir (2010) provide empirical support for the hypothesis that private labels enhance the retailer's bargaining power relative to manufacturers. Similarly, Ellickson et al. (2018) find that the introduction of a private label increases the retailer's bargaining power.

To examine the relationship between the strength of private labels and trade allowances, we estimate the following specification:

$$a_{skct} = \alpha + \beta\, PL_{kct} + \lambda_k + \xi_s + \zeta_c + \theta_t + \nu_{st} + \varepsilon_{sct} \tag{5}$$

where a_{skct} is a measure of trade allowances paid by supplier s in category k to supermarket chain c at time t, PL_{kct} is a measure of the strength of private labels in category k, λ_k are category fixed effects, ξ_s are supplier fixed-effects, ζ_c are chain fixed-effects, θ_t are time fixed-effects, ν_{st} are supplier by time fixed effects which capture factors such as suppliers' market size and ε_{sct} is an idiosyncratic error term. Notice that, unlike previous specifications, this equation focuses on allowance payments made by a supplier in a specific category.

We consider the same two measures of trade allowances as previous sections. Also, we use two measures of private label strength: (i) the market share of the private labels; and (ii) a dummy variable indicating whether the market share of the private labels exceeds the 90th percentile of the conditional distribution (24.7%).[20]

The results of the OLS estimation of Equation (5) are presented in Table 8. We do not find a statistically significant effect of the market share of private labels in a category neither on trade allowances as a share of gross manufacturer revenue (Column 1) nor trade allowances per SKU per store per period (Column 3). The estimates, on the other hand, indicate that the dummy variable on whether a category includes a strong private label is highly statistically significant and positive (Column 2). Thus, estimates in Table 8 provide partial support to the "retail power hypothesis".

Endogeneity Concerns. Arguably, a supermarket chain may choose to improve the market share position of its private labels in categories paying high allowances to enhance bargaining power and boost profits. Hence, we have to account for the potential positive correlation between the importance of private labels, PL_{kct}, and the error term ε_{sct}.

Following the same logic as in Subsection 5.1 above, we use PL_{kct} as the instrument for the importance of private labels in the other chain, $PL_{kc't}$. Figure 7 shows the correlation (0.69) of the market share of private labels between the two chains of our retailer. Consistently, the first stage Kleibergen-Paap F-stats are quite robust.

In terms of exclusion restrictions, conditional on supplier-chain-time fixed effects, we believe that shocks ε_{sct} are uncorrelated with the market size of the private labels in the other chain, $PL_{kc't}$. Furthermore, notice that shocks are at the supplier level (sct), while the potential endogenous regressor is at the category level ($kc't$).

Most IV estimates are not statistically significant when using the share of revenues as a measure of allowances. However, when using the amount per SKU-store, we observe a powerful effect of the PL dummy on allowances. This positive and significant estimated effect supports the idea that retailers can negotiate higher allowances in categories in which the private label is dominant.

5.3 Discussion

Overall, the results presented in this section provide supportive evidence to the hypothesis that trade allowance payments are driven by the relative bargaining power of the retailer vis-à-vis suppliers. Our estimates show consistently, across several specifications and alternative metrics, that smaller suppliers tend to pay higher allowances compared with larger suppliers. These results are also robust to different temporal aggregation schemes and to alternative measures

[20]The distribution of private labels market shares conditional on nonzero shares has an average of 10.5% and a standard deviation of 12.1%

of trade allowances and market size. Furthermore, our findings are robust to the inclusion of alternative mechanisms that might rationalize a negative relationship between trade allowances and market size, such as the rate of new product introduction and different levels of supplier's risk.

Another justification for the negative relationship between size and trade allowances is that large manufacturers pay less allowances because the costs of serving them are also lower. The argument relies on the fact that larger suppliers are more likely to deliver directly to supermarket stores, allowing the retailer to save on logistic resources (FTC (2003)). This potential explanation, however, does not apply to our findings, as our measure of trade allowances reflects mostly slotting and placement allowances (see Figure 1). Moreover, our trade allowances explicitly exclude logistic payments, meant to precisely cover the centralized delivery service. In a similar spirit, another potential explanation is that smaller suppliers request the retailer to perform restocking services on their behalf while large manufacturers use, instead, their own personnel. Thus, restocking allowances might be driving our results. However, the share of restocking allowances in total trade allowances makes this explanation highly implausible. Based on our section-level data, we observe that restocking allowances represent only 0.02 percent of total trade allowances.

An alternative hypothesis is that small suppliers pay higher allowances but also negotiate better terms (better shelf spaces, or placement in promotional flyers, etc.). While we cannot rule this out, Rivlin (2016) documents otherwise. He reports that retailers allocate their best positions in shelves to large suppliers, and feature them more often and more visibly in weekly circulars.

Evidence on the strength of private labels is partially supportive of the "retail power hypothesis". We note, however, that the connection between private labels' strength and allowance payments admits an alternative interpretation consistent with an efficiency-enhancing role of trade allowances. Sudhir and Rao (2006) argue that a positive association between strong private labels and slotting fees may provide evidence in favor of the shelf-scarcity hypothesis. The argument is that private labels usually give the retailer a higher markup and therefore increase the opportunity cost of shelf space in the category. We believe that in the market environment we study, the argument is somewhat weakened by the fact that the retailer might not face binding space constraints.

6 Concluding Remarks

As trade allowances have become a widespread feature of marketing channels, a heated debate ensued about the role these instruments play. While some academics and practitioners argue that trade allowances are driven by the increasing bargaining power of large retailers, others claim that they help to improve channel efficiency. The confidential nature of trade allowances has precluded much progress in the empirical characterization of those payments and the assessment of competing explanations for their widespread use.

In this paper, we analyze a unique and comprehensive panel dataset of trade allowances paid by the universe of suppliers to a large retailer in Chile. We provide new evidence on the magnitude and dispersion of trade allowances and shed light on their main drivers. We find that trade allowances average approximately 14% of suppliers gross revenues (about $97 per SKU, per store, per year) and are highly heterogeneous. We document that the variation of trade allowances across suppliers within a category is much more important than the variation across categories. This finding is critical as it casts doubts on explanations of trade allowances that are primarily associated with category-specific costs of the retailers.

Consistently, we find evidence that trade allowances are driven by the relative bargaining power of the retailer with respect to suppliers. In effect, larger suppliers negotiate lower allowance payments than smaller suppliers, controlling for a broad set of covariates. Moreover, the payment gap cannot be explained by differences in perceived supplier risk or the speed of introduction of new products. Furthermore, our data reject that restocking allowances and/or systematic technological differences in store delivery (i.e., direct store delivery versus centralized delivery) can drive the results. We also find partial evidence that suppliers tend to pay higher allowances in categories in which retailer's private labels command a significant market share.

Finally, we acknowledge some limitations of our study. First, our analysis involves two supermarket chains operated by a single retailer. Although we believe the Chilean supermarket industry shares essential features with other markets were trade allowances have become widespread, we cannot guarantee the external validity of our findings. However, prior literature analyzing observational data on trade allowances has also been restricted to analyze a single retailer (Sudhir and Rao (2006)). Relative to this literature we have the advantage of observing a panel (as opposed to a cross-section) of allowance payments including the actual magnitude (as opposed to only the incidence) of these payments. We hope future research will gain access to appropriate data to extend the analysis to a cross-section of many retailers. Also, it would be interesting to investigate the extent to which the increasing growth of online retailing would change the structure of payments negotiated between suppliers and retailers. As a second limitation, our analysis does not rely on randomly assigned market size or presence of private labels. However, we rely on our instrumental variables, that on top of a rich set of fixed-effects should limit potential endogeneity concerns.

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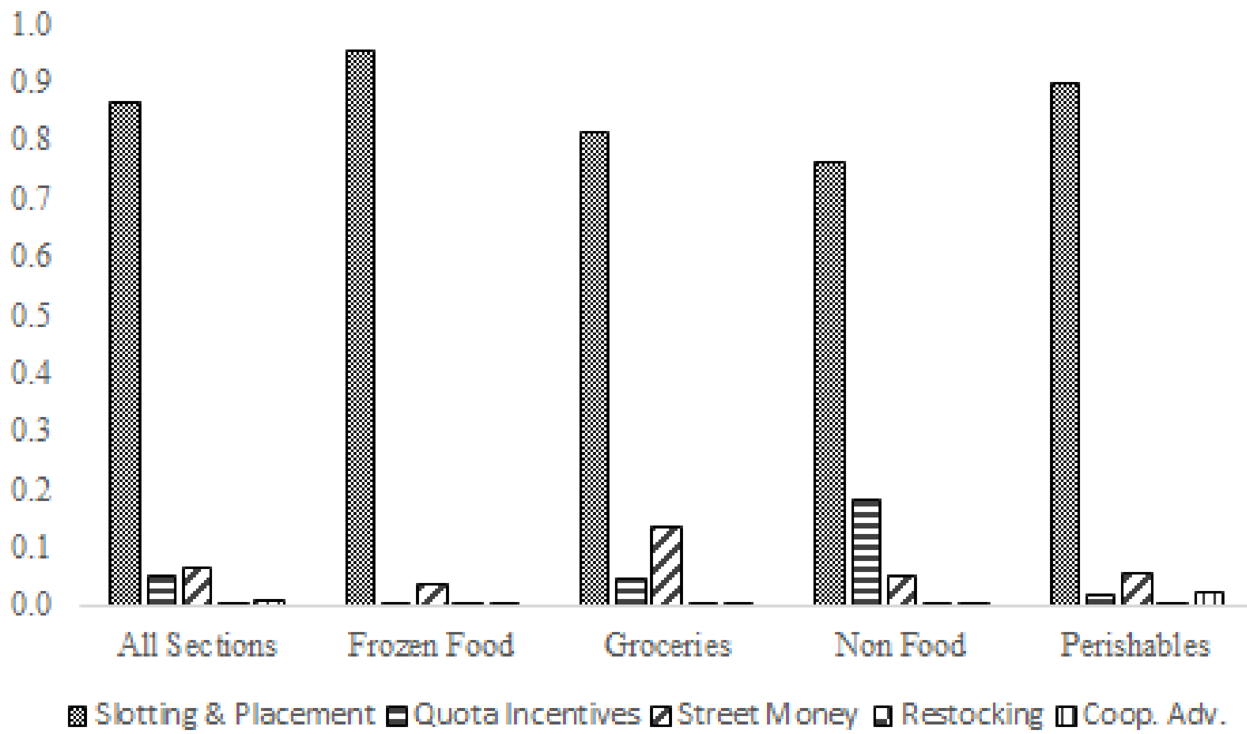
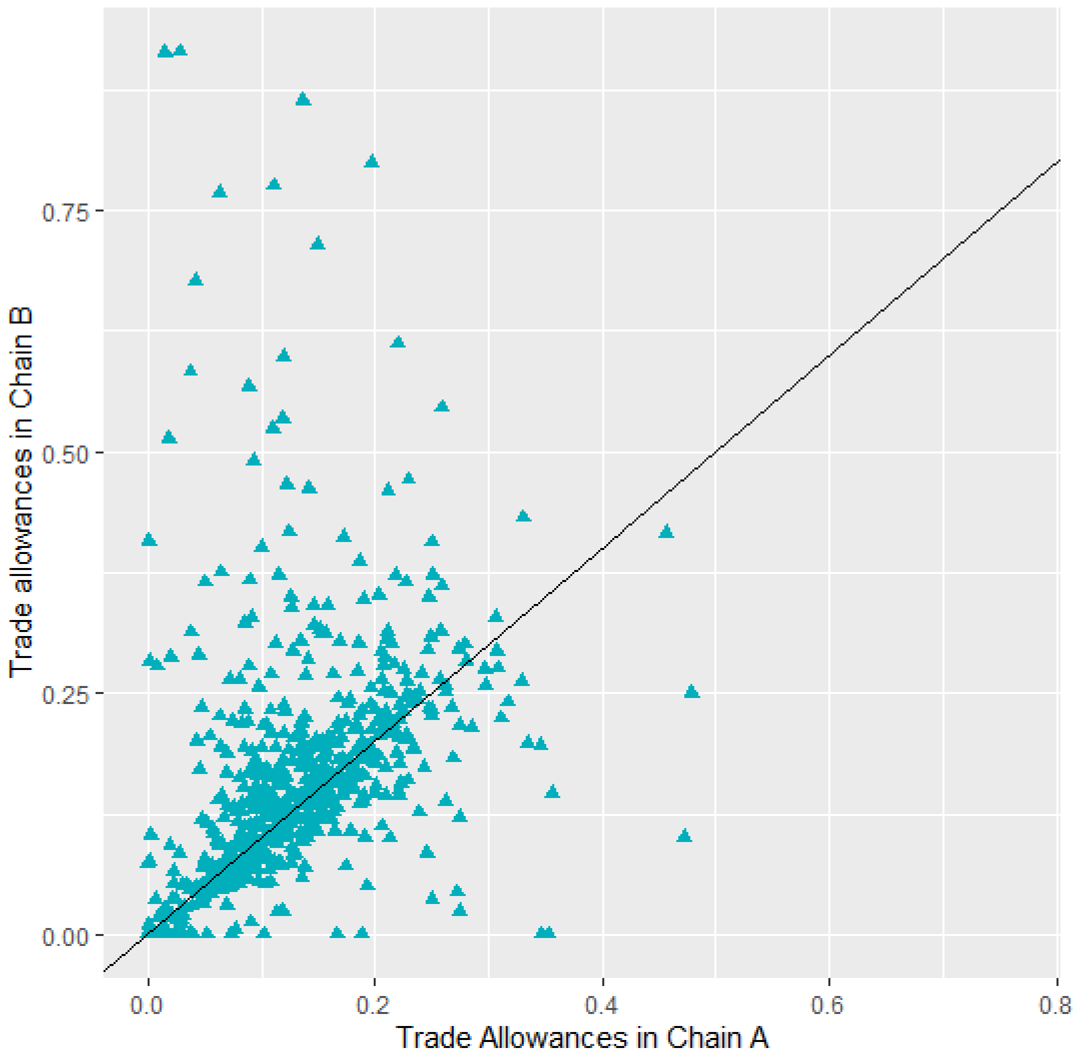
Figure 1: Trade Allowance Components



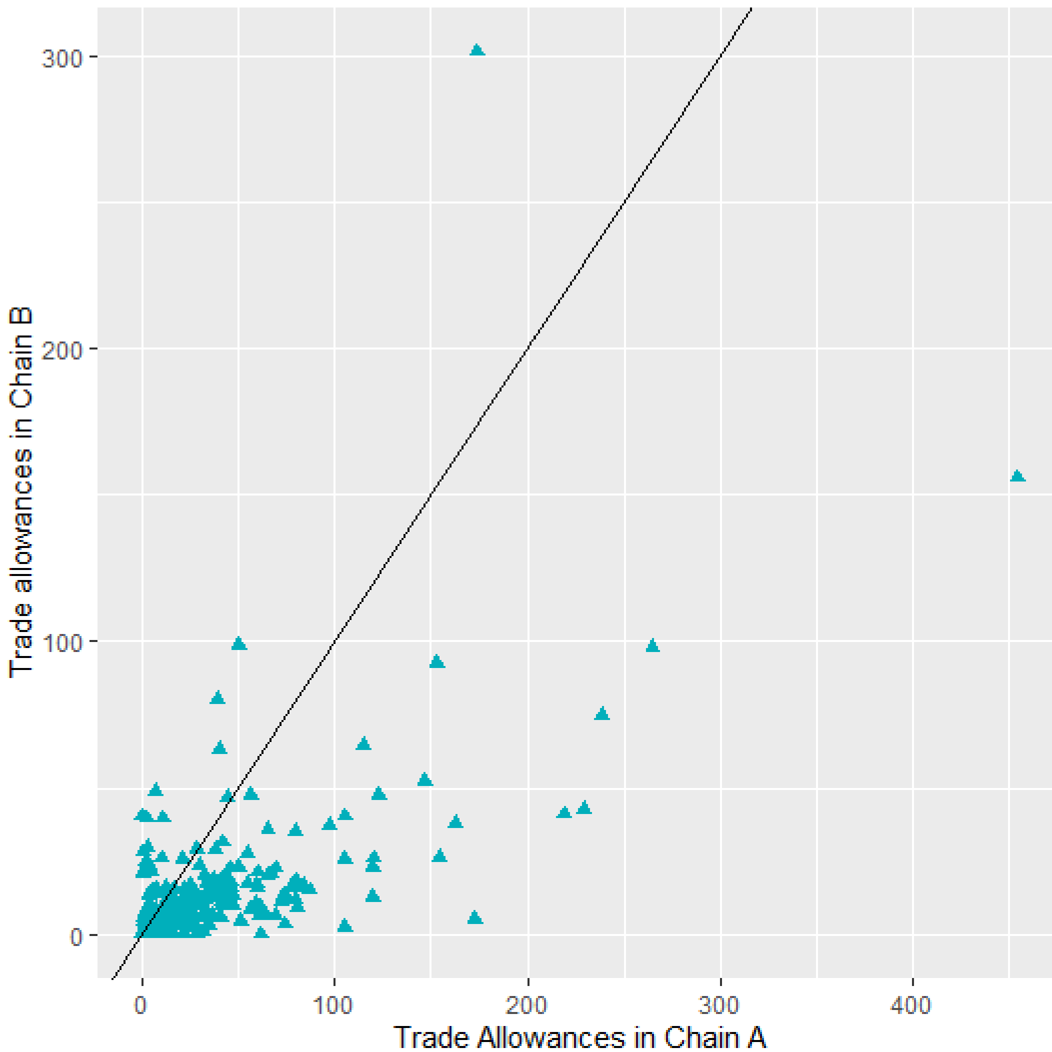
Notes: The figure shows the share of the different types of trade allowances over total allowances across supermarket-sections.

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



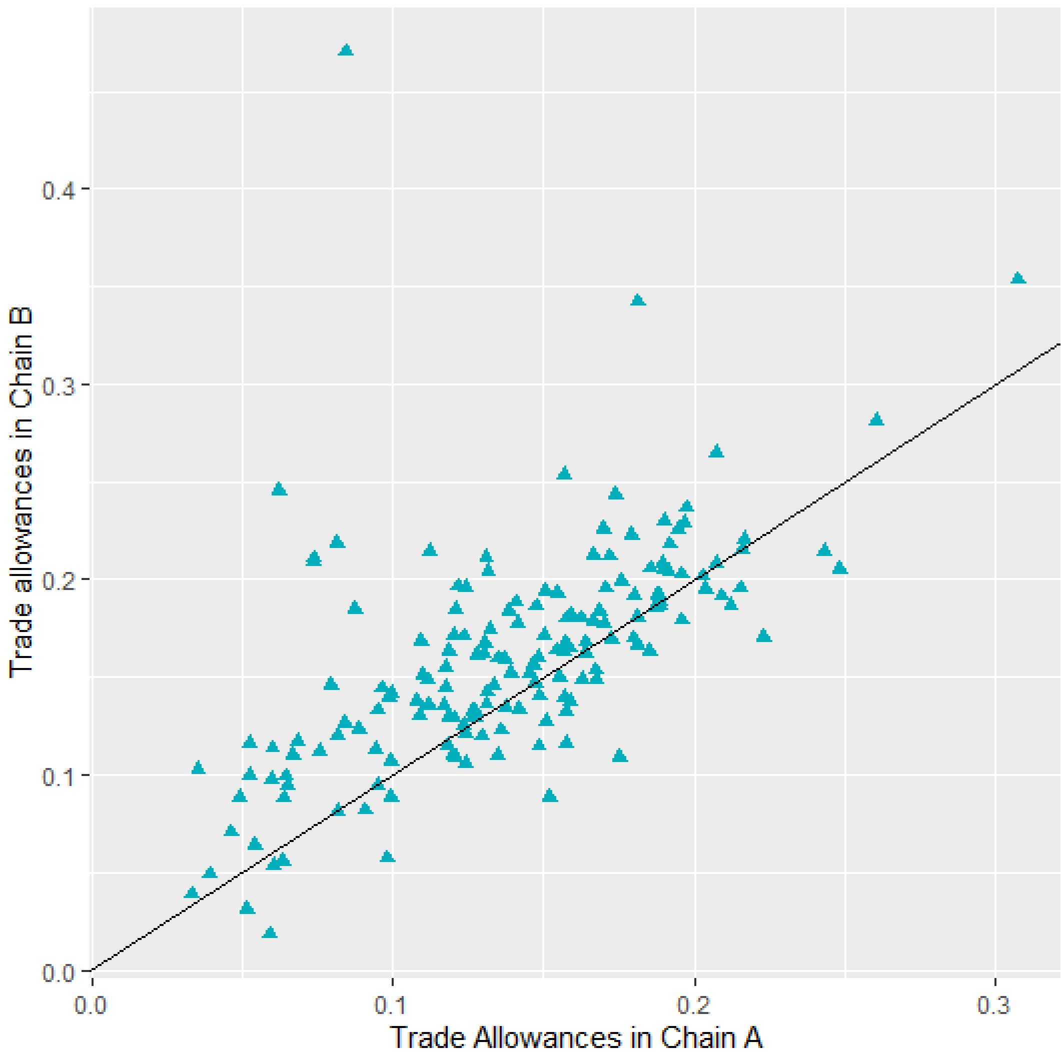
Notes: The figure shows the share of trade allowance over gross manufacturer revenues across suppliers in different supermarket chains. Correlation coefficient, $\rho = 0.3604$.

Figure 3: Heterogeneity in Trade Allowances Across Suppliers
(as Amount per SKU per store per period)



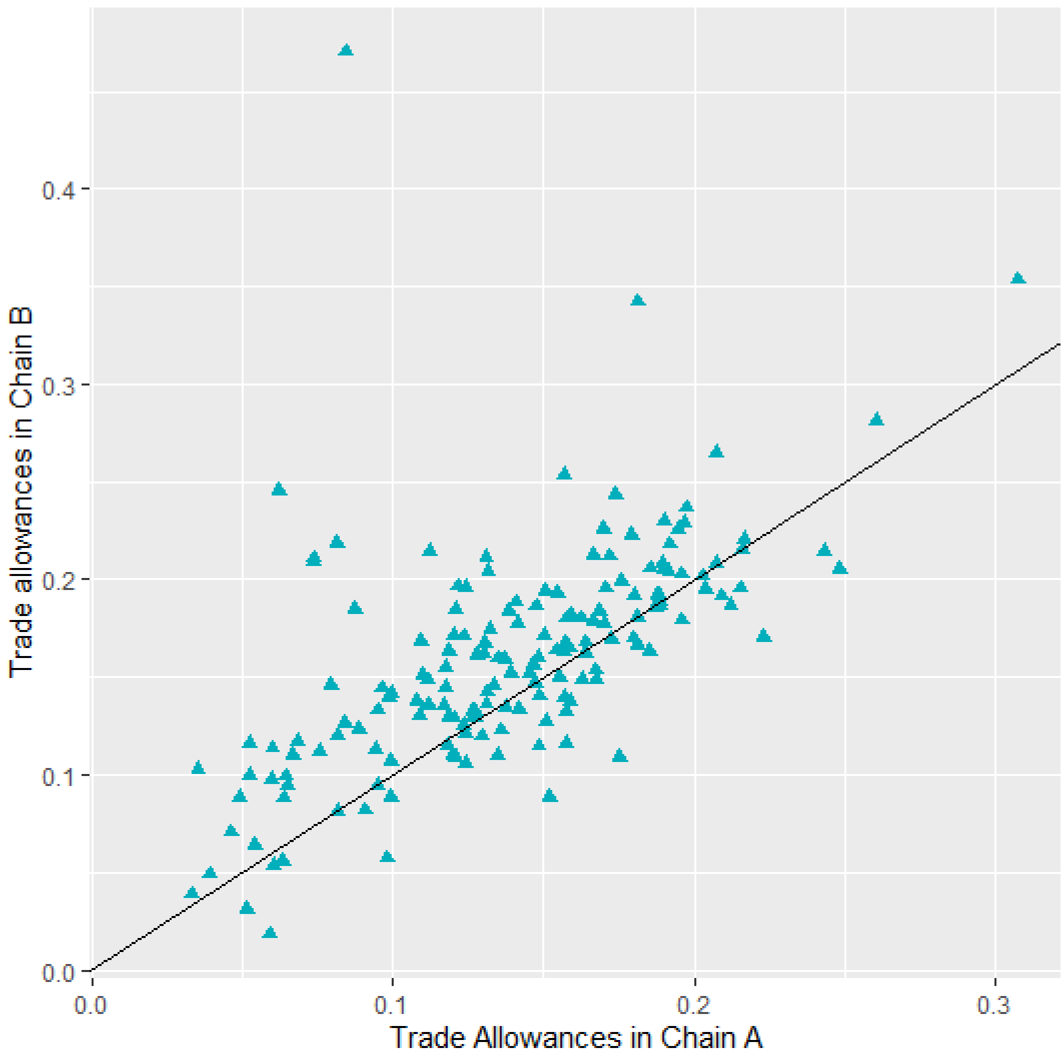
Notes: The figure shows the trade allowance amounts per SKU per store per period across suppliers in different supermarket chains. Correlation coefficient, $\rho = 0.671$.

Figure 4: Heterogeneity in Trade Allowances Across Categories
(as Share of Gross Manufacturer Revenues)



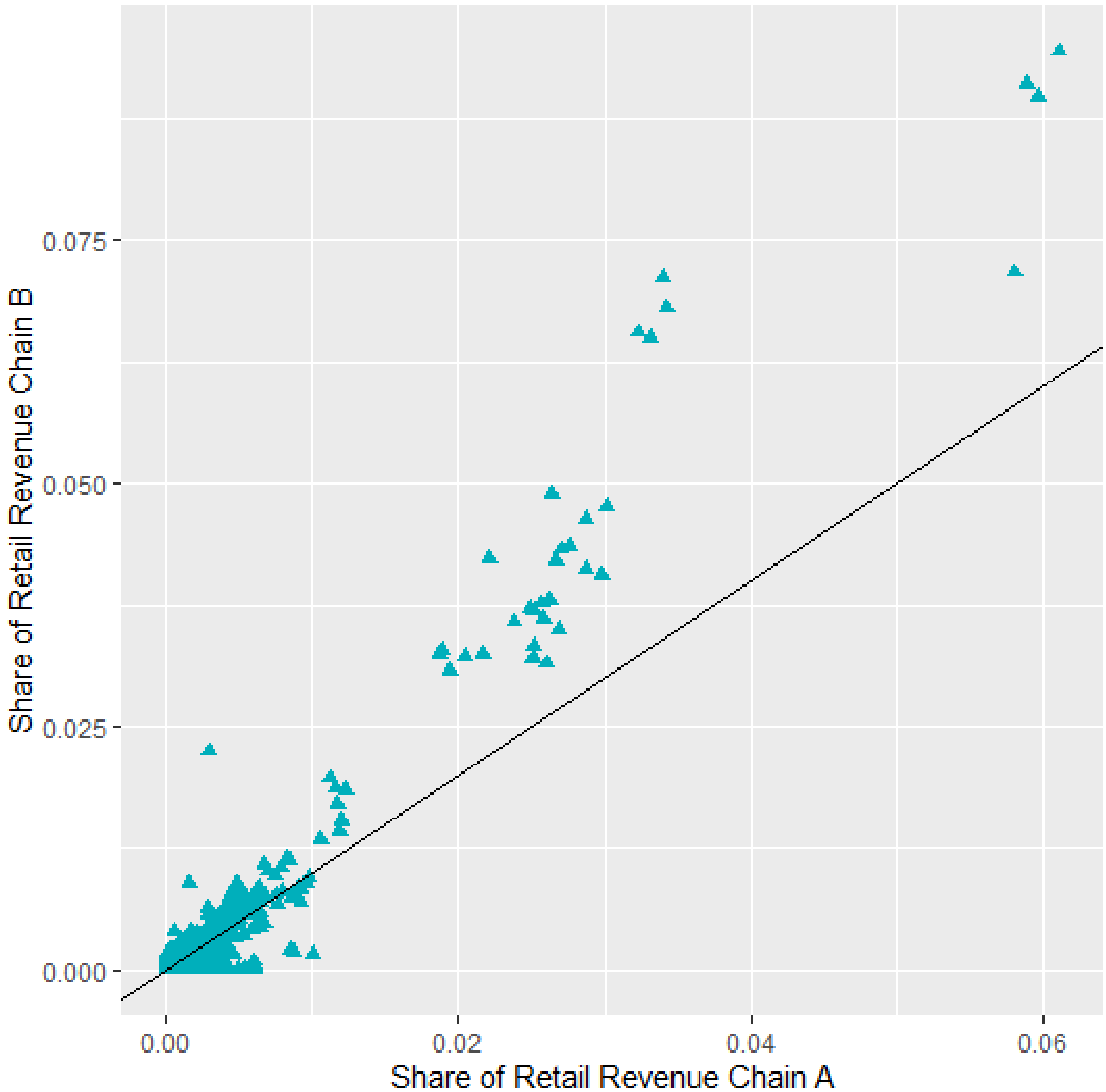
Notes: The figure shows the share of different trade allowance over gross manufacturer revenues across categories in different supermarket chains. Correlation coefficient, $\rho = 0.617$.

Figure 5: Heterogeneity in Trade Allowances Across Categories
(as Amount per SKU per store per period)



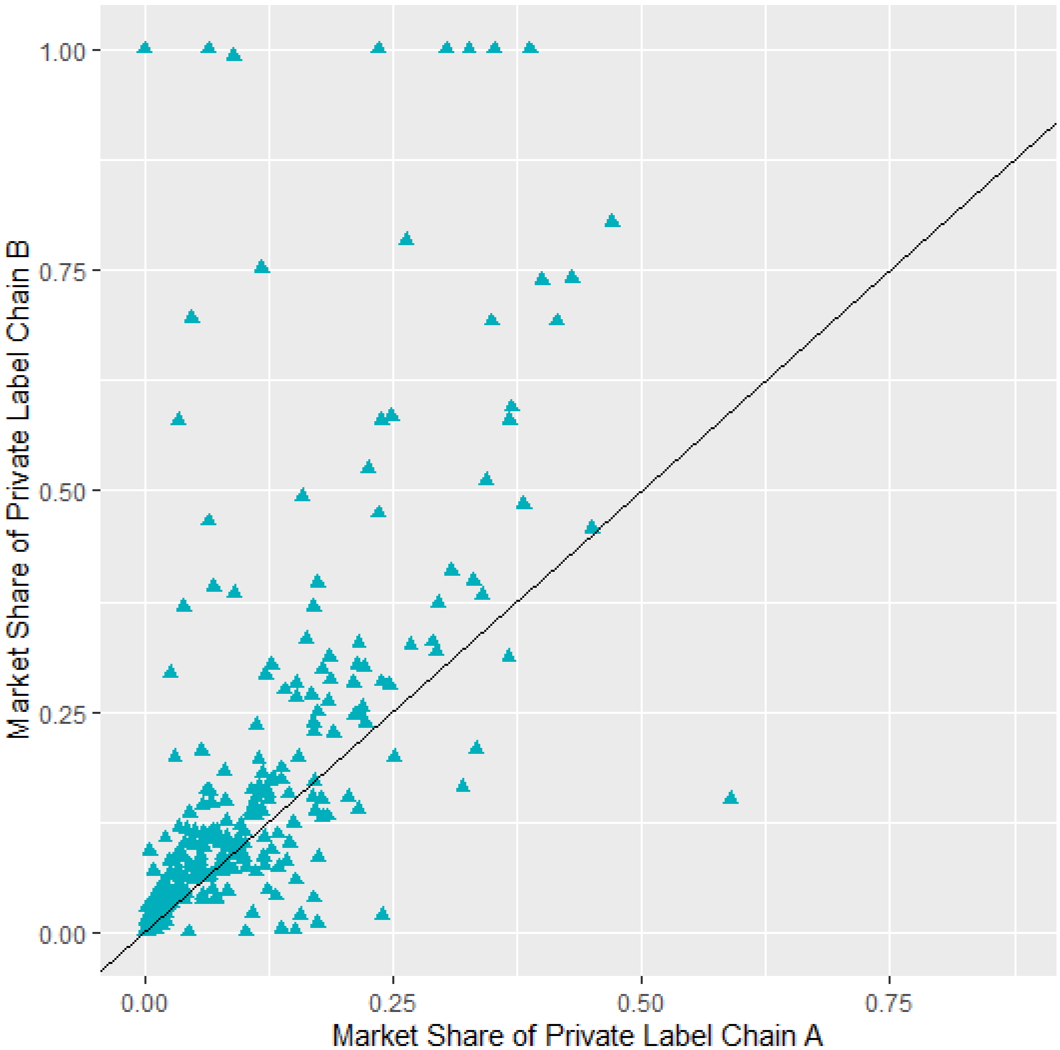
Notes: The figure shows the amounts per SKU per store per period across categories in different supermarket chains. Correlation coefficient, $\rho = 0.581$.

Figure 6: Market Size across Supermarket Chains



Notes: The figure shows the share of retail revenues for each supplier-time combination across supermarket chains. Correlation coefficient, $\rho = 0.885$.

Figure 7: Market Share of Private Labels across Supermarket Chains



Notes: The figure shows the market share of private labels for each supplier-time combination across supermarket chains. Correlation coefficient, $\rho = 0.687$.

Table 1: Summary Statistics on Type of Trade Allowances

Chain A	% of Gross Manuf. sales (1)	$ per SKU per store per year (2)
Trade Allowances	0.1386	138.4948
	(0.1026)	(327.3046)
Logistic Fees	0.0056	5.2585
	(0.0137)	(19.8148)
New Openings Fees	0.0166	23.5236
	(0.0457)	(120.8988)
N. of suppliers	1,225	
N. of categories	176	
N. of observations	10,161	

Chain B	% of Gross Manuf. sales (1)	$ per SKU per store per year (2)
Trade Allowances	0.1601	78.8380
	(0.1324)	(209.5768)
Logistic Fees	0.0065	2.9093
	(0.0134)	(11.3276)
New Openings Fees	0.0163	12.2225
	(0.0525)	(269.8882)
N. of suppliers	744	
N. of categories	168	
N. of observations	5,775	

Notes: Summary statistics of trade allowances measured as a share of gross manufacturer revenue (Column (1)) and in US dollars per SKU per store per period (Column (2)). Statistics for each chain are computed over suppliers, categories, and time periods. As described in subsection 3.3, allowances are grouped in *Trade allowances*, *Logistic fees* and *New store opening fees*.

Table 2: Variance Decomposition of Trade Allowances (Share of Gross Manufacturer Revenue)

Parameters	Estimate	Std. Err.	[95% Conf.	Int.]	Explained Variance (%)
(1)	(2)	(3)	(4)	(5)	(6)
Time	0.0002	0.0002	0.0000	0.0018	0.0149
Chain	0.0003	0.0003	0.0000	0.0021	0.0185
Category	0.0017	0.0002	0.0013	0.0022	0.1216
Supplier	0.0115	0.0002	0.0112	0.0119	0.8450
LL	7137.74				
N. of observations	9,014				

Notes: Estimates in column (2) correspond to maximum likelihood estimates of variances. Column (6) shows the share of the total variance that is explained by the variance of each given covariate.

Table 3: Variance Decomposition of Trade Allowances ($ per SKU per store per period)

Parameters	Estimate	Std. Err.	[95% Conf.	Int.]	Explained Var. (%)
(1)	(2)	(3)	(4)	(5)	(6)
Time	0.1265	0.1944	0.0062	2.5689	0.0002
Chain	13.0888	13.2644	1.7959	95.3942	0.0188
Category	236.3913	26.8896	189.1503	295.4310	0.3396
Supplier	446.3997	5.0317	436.6460	456.3713	0.6414
LL	-71,524.94				
N. of observations	15,931				

Notes: Estimates in column (2) correspond to maximum likelihood estimates of variances. Column (6) shows the share of the total variance that is explained by the variance of each given covariate.

Table 4: Variance Decomposition of Trade Allowances Accounting for Multicategory Suppliers

Component	(1)	(2)
Time	0.738	0.031
Chain	1.437	0.855
Category	13.332	23.846
Supplier	84.494	75.268
N. of observations	6,190	6,190

Notes: Column (1) presents the variance decomposition for trade allowances as a share of gross manufacturer revenue. Column (2) presents the results for trade allowances measured in dollars per SKU per store per period.

Table 5: Market Size and Trade Allowances
(as Share of Gross Manufacturer Revenues)

	OLS	OLS	IV	OLS	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
m_{sct}	-1.72	-2.20	-3.50			
	(0.50)***	(0.48)***	(0.75)***			
m_{sct-1}				-1.49	-1.94	-3.27
				(0.49)***	(0.48)***	(0.79)***
Fixed Effects:						
Chain	✗	✓	✓	✗	✓	✓
Time	✓	✓	✓	✓	✓	✓
Supplier	✓	✓	✓	✓	✓	✓
High-Cost Section	✓	✓	✓	✓	✓	✓
Adj. R-squared	0.36	0.37		0.38	0.39	
Kleibergen-Paap F stat			44.71			32.12
Number of Observations	6,070	6,070	4,082	4,205	4,205	2,906

Notes: Robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Market Size and Trade Allowances
(as $ per SKU per Store per Period)

	OLS	OLS	IV	OLS	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
m_{sct}	-309.83	-127.86	-941.07			
	(167.83)	(157.25)	(244.97)***			
m_{sct-1}				-686.29	-508.35	-729.02
				(162.36)***	(149.69)***	(189.54)***
Fixed Effects:						
Chain	✗	✓	✓	✗	✓	✓
Time	✓	✓	✓	✓	✓	✓
Supplier	✓	✓	✓	✓	✓	✓
High-Cost Section	✓	✓	✓	✓	✓	✓
Adj. R-squared	0.60	0.63		0.62	0.66	
Kleibergen-Paap F stat			44.72			32.11
Number of Observations	6,058	6,058	4,074	4,201	4,201	2,904

Notes: Robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Assessing Alternative Hypotheses: Role of New Product Introductions and Established Suppliers

	Share of Revenues		Amount per SKU-Store	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
m_{sct-1}	-1.93	-3.28	-489.98	-676.92
	(.48)***	(.71)***	(145.75)***	(164.20)***
New Intro	-4.8e−5	3.34e−5	-0.09	-0.10
	(1.5e−4)	(1.3e−4)	(0.02)***	(0.02)***
Established	1.3e−4	0.03	141.57	89.28
	(0.02)	(0.02)	(2.30)***	(60.94)
Fixed Effects:				
Chain	✓	✓	✓	✓
Time	✓	✓	✓	✓
Supplier	✓	✓	✓	✓
High-Cost Section	✓	✓	✓	✓
R-squared	0.55		0.74	
Kleibergen-Paap F stat		31.75		31.75
N. of observations	4,322	2,943	4,316	2,941

Notes: Specifications in Columns (1)-(2) use share of gross manufacturer revenue as the dependent variable; specifications in Columns (3)-(4) use trade allowances per SKU, per store, per period as the dependent variable. Robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Trade Allowances and Strength of Private Labels

	Share of Revenues				Amount per SKU-Store			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	IV	IV	OLS	OLS	IV	IV
PL Market Share$_{t-1}$	1.5e−4		-0.05		-5.63		-14.66	
	(0.02)		(0.04)		(6.61)		(11.76)	
Strong PL$_{t-1}$		0.02		0.09		0.29		83.38
		(0.005)***		(0.053)*		(0.94)		(11.95)***
Fixed Effects:								
Chain	✓	✓	✓	✓	✓	✓	✓	✓
Time	✓	✓	✓	✓	✓	✓	✓	✓
Supplier	✓	✓	✓	✓	✓	✓	✓	✓
Category	✓	✓	✓	✓	✓	✓	✓	✓
Supplier by Time	✓	✓	✓	✓	✓	✓	✓	✓
Adj. R-squared	0.43	0.43			0.49	0.49		
Kleibergen-Paap F stat			218.81	94.28			27.51	15.54
Number of Observations	10,184	10,184	7,598	10,184	10,174	10,174	7,593	10,174

Notes: Specifications in Columns (1)-(4) use share of gross manufacturer revenue as the dependent variable; specifications in Columns (5)-(8) use trade allowances per SKU, per store, per period as the dependent variable. All specifications include category, supplier, time and supplier by time fixed effects. Robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

Appendix (For Online Publication)

A Further Details on the Data

Included product categories. Table A.1 below presents the list of product categories included in our raw data. The list is comprehensive in that all product categories carried by both supermarket chains are included in the data. Category definitions are determined by the retailer on the basis of proximity on supermarket shelves. In our analysis, we excluded some 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"). Specifically, the following 10 categories were excluded from the analysis: *Christmas Decoration*, *Own Pastries*, *Gift Cases*, *Pasta Making*, *Pre-Wash*, *Pre-payments*, *Restaurant*, *Prepared Meals*, *Cards* and *Special Seasons*.

High-cost Sections. Following reports from both the academic literature (e.g., Shaffer (1991), Sullivan (1997)) as well as anecdotal evidence (e.g., Rivlin (2016)) we choose to control for sections which presumably involve higher stocking costs. We accordingly construct two dummy variables which capture whether a supplier's products require refrigeration and whether a supplier's products belong to a set of products which are typically placed near the checkout aisle. More precisely, the variable "refrigerated" takes on the value of one if the supplier's products belong to any of the following product categories: *Meat-Beef*, *Pork*, *Frozen Prepared Meals*, *Delicatessen*, *Frozen Fruits*, *Frozen Hamburgers*, *Ice-Cream*, *Ice*, *Fresh Juices*, *Lard*, *Butter*, *Margarine*, *Packaged Pastries*, *Frozen Seafood*, *Fresh Seafood*, *Chicken*, *Desserts*, *Cheeses*, *Frozen Vegetables* and *Yogurts and Desserts*. Similarly, the variables "Checkout" takes on the value of one if the supplier's products belong to any of the following categories: *Candies*, *Chocolates* and *Batteries*.

B Alternative Time Aggregation

As we discuss in Section 3, the bulk of trade allowances in the Chilean supermarket industry are negotiated either annually or semiannually. Accordingly, we choose to conduct the analysis at the semiannual level in the main body of the paper. In this appendix we estimate the relationship between trade allowances and market size using an annual instead of a semiannual aggregation and show that our main results are unaltered by the choice of time aggregation.

Table A.1: Product Categories Included in the Data

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

Table B.1: Robustness to Annual Aggregation (share of gross manufacturer revenue)

	(1)	(2)	(3)	(4)
m_{sct}	-2.41	-2.94		
	(0.83)***	(.77)***		
m_{sct-1}			-3.95	-4.70
			(1.86)**	(1.69)***
Fixed Effects:				
Chain	✗	✓	✗	✓
Time	✓	✓	✓	✓
Supplier	✓	✓	✓	✓
High-Cost Section	✓	✓	✓	✓
Adj. R-squared	0.28	0.30	0.44	0.49
N. of observations	3,069	3,069	950	950

Notes: Robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

Table B.2: Robustness to Annual Aggregation ($ per SKU per store per period)

	(1)	(2)	(3)	(4)
m_{sct}	-5,692	-3,845		
	(2,297)**	(2,174)*		
m_{sct-1}			-10,524	-8,265
			(2,755)***	(2,560)***
Fixed Effects:				
Chain	✗	✓	✗	✓
Time	✓	✓	✓	✓
Supplier	✓	✓	✓	✓
High-Cost Section	✓	✓	✓	✓
Adj. R-squared	0.61	0.65	0.42	0.52
N. of observations	3,053	3,053	948	948

Notes: Robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

C Robustness to Alternative Market Size Definition

This appendix estimates the relationship between trade allowances and market size using the total number of SKU's per store as an alternative measure of market size.

Table C.1: Robustness to Alternative Measure of Market Size

	(1)	(2)
$\log(\#SKU)_{sct}$	-.008	
	(.002)***	
$\log(\#SKU)_{sct-1}$		-.008
		(.002)***
Fixed Effects:		
Chain	✓	✓
Time	✓	✓
Supplier	✓	✓
High-Cost Section	✓	✓
Adj. R-squared	0.40	0.40
N. of observations	6,058	4,201

Notes: Robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.

D Robustness to Endogeneity

Table D.1: Robustness to Endogeneity: Lagged Market Size Regressor

	Share of Revenues (1)	Amount per SKU-Store (2)
m_{sct-2}	-2.61	-462.1
	(0.70)***	(141.8)***
Fixed Effects:		
Chain	✓	✓
Time	✓	✓
Supplier	✓	✓
High-Cost Section	✓	✓
Adj. R-squared	0.38	0.63
N. of observations	2,540	2,536

Notes: Robust standard errors in parenthesis. P-values notation: *** p<0.01, ** p<0.05, * p<0.1.