Are supermarkets squeezing small suppliers? Evidence from negotiated wholesale prices.*

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Abstract

Conventional wisdom is that big-box retailers squeeze the profits of small suppliers. This belief relies on the assumption that relative market size is the primary source of bargaining leverage. We use actual wholesale prices to study profit-sharing between large retailers and suppliers of different size. We find that all suppliers are able to earn a sizable fraction of the channel surplus: The largest upstream supplier earns at least 65 percent of the surplus and the small suppliers earn about 41 percent of the surplus. Strikingly, some very small suppliers that sell niche products can attain a share of the channel surplus close to that of the largest supplier. Using a Nash bargaining model, we find that, in spite of their small market size, small suppliers are able to gain bargaining leverage by maintaining a base of loyal customers.

JEL codes: C78, L13, L14

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1 Introduction

Since the rise of big-box retailers, the public outcry from suppliers is that the balance of power has shifted towards large retailers. According to this hypothesis, the larger size of retailers allows them to exert undue pressure on suppliers, especially small ones, to lower their prices (Bowman (1997)).

The issue is hotly debated. On the one hand, the trade press[1] and some academic research argue that large chains of supermarkets (e.g., Walmart) have gained bargaining leverage. Most empirical arguments are based on the increasing concentration in the retail sector (Clarke, Davies, Dobson, and Waterson (2002)), the proliferation of store brands, and the widespread use of slotting and promotional allowances charged by retailers to suppliers. On the other hand, academic research surveyed by Ailawadi (2001) shows that there is no clear trend in the profitability of retailers relative to that of suppliers. Moreover, she argues that the aforementioned allowances and the proliferation of stores brands should not be interpreted as evidence of the balance of power shifting towards retailers.

Despite the hot debate, there is scarce direct evidence on the share of the channel surplus earned by big retailers and suppliers and the way these shares vary across suppliers of different market size. The lack of empirical assessments on the importance of market size for profit-sharing is largely due to three data limitations. First, measuring the size of the channel surplus requires information on production costs which are typically unavailable to researchers and hard to estimate. Second, the split of profits is mainly driven by negotiated wholesale prices between suppliers and retailers, which are considered sensitive information and, hence, typically not shared with academics. Third, the few papers that have some measure of wholesale prices are unable to reveal the identity or characteristics of suppliers, leaving open the question of whether relative market size is the main determinant of bargaining leverage.

In this paper we shed light on how profit-sharing varies across suppliers of different market size. To overcome the usual data limitations faced by the literature, we gather a rich UPC (Universal Product Code)-level data set on negotiated wholesale prices between large retailers and suppliers of different market size. Combining data on negotiated wholesale prices with retail prices and quantities, we are able to compute retailers' payoffs obtained in bilateral

[1] See for instance Lynn (2006), Smith (2002) and Fishman (2006).

negotiations. Additionally, we focus on an industry in which production costs can be estimated based on observable input prices. Thus, we are able to estimate the payoffs of both large and small suppliers.

The coffee industry in Chile offers an ideal setting to shed light on this issue. First, the coffee manufacturing sector uses a simple and well-known production technology that is virtually homogeneous across producers and based on observable commodity prices (Sutton (1991)). Thus, we are able to reliably estimate production costs through simple computations. Second, in line with the international trend, the Chilean retail market has become highly concentrated with two large retailers accounting for approximately 80 percent of the coffee sales made through supermarkets. Third, market size of coffee suppliers is highly heterogeneous. The coffee sector is characterized by a dominant supplier (Nestlé) and a fringe of small manufacturers.[2] Thus, we focus on a typical setting where big-box retailers bargain with large and small manufacturers.

Our analysis of profit-sharing behavior comprises two stages. In the first stage, we conduct a reduced-form analysis to identify the key stylized facts and then, in the second stage, we use a structural model to rationalize our findings. In the reduced-form approach, we compare the share of surpluses earned by upstream and downstream players. To estimate those shares we use data on retail prices, wholesale prices and quantities, as well as estimated production costs.

In the structural approach, we use a Nash bargaining model to rationalize equilibrium payoffs. In this model, the outcomes of the negotiations depend on two sources of bargaining leverage: i) bargaining position, the difference between agreement and disagreement payoffs; and ii) bargaining power, broadly including factors such as bargaining skills, patience, and risk tolerance (Dukes, Gal-Or, and Srinivasan (2006)). While the data contain the sequence of agreement outcomes, we do not observe disagreement episodes. To estimate disagreement payoffs or outside options, we use a structural demand model to simulate the counterfactual scenario in which a manufacturer is excluded from a given retailer. Given the estimated bargaining positions we are able to infer the bargaining power consistent with the data.

Our main finding from the reduced-form approach is that both large and small manufacturers are able to earn a sizable fraction of the channel surplus

[2]From here onwards we use the terms manufacturer and supplier indistinctively since intermediaries are negligible in the market we study.

(we refer to channel or total surplus as the difference between retail revenues and variable costs of production). As expected, the largest manufacturer, Nestlé, obtains a large fraction of the surplus (at least 65 percent). Our findings do not support the hypothesis that small suppliers are squeezed by big-box retailers. In fact, the median of the fraction of the surplus of non-Nestlé suppliers equals 41 percent despite their small market size. Strikingly, some very small suppliers that sell niche products attain a similar share of the channel surplus as the largest supplier.

Following the structural approach, we are able to assess the relative importance of the players' outside options relative to their bargaining power parameter in a Nash bargaining model. Our structural estimates suggest that the degree of brand substitution is limited, worsening retailers' outside options, and therefore granting small suppliers with increased bargaining leverage. Thus, we find that consumer preferences can offset the effect of market size on bargaining outcomes, and hence, large supermarkets do not necessarily squeeze small manufacturers.

Our paper primarily relates to a strand of the bargaining literature that studies how the channel surplus is split between upstream manufacturers and downstream retailers.[3] The closest paper to ours is Draganska, Klapper, and Villas-Boas (2010) who study profit-sharing in the German coffee market and find that bargaining power lies primarily with the manufacturers. However, a disadvantage of their approach is that they need to rely on a structural model to infer wholesale prices as do most of the articles on vertically organized industries (Sudhir (2001), Villas-Boas (2007), Bonnet and Dubois (2010)).[4] In the same spirit but using a reduced-form analysis, Bloom and Perry (2001) and Mottner and Smith (2009) study the effect of trading with Walmart on suppliers' profitability. Both articles find a positive correlation between supplier's market size and profitability when trading with Walmart. Huang, Nijs, Hansen, and Anderson (2012) study the effect of Walmart's entry on the profits of a large supplier. Their main finding is that Walmart's entry causes suppliers profits to increase while having almost no impact on wholesale prices. Their data are limited to a single and anonymous large manufacturer which precludes them from addressing the issue of big retailers squeezing the

[3]Our paper belongs to a broader empirical literature on bargaining that covers topics such as bundling (Crawford and Yurukoglu (2012)), mergers (Gowrisankaran, Nevo, and Town (2015)), price discrimination (Grennan (2013)), search and switching costs (Allen, Clark, and Houde (2012)), among others.

[4]See Sudhir and Datta (2008) for a survey.

profits of small suppliers.

The remainder of this paper is organized as follows. Section 2 presents our data and describes the industries studied in this paper. Section 3 provides reduced-form analysis of profit-sharing. Section 4 presents the structural analysis using a Nash bargaining model. Finally, Section 5 presents our conclusions.

2 Industry Description and Data

2.1 Data

Our data consist of weekly retail prices (i.e., prices faced by final consumers), wholesale or transfer prices (i.e., prices negotiated between suppliers and supermarkets), and quantities sold in Santiago, Chile. Our transaction data are recorded at the UPC and store[5] level.

The retail data cover all major supermarket outlets in Santiago and span the period 2005-2007. They include 120,884 observations of scan data for 180 stores located in 34 counties over 94 weeks. The wholesale data include prices agreed upon between the two major supermarket chains and all the coffee suppliers, which account for 80 percent of total coffee sales of supermarkets in Santiago.

The wholesale prices in our data are those agreed upon between coffee manufacturers and supermarket chains as no relevant intermediaries participate in the Chilean coffee distribution chain. These wholesale prices include shipping and handling costs and are common across stores, as each chain negotiates at the national level. Our wholesale data, based on one representative store per chain, include 5,175 observations that match an important subset of our retail data.

Our wholesale price data include two standard cost measures widely used in the retail industry. In one chain, the wholesale prices reported by the retailer are replacement costs, which are the costs that a retailer would incur to acquire an extra unit of the product. In the other chain, wholesale prices correspond to the average acquisition cost (AAC), which is an average of the historical wholesale prices at which items in inventory were purchased.[6]

[5]We use "store" to refer to a particular outlet within a supermarket chain. In what follows we use the terms "supermarket chain" and "retailer" indistinctively.

[6]For a formal definition of AAC see Besanko, Dubé, and Gupta (2005).

In spite of the different methodologies used in computing wholesale costs, the two series appear to behave similarly, which can be explained by highly efficient inventory management systems.

We also gather information on supplier identity and coffee characteristics, such as whether the variety is ground, instant, or whole-bean and whether it is decaffeinated or flavored. Finally, we complement our data with publicly available spot prices of green coffee beans traded in the international commodity markets.

2.2 The Coffee Industry

The coffee industry comprises two major product segments: (1) *ground* or *roast* coffee, and (2) *instant* or *soluble* coffee. From a consumer's viewpoint, the only difference between these two types of products lies in the flavor (instant coffee is usually perceived as a lower quality product) and ease of preparation. In both segments, the technology employed in manufacturing coffee is simple. To produce ground coffee, green coffee beans are roasted and ground to a consistency suited to local preparation methods (percolation, filtering, espresso, etc.). Producing instant coffee involves extra steps, including extraction (dissolving ground coffee in water) and drying.

One relevant feature of the Chilean market is that, as in a number of other countries, instant coffee is the dominant segment (Ferdman (2014)). In fact, instant coffee accounted for approximately 85 percent of the volume of coffee sold in Chile over the period 2005-2010 (Euromonitor International (2011)). In contrast, ground coffee manufacturers, who tend to purchase higher quality beans, account for a tiny market share (for instance, the market share of Illy, a producer of high-quality ground coffee, is only 0.18 percent). Both types of coffee are mainly sold through supermarkets.

The producers of ground coffee can be labeled as high-end boutique producers. In the industry, ground coffee is perceived as being preferred by sophisticated *coffee connoisseurs*, who in search of a genuine taste are willing to invest in extra equipment for the preparation (such as the coffee machine) in contrast to the simplicity of mixing the ready-to-drink instant coffee. The producers of instant coffee can be categorized as low-end suppliers. However, these suppliers have a long tradition in the Chilean market with some well-known brands.

In Chile, as in several other countries, the instant coffee segment is dominated by the Swiss multinational Nestlé. Its leading brand, Nescafé, domi-

nates the retail market for instant coffee in various countries, including Italy, Japan, France, Germany, and the UK. In Chile, the brand Nescafé tops the ranking of brand loyalty elaborated by AC Nielsen.

The upstream industry is highly concentrated. Nestlé has a market share of approximately 77.9 percent of the entire Chilean market. The largest non-Nestlé manufacturer only accounts for approximately 14.6 percent while the other coffee manufacturers account for tiny shares of the market (Euromonitor International (2011)).

2.3 The Chilean Supermarket Industry

Following a worldwide trend, the Chilean supermarket industry has become increasingly concentrated in recent decades. By 2006, the two largest supermarket chains accounted for more than 60 percent of the Chilean supermarket sales and approximately 88 percent of the coffee sold through supermarkets. In terms of relative size, the two retailers account for a substantial market share of the coffee market, ranging between 40 and 50 percent.

As the concentration of the Chilean supermarket industry increased, conflicts between supermarkets and suppliers began to surface to the public's attention. In a number of presentations to the antitrust authorities several suppliers grouped in AGIP[7] -a trade association of supplier industries- accused large supermarket chains of several conducts that on their view would be detrimental to competition. These conducts included, among others, selling products below (wholesale) cost; misleading consumers by choosing own-brand packaging that imitated that of popular national brands; and demanding increasing amounts of allowance payments.[8] The Chilean antitrust authority ruled that while these conducts were not necessarily anti-competitive per se –and that they should be assessed on a case by case basis– the terms of the contracts between supermarkets and suppliers should be clearly stated ex-ante and that supermarkets should abstain from unilaterally changing them ex-post (TDLC (2004)). We discuss the nature of these contracts in the next subsection.

In what follows and for expositional convenience, we label the two retailers in our dataset as EDLP and HL based on the pricing strategy they follow:

[7] for Spanish Asociacion Gremial de Industrias Proveedoras.

[8] While private labels do not play a relevant role in the Chilean coffee industry, allowance payments from coffee suppliers to supermarkets are typically part of the negotiations between the two players. We discuss this point in greater detail in the next subsection.

"Everyday-low-prices" and "High-Low", respectively.[9]

2.4 Structure of the Contracts

One important aspect of the relationship between coffee suppliers and supermarkets that we need to account for in estimating profit-sharing within the channel is the way contracts between the two parties are specified. According to industry experts,[10] the relationship between coffee suppliers and supermarkets is governed by two types of contracts: those defining wholesale prices and those defining allowances.

The first type of contract specifies volumes and a per-unit price for the actual products purchased by the retailer –referred to in this paper and in most of the literature as wholesale (or transfer) prices. These contracts are short term and subject to renegotiation several times a year. In fact, in our data wholesale prices are changed on average every 4.2 weeks.[11] It should be noted that the contracts in this industry do not specify a formula based on observable input prices such as coffee bean prices or energy costs and hence are not characterized by a *cost-plus* rule.

The second type of contract specifies allowance payments, which are monetary transfers made by suppliers to supermarkets (Lariviere and Padmanabhan (1997), FTC (2001 and 2003)). These payments include: (i) *slotting allowances*, which are payments to have a new product carried by the retailer and placed on its shelves; (ii) *pay-to-stay* fees, which are payments to keep existing products on the retailer shelves; and (iii) payments to carry out promotional activities on behalf of the supplier. These contracts are in the majority of cases negotiated once a year and hence are of a longer term nature than those specifying wholesale prices. The way these contracts are structured involves agreeing on the fraction of next year's purchases the supplier will pay the supermarket as those purchases are realized. According to our sources these payments in the Chilean coffee industry are in the order of

[9] In an EDLP strategy the retailer maintains relatively low shelf prices and only rarely offers specials or discounts. An HL strategy is characterized by the combination of relatively high shelf prices and frequent promotions and discounts

[10] We gathered information on the specifics of the negotiations between supermarkets and suppliers from interviews with three high-ranking managers from two large retail chains. We gratefully acknowledge their assistance.

[11] This figure is based on replacement costs and hence it is not explained by inventory changes.

10 percent of purchases.

3 Reduced-Form Analysis of Profit-Sharing

We conduct a reduced-form analysis of profit-sharing by comparing the payoffs earned by upstream manufacturers and downstream retailers.

We define the payoff for each downstream retailer D as:

$$\pi^D = \sum_{j \in \mathcal{D}} (p_j^r - p_j^w) Q_j \tag{1}$$

where $\mathcal{D}$ is the set of coffee products sold by retailer D, and Q_j, p_j^r, and p_j^w are the quantity, retail price, and wholesale price of product j, respectively.[12] Because our data include all terms in Equation (1), we are able to directly compute the retailers' payoffs.

Similarly, for upstream coffee manufacturer U the payoff is given by:

$$\pi^U = \sum_{j \in \mathcal{U}} (p_j^w - \widehat{c}_j) Q_j \tag{2}$$

where $\mathcal{U}$ is the set of coffee products sold by manufacturer U and $\widehat{c}_j$ is the marginal cost of producing product j.

Notice that we abstract from both fixed and marginal distribution costs. This implies that the above payoffs represent an upper bound of the profits obtained by each player. We discuss the presence of fixed costs in the empirical section below.

3.1 Production Costs of Coffee Manufacturers.

Because our data do not include a measure of marginal costs, $\widehat{c}_j$, they must be estimated to compute the manufacturers' payoffs. To avoid imposing a particular structure linking the bargaining outcome to the manufacturer's underlying marginal cost we estimate production costs without using our information on wholesale prices.

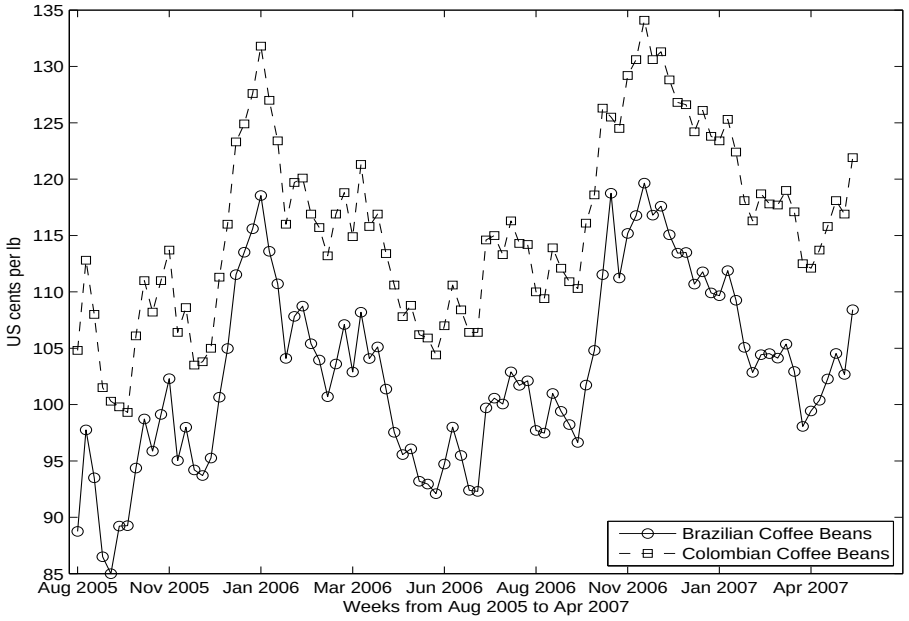
Cost estimation is greatly facilitated by the simplicity of the coffee production technology (Sutton (1991), Yip and Williams (1982), Leibtag, Nakamura, Nakamura, and Zerom (2007), Durevall (2007), Koerner (2002)). The

[12] We use indistinctively the terms "product", "variety" and "good" to refer to a unique UPC.

dominant input in the production of packaged coffee is green coffee beans which represent at least 50 percent of variable costs. As a small importer of green coffee beans, Chile is a price taker in international markets. According to the International Coffee Organization (ICO 2006), most coffee beans in Chile are imported from Brazil (approximately 70 percent) and Colombia (approximately 10 percent).

Variation in marginal costs reflects the large fluctuations exhibited by the international price of green coffee beans. These are apparent from Figure 1, which shows the pattern of weekly spot prices for Brazilian and Colombian coffee beans over the 2005-2007 period. Prices oscillate by as much as 30 percent over the span of a few weeks.

Figure 1: **International price of green coffee beans**



Notes: The figure presents the end-of-week closing cash price of Colombian and Brazilian coffee in the New York Futures Exchange.

There are few economies of scale in coffee roasting and grinding, so marginal costs are largely independent of output, and companies of different sizes have similar marginal cost functions. The total marginal cost of product variety j, $\widehat{c}_j$, is typically expressed as the sum of the coffee and non-coffee

components:

$$\widehat{c}_j = m_j^C + m_j^O \tag{3}$$

where m_j^C is the coffee component and m_j^O is the non-coffee component of product j (including packaging, freight, and labor). There is consensus that coffee beans should, on average, account for more than half of marginal costs. Other inputs, such as labor, energy, packaging, transport, and physical capital, usually represent less than 5 percent of total variable costs each, and rarely more than 10 percent.

We compute the product-specific coffee cost, m_j^C, as the product of the required quantity of coffee beans and the international price of green coffee beans expressed in Chilean pesos. For input requirements, we use the facts that producing one kilogram of ground coffee requires 1.19 kg of beans and that producing one kilogram of instant coffee requires 2.60 kg of beans. In the case of instant coffee, we assume that the cost of green coffee beans is a weighted average of Brazilian and Colombian coffee prices. Instead, to be consistent with the higher quality of ground and whole-bean coffee, we assume that only the more expensive Colombian green coffee beans are used in their production.

We express the time-invariant portion of the marginal costs, m_j^O, as a function of the fraction of non-coffee costs over total costs, which we denote by κ:

$$m_j^O = \left(\frac{\kappa}{1-\kappa}\right)\overline{m}^C \tag{4}$$

where $\overline{m}^C$ is the average of m^C over time and manufacturers. Thus, total variable cost of product j is a function of the coffee component, m_j^C, and the share of non-coffee costs, κ.

To account for estimation noise, we estimate upper and lower bounds for marginal costs. The estimated production costs are increasing in the fraction of non-coffee costs, κ, and, in the case of instant coffee, the share of the more expensive Colombian coffee.[13] To compute the lower-bound cost, we use $\kappa = 0.3$ and the Colombian coffee price is weighted by 30 percent. To compute the upper-bound cost, we increase the share of non-coffee costs to $\kappa = 0.4$ and the weight of the Colombian price to 50 percent. In what

[13]The remaining share is allocated to cheaper Brazilian coffee in the case of instant coffee. In the case of ground and whole bean coffee, the only input considered is the Colombian green coffee beans.

follows we use the upper bound estimations for costs, hence we present lower bounds for manufacturer payoffs.

3.2 Profit-Sharing Analysis

Once we have estimated production costs, we are able to compute profits of every player in the market. Table 1 presents their estimated share of the total surplus as well as their market size. In particular, Table 1 presents market shares by coffee segment (instant vs ground[14]), average supplier markups, retail markups and the share of total surplus that each supplier earns. As can be seen from column 3, the leading supplier is the multinational Nestlé (75.9% of total sales) followed by the local suppliers Tres Montes (11.9%) and Haiti (4.6%).

As it is apparent from columns 1 and 2, suppliers are mainly specialized in either instant or ground coffee. Only 6 out of 23 suppliers produce both types of products. Among those who produce both types of coffee, one of the segments is clearly dominant within a firm. For instance, while Nestlé and Tres Montes derived 98 percent and 96 percent of their retail sales, respectively, from the instant coffee segment, Haiti and Illy are primarily producers of ground coffee (98 percent and 89 percent of their retail sales, respectively, are in the coffee ground segment). This specialization, in addition to the presence of the dominant firm Nestlé, justifies the simplification that we adopt in this paper of grouping the suppliers into three groups: Nestlé, non-Nestlé instant coffee producers, and non-Nestlé ground coffee producers.[15]

The markups in column 4 and 5 are computed as the difference between wholesale price and marginal cost over wholesale price, and the difference between retail price and wholesale price over retail price, respectively. Overall, suppliers' markups are twice as large as the retailers' markups. The median markups are 45 percent for suppliers[16] whereas the median markups for retailers is 21 percent. The supplier markups were computed using our upper bound measure of marginal costs, hence it is a conservative measure

[14]For simplicity of exposition the label "ground coffee" stands for both ground and whole bean coffee.

[15]The suppliers listed as non-Nestlé instant coffee producers are: Cafe do Brasil, Cocam, Colcafe, Dallmayr, Di Carlo, Hansewappen, Iguazu, Kraft, Kruger, Tres Montes and Usher.

[16]Using survey data from American manufacturers of coffee and tea, Leibtag, Nakamura, Nakamura, and Zerom (2007) find margins in the order of 39 percent.

of suppliers' markups.[17]

As expected, we observe a negative correlation between market size and retailers' markups (the simple coefficient of correlation equals -0.32). Interestingly, we observe no positive correlation between market size and suppliers' markups (excluding Usher, the simple coefficient of correlation equals -0.06). For instance, comparing the top three players, we observe that Nestlé (76% of retail sales) has an estimated markup of 46%, Tres Montes (12% of retail sales) has a 22% markup, and Haiti (5% of retail sales) exhibits a large markup of 49%.

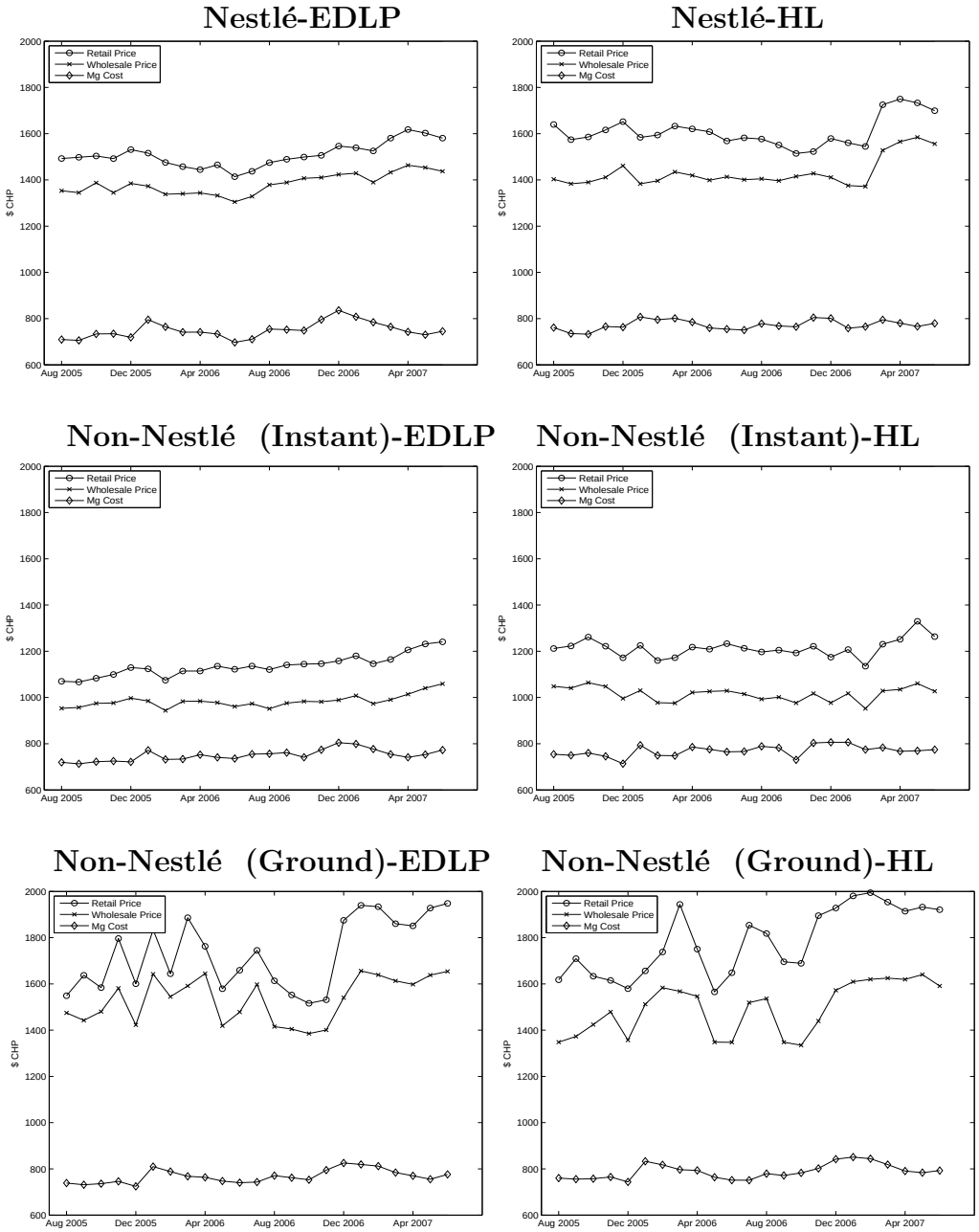
Column 6 presents the share of total surplus obtained by each supplier, including the non-linear payments made by suppliers to retailers (as described in Subsection 2.4). According to industry experts, average allowance payments in the coffee industry over the period 2005-2007 are 9 percent and 11 percent of the total purchases made by retailers from Nestlé and non Nestlé, respectively. We had access to hard data on allowances for one of the retailers in the dataset for the period 2010-2012. We find values of 7.86 percent and 15.78 percent for Nestlé and non Nestlé, respectively, in line with our initial numbers. To be conservative regarding the profits of suppliers, we choose to use in our computations the allowance payments that are in favor of retailers and hence in favor of the hypothesis that small suppliers are squeezed by retailers. The median share obtained by suppliers (excluding Uscher) is 42 percent with a large dispersion across suppliers. We find a positive correlation between the share of the surplus obtained by suppliers and their market shares (the coefficient of correlation equals 0.26).

Figure 2 shows how retail prices, wholesales prices and marginal costs vary across groups of suppliers (Nestlé, non-Nestlé manufacturers of instant coffee; and non-Nestlé manufacturers of ground coffee) and retailers over time. The following three stylized facts are apparent from Figure 2. First, Nestlé's retail and wholesale prices are higher than those of non-Nestlé manufacturers of instant coffee across both retailers. Second, wholesale prices are substantially larger than marginal costs in all retailer-manufacturer pairs, including the small suppliers. Third, non-Nestlé ground coffee manufacturers' retail and wholesale prices are higher than those of non-Nestlé instant coffee producers across both retailers.

The finding that Nestlé obtains higher wholesale prices relative to their

[17]The use of the upper bound of marginal costs in the calculation of suppliers' markups might explain the negative markup of Usher.

Figure 2: **Weighted Average Mg Cost, Wholesale and Retail Price.**



Notes: Retail and wholesale prices correspond to volume weighted monthly averages of retail and wholesale coffee prices in a given retailer across weeks and UPCs. Marginal costs are volume weighted monthly averages of estimated coffee production costs.

Table 1: **Market Share, Markups and Share of Total Surplus by Coffee Manufacturer (%)**

	Mkt Share Instant (1)	Mkt Share Ground (2)	Total Mkt Share (3)	Supplier markup* (4)	Retailer markup** (5)	Suppliers' share of total surplus*** (6)
Nestlé	74.44	1.41	75.85	46	9	68
Tres Montes	11.39	0.47	11.86	22	15	18
Haiti	0.11	4.45	4.57	49	11	54
Iguazu	4.02	-	4.02	20	13	12
Colcafe	1.05	-	1.05	45	17	44
Caribe	-	0.97	0.97	45	19	43
Cafe Bomdia	-	0.72	0.72	37	20	35
Cabrales	0.05	0.16	0.20	53	21	47
Illy	0.02	0.16	0.18	85	25	59
Cafe do Brasil	0.12	0.04	0.16	58	27	45
Cocam	0.15	-	0.15	24	20	17
Melitta	-	0.15	0.15	42	25	35
Kraft	0.03	0.00	0.03	59	40	34
Kruger	0.02	-	0.02	13	28	-5
Tchibo	-	0.02	0.02	64	19	55
Di Carlo	0.02	-	0.02	10	47	-6
Dallmayr	0.01	-	0.01	43	32	31
Hansewappen	0.01	-	0.01	55	29	41
Eduschp	-	0.01	0.01	64	7	67
Usher	0.005	-	0.005	-47	28	-
Lavazza	-	0.002	0.002	74	32	48
Kaffee Hag	-	0.001	0.001	67	0	76
Rio Grande	-	0.001	0.001	42	29	31
Sum(1-3)/Median(4-6)	91.44	8.56	100.00	45	21	42

Notes:
* Supplier markups computed as wholesale price minus marginal cost over wholesale price.
** Retail markups computed as retail price minus wholesale price over retail price.
*** The supplier's share is the ratio between the sum of supplier profits over time (Equation 2) and the total profits over time (including allowances payed by suppliers to retailers).

smaller competitors in the instant coffee segment could be explained by the large market share it commands. However, the fact that ground coffee producers are able to negotiate relatively high wholesale prices, in spite of their relatively small market shares, suggests that market size is not the predominant force driving the outcomes of these negotiations.

Table 2 presents the average share of the total surplus obtained by retailers (EDLP and HL) for a given upstream manufacturer type (Nestlé, non-Nestlé instant coffee, and non-Nestlé ground coffee), including allowances. While Nestlé obtains a sizable fraction of the pie (approximately 65-69 percent) when negotiating with either supermarket, non-Nestlé manufacturers of instant coffee manage to obtain about 20 percent of the total surplus. Strikingly, non-Nestlé manufacturers of ground coffee earn between 46 and 52 percent of the surplus. The differences across manufacturers are statistically significant at any conventional level of significance. We also strongly reject the null hypothesis of zero surplus for manufacturers. Therefore, the fraction of the pie obtained by non-Nestlé manufacturers seems inconsistent with the hypothesis that small producers are squeezed by large supermarket chains.

Table 2: **Retailers' Share in Total Surplus.**

	Nestlé		Non-Nestlé			
	Instant Coffee		Instant Coffee		Ground Coffee	
	EDLP	HL	EDLP	HL	EDLP	HL
Mean	0.31	0.35	0.82	0.83	0.48	0.54
Std. Dev.	0.02	0.04	0.06	0.07	0.04	0.06
Min	0.27	0.28	0.72	0.72	0.40	0.42
Max	0.35	0.40	0.94	0.98	0.57	0.64

Notes: Retailer's share corresponds to the ratio between the retailers' profits (Equation 1) and total profits. The table presents the mean, standard deviation, minimum and maximum of these ratios for a given retailer-supplier combination over time.

Two natural candidates to explain the large share of the surplus obtained by smaller manufacturers are the poor outside options of the retailer and the relative negotiating skills of the manufacturers. Consider for instance the case of Haiti. Despite having a market share of only 4.6%, its markup is slightly

above that of Nestlé (75.9% market share). Instead, Tres Montes, which has more than twice the market share of Haiti, only exhibits about a third of Haiti's markup. What is the source of Haiti's relatively high profits? Is it the fact that Haiti has no close substitutes hence harming retailers' outside options? Is it the fact that Haiti's managers are highly skilled negotiators?

Based on reduced-form evidence alone, we cannot say whether the outcome of the negotiations in favor of manufacturers is driven by retailers' poor outside options, manufacturers' strong bargaining skills, or a combination of both. Given the absence of entry/exit of players or actual disagreement episodes in our data, both types of explanations could not be separately identified in a reduced form approach as both would be captured by a supplier fixed effect. This highlights the necessity of a structural model to assess the relative importance of the two explanations. A structural demand model that captures consumer preferences allows us to compute counterfactual scenarios of disagreement that in turn help us to identify the two sources of bargaining leverage. We explore the merits of each of these two hypothesis using a structural model in Section 4.

4 Structural Analysis of Profit-Sharing

4.1 Bargaining Model

Following the workhorse model in empirical work on bargaining, we assume that payoffs satisfy the bilateral Nash bargaining solution, as in Nash (1950) and Horn and Wolinsky (1988).[18] In the Nash bargaining model the two sources of bargaining leverage are the outside options of each player and their relative strength to negotiate. A particular advantage of the Nash bargaining model in our context is that market size arises endogenously as the result of consumer preferences and player's characteristics.[19]

We assume simultaneous and bilateral negotiations such that, in equilibrium, no party wants to renegotiate. Additionally, parties do not consider

[18]The Nash bargaining model can be considered a reduced-form of a bargaining game. Binmore, Rubinstein, and Wolinsky (1986) state the conditions under which the Nash solutions are the payoffs of the structural bargaining game of Rubinstein (1982).

[19]For models of vertical relationships that suggest alternative sources of bargaining leverage see Chipty and Snyder (1999), Inderst and Wey (2007), Inderst and Shaffer (2007), and Chambolle and Villas-Boas (2015) among others.

the possibility of other contracts being renegotiated in case of disagreement (Collard-Wexler, Gowrisankaran, and Lee (2014)).

Consequently, the equilibrium payoffs maximize the Nash product (hereafter, NP) defined as follows:

$$NP = \left(\pi^D - \pi^D(na)\right)^{\lambda} \left(\pi^U - \pi^U(na)\right)^{1-\lambda} \tag{5}$$

where $\pi^k, k \in \{U, D\}$ is the payoff of player k in the case of agreement ("agreement payoff"); $\pi^k(na)$ is the payoff of player k in the absence of agreement ("disagreement payoff" or "outside option"); and $\lambda \in [0, 1]$ is the bargaining weight or normalized bargaining power parameter of the downstream retailer (while $(1-\lambda)$ is the bargaining weight of the upstream manufacturer).

The players bargain over total surplus, which is the difference between retail revenues and variable costs of production. We write the Nash product as a function of a lump sum transfer, ε, between the retailer and manufacturer:

$$NP(\varepsilon) = \left[\pi^D - \pi^D(na) + \varepsilon\right]^{\lambda} \left[\pi^U - \pi^U(na) - \varepsilon\right]^{1-\lambda} \tag{6}$$

Thus, as in Draganska, Klapper, and Villas-Boas (2010), the payoffs of the efficient outcome that maximize the Nash product ($\frac{\partial NP(\varepsilon)}{\partial \varepsilon}|_{\varepsilon=0} = 0$) are given by :

$$\frac{\lambda}{1-\lambda} = \frac{\pi^D - \pi^D(na)}{\pi^U - \pi^U(na)} \tag{7}$$

Equation (7) conveys the intuitive idea that, *ceteris paribus*, a player with a larger bargaining weight or a larger outside option will be able to extract a larger portion of the total surplus.

Based on this model, the estimator of bargaining power parameter of the retailer that rationalizes a certain configuration of payoffs, is given by the following expression:

$$\lambda(\pi^D, \pi^D(na), \pi^U, \pi^U(na)) = \frac{\pi^D - \pi^D(na)}{\pi^D - \pi^D(na) + \pi^U - \pi^U(na)} \tag{8}$$

Note that in this setting where λ is endogenous, the larger the retailer's disagreement payoff, $\pi^D(na)$, the lower its bargaining weight λ, holding other payoffs constant (i.e. $\partial\lambda/\partial\pi^D(na) < 0$). The intuition for this result is that a larger retailer's outside option will reduce the net value of the relationship for the retailer. Given that the remaining payoffs are held constant, a lower

value of the relationship only can be rationalized by a lower bargaining weight of the retailer.

Notice that if the outside payoffs were equal to zero for both upstream and downstream players, then the bargaining weight parameter will be identical to the share of total surplus earned by each player. For instance, the shares of surplus obtained by retailers in Table 2 would be the retailer bargaining weight parameters under no disagreement payoffs for retailers and suppliers. Furthermore, these values can be considered upper bounds for the retailer's bargaining weight if retailers have strictly positive outside options. Similarly, the values of the supplier's share of surplus in column 6 of Table 1 can be seen as lower bounds of the supplier's bargaining weight parameter.

4.2 Empirical Strategy and Identification

To estimate the bargaining model requires the identification of three sets of parameters: production costs, demand side parameters and bargaining power parameters. We use the marginal cost estimates from section 3.1. Using those estimates and data on quantities, retail and wholesale prices, we are able to compute agreement payoffs for each retailer-manufacturer combination.

Since we do not observe episodes of disagreement in the data, we need to estimate a demand system to simulate counterfactual demands and therefore disagreement payoffs. Once we compute the two sets of payoffs (i.e., agreement and disagreement), we can compute the bargaining power parameters for each retailer-manufacturer pair as described in Equation (8).

The source of identification of the demand side parameters comes from the large variation across time and products of retail prices. Our weekly data on retail prices exhibits large variation (the coefficient of variation equals 0.59) that ensures our ability to identify the price sensitivity parameter in a demand system à la Berry, Levinsohn, and Pakes (1995).

Regarding the bargaining power parameters, we benefit from the large time variation of upstream and downstream markups. The variation of the surplus obtained by each player is explained by different negotiation outcomes, that in turn shed light on the relative bargaining weight of each player. To show the variation in our data, we compute the coefficients of variation across time for upstream and downstream markups for each supplier-retailer pair. The median coefficients of variation of the retail markup equals 0.44 for both chains. The median coefficients of variation of the supplier markup is 0.25 for HL and 0.17 for EDLP.

Having outlined our empirical strategy, we turn to the assumptions underlying our computation of payoffs:

Assumption 0: All the negotiations are bilateral and take place simultaneously.

Assumption 1: Bilateral bargaining between supermarket D and supplier U takes place over the entire bundle of U's products. Hence, a disagreement implies the exclusion of all of U's products from supermarket D.

Assumption 2: No coffee product is sufficiently important to cause supermarket switching among consumers. Hence, unavailable coffee products would not induce changes in the choice of retailer by consumers.[20]

Assumption 3: In case a coffee product is unavailable, consumers substitute among the remaining products. Hence, disagreement with a given supplier should weakly increase the sales of remaining coffee suppliers for the retailer.

Assumption 4: In case of disagreement with a given supplier, the retailer can set new optimal retail prices for the remaining available products.

Assumption 5: Fixed costs (such as marketing expenditures, R&D, etc.) play no role in the estimation. This is supported by the fact that fixed costs are not conditional on an agreement being reached, and cancel out in the computation of the value of the agreement.

Assumption 6: In case of disagreement between a retailer and a producer, the wholesale prices of remaining producers stay at their equilibrium level. This is standard in the literature and is consistent with passive beliefs and simultaneous negotiations (Collard-Wexler, Gowrisankaran, and Lee (2014)).

Under these assumptions, the value of the agreement for the upstream manufacturer U can be computed as follows:

$$\pi^U - \pi^U(na) = \sum_{j \in \mathcal{U}} (p_j^w - \widehat{c}_j) Q_j - \sum_{j \in \{\mathcal{U} \cap \mathcal{D}^{\complement}\}} (p_j^w - \widehat{c}_j) Q_j = \sum_{j \in \{\mathcal{U} \cap \mathcal{D}\}} (p_j^w - \widehat{c}_j) Q_j \quad (9)$$

where $\widehat{c}_j$, p_j^w, p_j^r, and Q_j were introduced in Section 3; $\mathcal{U}$ and $\mathcal{U}^{\complement}$ denote the set of coffee products produced by supplier U and the remaining suppliers,

[20] The fact that the weight of coffee in the Chilean consumption basket is less than one percent (Chilean Agency of Statistics, INE) is supportive of this assumption.

respectively; $\mathcal{D}$ and $\mathcal{D}^{\complement}$ denote the coffee products sold in supermarket D and the complement of that set, respectively.

Since no consumer switches retailers in the event of U's products being unavailable (*Assumption 2*), the value of the agreement for supplier U equals the profits from supermarket chain D.

Similarly, the value of the agreement for the downstream retailer D can be computed as follows:

$$\pi^D - \pi^D(na) = \sum_{j \in \mathcal{D}} (p_j^r - p_j^w) Q_j - \sum_{j \in \{\mathcal{D} \cap \mathcal{U}^{\complement}\}} (\widehat{p}_j^r - p_j^w) \widehat{Q}_j \tag{10}$$

where $\widehat{p}_j^r$ is the counterfactual retail price when U's products are unavailable (*Assumption 4*); and $\widehat{Q}_j$ is the counterfactual demand for coffee product j when consumers face the restricted choice set $\mathcal{D} \cap \mathcal{U}^{\complement}$ and the re-optimized retail prices $\widehat{p}_j^r$ (*Assumption 3*).

4.3 Demand Model

As argued above, a structural model is necessary to assess the relative importance of the two competing explanations for the large share of the channel surplus obtained by small suppliers: poor outside options of retailers versus a high bargaining weight of small suppliers. The value of disagreement payoffs cannot be calculated in a reduced form approach, since we do not observe episodes of disagreements or relevant entry/exit of suppliers. Nevertheless, a structural demand is able to capture the consumer preferences that in turn allow us to compute payoffs in counterfactual scenarios that are not present in the data. In particular, we aim at estimating payoffs when removing all products of a given supplier from each supermarket in order to shed light on the marginal value of that particular relationship to the retailer.

There is a large variety of structural demand models for differentiated products. The random coefficient model à la Berry, Levinsohn, and Pakes (1995) (hereafter, BLP) has been recognized for allowing more realistic consumer substitution patterns relative to logit or nested logit models (Cardell (1997)).

In the BLP model the utility of consumer i from coffee product j at time

t, denoted by U_{ijt}, is specified as follows:[21]

$$U_{ijt} = -\alpha_i p^r_{jt} + x'_{jt}\beta + \xi_{jt} + \varepsilon_{ijt}$$

where p^r_{jt} is the retail price, x_{jt} is the vector of observable characteristics of coffee product j, ξ_{jt} is an unobserved scalar product characteristic, ε_{ijt} is a homoscedastic mean-zero stochastic term, β is a vector of taste coefficients common across consumers, and α_i is the individual-specific marginal utility of income which is assumed to be distributed as follows:

$$\alpha_i = \alpha + \sigma_p v_i \qquad \text{where} \qquad v_i \sim \mathcal{N}(0,1)$$

where v_i is a taste shock capturing the unobservable consumer heterogeneity in price sensitivity.[22] Define $\theta \equiv (\alpha, \beta, \sigma_p)$ as the vector containing all the parameters of the model.

Under the assumption of ε being i.i.d. with a Type I extreme value distribution, we have a closed-form expression for the individual probability s_{ijt}:

$$s_{ijt} = \frac{\exp(-\alpha p^r_{jt} + x'_{jt}\beta + \xi_{jt} - p^r_{jt}\sigma_p v_i)}{1 + \sum_g \exp(-\alpha p^r_{gt} + x'_{gt}\beta + \xi_{gt} - p^r_{gt}\sigma_p v_i)}$$

The predicted market share for product j, s_{jt}, is the integral of the individual probabilities over the mass of consumers, A_{jt}, who choose product j at time t. Therefore, the market shares are given by the following expression:

$$s_{jt}(\mathbf{x}_t, \mathbf{p}^r_t, \xi_t; \theta) = \int_{A_{jt}} \frac{\exp(-\alpha p^r_{jt} + x'_{jt}\beta + \xi_{jt} - p^r_{jt}\sigma_p v_i)}{1 + \sum_g \exp(-\alpha p^r_{gt} + x'_{gt}\beta + \xi_{gt} - p^r_{gt}\sigma_p v_i)} d\Phi(v)$$

The estimation procedure searches for the vector θ that minimizes the difference between the observed and predicted market shares, where the latter are computed through simulation. Importantly, the unobservable characteristic might be correlated with the retail price causing an endogeneity problem that we address using suitable instrumental variables.

To compute counterfactual prices when a given set of products are unavailable, we use the first-order conditions of a multiproduct monopoly that

[21] We perform the estimation by supermarket chain, all parameters are retailer-specific, and we omit that subscript for simplicity.

[22] We normalize the outside good, $j = 0$, that represents the choice of "not to buy coffee" ($U_{i0t} = \varepsilon_{i0t}, \forall(i,t)$).

sells differentiated products,

$$s_{jt}(\mathbf{x}_t, \widehat{\mathbf{p}}_t^r, \xi_t; \widehat{\theta}) + \sum_{k \in \mathcal{R}} (\widehat{p}_{kt}^r - p_{kt}^w) \frac{\partial s_{kt}(\mathbf{x}_t, \widehat{\mathbf{p}}_t^r, \xi_t; \widehat{\theta})}{\partial p_{jt}^r} = 0, \quad \forall j \in \mathcal{R} \tag{11}$$

where p_{kt}^w is the wholesale price of product k at time t and $\mathcal{R}$ is the set of coffee products excluding those products sold by the supplier that did not reach an agreement with the retailer. Using the parameter estimates, we solve the equation system (11) to obtain the counterfactual equilibrium prices. We evaluate the demand function using the restricted choice set $\mathcal{R}$ and the counterfactual prices, $\widehat{\mathbf{p}}_t^r$, to obtain the quantities demanded under disagreement.

We take *La Florida* as a representative middle-income market for estimation and counterfactual exercises. We consider coffee products in the same category size (between 100 and 250 grams) to fit in the discrete choice framework where consumers choose at most one product. For computational reasons we keep transactions with quantities of over 60 units per store per week, which include more than 80 percent of total coffee expenditure in our data. As a consequence of this choice, many of the smaller suppliers are not considered. The suppliers included in the structural analysis are Nestlé, Tres Montes, Haiti, Iguazu, Colcafe and Kraft. As product characteristics we include dummies for whether the product is decaffeinated, ground, instant, flavored, or whole bean. In addition, we include product dummies at the UPC level.

We estimate three different demand specifications: logit, logit with instrumental variables (hereafter, IV logit) and BLP. The logit specification assumes homogeneous preferences and prices uncorrelated with demand shocks. The IV logit specification still assumes homogeneous preferences but relaxes the assumption on price exogeneity. The IV logit relies on suitable instruments to address the price endogeneity. The BLP specification allows for heterogeneous preferences and price endogeneity.[23] The three set of estimates are presented in Table 3.

We use the international price of coffee beans as instruments for price in the IV logit and BLP specifications. Input prices are considered to be good instruments for retail prices, since they are heavily correlated with

[23] We follow the MPEC approach suggested by Dubé, Fox, and Su (2012) to estimate the BLP model.

Table 3: **Demand Estimates by Supermarket Chain**

	HL			EDLP		
	Logit	IV Logit	BLP	Logit	IV Logit	BLP
Price Coefficient α	-3.04 (0.09)	-5.52 (0.16)	-6.48 (0.82)	-4.94 (0.07)	-6.58 (0.09)	-7.07 (0.49)
Price Coeff Std Dev σ_p			1.29 (0.53)			1.22 (0.60)
Characteristics*	✓	✓	✓	✓	✓	✓
Product FE	✓	✓	✓	✓	✓	✓
Week FE	✓	✓	✓	✓	✓	✓
Instruments for price**		✓	✓		✓	✓
Consumer Heterogeneity			✓			✓

Notes: Standard errors in parentheses.
*Dummies whether product is decaffeinated, ground, instant, flavored, or whole bean.
**Instruments are the international spot prices of green coffee beans in NYFE.

retail prices but uncorrelated with unobserved demand shocks or unobservable product characteristics. As expected, the price coefficient estimates are downward biased in logit specifications and the demand becomes more elastic in less restrictive specifications confirming the benefits of the more flexible BLP approach.

Table 4 presents summary statistics of the estimated own-price elasticities in each retailer.[24] Our median price elasticities (-6.5 and -7.5) are well within the range of previous estimates reported in the literature. For instance, Draganska, Klapper, and Villas-Boas (2010) report own prices elasticities ranging from -5.7 to -6.9 in line with Guadagni and Little (1983) and Krishnamurthi and Raj (1991).

4.4 Disagreement Payoffs Estimates

Using the estimates of demand parameters and production costs, we compute agreement and disagreement payoffs for all players. In computing the disagreement payoffs, we group the suppliers in our subsample as in section 3.2,

[24]Figure 3 in Appendix A presents the histogram of elasticities by retailer.

Table 4: **BLP Price Elasticities**

Panel A: EDLP

	All	Nestlé	non-Nestlé Instant	non-Nestlé Ground*
Mean	-8.3	-8.2	-8.6	-
Median	-7.5	-7.4	-7.8	-
Std Dev	4.7	4.9	4.2	-

Panel B: HL

	All	Nestlé	non-Nestlé Instant	non-Nestlé Ground
Mean	-9.2	-8.2	-12.5	-8.3
Median	-6.5	-6.5	-6.5	-8.1
Std Dev	17.0	7.3	32.4	5.7

Notes: Elasticities were computed using estimates of the random coefficients model. *EDLP data do not contain enough observations to estimate elasticities for ground coffee manufacturers.

that is: Nestlé, non-Nestlé instant coffee suppliers (Tres Montes, Iguazu, Colcafe and Kraft), and non-Nestlé ground coffee suppliers (Haiti). By grouping the suppliers in the instant coffee segment and by considering a single firm in the ground coffee segment, we are necessarily reducing or underestimating the outside option of the retailers in each segment.

The fact that Haiti is the only firm in the ground coffee segment is not surprising. Haiti is by far the largest ground coffee producer and the other ground coffee producers are not present in most of our stores and weeks. In fact, the average market share of those small producers and Haiti is 2.9% and 62.5% respectively within the ground coffee segment. In the presence of other ground coffee producers, we should expect a larger disagreement payoff of the retailer.

We group the four non-Nestlé instant coffee suppliers because Tres Montes is the only supplier being frequently observed across weeks and stores. This is not surprising given its relative size within this segment. In the presence of a larger number of independent suppliers, we should expect a larger

disagreement payoff of the retailer.

To assess the consequences of this aggregation, we study the sensitivity of our bargaining weight estimates to an increase in the retailers' outside option in each segment.

Table 5: **Ratio of Average Disagreement Payoffs to Average Agreement Payoffs**

	Nestlé		Non-Nestlé			
Ratio Payoffs	Instant Coffee		Instant Coffee		Ground Coffee	
$\overline{\pi}^D(na)/\overline{\pi}^D$	EDLP	HL	EDLP	HL	EDLP*	HL
Mean	0.089	0.098	0.236	0.212	-	0.271
Median	0.095	0.105	0.241	0.219	-	0.256
Std Dev	0.063	0.102	0.024	0.034	-	0.044

Notes: The figures correspond to the ratio between disagreement payoffs and agreement payoffs of retailers (Equation 10). The table presents the mean, median, and standard deviation of these ratios for a given retailer-supplier combination over time.

*EDLP data do not contain enough observations to simulate disagreement profits for ground coffee manufacturers.

The average ratio of disagreement payoffs over agreement payoffs is presented in Table 5. Disagreement payoffs for both retailers in the absence of Nestlé products are approximately 9 percent of agreement payoffs. Retailers' disagreement payoffs in the absence of non-Nestlé instant coffee products are approximately 22-24 percent of agreement payoffs, while retailers' disagreement payoff in the absence of non-Nestlé ground coffee products is approximately 26 percent. These are relatively low numbers reflecting a low degree of consumer substitution and strong brand loyalty.

4.5 Bargaining Power Estimates

Using the observed agreement payoffs and the estimates of disagreement payoffs, we estimate bargaining power parameters using Equation (8). Table 6 presents the upper bound estimates of the retailers' bargaining weight. The upper bound estimate considers the upper bound of cost estimates which decrease the amount of the surplus captured by the manufacturer relative to

the retailer. As a robustness check we compute our estimates of bargaining power for different values of the ratio of average disagreement payoffs to the average agreement payoffs (See Appendix B for details). As mentioned in subsection 4.1, holding constant the payoffs $(\pi^D, \pi^U, \pi^U(na))$, the larger the retailer's disagreement payoff, $\pi^D(na)$, the lower its bargaining weight λ. The intuition for this result is as follows: a more elastic demand reduces the net value of the relationship for the retailer. Given the fixed payoffs we observed, this only can be rationalized by a smaller bargaining power parameter of the retailer. Therefore, the estimates of the retailer bargaining power parameter presented in Table 6 correspond to an upper bound estimate.

Table 6: **Retailer Bargaining Power Estimates**

	Nestlé		Non-Nestlé		
Retail Bargaining Weight λ	Instant Coffee		Instant Coffee		Ground Coffee
	EDLP	HL	EDLP	HL	HL
Mean	0.322	0.321	0.643	0.612	0.388
Median	0.321	0.319	0.610	0.581	0.406
Std Dev	0.023	0.056	0.125	0.115	0.059

Notes: The average estimated bargaining power parameter of the retailer for a given retailer-supplier combination is taken over weeks. The bargaining power parameter of the retailer is based on higher cost estimates which reduce the relative surplus obtained by the manufacturer. The retailer captures the entire surplus if $\lambda = 1$.

The estimates of the structural model in Table 6 reject the hypothesis that small suppliers have no bargaining power. Moreover, bargaining weights of ground coffee suppliers are comparable to Nestlé's, despite the substantial differences in market shares.

The fact that the bargaining weight estimates presented above are similar to the retailers' share of profits in Table 2 reflects the fact that disagreement payoffs are quantitatively unimportant and that most of the share of profits is coming from poor outside options for the retailers.[25] However, retailer's

[25]Estimates in Table 6 consider a subsample of the data and hence are not strictly comparable to Table 2.

poor outside options are not enough to rationalize the differences between non-Nestlé suppliers, and thus the bargaining weights play an important role to increase the share of surplus ground coffee producers earned.

4.6 Discussion

Our estimates from the Nash bargaining model presented in this section shed light on the sources of bargaining leverage underlying our findings from Subsection 3.2, namely that: (i) Nestlé, being the largest manufacturer in the Chilean coffee market, is able to extract a large fraction of the total surplus; (ii) small suppliers are able to extract a large fraction of the total surplus, in spite of their small market size; and (iii) small ground coffee manufacturers are able to extract a larger fraction of the channel surplus than small instant coffee manufacturers.

Our estimates point to two channels through which Nestlé is able to extract a large fraction of the total surplus. First, the low degree of consumer substitutability for Nestlé products enhances its bargaining leverage through a reduction in the outside option of the retailer. That is, in the event of a disagreement between the supermarket and Nestlé, the supermarket would only be able to recoup a small fraction of the profits that otherwise had been obtained from Nestlé products (according to our estimates, 9%) through the sale of non-Nestlé coffee brands. Second, Nestlé's estimated bargaining power parameter of 0.7, grants it a greater bargaining leverage through factors related to having highly skilled bargainers (or lower discount rates, smaller risk aversion, etc.) relative to retailers.

A low degree of consumer substitutability is also responsible for the fact that small suppliers (both instant coffee and ground coffee suppliers) are able to extract a large fraction of the channel surplus. In the event of a disagreement with either group of small non-Nestlé manufacturers (instant or ground), the retailer would only be able to recoup at most 25% of the lost profits from selling alternative coffee brands. Here brand loyalty of instant and grounds coffee brands appears to play a crucial role to justify the payoffs we observe.

The observed stylized fact that small ground coffee manufacturers are able to extract a larger share of the channel surplus than small instant coffee manufacturers can be rationalized by their higher bargaining power parameter. While the non-Nestlé instant coffee producers exhibit a normalized bargaining weight about 0.4, the non-Nestlé ground coffee producers exhibit

a bargaining weight about 0.6.

A potential concern regarding our results on the sources of bargaining leverage for the ground coffee manufacturers is that the structural analysis only considers the largest player in that segment (Haiti). In our view, the bargaining power parameters for other ground coffee suppliers are likely to be similar to the one we estimate for Haiti. The main reason for this is that other ground coffee manufacturers exhibit similarly large markups as those of Haiti while their market shares are well below that of Haiti. For instance, Illy exhibits a larger markup than Haiti's (83% versus 4.6%) while its market share is substantially lower (0.18% versus 4.6%).

We should also highlight that the counterfactual exercise only considers a joint disagreement for the four largest suppliers of instant coffee. In order to examine to what extent this methodological choice can influence our results, we performed a sensitivity analysis of the impact of the size of the disagreement payoffs on the estimated bargaining power parameters. Appendix B presents the details of this robustness check that shows that we have estimated an upper bound of non-Nestlé bargaining weight for instant coffee producers. Recall that given the nature of our data in which the agreement payoffs are given, a larger retail outside option necessarily implies a smaller bargaining weight for the retailer. Hence, our main conclusions are robust to the size of the retailer's outside option.

Our finding that small manufacturers are able to capture a sizable share of the channel surplus runs contrary to the conventional wisdom that market size is a primary driver of bargaining outcomes. Along these lines, Nestlé's large payoffs may not be solely driven by its market size. The strong brand loyalty of Nestlé's customers, as supported by our demand estimations, are an important source of bargaining leverage. Thus, our evidence suggests that the most likely explanation to small manufacturers capturing value is that they provide differentiated products to small groups of loyal consumers. This finding has profound implications for the public debate on the profit-sharing between big-box retailers and small manufacturers, stressing the role played by brand loyalty as a counteracting force to market size. Recall that market size is endogenous in our model and that the exogenous sources of bargaining leverage are the size of the outside options of players and their relative firm specific characteristics such as bargaining skills, patience rate, risk aversion, etc.

Our structural model abstracts from other possible explanations of the large payoffs obtained by small manufacturers. We discuss three alternative

hypothesis and their plausibility in the Chilean coffee market: i) fixed costs; ii) strategic retailers, and iii) the presence of spillovers within the supermarket multicategory assortment.

1. *Fixed Costs*: One could argue that non-Nestlé producers require large payoffs to cover large fixed costs which drive their long run profitability to zero. What are the fixed costs that can overturn our conclusions about the sizable profits of small suppliers? Note that we have a huge dispersion of profits among non-Nestlé producers. Hence, we have performed the exercise of calculating the share of the channel surplus small manufacturers would obtained (net of allowances) assuming that the fixed costs are homogenous across manufacturers and equivalent to the profits made in the 20th percentile of the profits distribution. Given the large degree of heterogeneity of profits among small suppliers, we conclude that even if the amount of fixed costs leaves 20 percent of the firms below the break-even level, we should still observe a large number of firms earning about 35% of the channel surplus.[26]

   Based on these figures, overturning our conclusions would require a very peculiar distribution of fixed costs across time and producers.

2. *Strategic Retailers*: One could argue that retailers may favor the presence of non-Nestlé producers to enhance their outside options when bargaining with the largest supplier Nestlé (Bedre and Shaffer (2011), Rey and Vergé (2010)). Although this is a plausible explanation, a rational retailer should aim at minimizing the payments to non-Nestlé small suppliers. Given the large payoffs of small suppliers we observe, this hypothesis should not explain the data alone.

3. *Spillovers*: One could argue that in a multi-category retail environment, the presence of non-Nestlé small suppliers generate complementarity in consumption with other profitable products.

   These positive spillovers of non-Nestlé brands can improve the bargaining leverage of the small suppliers. However, given the small number of transactions involved in this particular segment, we think that this explanation cannot justify the large payoffs obtained by small suppliers.

[26] See Appendix C for details of these calculations.

5 Conclusions

Our findings challenge a widely held belief about the profit-sharing behavior of bargainers in a vertical relationship. Our evidence runs against the common wisdom that large supermarket chains are able to extract most of the channel surplus from small manufacturers. We find that even small manufacturers obtain a sizable portion of the channel surplus despite their small market shares. Our results support the hypothesis that brand loyalty plays a key role in profit-sharing between retailers and manufacturers.

Our findings for the coffee market in Chile are likely to be informative about other markets for mainly two reasons. First, the players in the Chilean coffee market are similar to those in other countries. In fact, players in the Chilean coffee industry include multinational manufacturers and international retailers who participate in the global market. Second, concentration in the Chilean retail market is likely to be an upper bound to the level of retail concentration in other countries. Thus, the Chilean retail market is particularly favorable to the view that supermarkets squeeze upstream suppliers, given its unusual concentration by international standards. Since we observe that small manufacturers are able to earn large share of total surplus in Chile, this outcome should be more likely to hold in less concentrated retail markets.

Finally, we believe that this paper opens up a new line of research. Having broken the tight link between market size and negotiated wholesale prices, alternative sources of bargaining power remain to be empirically confirmed. Exploring the sources of bargaining power poses two important challenges. First, it is hard to separately identify the effects of brand loyalty and market size, as they are endogenous and naturally positively correlated. Second, assessing the relative importance of different sources of bargaining power would require a richer dataset in terms of the number and characteristics of the bargainers.

References

Ailawadi, K. L. (2001): "The retail power-performance conundrum: what have we learned?," *Journal of Retailing*, 77(3), 299–318.

Allen, J., R. Clark, and J.-F. Houde (2012): "Price Negotiation in

Differentiated Products Markets: Evidence from the Canadian Mortgage Market," *Unpublished Working Paper*.

Bedre, O., and G. Shaffer (2011): "Countervailing Power Hypothesis and Waterbed Effects," *Unpublished Working Paper*.

Berry, S., J. Levinsohn, and A. Pakes (1995): "Automobile Prices in Market Equilibrium," *Econometrica*, 63(4), 841–890.

Besanko, D., J.-P. Dubé, and S. Gupta (2005): "Own-Brand and Cross-Brand Retail Pass-Through," *Marketing Science*, 24(1), 123–137.

Binmore, K., A. Rubinstein, and A. Wolinsky (1986): "The Nash bargaining solution in economic modelling," *The RAND Journal of Economics*, 17(2), 176–188.

Bloom, P. N., and V. G. Perry (2001): "Retailer power and supplier welfare: the case of Wal-Mart," *Journal of Retailing*, 77(3), 379–396.

Bonnet, C., and P. Dubois (2010): "Inference on vertical contracts between manufacturers and retailers allowing for nonlinear pricing and resale price maintenance," *The RAND Journal of Economics*, 41(1), 139–164.

Bowman, R. J. (1997): "Should you just say no to Wal-Mart?," *Distribution*.

Cardell, N. S. (1997): "Variance Components Structures for the Extreme-Value and Logistic Distributions with Application to Models of Heterogeneity," *Econometric Theory*, 13(02), 185–213.

Chambolle, C., and S. B. Villas-Boas (2015): "Buyer Power through the Differentiation of Suppliers," *International Journal of Industrial Organization*, 43, 56–65.

Chipty, T., and C. M. Snyder (1999): "The Role of Firm Size in Bilateral Bargaining: A Study of the Cable Television Industry," *Review of Economics and Statistics*, 81(2), 326–340.

Clarke, R., S. Davies, P. Dobson, and M. Waterson (2002): *Buyer power and competition in European food retailing*, vol. 10. Edward Elgar Pub.

Collard-Wexler, A., G. Gowrisankaran, and R. S. Lee (2014): ""Nash-in-Nash" Bargaining: A Microfoundation for Applied Work," *NBER Working Paper No. w20641*.

Crawford, G. S., and A. Yurukoglu (2012): "The Welfare Effects of Bundling in Multichannel Television Markets," *The American Economic Review*, 102(2), 643–685.

Draganska, M., D. Klapper, and S. B. Villas-Boas (2010): "A larger slice or a larger pie? An empirical investigation of bargaining power in the distribution channel," *Marketing Science*, 29(1), 57–74.

Dubé, J.-P., J. T. Fox, and C.-L. Su (2012): "Improving the Numerical Performance of Static and Dynamic Aggregate Discrete Choice Random Coefficients Demand Estimation," *Econometrica*, 80(5), 2231–2267.

Dukes, A. J., E. Gal-Or, and K. Srinivasan (2006): "Channel bargaining with retailer asymmetry," *Journal of Marketing Research*, 43(1), 84–97.

Durevall, D. (2007): "Competition in the Swedish coffee market, 1978–2002," *International Journal of Industrial Organization*, 25(4), 721–739.

Euromonitor International, R. (2011): " Country Report Coffee in Chile ," Discussion paper, Euromonitor International.

Federal Trade Commission, R. (2001): "Report on the Federal Trade Commission Workshop on Slotting Allowances and Other Marketing Practices in the Grocery Industry," .

——— (2003): "Slotting allowances in the retail grocery industry: Selected case studies in five product categories," .

Ferdman, R. A. (2014): "Almost half of the world actually prefers instant coffee," *Washington Post*, July 14.

Fishman, C. (2006): *The Wal-Mart Effect: How the World's Most Powerful Company Really Works–and How It's Transforming the American Economy*. The Penguin Group, New York, NY.

Gowrisankaran, G., A. Nevo, and R. Town (2015): "Mergers When Prices Are Negotiated: Evidence from the Hospital Industry," *The American Economic Review*, 105(1), 172–203.

Grennan, M. (2013): "Price Discrimination and Bargaining: Empirical Evidence from Medical Devices," *The American Economic Review*, 103(1), 145–77.

Guadagni, P. M., and J. D. Little (1983): "A logit model of brand choice calibrated on scanner data," *Marketing Science*, 2(3), 203–238.

Horn, H., and A. Wolinsky (1988): "Bilateral monopolies and incentives for merger," *The RAND Journal of Economics*, 19(3), 408–419.

Huang, Q., V. R. Nijs, K. Hansen, and E. T. Anderson (2012): "Wal-Mart's impact on supplier profits," *Journal of Marketing Research*, 49(2), 131–143.

Inderst, R., and G. Shaffer (2007): "Retail Mergers, Buyer Power and Product Variety," *The Economic Journal*, 117(516), 45–67.

Inderst, R., and C. Wey (2007): "Buyer Power and Supplier Incentives," *The European Economic Review*, 51(3), 647–667.

International Coffee Organization, R. (2006): *Coffee Consumption in Non-Member Countries*. International Coffee Council, 95th period of sessions, London England.

Koerner, J. (2002): "The dark side of coffee. Price war in the German market for roasted coffee," Discussion paper, FE Workingpaper/Universität Kiel, Department of Food Economics and Consumption Studies.

Krishnamurthi, L., and S. P. Raj (1991): "An empirical analysis of the relationship between brand loyalty and consumer price elasticity," *Marketing Science*, 10(2), 172–183.

Lariviere, M. A., and V. Padmanabhan (1997): "Slotting allowances and new product introductions," *Marketing Science*, 16(2), 112–128.

Leibtag, E., A. Nakamura, E. Nakamura, and D. Zerom (2007): "Cost pass-through in the US coffee industry," *USDA-ERS Economic Research Report*, (38).

Lynn, B. C. (2006): "Essay Breaking the Chain: The antitrust case against Wal-Mart," *Harpers*, 1874, 29.

Mottner, S., and S. Smith (2009): "Wal-Mart: Supplier performance and market power," *Journal of Business Research*, 62(5), 535–541.

Nash, J. F. (1950): "The Bargaining Problem," *Econometrica*, 18(2), 155–162.

Rey, P., and T. Vergé (2010): "Resale Price Maintenance and Interlocking Relationships," *The Journal of Industrial Economics*, 58(4), 928–961.

Rubinstein, A. (1982): "Perfect equilibrium in a bargaining model," *Econometrica*, 50(1), 97–109.

Smith, G. (2002): "War of the Superstores," *Business Week*, 23, 60.

Sudhir, K. (2001): "Structural Analysis of Manufacturer pricing in the presence of a Strategic Retailer," *Marketing Science*, 20(3), 244–264.

Sudhir, K., and S. Datta (2008): "Pricing in Marketing Channels," *Handbook of Pricing (V. Rao Ed.), Edward Elgar Publishers*.

Sutton, J. (1991): *Sunk Costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration*. The MIT press.

TDLC (2004): *Sentencia No 9/2004 [Verdict No 9/2004]*. Tribunal de Defensa de la Libre Competencia [Chilean Antitrust Supreme Court].

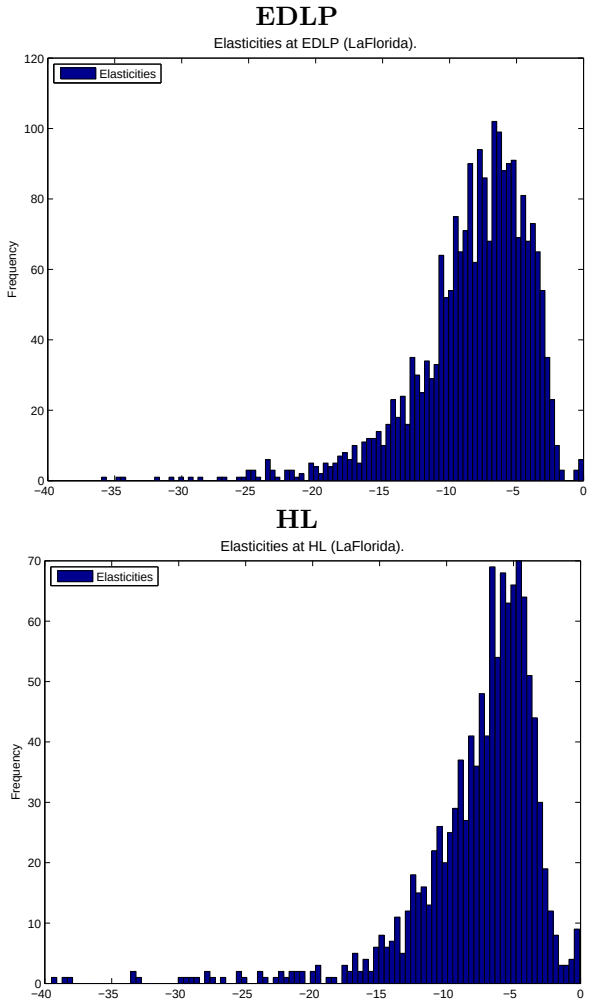
Villas-Boas, S. B. (2007): "Vertical Relationships between Manufacturers and Retailers: Inference with Limited Data," *The Review of Economic Studies*, 74(2), 625–652.

Yip, G. S., and J. R. Williams (1982): "U.S. Retail Coffee Market (A)," *Harvard Business School Case study number 582-087*.

APPENDIX

A Histogram of Own Price Elasticities

Figure 3: **Elasticities by Retailer**



Notes: Elasticities were computed using the BLP estimates in Table 3 for the subsample described in Subsection 4.3

B Sensitivity Analysis in Bargaining Weight Estimation.

We perform a sensitivity analysis regarding the impact of the ratio of average disagreement payoffs to average agreement payoffs, $\overline{\pi}^D(na)/\overline{\pi}^D$, on our estimates of retailer's bargaining weight, λ. As mentioned in subsection 4.1, holding constant the observed agreement payoffs (π^D, π^U) and the zero suppliers' disagreement payoffs $(\pi^U(na) = 0)$, the larger the retailer's disagreement payoff, $\pi^D(na)$, the lower its bargaining weight λ. Formally, everything else constant, $\partial\lambda/\partial\pi^D_{NA} < 0$.

The intuition for this implication is as follows: a more elastic demand reduces the net value of the relationship for the retailer. Given the fixed payoffs we observed, this only can be rationalized by a smaller bargaining power parameter of the retailer.

Table 7: Retail Bargaining Weights under alternative Retailer Outside Options

	Disagreement payoffs over Agreement Payoffs $\overline{\pi}^D(na)/\overline{\pi}^D$ (1)	Retailer Bargaining Weight λ (2)
Nestlé	0.10	0.30
	0.20	0.28
	0.30	0.25
Non-Nestlé Instant	0.22	0.60
	0.32	0.56
	0.42	0.52
Non-Nestlé Ground	0.27	0.40
	0.37	0.36
	0.47	0.33

Notes: The figures in column 1 correspond to different ratios between disagreement payoffs and agreement payoffs of retailers (Equation 10). The figures in column 2 present the corresponding bargaining weight estimates.

C Fixed Cost Analysis

In this appendix section, we calculate the share of the channel surplus small manufacturers would obtain (net of allowances) assuming that the fixed costs are homogenous across manufacturers and equivalent to the profits made in the 20th percentile of the profits distribution (Supplier Kaffee Hag). Given the large degree of heterogeneity of profits among small suppliers, we conclude that even if fixed costs leave 20 percent of the firms below the break-even level, we still observe a large number of firms earning about 35% of the channel surplus.[27]

[27] We do not consider those firms for which the allocated fixed costs were larger than total surplus. That explains the absense of Di Carlo, Kruger, Rio Grande and Usher,which is 0,004 percent of sales.

Table 8: Profits of Suppliers over Total Surplus including Fixed Costs [%].

	No Fixed Costs (1)	Positive Fixed Costs (2)
Kaffee Hag	76	0
Lavazza	48	6
Iguazu	12	12
Cocam	17	16
Tres Montes	18	18
Dallmayr	31	23
Kraft	34	32
Hansewappen	41	33
Melitta	35	34
Bomdia	35	35
Caribe	43	43
Cafe Do Brasil	45	44
Colcafe	44	44
Cabrales	47	47
Tchibo	55	52
Haiti	54	54
Illy	59	59
Eduscho	67	61
Nestlé	68	68
Median	44	35

Notes: The figures in column 1 correspond to the profits of suppliers over total surplus assuming zero fixed costs (see column 6 in Table 1). The figures in column 2 correspond to the profits of suppliers over total surplus assuming fixed costs equal to the total profits obtained by the supplier in the 20th percentile of the distribution (Kaffee Hag).