Revealing Bargaining Power through Actual Wholesale Prices[*]

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Preliminary Version
January 9, 2012

Abstract

In this paper, we use product-specific wholesale and retail prices to study bargaining power. We focus on two outcomes of bargaining between coffee manufacturers and supermarkets in Chile: (1) the share of total profits that each player earns, and (2) the risk exposure to cost shocks that each player bears. We find that Nestlé, which accounts for almost 80 percent of the market, obtains 70 percent of the total profits. Surprisingly, small manufacturers obtain between 30 and 50 percent. Our estimates suggest that a low degree of consumer substitutability can offset market size in terms of bargaining power. In terms of risk exposure, we find that most cost shocks are absorbed by upstream manufacturers, and that small manufacturers bear more risk than larger players. Supermarkets' pricing strategies also appear to play a role in the risk-sharing outcomes.

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1 Introduction

The food retail industry has undergone a remarkable transformation in recent decades. In several developed countries and increasingly in emerging markets, the industry has evolved towards larger formats, a higher prevalence of retail chains, and concentration among retailers.[1] These transformations in the retail sector have attracted the attention of practitioners and researchers who seek to characterize the outcome of bargaining between upstream manufacturers and downstream retailers.[2] In order to explain this new scenario, models of bargaining between upstream and downstream firms have identified predictions over a variety of outcomes.[3] Despite the importance of the bargaining outcomes, there is little empirical work in the literature. This is largely because data on negotiated wholesale prices are usually not available. Prior empirical work on vertically organized supply chains has typically relied on estimates of wholesale prices or average wholesale prices.

To infer unobservable wholesale prices, the usual approach uses the optimal pricing conditions in a model of Bertrand competition with differentiated products. These optimality conditions ensure an equilibrium outcome and allow us to express unobservable wholesale prices as a function of retail prices, market shares, and demand parameters. For example, Sudhir (2001), Villas-Boas (2007), and Bonnet and Dubois (2010) follow this approach to infer the pricing scheme along the chain value in different industries. Along the same lines, Hellerstein (2008) also includes the wholesale prices of a single retailer (Dominick's) to study exchange rate pass-through in the beer industry.

Recent papers have extended the initial framework to allow for bilateral bargaining with externalities, such as the presence of downstream networks or product bundling.[4] Thus, the estimation of negotiated prices has to account not only for the bargaining game, but also for the optimality of the observed networks or bundles. Pakes, Porter, Ho, and Ishii (2006) present an estimation technique based on moment inequalities that has been successfully applied to estimate models of bilateral bargaining with externalities. Their main insight is that wholesale prices and other estimates should maximize consistency between the observed bargaining outcomes and their corresponding Nash equilibrium.

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[1] See Clarke, Davies, Dobson, and Waterson (2002).

[2] For example, see Federal Trade Commission (2001).

[3] Topics studied in this literature include mergers (Horn and Wolinsky (1988)), technology incentives (Inderst and Wey (2003)), product-variety (Inderst and Shaffer (2007)), and foreclosure (Bolton and Whinston (1993)).

[4] See Horn and Wolinsky (1988) and De Fontenay and Gans (2007) for the theoretical background.

Two papers that illustrate this approach are Ho (2009)) and Crawford and Yurukoglu (forthcoming)). Ho (2009) studies hospitals' incentives when managed care health insurers and hospital networks bargain over profits. She characterizes the most profitable hospitals by applying not only optimal pricing conditions, but also the moment inequality approach to estimate payoffs consistent with the actual hospital networks.

In another application, Crawford and Yurukoglu (forthcoming) study the welfare effects of unbundling in multichannel TV. They evaluate à la carte policies that require distributors to offer consumers individual channels for sale when fees are negotiated between broadcasters and producers. They use three sets of moments: (i) The inequality moment conditions to derive the optimal bundling and estimate the specific fees; (ii) equality moment conditions to match the observed average fees; and (iii) the usual moment conditions related to optimal pricing at the downstream level. Bargaining parameters consistent with equilibrium prices are used to compute a counterfactual exercise that suggests modest welfare effects.

Among the few papers using actual data on negotiated prices, Grennan (2010) observes the prices of a particular medical device that are bargained between manufacturers and their buyers (hospitals). He performs the counterfactual exercise of replacing the current bargaining with uniform pricing. To do so, he derives an estimation based on the pricing equation that solves for unobservable costs and other supply, demand, and bargaining parameters. This paper documents a large idiosyncratic heterogeneity in bargaining power.

In this paper, we reveal empirical features of bargaining power in the retail industry using the actual wholesale prices negotiated between upstream manufacturers and downstream supermarkets. Since we take the wholesale prices as given, our empirical approach is similar to the models of rent-sharing in the labor market (Blanchflower, Oswald, and Sanfey (1996)). However, unlike the previous literature, we focus on two aspects of bargained outcomes that have been raised as important issues in the retail industry. First, we focus on the share of total profits that each player is able to earn while accounting for endogenous disagreement profits consistent with a standard Nash bargaining model. Second, we focus on the risk exposure to cost shocks that each player bears as another, potentially asymmetric, index of bargaining power. Given the large fluctuations in input prices, risk-sharing behavior could be key for players' survival.

Our distinctive, proprietary dataset includes product-specific wholesale prices paid by the two largest retailers in Chile. The data also includes weekly product-level retail prices and quantities covering about 180 stores from twelve supermarket chains operating in Santiago de Chile over the 2005-2007 period.

We focus on the coffee market because its salient characteristics make it suitable to study bargaining power in the retail industry. First, coffee

manufacturing has a simple production technology, which features green coffee beans as its dominant input and is homogeneous across coffee manufacturers (Sutton (1991)). Thus, we are able to estimate production costs using data on international prices of green coffee beans and calibrate the share of non-coffee costs. Fluctuations in international commodity prices are exogenous cost shocks for a small-scale importer like Chile.[5]

Second, there are large differences in size between Nestlé and non-Nestlé manufacturers. Thus, we are able to identify the effects of upstream size on bargaining outcomes. Nestlé, a Swiss multinational corporation, is the largest coffee manufacturer in Chile and accounts for almost 80 percent of market shares in the two largest retailers.

Third, the two largest retailers, which are relatively similar in size, follow heterogeneous pricing strategies. Thus, we are able to identify the effects of downstream pricing strategies on bargaining outcomes. Our largest retailer (49% of the coffee market share) follows a so-called *Every-Day-Low-Prices* strategy (henceforth EDLP). In the EDLP strategy, the retailer maintains shelf prices as low as possible, and only rarely offers specials or discounts. The second largest retailer (40% of the coffee market share) follows a *High-Low* strategy (henceforth HL), characterized by the combination of relatively high shelf prices with frequent promotions and discounts. Among US-based retailers, Walmart follows EDLP and Safeway follows HL.

Other relevant characteristics of the Chilean coffee market are the absence of supermarket brands and the high rotation of these products. Supermarket owned brands (also known as private labels) play no role in this particular market, so there are no distortions in supermarkets incentives. Also, given the high rotation of coffee products and current technology, supermarket inventory costs seem minimal. This fact emphasizes the tight relationship between contemporary wholesale and retail prices.

Based on the standard Nash bargaining model, the estimator of bargaining power is the share of total profits (net of disagreement payoffs) that each player earns. Since we know the actual retail and wholesale prices, we only need to estimate upstream production costs and disagreement payoffs to identify the size of the pie and the portion each player obtains. To compute the disagreement payoffs, we estimate a structural demand model to capture consumers' substitution patterns, and calculate counterfactual profits for each supermarket. To calculate upstream production costs, we follow the vast coffee production literature, in which the technological requirements of coffee beans and the proportions of non-coffee costs are well known. Furthermore, we focus on marginal costs given the constant returns to scale in production (Sutton (1991)).[6] We complement our data with anecdotal information on allowances, which are fixed payments paid

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[5]According to FAOSTAT, Chile accounted for 0.25 percent of the world's imports in 2007.

[6]Notice that fixed costs play no role in bargaining parameter estimations, since those costs

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by manufacturers to retailers.

We consistently find that Nestlé obtains about 70 percent of the total profits generated by its products in both retailers, while non-Nestlé manufacturers (surprisingly) obtain between 30 and 50 percent despite their small market shares. Counterfactual demands have little impact on the overall results because consumer substitution between brands is limited. We see this as direct evidence of bargaining power driven by brand differentiation rather than market size.

In order to identify the risk exposure of each player, we study passthrough behavior from cost shocks to wholesale prices. We find that less than 20 percent of cost shocks are passed through to wholesale prices, with small manufacturers absorbing more risk than larger players. We reject full pass-through at the retail level, finding remarkable supermarket-specific features that suggest heterogeneous risk preferences. The different risk-sharing policies are consistent with retailers' pricing strategies targeting different consumers. We also find no evidence of asymmetric responses at any level of the value chain.

The rest of the paper is organized as follows: Section 2 introduces details about the coffee and retail industries in Chile, and section 3 presents our data. Section 4 presents the analysis of bargaining power associated with the actual profit sharing in our data. Section 5 presents the risk-sharing behavior of agents given by the pass-through analysis. Finally, section 6 concludes.

2   The Coffee and Retail Industry in Chile

This section provides background information on the Chilean industries analyzed in this paper. Subsection 2.1 introduces features of the coffee manufacturing industry. Subsection 2.2 describes the most important characteristics of the Chilean supermarket industry, particularly for the two largest supermarket chains for which wholesale price data are available.

2.1   The Coffee Industry

We follow Sutton (1991) to describe the coffee market. The market has two basic segments: (1) *roast* or *ground* coffee (sometimes referred to as "regular" coffee), and (2) *instant* coffee (sometimes referred to as soluble coffee).[7]

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are not conditional on the player's agreement.

[7] Decaffeinated coffee may be either roast/ground or instant, so it falls within these categories.

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.). To produce instant coffee, there are extra steps which include extracting (dissolving ground coffee in water) and drying. From a consumer's point of view, the only difference lies in flavor and ease of preparation. The two types of products are sold through similar channels of distribution, and are similarly suitable to build brand image.

Nestlé is the market leader in instant coffee worldwide. Its leading brand, Nescafé, dominates the retail market for instant coffee in various countries including Italy, Japan, France, Germany and the UK, although the US-based General Foods, outsells Nestlé in the United States with its Maxwell House brand. In the ground coffee segment, the leading manufacturer is usually country-specific (General Foods and Procter & Gamble, among others).

Chile is a net importer of green coffee beans, the main input in packaged coffee. According to the International Coffee Organization (2006), most coffee beans are imported from other Latin American countries, especially Brazil.[8] In the Chilean market, instant coffee is very popular and accounts for about 85 percent of the volume of coffee sold over the 2005-2010 period (Euromonitor International, 2011). In fact, Nestlé only sells instant coffee in Chile.

The upstream industry is highly concentrated since Nestlé has a market share close to 80 percent, and is only followed by Tres-Montes-Luchetti which has about 12 percent of the market. The third and fourth largest players account for 4 and 2.3 percent, respectively. The other 16 coffee manufacturers have less than 0.5 percent each.[9]

Nestlé produces the brand Nescafé. Nescafé's star product, Nescafé Tradición, tops the ranking of product loyalty constructed by AC Nielsen, capturing almost 60 percent of the market share.

2.2 The Retail Industry

The coffee industry and the retail sector are increasingly interconnected because most coffee for in-home consumption is purchased in supermarkets. According to AC Nielsen, 89 percent of the volume of coffee is sold through supermarkets, and only 11 percent through the traditional sector ("mom & pop" stores). As in advanced countries, the supermarket industry in Chile has become more concentrated in recent years.[10]

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[8]In 2002, 73.8% of coffee came from Brazil, 12.9% from Peru, and 9% from Colombia (International Coffee Organization (2006)).

[9]Appendix A presents detailed market share data.

[10]For more on the concentration trend, see Foster, Haltiwanger, and Krizan (2006), Holmes (2001), and Clarke, Davies, Dobson, and Waterson (2002).

Two major supermarket chains dominate the Chilean supermarket industry during the period of analysis: Distribución y Servicio (D&S) and Cencosud. By 2006, D&S and Cencosud accounted for more than 60 percent of the Chilean food market, and about 88 percent of the coffee market. Cencosud manages two major supermarket banners: Jumbo and Santa Isabel. Jumbo has the largest portion of Cencosud's sales, while Santa Isabel was acquired by the group in 2003. D&S' brands include its main banner, Lider, and the small discounter, Ekono (since late 2007). In terms of size, both retailers have similar market shares for coffee products, with D&S and Cencosud accounting for 49 and 40 percent of the market, respectively.

These two major retailers differ in the type of pricing strategies they follow. Lider follows the so-called *Every-Day-Low-Prices* strategy (henceforth, we denote supermarket Lider by EDLP), in which the retailer maintains shelf prices as low as possible, and only rarely offers specials or discounts. Jumbo follows a *High-Low* strategy (henceforth, we denote supermarket Jumbo by HL), characterized by the combination of relatively high shelf prices with frequent promotions and discounts.

The marketing literature argues that pricing strategies target different populations of consumers. The HL strategy is intended for *bargain hunters* who value promotions while the EDLP strategy is intended for large-basket shoppers who seek a stable and low average price.[11]

Other differences can also be established. Supermarket EDLP might be perceived by consumers as cheaper and less elegant, but of decent quality and intended for regular people. Supermarket HL is perceived as a fancier retailer with a larger variety of products, and intended for upper-class consumers.

Table 1 shows the split of market shares of coffee manufacturers among retailers, and Table 2 shows the split of market shares of supermarkets among coffee manufacturers.[12]

3 Data Description

This section describes our proprietary data. The data consists of retail prices, wholesale costs, and quantities sold by stores in nearly all major supermarket outlets in Santiago de Chile over the 2005-2007 period. Weekly transactions are recorded at the European Article Number (EAN)-level (equivalent to the UPC symbology commonly used in the US). Data on retail prices and quantities sold come from an international market research company that collects barcode data from major supermarkets.

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[11]See Bell and Lattin (1998) for more details on the targeted consumers.

[12]Appendix A contains figures with the evolution of the market shares over time.

Table 1: **Market Share of Coffee Suppliers by Retailer**

	EDLP	HL	Others	Total
Nestlé	78.9	80.4	91.3	80.9
Non Nestlé	21.1	19.6	8.7	19.1
Total	100.0	100.0	100.0	100.0

Table 2: **Market Share of Retailers by Coffee Supplier**

	Nestlé	Non Nestlé	Total
EDLP	47.4	53.9	48.6
HL	39.3	40.8	39.6
Others	13.3	5.4	11.8
Total	100.0	100.0	100.0

The final[13] retail data includes 120,884 weekly observations of scan data for 180 stores owned by 12 supermarkets and located in 34 counties within Santiago. Observations are for 94 weeks between 2005 and 2007. The scan data is collected at store level, so we have no information on the characteristics of the consumers. We also gather information on supplier identity and other coffee characteristics such as decaffeinated, ground, instant, flavored, and bean.

Data on wholesale costs were directly provided by the two largest supermarket chains. Naturally, the chains negotiate and purchase from suppliers at the national level. Hence, the wholesale data were recorded at a reference store per chain. Our final wholesale data identifies 5,175 observations that match an important subset of our retail data.

Regarding the measures of wholesale prices, the cost information available from retailers are recorded using two different methodologies. In HL data, the reported costs correspond to the average acquisition cost (AAC), which is an average of the historical costs at which items in inventory were purchased in a given week.[14] Given the popularity of the coffee category, we expect a high rotation speed, such that the stock is constantly renewed using a modern delivery system. Hence, our wholesale data should ap-

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[13]We keep the observations for coffee products with sizes between 100 and 250 grams, and transactions with quantities over 20 units per store, weekly. This covers more than 80 percent of the total coffee market universe.

[14]Besanko, Dubé, and Gupta (2005) provide the following formal definition of AAC:

$$AAC_t = [P_t^w Q_t^m + (I_{t-1} - P_t Q_t) AAC_{t-1}] I_t^{-1}$$

where P_t^w is the wholesale price paid by the retailer in period t, Q_t^m are units of the product purchased by the retailer in period t, I_t are inventories of the product at the end of period t, P_t is the retail price, and Q_t is the quantity sold by the retailer in period t.

proximate the retailer's marginal costs closely. This measure of cost is reported in *Dominick's* data set and has been used by several studies on retail pricing (Besanko, Dubé, and Gupta (2005), Peltzman (2000)).[15]

In EDLP data, the reported costs provided by the retailer correspond to current prices charged by sellers at the wholesale level. These costs are treated by the retailer as a measure of replacement cost, which is the cost that the retailer would incur for acquiring an extra unit of the product. These replacement costs are inclusive of shipping and handling costs and do not include allowance payments. It should be noted that in Chile there are no intermediaries between retailers and major manufacturers of packaged coffee. Thus, the measure of wholesale cost in the data corresponds to the wholesale price that the manufacturer charges the retailer.[16]

One piece of information that is not included in the data is a measure of the lump-sum payments made by manufacturers to retailers. These "slotting allowances" are up-front payments to ensure a given shelf location or some advertising effort in terms of promotional activities. Anecdotal evidence indicates that these types of payments are common in the Chilean supermarket industry. We gather informal knowledge of these payments and use it in the empirical section.

4 Share of Total Profits and Bargaining Power Analysis

This section performs an empirical analysis of bargaining power based on the share of total profits that each upstream and downstream player receives in the Chilean coffee market. In this section, as in the rest of the paper, production cost is the variable cost of the upstream coffee manufacturer (such as Nestlé) who buys green coffee beans from international commodity markets and produces packaged coffee. Wholesale prices are the negotiated prices at which upstream coffee producers agree to trade with downstream supermarkets. Retail price is the price charged by downstream supermarkets to final coffee consumers.

Subsection 4.1 presents the theoretical model, Subsection 4.2 presents cost estimation s for the coffee manufacturers, and Subsection 4.3 studies profits in the Chilean supermarket industry. Section 4.4 introduces the structural demand used to calculate the counterfactual disagreement payoffs for retailers. Finally, the results are presented in Subsection 4.5.

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[15]If inventory management were not efficient enough, then the lags of prices might matter for the pass-through analysis. We perform this robustness check when presenting the results.

[16]We have focused on the coffee category subsample of the broad data set that contains about 190 categories. See Elberg (2011) for a more detailed description of this data.

4.1 Bargaining Model

We use the standard Nash bargaining model (Nash (1950)) to describe the relationship between upstream coffee manufacturers and downstream supermarkets. As a result, the payoffs maximize the so-called Nash product, NP, that is defined as follows:

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

where $\lambda \in [0,1]$ is the normalized bargain parameter of the downstream retailer, D, with upstream manufacturer, U. π^k and $\pi^k(na)$ are the profits that player $k \in \{U,D\}$ gets if there is agreement and no agreement, respectively. $\pi^k(na)$ is usually called the disagreement payoff.

Since our data includes the negotiated wholesale prices, we observe the equilibrium outcome of the bargaining game. Therefore, *we consider the observed negotiated wholesale prices as given.* Before turning to the estimation, we present our assumptions explicitly:

Assumption 1: Based on the Nash bargaining model, we assume bilateral and simultaneous negotiations. Thus, payoffs maximize the Nash product of the game.[17]

Assumption 2: Bargaining between supermarket D and manufacturer U takes place over the entire bundle of U's products. Hence, disagreement implies the exclusion of all U's products from supermarket D.

Assumption 3: Downstream competition takes place at basket level, and there is no coffee brand in the consumer's basket with a weight large enough to induce supermarket switching. Hence, the non-availability of a particular coffee brand does not trigger a change in supermarket choice.[18]

Assumption 4: If a coffee brand is not available, consumers substitute, in some degree, amongst available brands. Hence, when there is no agreement with a given brand, aggregate revenues of the retailer in all other coffee brands should increase.

Assumption 5: Fixed cost payments (such as marketing expenditures, R&D, and any other investments) are not conditional on an agreement between the players being reached. Although fixed costs affect the total profitability of the retail and manufacturing industry, they play no role in the bargaining power estimation. This argument does not apply to in-advance payments made by manufacturers to supermarkets; those payments are conditional on annual agreements (allowances).

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[17]For a strategic game that justifies this assumption, see Binmore, Rubinstein, and Wolinsky (1986).

[18]As an empirical justification, the coffee weight in the Chilean basket is about 0.78% as reported by INE, the Chilean agency of statistics (equivalent to the BLS in the US).

In order to derive the empirical estimator of the bargaining parameter λ, we write the Nash product as a function of payoff deviation or lump sum transfer, ε, between retailer, D, and manufacturer, U.[19] Therefore, for a given λ, the Nash product $NP(\varepsilon)$ is given by:

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

If the maximum NP is achieved at the actual profits, then the derivative is zero when evaluated at $\varepsilon = 0$.[20] Taking derivatives, we have:

$$\frac{\partial NP(\varepsilon)}{\partial \varepsilon} = \lambda \left(\frac{\pi^D - \pi^D(na) + \varepsilon}{\pi^U - \pi^U(na) - \varepsilon}\right)^{\lambda-1} - (1-\lambda)\left(\frac{\pi^D - \pi^D(na) + \varepsilon}{\pi^U - \pi^U(na) - \varepsilon}\right)^\lambda$$

Thus, the relationship at the optimum must yield:

$$\frac{\partial NP(\varepsilon)}{\partial \varepsilon}\Big|_{\varepsilon=0} = 0 \quad \Leftrightarrow \quad \frac{\lambda}{1-\lambda} = \left(\frac{\pi^D - \pi^D(na)}{\pi^U - \pi^U(na)}\right)$$

Therefore, the estimator is given by:

$$\widehat{\lambda}_{(U,D)} = \frac{\pi^D - \pi^D(na)}{\pi^D - \pi^D(na) + \pi^U - \pi^U(na)} \tag{2}$$

Consequently, if players maximize the Nash product, then the best estimator of the retailer's bargaining power parameter is the share of total profits that go to the retailer (net of disagreement payoffs).

Let us introduce some notation for the generic pair of players (U, D) in order to present the implications of our assumptions.

First, $\mathcal{U}$ denotes the set of products produced by manufacturer U, and $\mathcal{U}^{\complement}$ its complement. Similarly, $\mathcal{D}$ denotes the products sold in supermarket D, and $\mathcal{D}^{\complement}$ the set of products sold in the other retailers.

For a given product i, the upstream marginal cost is $\widehat{c}_i$, the wholesale price is p_i^w and the retail price is p_i^r. The demand when all brands are available is Q_i.

Under *Assumption 3*, the disagreement between manufacturer U and supermarket D does not affect the demand of other supermarkets, hence:

$$\pi^U - \pi^U(na) = \sum_{i \in \mathcal{U}}(p_i^w - \widehat{c}_i)Q_i - \sum_{i \in \{\mathcal{U} \cap \mathcal{D}^{\complement}\}}(p_i^w - \widehat{c}_i)Q_i$$

$$= \sum_{i \in \{\mathcal{U} \cap \mathcal{D}\}}(p_i^w - \widehat{c}_i)Q_i \tag{3}$$

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[19]Note that we consider a payoff deviation, which differs from a wholesale price deviation. A payoff deviation is equivalent to a lump sum transfer between the players, given fixed retail prices. The wholesale price deviation implies changes in retail prices. Since pass-through from wholesale prices to retail prices is incomplete, the supermarket payoff is reduced in that framework. Therefore, the approach taken here can be considered an upper bound for the supermarkets' payoffs.

[20]Formally, if $\max_{\varepsilon \in \mathbb{R}}\{NP(\varepsilon)\} = NP(0)$ then $\frac{\partial NP(\varepsilon)}{\partial \varepsilon}\Big|_{\varepsilon=0} = 0$.

Thus, the upstream marginal profits from the agreement with supermarket D are just the profits in that supermarket.

Now, denote $\widehat{p}_i^r$ and $\widehat{Q}_i$ the optimal price and demand when U's products are not available. Under *Assumption 4*, there is substitution between brands within a retailer ($\widehat{Q}_i \neq Q_i$). Thus, the marginal profits for retailer D from an agreement with manufacturer U are given by:

$$\pi^D - \pi^D(na) \quad = \quad \sum_{i \in \mathcal{D}} (p_i^r - p_i^w) Q_i - \sum_{i \in \{\mathcal{D} \cap \mathcal{U}^{\complement}\}} (\widehat{p}_i^r - p_i^w) \widehat{Q}_i \qquad (4)$$

Since we observe quantities, retail prices, and wholesale prices, the only unobservable terms we need to estimate in equation 4 are the counterfactual demand, $\widehat{Q}_i$, and the counterfactual prices, $\widehat{p}_i^r$.

As a special case, suppose there is no substitution between coffee brands ($\widehat{Q}_i = Q_i$ and $\widehat{p}_i^r = p_i^r$). In this case, equation 4 simplifies to $\pi^D - \pi^D(na) = \sum_{i \in \{\mathcal{D} \cap \mathcal{U}\}} (p_i^r - p_i^w) Q_i$. We refer to this case as the zero disagreement payoff since the disagreement does not alter the other downstream revenues.

Finally, note that bargaining power for a given player is weakly decreasing in his or her own disagreement payoff.[21] The intuition is simple. Suppose both players have fixed payoffs (i.e., suppose fixed production costs, wholesale, and retail prices). As the disagreement payoff increases, players' bargaining power decreases because the marginal value of the agreement decreases while the agreement payoffs are kept constant.

4.2 Production Cost of Coffee Manufacturers

This section presents our estimates of production costs for coffee manufacturers. These, in turn, will allow us to estimate the upstream manufacturers' profits since we observe their revenues.

We estimate production costs without using our information on wholesale prices. The reason for this is simple: we do not want to impose a particular structure linking the bargaining outcome with the manufacturer's underlying marginal cost. In fact, we chose the coffee industry as the focus of our analysis because of the relative simplicity of coffee production technology, and the well-established literature documenting this technology in detail. The simplicity of coffee production technology makes cost estimation quite straightforward.

The dominant input in the production of packaged coffee are green coffee beans. According to Koerner (2002) and Durevall (2004), producing one kilogram of roasted coffee requires 1.19 kg of beans, and producing one kilogram of soluble coffee requires 2.6 kg of beans. There are few economies of scale in coffee roasting and grinding, so marginal costs are

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[21]Formally, $\frac{\partial \widehat{\lambda}_{(U,D)}}{\partial \pi^D(na)} \leq 0$.

largely independent of output and companies of different sizes have similar marginal cost functions.[22]

Recall that consumption of instant coffee accounts for more than 84 percent of the Chilean market. Nestlé alone accounts for most of that share. Tables 3 and 4 give a detailed picture by retailer, with EDLP trading less ground coffee than HL. Also note that Nestlé does not sell ground coffee in Chile.

Table 3: **Market Share by coffee type and manufacturer at EDLP**

	Nestlé	Non Nestlé	Total
Instant Coffee	71.1	15.2	86.3
Ground Coffee	0.0	4.1	4.1
Others	7.8	1.8	9.6
Total	78.9	21.1	100.0

Table 4: **Market Share by coffee type and manufacturer at HL**

	Nestlé	Non Nestlé	Total
Instant Coffee	73.8	11.0	84.8
Ground Coffee	0.0	6.8	6.8
Others	6.6	1.8	8.4
Total	80.4	19.6	100.0

As found by Durevall (2004), other inputs such as labor, energy, packaging, transport, and physical capital usually make up less than 5 percent of total variable costs each, and rarely more than 10 percent. Koerner (2002) documents that, apart from coffee beans, no single input accounted for more than 5 percent of total production value in the US and Germany during the 1990's. In fact, labor and freight costs are not significant in her cost estimation. There is consensus that, on average, coffee beans should account for more than half of marginal costs. This is consistent with industry estimates of the magnitude of non-coffee costs reported in Yip and Williams (1982), estimates in Leibtag, Nakamura, Nakamura, and Zerom (2007) based on the Survey of Manufacturers, and the assumptions in Bettendorf and Verboven (2000) for the Dutch coffee market.

We follow the literature closely to estimate upstream production costs using our Chilean data. First we compute the coffee component of the marginal costs of product i, denoted by m_i^C. To compute the non-coffee components of variable costs like packaging, freight, and labor, we calibrate their fraction $\alpha \in (0, 1)$ of total costs. We denote these other inputs by m^O. This implies that the non-coffee component equals $\alpha/(1 - \alpha)$ times

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[22]See Sutton (1991).

the average coffee component, denoted by $\mathbb{E}(m^C)$.[23] We also include the value added tax rate of 19 percent, denoted by ν.

Hence, total marginal cost of product i, $\widehat{c}_i$, is given by:

$$\widehat{c}_i = (1+\nu)(m_i^C + m^O) = (1+\nu)\left(m_i^C + \frac{\alpha}{1-\alpha}\mathbb{E}(m^C)\right) \qquad (5)$$

Therefore, we have expressed the total variable cost of product i as a function of only two unknowns: the coffee component m_i^C and the share α of non-coffee costs.

To compute the coffee cost component m_i^C, we construct the required quantity of coffee beans in grams for each particular product i, accounting for the different levels of coffee loss by type (ground versus instant). Using the international price of green coffee beans and the nominal exchange rate, we express those product-specific quantities in Chilean pesos.[24]

As shown in Figure 1, fluctuations in the international price of coffee, which can reach 30 percent in a given year, is the main source of cost variation. The right hand side Y-axis of the same figure shows that the variation of the nominal exchange rate is about 5 percent, and therefore plays a relatively minor role in the variation of production cost.

Figure 1: **International price of coffee beans and nominal exchange rate**
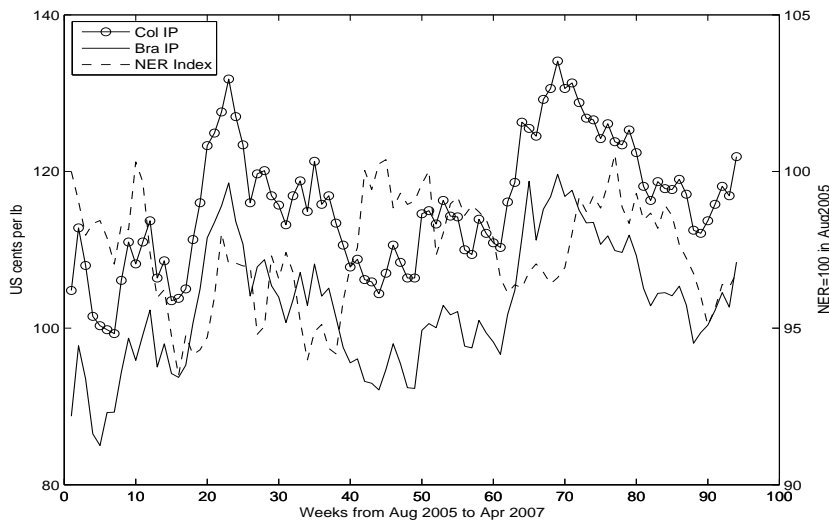
We construct lower and upper bounds for production cost estimations denoted by MC^L and MC^U, respectively. The lower bound MC^L uses the non-coffee cost share $\alpha = 30\%$ of the total variable costs. The international

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[23]Trivially if $m^O = \alpha(\mathbb{E}(m^C) + m^O)$, then $m^O = \left(\frac{\alpha}{1-\alpha}\right)\mathbb{E}(m^C)$.

[24]There is no tariff for coffee imports from South America.

coffee price for the lower bound estimation uses as weights the actual import shares. Hence, Brazilian coffee price is weighted by 70 percent and Colombian coffee price is weighted by 30 percent, where the former is always cheaper than the latter. For the cost upper bound MC^U, we increase the weight of the more expensive Colombian prices up to 50 percent, and increase the non-coffee cost share to $\alpha = 40$ percent of the total variable costs.[25]

To illustrate the differences in cost and prices, Figure 2 shows weighted average production costs and wholesale prices. Clearly, estimated production costs are similar between Nestlé and non-Nestlé, but wholesale price levels differ significantly in favor of Nestlé. We also observe less volatility in Nestlé wholesale prices compared to non-Nestlé wholesale prices.[26]

Figure 2: **Upper Bound Costs and Wholesale prices**
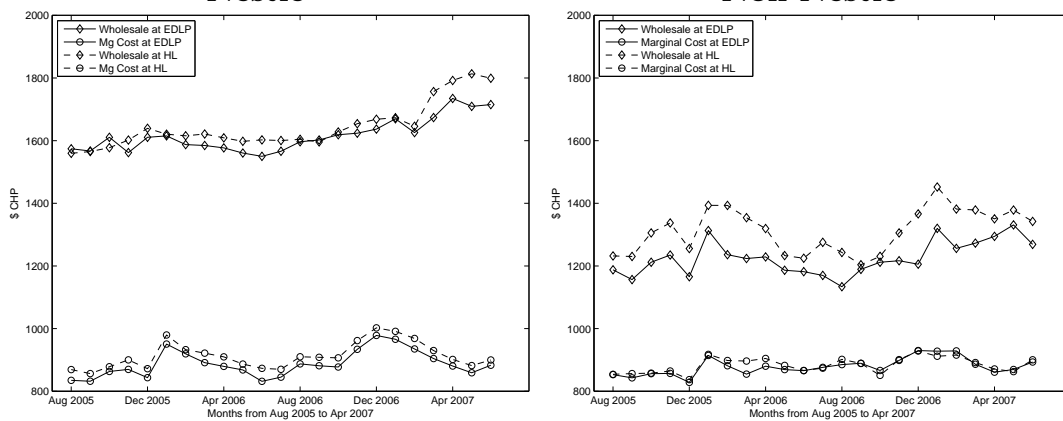
The cost estimation allows us to calculate product-specific price-cost markups given by $mk_i^U = (p_i^w - \widehat{c}_i)/p_i^w$, where p_i^w and $\widehat{c}_i$ are product i's wholesale price and estimated marginal cost, respectively.

Figure 3 shows the lower bound for markups by producer in each retailer. The solid lines depict the larger Nestlé markups, while the dotted lines present the smaller but still significant non-Nestlé markups. The Nestlé markups are stable while the non-Nestlé markups follow the cycle of the international price of coffee beans in Figure 1. Recall that HL has a larger proportion of ground coffee; this is why non-Nestlé markups are higher at HL.

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[25]Packaging has been estimated to be the largest of the non-coffee costs. The actual average unit cost of tin cans for 2005 and 2006 yields average values below a third of our estimated costs, m^O, leaving a lot of room for other variable non-coffee costs.

[26]For more details on bound costs estimation and wholesale prices see Appendix B.

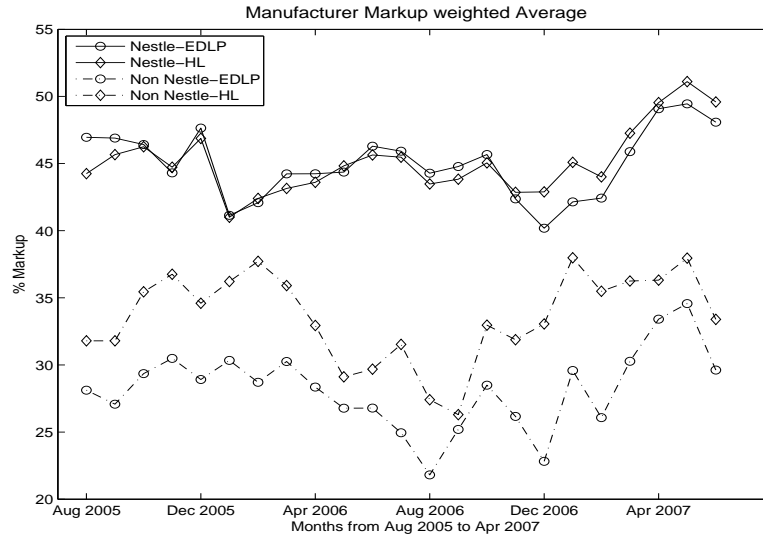Figure 3: **Lower Bound Markups of Coffee Manufacturers**

Table 5: **Markups of Nestlé for Instant Coffee**

	EDLP		HL	
	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Weighted Average	54.1	45.9	52.5	44.2
Std Dev	11.1	12.7	12.2	14.3

Table 6: **Markups of Non-Nestlé Manufacturers for Instant Coffee**

	EDLP		HL	
	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Weighted Average	35.3	24.4	34.1	22.9
Std Dev	12.0	13.1	17.3	19.1

Table 7: **Markups of Non-Nestlé Manufacturers for Ground Coffee**

	EDLP		HL	
	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Weighted Average	57.0	48.1	55.9	46.8
Std Dev	5.8	7.0	7.1	8.4

Descriptive statistics of markups are presented in Tables 5 and 6 for instant coffee, and in Table 7 for ground coffee by manufacturer (Nestlé vs non-Nestlé) and by retailer (HL vs. EDLP).[27] Our results are consistent with Leibtag, Nakamura, Nakamura, and Zerom (2007). They estimate the manufacturer's gross margin for the coffee and tea industries in the US as the difference between the manufacturer's selling price and the manufacturer's non-capital costs. Based on the coffee and tea category of the Annual Survey of Manufacturers, they divide the value of total shipments minus material and labor costs, by the value of total shipments. They find that the average of aggregated margins is 39 percent for American manufacturers of coffee and tea. Their estimates indicate that manufacturers' gross margins and coffee bean prices are inversely correlated.

Since the Chilean coffee industry is characterized by the absence of "private labels", a product sold in both supermarkets must have the same unitary production cost. Given the homogeneous production technology, the markup differences among manufacturers are mainly explained by differences in wholesale prices.

Markup differences do not vary dramatically between supermarkets. In terms of volatility, markups at HL consistently display larger variance than EDLP.[28]

Figure 4: **Markup Upper Bounds for Non Nestlé Instant Coffee**
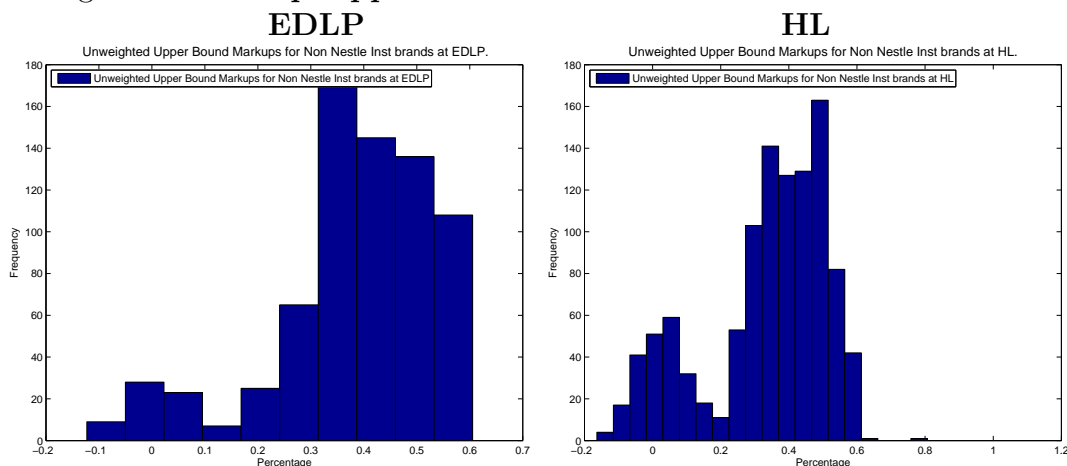
Although we assume generous cost upper bounds, we check for some underestimation of costs given the large markups we find in the upstream industry. The histograms of non-Nestlé markups in Figure 4 show that increasing the production costs for non-Nestlé producers would create negative markups for a sizable proportion of the transactions. We therefore

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[27]Ground coffee is produced by non-Nestlé manufacturers only.

[28]Appendix B contains more details on manufacturers' features.

conclude that we have reasonable upper bound estimates for production costs.

4.3 Markups of the Supermarkets

This section analyzes the pricing behavior of Chilean retailers in the coffee category. Since our data includes wholesale and retail price information at barcode level for the two largest supermarket chains, we observe actual markups without needing to make any further assumptions.

In general, supermarket EDLP systematically sets cheaper retail prices than HL for both Nestlé and non-Nestlé products, while prices at supermarket HL display a larger volatility than at EDLP. Interestingly, this pattern is replicated in wholesale prices, suggesting that the different pricing strategies are transmitted upstream.[29] To illustrate this fact, Figure 5 plots the series of weighted averages of wholesale and retail prices by retailer-producer combination.

Figure 5: **Wholesale and Retail Prices**
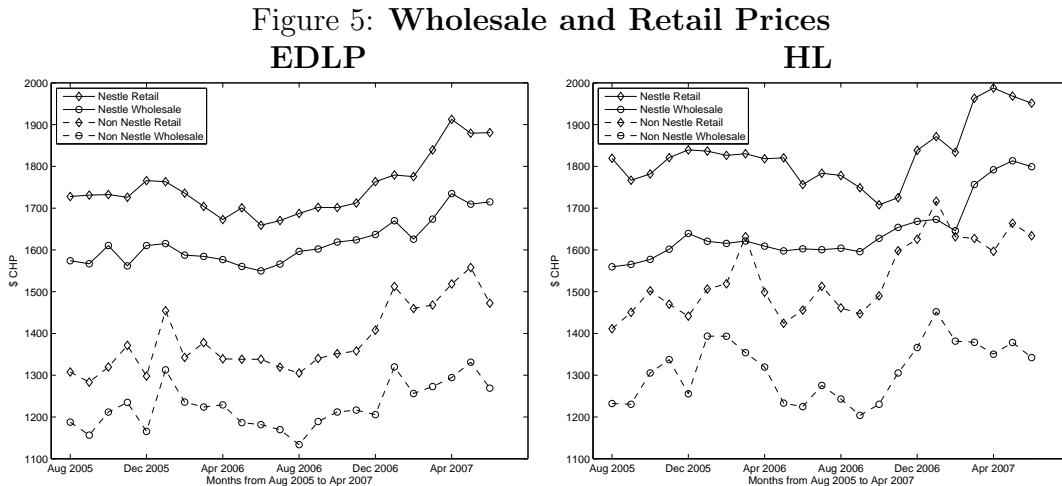
As discussed before, EDLP has lower and more stable retail prices, whereas HL has more volatile prices. Within a retailer, non-Nestlé products are more volatile than Nestlé products. Note that this figure uses the quantity-weighted average, so the most popular products are leading the figure.

Markups of the average prices are plotted in Figure 6 for each retailer-manufacturer combination. Markups are given by $mk_i^D = (p_i^r - p_i^w)/p_i^r$, where p_i^w and p_i^r are product i's wholesale and retail price, respectively.

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[29]The difference in wholesale accounting (with HL following AAC) dampens HL volatility. Appendix C contains details on retailers' features.

Figure 6: **Markups of Retailers**
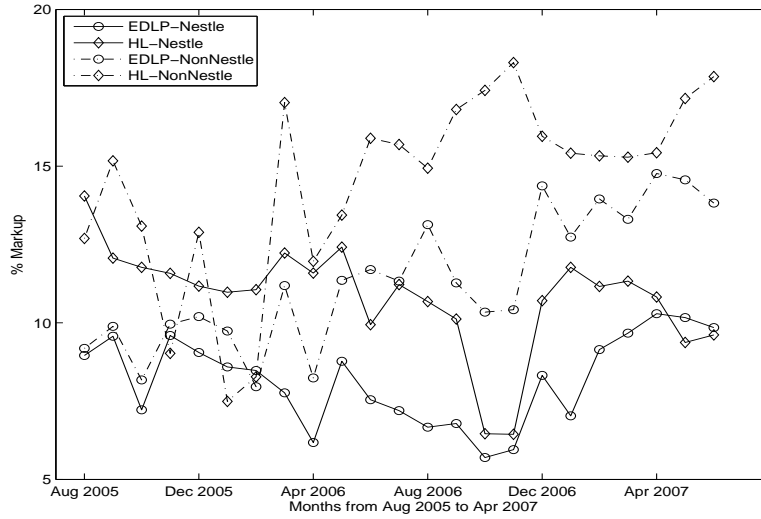
Table 8: **Retailer Markups for Instant Coffee**
(by Manufacturer-Retailer pair)

	Nestlé-EDLP	Nestlé-HL	non-Nestlé-EDLP	non-Nestlé-HL
Mean	9.5	12.4	12.3	15.4
Weighted Av.	7.2	9.4	11.6	14.7
Median	9.7	12.5	11.7	16.2
Std Dev	4.6	5.6	5.4	11.3

Table 9: **Retailer Markups for Ground Coffee**
(**Non Nestlé** manufacturers only)

	EDLP	HL
Mean	10.3	16.1
Weighted Average	10.0	14.1
Median	10.9	15.4
Std Dev	8.3	10.3

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In general, retail markups for Nestlé products are smaller and more stable than for non-Nestlé products. Summary statistics of retailers' markups are shown for instant coffee in Table 8, and for ground coffee in table 9.

EDLP has lower markups than HL in every category. In general, the largest markups are observed in non-Nestlé instant coffee for both retailers, followed by the markups for ground coffee. Nestlé brands always show the lowest markups within a retailer. Retailers obtain similar markups for non-Nestlé brands in both ground and instant coffee. As expected from their pricing strategies, HL shows larger standard deviations in every category.

To compute counterfactual prices, potential geographic price discrimination is important. As the data section describes, all stores within a supermarket chain share the same wholesale prices if transportation costs are negligible. To uncover potential geographic price discrimination, we compute markups for three large counties with important income differences: Las Condes, the richest county, is denoted by *Rich*; La Florida, the median income county, is denoted by *Mid*; Maipu, the low income county, is denoted by *Poor*.

Table 10: **Mean of Retailer Markups by counties**

Manufacturer \ County	EDLP			HL		
	Rich	Mid	Poor	Rich	Mid	Poor
Nestlé	7.5	7.4	7.3	10.9	10.0	9.1
Non Nestlé	10.8	11.7	11.7	15.0	14.9	14.4

Table 10 presents the markups for Nestlé and non-Nestlé brands in each of the retailers. Surprisingly, retailers do not fully discriminate as they could, given the massive income differences. We could argue that retailer HL discriminates geographically more than EDLP, who does it very mildly, consistent with EDLP pricing. These results are important to estimate the structural demand for each retailer in the next section.

In general, the mild geographic discrimination and the low markups we document are consistent with a highly competitive retail sector. The high degree of competition in the Chilean retail sector has also been documented by Díaz, Galetovic, and Sanhueza (2009) and Lira, Rivero, and Vergara (2007).[30]

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[30] A multi-product pricing strategy by retailers could be another potential explanation for low markups in the coffee category. This hypothesis merits future research, but so far we have no hard evidence.

4.4 Disagreement Payoffs for Retailers

This subsection presents the structural demand estimation that allows us to compute the counterfactual disagreement payoff for each retailer. These are the profits generated by consumers' substitution in the hypothetical case when a particular coffee brand is not available. These calculations should provide the counterfactual prices and quantities in the disagreement scenario. Recall that this substitution makes the agreement less valuable for the supermarket because the marginal benefit of the agreement decreases as the disagreement payoff increases.

Recall that counterfactual demands account for substitution within a retailer, and not between retailers. This assumption seems appropriate if the weight of coffee products in the representative basket is sufficiently small. Under this condition, the unavailability of a given coffee brand should not induce consumer switching between retailers We argue that retailer choice is based on transport costs and total basket costs for which the coffee product is not pivotal. In fact, the weight of coffee in the official CPI basket of food and non-alcoholic beverages is 0.78%.

We estimate a standard random coefficient model developed by Berry, Levinsohn, and Pakes (1995) (hereafter BLP).[31] Since we conduct the estimation by retailer, all the parameters are supermarket-specific. The utility to consumer h from coffee product i at time t in supermarket d is denoted by U_{hitd}:

$$U_{hitd} = -\alpha_h^d p_{itd}^r + x_{itd}'\beta^d + \xi_{itd} + \varepsilon_{hitd} \qquad (6)$$

where p_{itd}^r is the retail price, x_{itd} is the vector of observable characteristics, ξ_{itd} is an unobserved scalar product characteristic, and ε_{hitd} is a homoscedastic mean-zero stochastic term. α_h^d is the individual-specific marginal utility of income with a distribution given by:

$$\alpha_h^d = \alpha^d + \sigma_p^d v_h \qquad \text{where} \qquad v_h \sim \mathbb{N}(0,1)$$

where v_h is distributed as a standard normal shock, and captures the unobservable consumer heterogeneity in price sensitivity. Define $\theta^d = (\alpha^d, \beta^d, \sigma_p^d)$ as the vector containing all the parameters of the model. The set of consumers who choose product i at time t in supermarket d is denoted by A_{itd}. This is a function of all parameters θ^d, prices $(\mathbf{p}_{td}^r)$, and characteristics $(\mathbf{x}_{td}, \xi_{td})$ in that market:

$$A_{itd}(\mathbf{x}_{td}, \mathbf{p}_{td}^r, \xi_{td}; \theta^d) = \{(v_h, \varepsilon_{h0td}, .., \varepsilon_{hItd}) | U_{hitd} \geq U_{hltd}, \forall l \in \{0, .., I\}\}$$

The next step is to build market shares given the population of each market.[32] Assuming ties occur with zero probability, the market share s_{itd} of

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[31] For details see Nevo (2000).

[32] This approach also considers a normalized outside good, $i = 0$, that represents the choice of "not to buy coffee" ($U_{h0td} = \varepsilon_{h0td}, \forall(h, t, d)$).

product i is just an integral over the mass of consumers in the region A_{itd} that depends on random variables $\varepsilon = (\varepsilon_{h0td}, .., \varepsilon_{hItd})$ and v_h. Thus, the market shares are given by:

$$s_{itd}(\mathbf{x}_{td}, \mathbf{p}_{td}^r, \xi_{td}; \theta^d) = \int_{A_{itd}} dF_\varepsilon(\varepsilon|v_h) d\Phi(v_h) = \int_{A_{itd}} s_{hitd} d\Phi(v_h)$$

Following the standard assumption of ε being i.i.d. with Type I extreme value distribution, we have a closed form for individual probability s_{hitd}:

$$s_{hitd} = \frac{\exp(-\alpha^d p_{itd}^r + \beta^d x_{itd} + \xi_{itd} - p_{itd}^r \sigma_p^d v_h)}{1 + \sum_g \exp(-\alpha^d p_{gtd}^r + \beta^d x_{gtd} + \xi_{gtd} - p_{gtd}^r \sigma_p^d v_h)}$$

The market shares in supermarket d are given by:

$$s_{itd}(\mathbf{x}_{td}, \mathbf{p}_{td}^r, \xi_{td}; \theta^d) = \int_{A_{itd}} \frac{\exp(-\alpha^d p_{itd}^r + \beta^d x_{itd} + \xi_{itd} - p_{itd}^r \sigma_p^d v_h)}{1 + \sum_g \exp(-\alpha^d p_{gtd}^r + \beta^d x_{gtd} + \xi_{gtd} - p_{gtd}^r \sigma_p^d v_h)} d\Phi(v_h)$$

The non-analytical integral over individual shocks v_h is computed through simulation. The vector of unobservable characteristics, ξ_{td}, is the only unobservable that explains an imperfect fit with the actual market shares. To estimate $\widehat{\theta}^d$, we match predicted and actual market shares. However, the estimation procedure is not straightforward because unobservable vector ξ_{td} enters the predicted market shares in a non-linear fashion. Moreover, the unobservable random terms might be correlated with prices $\mathbf{p}_{td}^r$. To overcome this endogeneity, we use the international prices of coffee as instruments. To estimate the mixed logit model of BLP, we follow the MPEC approach suggested by Dubé, Fox, and Su (2010).

Our goal in this section is to compute counterfactual demands and prices when a given brand is not available due to a disagreement between a manufacturer and a supermarket. We denote the restricted choice set at supermarket d when some brand is not available by $\mathcal{R}_d$; hence, the first order conditions are given by:

$$s_{itd}(\mathbf{x}_{td}, \mathbf{p}_{td}^r, \xi_{td}; \widehat{\theta}^d) + \sum_{k \in \mathcal{R}_d} (p_{ktd}^r - p_{ktd}^w) \frac{\partial s_{ktd}(\mathbf{x}_{td}, \mathbf{p}_{td}^r, \xi_{td}; \widehat{\theta}^d)}{\partial p_{itd}^r} = 0, \quad \forall i \in \mathcal{R}_d \quad (7)$$

where p_{ktd}^w is the wholesale price of product k at supermarket d at time t. Solving the equation system above, we are able to estimate counterfactual equilibrium prices and quantities, given $\widehat{\theta}^d$.

When estimating the demand system by county, we find elasticities changing with consumers' income; as expected, richer consumers are less price-sensitive. This finding is not consistent with the retailer's pricing illustrated in Table 10, which shows almost no geographic price discrimination. Since the estimated elasticities are conditional on a given retailer, they do not capture the highly competitive environment at basket level that

Table 11: **Own Price Elasticities at EDLP**

	All	Nestlé	Non Nestlé
Mean	-8.3	-8.2	-8.6
Median	-7.5	-7.4	-7.8
Std	4.7	4.9	4.2

Table 12: **Own Price Elasticities at HL**

	All	Nestlé	Non Nestlé
Mean	-9.2	-8.2	-11.9
Median	-6.5	-6.5	-6.6
Std	17.0	7.3	30.1

forces retailers to reduce markups and avoid price differences between counties. We discuss this issue further when computing counterfactual payoffs. We take the middle-income county, La Florida, as the representative market. To summarize the demand results, Tables 11 and 12 present summary statistics of the estimated own-price elasticities in each supermarket.[33]

These estimates are in line with prior beliefs about consumers at supermarkets EDLP and HL. In general, the median elasticity is higher at EDLP than HL. There is also a greater heterogeneity of price elasticities at HL than at EDLP. Finally, the demand is more inelastic for popular Nestlé products.[34]

An attractive feature of the BLP model is that it allows us to estimate markups consistent with static optimization, observed prices, and demand parameters. We compare predicted markups using our data with actual markups for the middle-income market. Table 13 presents summary statistics for real markups minus the BLP predicted markups. The general finding is that retailer EDLP charges smaller markups than those predicted by the first order conditions, whereas supermarket HL charges markups that are closer to predicted values. This characterization is robust across specifications and counties, although the gap is larger for richer counties. Although standard errors are such that the null hypothesis of a zero difference is not rejected, we acknowledge the discrepancy between the data and the predictions of the static model. We discuss this issue in the

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[33]The own price elasticities are given by:

$$\eta_{it} \equiv \frac{\partial s_{it}}{\partial p_{it}} \frac{p_{it}}{s_{it}} \quad = \quad -\frac{p_{it}}{s_{it}} \int |\alpha_h| s_{hjt}(1 - s_{hjt}) d\Phi(v_h)$$

[34]Appendix D contains histograms of the estimated elasticities.

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results section below.

Table 13: **Real Markups minus Predicted Markups**

	EDLP-Nestlé	EDLP-Non Nestlé	HL-Nestlé	HL-Non Nestlé
Mean	-8.1%	-4.8%	-2.1%	-1.7%
Median	-7.9%	-5.0%	-1.9%	-1.2%
Std	6.0%	5.6%	7.6%	7.7%

We find the supermarket-specific gap between predicted and actual markups very interesting but beyond the scope of this paper. Hence, we focus on the potential consequences for our bargaining power estimations; we discuss these when presenting the results on profit sharing.

4.5   Profit Sharing Results

This section presents our estimates of bargaining power based on how profit is shared between upstream and downstream players. We estimate profits (net of disagreement payoffs) for each retailer-manufacturer combination using our hard data on quantity, wholesale prices, and retail prices, as well as the estimations of manufacturer costs and counterfactual payoffs.

In addition to marginal costs and revenues, we account for allowances; these are fixed payments made in advance by manufacturers to retailers. Allowances are commonly associated with promotional efforts; according to information provided by industry insiders, they are made on a yearly basis. Like most of the empirical literature, we have no hard data on allowances. As a second best, we use the values obtained in interviews with insiders. According to these sources, Nestlé pays 9.5 percent of its annual revenues while the non-Nestlé producers pay 11 percent. In other words, abstracting from timing, an allowance of x percent is equivalent to a reduction of x percent in the wholesale price that is paid upfront. Based on the retail markups found in section 4.3, allowances represent a large amount in terms of supermarkets' revenues. Despite the massive differences in market share between Nestlé and non-Nestlé, allowances in percentage terms are not strikingly different. Since these are lump-sum transfers, computing profit sharing under alternative values of the allowance rate results in a trivial, one-to-one change.

Indeed, we have to compute profits under the scenarios of disagreement and agreement between each retailer-manufacturer combination. Under disagreement, optimal prices are calculated using the first order conditions of the estimated model of Bertrand differentiated products, as in equation 7. Under the agreement scenario, we have two options to compute profits:

we can use either the theoretical optimal prices based on the first order conditions or the actual retail prices, which do not necessarily match the first order conditions (Table 13). Both options lead to similar conclusions.

To calculate $\widehat{\lambda}_{(U,D)}$, we add up the profits of the respective player over 94 weeks, subtract the respective disagreement payoffs, and divide the sum by total profits in the same markets. For disagreement payoffs, we consider the representative market only. As a robustness check, we also compute bargaining parameters assuming all the counties under zero disagreement payoffs. This case is an upper bound for the bargaining power parameter of the retailer. We obtain the same qualitative results under different assumptions on the disagreement payoffs. Therefore, the large set of assumptions on structural demand and counterfactual payoffs does not play a key role in our findings. Disagreement payoffs are not crucial because the cross-substitution between Nestlé and non-Nestlé brands is very low.

The main results of this section are presented in three tables. Table 14 presents results with theoretical optimal prices for agreement and disagreement payoffs in the representative market. Table 15 presents results with actual prices for the agreement payoffs, but theoretical optimal prices for the disagreement payoffs in the representative market. Table 16 presents results with actual prices for the agreement payoffs and zero disagreement payoff in all markets.

Bargaining Power Parameters $\widehat{\lambda}_{(U,D)}$ under different assumptions:

Table 14: $\widehat{\lambda}_{(U,D)}$ considering Counterfactual payoffs and Optimal Prices

	EDLP		HL	
	Nestlé	Non Nestlé	Nestlé	Non Nestlé
Lower Bound	0.33	0.49	0.33	0.55
Upper Bound	0.38	0.69	0.38	0.78

Table 15: $\widehat{\lambda}_{(U,D)}$ considering Counterfactual payoffs and Actual Prices

	EDLP		HL	
	Nestlé	Non Nestlé	Nestlé	Non Nestlé
Lower Bound	0.26	0.37	0.28	0.42
Upper Bound	0.30	0.60	0.32	0.75

Table 16: $\widehat{\lambda}_{(U,D)}$ considering Zero Counterfactual payoffs

	EDLP		HL	
	Nestlé	Non Nestlé	Nestlé	Non Nestlé
Lower Bound	0.29	0.46	0.32	0.47
Upper Bound	0.33	0.58	0.36	0.56

To depict how parameters evolve over time in all markets, Figure 7 plots our upper bound estimates over the 94 weeks (under zero disagreement payoffs). The figures show instant coffee only to keep input requirements constant across manufacturers. During the period of analysis, there were no important changes in the market structure of any of the industries involved. Most variations appear to be driven by fluctuations in the international price of green coffee beans.

Figure 7: **Bargaining Parameter for Instant Coffee**
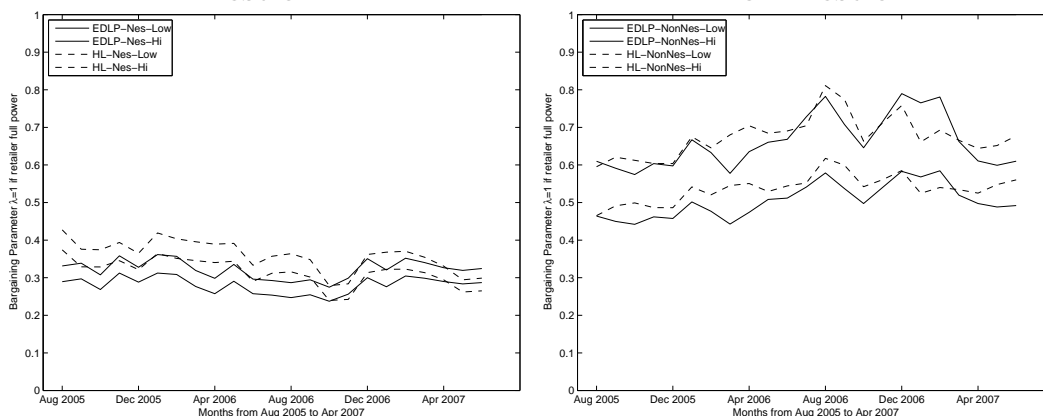
| **Nestlé** | **Non-Nestlé** |

The most striking result is that non-Nestlé producers are able to obtain a large share of the profits despite having only tiny market shares. Although the size effect is not zero, this finding goes against the conventional wisdom that market size is the most important source of bargaining power. In this regard, we find that the portion that each manufacturer obtains is roughly constant across retailers.

Our results seem robust to alternative cost estimations. Cost estimations are the most likely source of inaccuracy in our bargaining power estimates as disagreement points do not play a major role in the estimation and we observe actual retail and wholesale prices. Nevertheless, alternative cost estimates must have three specific features in order to change our conclusions. First, the alternative cost estimates should display a sizeable gap between Nestlé and its competitors. This, however, would be hard to reconcile with the fact of homogeneous technologies. Second, the cost gap should be heterogeneous across non-Nestlé producers. Third, the cost gap between non-Nestlé producers should be large in 2005, but decrease in 2006 in order to avoid negative markups for non-Nestlé producers in the second half of 2006. The second and third features are hard to reconcile with the histograms of non-Nestlé markups in Figure 4. Those distributions show that increasing the production costs for non-Nestlé producers would create

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negative markups for a large proportion of the transactions in 2006.

In our opinion, the high payoff obtained by non-Nestlé producers suggests that the low degree of consumers substitution across brands (brand loyalty) can offset the importance of market size.[35] Although market size and brand loyalty are naturally correlated, it is the latter that grants bargaining power to the non-Nestlé manufacturers who achieve a sizeable payoff despite their small market shares. Our evidence supports the argument that roasters have managed to keep control of the coffee chain with massive investments in advertising, despite a worldwide concentration in the food retail sector.[36] Of course, there are other potential explanations that are consistent with the high payoffs obtained by non-Nestlé producers documented here. For example, Nestlé may set price standards that generate spillovers to other manufacturers. In other words, Nestlé's wholesale prices become the framework for non-Nestlé negotiations in a leader-follower model. Hence, non-Nestlé wholesale prices are lower than Nestlé's, but still grant a significant share of the profits to small manufacturers.

Another explanation could appeal to fixed costs. Although fixed costs are not included in our estimator of bargaining power, they could justify the large non-Nestlé's profits. In order to cover the fixed costs, non-Nestlé producers need to achieve the estimated large markups. Given the heterogeneity in the size of non-Nestlé producers,[37] it seems unlikely that this is the main force driving their large markups.

Some arguments justify the presence of non-Nestlé manufacturers, but not their sizable share of profits. The first is that retailers can use non-Nestlé producers as a threat when bargaining with Nestlé, along the lines of Bedre and Shaffer (2011).[38] The second is that consumers value variety in the choice set. If consumers value the extent of the choice set, then non-Nestlé manufacturers have greater bargaining power despite their small market shares.

5   Risk Sharing and Pass-Through Analysis

In this section, we analyze the cost pass-through behavior of retailers and coffee manufacturers. Our goal is to identify who bears the risk of

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[35]We stress the brand differentiation of final products although the differentiation of retailers also plays a role, as studied by Dobson and Waterson (1997).

[36]See Ponte (2002).

[37]See table 25 in appendix.

[38]Although in their model, the upstream producer uses small retailers to threaten the largest downstream player. Rey and Vergé (2004) draw similar conclusions in a different context.

international cost shocks, as these seem to be the largest source of uncertainty in this market. Risk-sharing policies may shed light on aspects of bargaining power that are not captured by the level of wholesale prices but by their volatility. Specifically, we focus on two phenomena: the pass-through from international commodity prices to wholesale prices, and the pass-through from wholesale prices to retail prices.

5.1 Bargaining with Risky Outcomes

In order to explore risk-sharing, we introduce two elements to standard models of bargaining between manufacturers and retailers. The first element is risky outcomes, which in our case, are represented by cost shocks. The second one is that firms may not be risk-neutral.

The standard bargaining model focuses on how players—manufacturers and retailers in our case—split deterministic profits using the level of negotiated prices. Bargaining models involving firms usually assume that both players are risk neutral. Hence, by assumption, these models are silent about both the volatility of negotiated prices and which player bears the risk in uncertain environments.

Roth (1985) points out that although standard bargaining models usually refer to the "strategic risk" of disagreement, there are no random outcomes in those models. The concept of risk aversion is therefore related to the risk of disagreement and not easily extended to random payoffs or a random size of pie.[39]

Following Riddell (1981), we introduce a simple model to extend the standard Nash bargaining model presented in section 4.1.

To include risky outcomes, we consider random payoffs for both players. In principle, this could apply to both agreement and disagreement payoffs. We use the same notation for payoffs as the benchmark model adding a tilde to represent their random nature $(\widetilde{\pi}^D, \widetilde{\pi}^D(na), \widetilde{\pi}^U, \widetilde{\pi}^U(na))$.[40]

To include players that are not necessarily risk-neutral, we introduce payoff utility functions that can be linear or concave.[41] Let us denote the downstream and upstream utility functions by $v(\cdot)$ and $u(\cdot)$, respectively. The Nash product in this new setting is denoted by $\overline{NP}$. Now we have:

$$\overline{NP} = \left(\mathbb{E}[v(\widetilde{\pi}^D) - v(\widetilde{\pi}^D(na))]\right)^\lambda \left(\mathbb{E}[u(\widetilde{\pi}^U) - u(\widetilde{\pi}^U(na))]\right)^{1-\lambda} \qquad (8)$$

Following the same steps as in Section 4.1, we express the Nash product as a function of a lump-sum perturbation ε to the agreement payoffs:

$$\overline{NP}(\varepsilon) = \left(\mathbb{E}[v(\widetilde{\pi}^D + \varepsilon) - v(\widetilde{\pi}^D(na))]\right)^\lambda \left(\mathbb{E}[u(\widetilde{\pi}^U - \varepsilon) - u(\widetilde{\pi}^U(na))]\right)^{1-\lambda} \quad (9)$$

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[39] Models of bargaining that explicitly incorporate risky outcomes are Riddell (1981), Roth and Rothblum (1982) and White (2008).

[40] We assume no renegotiation after the random variable is realized. We also assume that there is a positive pie to share with probability one.

[41] In principle, we could consider risk-lovers.

The derivative of the Nash product with respect to this deviation is given by:

$$
\begin{aligned}
\frac{\partial \overline{NP}(\varepsilon)}{\partial \varepsilon} &= \lambda \left(\frac{\mathbb{E}[v(\widetilde{\pi}^D + \varepsilon) - v(\widetilde{\pi}^D(na))]}{\mathbb{E}[u(\widetilde{\pi}^U - \varepsilon) - u(\widetilde{\pi}^U(na))]} \right)^{\lambda - 1} \mathbb{E}[v'(\widetilde{\pi}^D + \varepsilon)] \\
&\quad - (1 - \lambda) \left(\frac{\mathbb{E}[v(\widetilde{\pi}^D + \varepsilon) - v(\widetilde{\pi}^D(na))]}{\mathbb{E}[u(\widetilde{\pi}^U - \varepsilon) - u(\widetilde{\pi}^U(na))]} \right)^{\lambda} \mathbb{E}[u'(\widetilde{\pi}^U - \varepsilon)]
\end{aligned}
$$

Therefore, the Nash product is maximized under the following condition:

$$
\begin{aligned}
\frac{\partial \overline{NP}(\varepsilon)}{\partial \varepsilon}\Big|_{\varepsilon=0} = 0 \quad &\Leftrightarrow \quad \left(\frac{\lambda}{1 - \lambda} \right) \frac{\mathbb{E}[v'(\widetilde{\pi}^D)]}{\mathbb{E}[u'(\widetilde{\pi}^U)]} = \frac{\mathbb{E}[v(\widetilde{\pi}^D) - v(\widetilde{\pi}^D(na))]}{\mathbb{E}[u(\widetilde{\pi}^U) - u(\widetilde{\pi}^U(na))]} \\
&\Leftrightarrow \quad \left(\frac{\lambda}{1 - \lambda} \right) = \frac{\mathbb{E}[v(\widetilde{\pi}^D) - v(\widetilde{\pi}^D(na))]/\mathbb{E}[v'(\widetilde{\pi}^D)]}{\mathbb{E}[u(\widetilde{\pi}^U) - u(\widetilde{\pi}^U(na))]/\mathbb{E}[u'(\widetilde{\pi}^U)]} \quad (10)
\end{aligned}
$$

This condition highlights the interaction of standard bargaining power parameters with the shape of the utility functions, for a given payoff distribution.

As an illustration, suppose the upstream manufacturer is risk neutral ($u(x) = x$ and $u' = 1$). Suppose the expected gains (in utils) of the relationship are identical for both players, so that the ratio cancels out. The expression of relative bargaining power yields:

$$
\left(\frac{\lambda}{1 - \lambda} \right) = \frac{1}{\mathbb{E}[v'(\widetilde{\pi}^D)]}
$$

As the expected marginal utility of the downstream player decreases, retailer's bargaining power, λ, increases. For a given payoff, a more concave utility function implies a smaller marginal utility, and therefore, greater bargaining power. Consequently, risk-aversion plays a role in bargaining with uncertainty. In other words, for a given a bargaining power λ in this example of equally valuable agreements, a more risk-averse player would obtain a larger payment.

We capture risk exposure through the degree of cost-pass-through. If a firm absorbs most of the cost shocks it faces, then we conclude that it is exposed to more risk. Similarly, a firm is not bearing any risk if it is able to fully pass through cost shocks into prices.

First, we study pass-through from cost shocks to wholesale prices, which is the negotiated outcome between manufacturers and retailers. Although production cost is not observable, the international price of green coffee beans gives us exogenous variations in the main component of the manufacturer's marginal cost. Second, we study retail pass-through using a direct measure of the marginal cost given by wholesale prices. We test whether the pass-through behavior of supermarkets is homogenous across the two different pricing strategies: HL and EDLP.

The closest paper to our pass-through analysis is Leibtag, Nakamura, Nakamura, and Zerom (2007). They study retail and wholesale pass-through in the American coffee industry. The main difference is that they do not have product-specific data; instead, they have average retail prices and average market-level wholesale prices with no information on wholesalers' identities. Therefore, we extend their analysis accounting for heterogeneity associated with the uneven sizes of upstream manufacturers and the different pricing strategies of retailers.

5.2 Cost Pass-Through at the Wholesale level

This subsection studies the degree of pass-through from the international price of coffee to bargained wholesale prices.

We run panel data fixed effect regressions to estimate our pass-through coefficients. Our baseline specification is given by:

$$\log(p_{jt}^w) = \alpha \log(IP_t) + \beta \log(NER_t) + \gamma D_j + \varepsilon_{jt} \tag{11}$$

where p_{jt}^w is the wholesale price of product j at time t, IP_t is the international price of green coffee beans, and NER_t is the nominal exchange rate at time t.[42] Specifications include time invariant dummies, D_j, by product, retailer, producer, and coffee characteristics (decaf, ground, instant, flavored, and bean).

We have several options to use as the baseline coffee price in the international commodity market. We chose the Brazilian and Colombian price series because they represent about 90 percent of the coffee imports in Chile.[43] Figure 1 already illustrated the large variation in international prices and the small variation in the Chilean nominal exchange rate. It also shows the high correlation between Colombian and Brazilian prices, where the Colombian coffee is always more expensive given its higher quality. Recall that the pattern of international prices for this data period is not systematically in favor of any of the players.

We run the estimations by upstream-downstream pairs separately in order to capture the importance of upstream size and supermarket pricing strategy in pass-through behavior. The wholesale price regressions at supermarket EDLP are presented in Table 17 and Table 18 for Nestlé and non-Nestlé products, respectively. Tables 19 and 20 present the same combinations for supermarket HL. The first two columns of each table present results using equally weighted observations, while the last two columns (namely 3-W and 4-W) use quantity-weighted observations. We weight our data by quantity to capture potentially different pass-through in more popular products.

_____

[42]NER is the value of one US dollar expressed in Chilean pesos, since commodity prices are set in American currency.

[43]The series are obtained from DATASTREAM.

Table 17: Wholesale Price Regressions for **EDLP-Nestlé**
Standard deviations below the coefficients in parenthesis

	1	2	3-W	4-W
log(Int Price)	0.21	0.22	0.15	0.14
	(0.06)	(0.06)	(0.01)	(0.01)
log(NER)	- 0.12		0.31	
	(0.11)		(0.03)	
Sample Size	973	973	973	973

Table 18: Wholesale Price Regressions for **EDLP-non-Nestlé**
Standard deviations below the coefficients in parenthesis

	1	2	3-W	4-W
log(Int Price)	0.11	0.12	0.13	0.11
	(0.05)	(0.05)	(0.01)	(0.01)
log(NER)	- 0.22		0.61	
	(0.11)		(0.04)	
Sample Size	1,158	1,158	1,158	1,158

Table 19: Wholesale Price Regressions for **HL-Nestlé**
Standard deviations below the coefficients in parenthesis

	1	2	3-W	4-W
log(Int Price)	0.14	0.13	0.14	0.14
	(0.03)	(0.03)	(0.01)	(0.01)
log(NER)	0.17		- 0.02	
	(0.08)		(0.03)	
Sample Size	1,121	1,121	1,121	1,121

Table 20: Wholesale Price Regressions for **HL-non-Nestlé**
Standard deviations below the coefficients in parenthesis

	1	2	3-W	4-W
log(Int Price)	0.12	0.12	0.35	0.33
	(0.07)	(0.06)	(0.01)	(0.01)
log(NER)	- 0.03		0.38	
	(0.09)		(0.03)	
Sample Size	1,897	1,897	1,897	1,897

We find strong evidence of incomplete pass-through from international to wholesale prices of green coffee beans. This is in line with what previous studies have found.[44] Our new piece of evidence shows that the degree of pass-through at wholesale level is specific to the retailer-manufacturer combination.

At the EDLP supermarket, the pass-through coefficient for Nestlé products is higher than it is for non-Nestlé products (21 percent versus 11 percent). When weighted by quantity, Nestlé's most popular products reduce the overall pass-through, while the non-Nestlé estimated pass-through coefficients do not change significantly. These regressions suggest that Nestlé is bearing less risk than smaller producers. Nevertheless, the deal between Nestlé and the EDLP supermarket ensures a low pass-through for Nestlé's star products. If, in addition, Nestlé has access to better hedging in international markets of green beans then the gap in exposure to cost shocks is even larger.

Instead, at supermarket HL the pass-through coefficients are about 13 percent, and are similar across manufacturers. Interestingly, when weighted by quantity, the pass-through coefficients increase dramatically up to 34 percent for the non-Nestlé products. Thus, non-Nestlé products with larger market shares exhibit larger pass-through coefficients, bearing less risk than the less popular brands.

We think that supermarkets' pricing strategies play a role in explaining the differences in pass-through when weighting by quantity. A retailer that pursues EDLP pricing targets consumers who are more sensitive to price volatility; therefore, Nestlé and the EDLP supermarket agree to pursue less volatile wholesale prices for Nestlé's star brand. On the other hand, the HL supermarket targets *bargain hunters* who are less averse to price changes; therefore, non-Nestlé manufacturers and the HL supermarket agree to have a larger pass-through in the most popular products.

Along the same lines, Leibtag, Nakamura, Nakamura, and Zerom (2007) cite comments by Nestlé 's executive from the United Kingdom Competition Commission's investigation into the incomplete pass-through from international commodity prices:

"In making price changes, Nestlé was influenced first by the need to avoid price volatility that could confuse the customer and be difficult for the trade to manage. Secondly, Nestlé aimed to smooth price increases to avoid sharp changes that could damage the confidence of the consumer. The company said that the history of recent price changes, given below, led to results which were overall more satisfactory to consumers than prices which changed more frequently in response to changes in green-coffee-bean prices, which fluctuated daily" (United Kingdom Competition Commission, 1991).

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[44]For example Leibtag et al (2007). For other products, see Berck, Leibtag, Solis, and Villas-Boas (2009).

The paragraph above argues that the cause for incomplete pass-through is consumers' distaste for price volatility. This argument is valid for supermarkets that follow an EDLP strategy, but it is not consistent with an HL pricing strategy that creates price volatility through promotional activities. We discuss this link in the retail pass-through section.

The pass-through from nominal exchange rate coefficients is not robust. These coefficients change signs and statistical significance across specifications, but including them does not affect our finding of the cost pass-through from international prices to wholesale prices. Hellerstein (2008) examines exchange rate pass-through and finds that manufacturers bear more exchange-rate risk than retailers in the beer industry.

As robustness checks, we explore different specifications. We include levels, lags, different subsamples, different international prices, and random effects instead of fixed effects. Our main findings remain unchanged. Robustness to the different lags rules out concerns about inventory behavior and differences between the supermarket-specific measures of wholesale prices discussed in the data section. As an aside, our results strongly reject asymmetric pass-through from international prices or nominal exchange rates.

5.3 Retail Pricing Behavior

This subsection presents estimated of the degree of pass-through from wholesale to retail prices. To quantify the degree of pass-through, we estimate the following panel data fixed effect regression:

$$\log(p_{jt}^r) \quad = \quad \phi \log(p_{jt}^w) + \alpha \log(IP_t) + \beta \log(NER_t) + \gamma D_{jt} + \varepsilon_{jt}$$

where p_{jt}^r is the retail price, p_{jt}^w is the wholesale price for product j at time t, IP_t is the international price, and NER_t is the nominal exchange rate at time t. We also include a set of dummies, D_{jt}, for product, retailer, producer, and coffee characteristics (decaf, ground, instant, flavored and bean). We include monthly and weekly dummies whenever possible since international prices and exchange rates are weekly and common across all the products. We present the results using Brazilian prices, but the results are very similar when using Colombian prices.

As in the previous section, we exploit the fact that we have two types of retailers and two types of manufacturers. The regressions using EDLP prices are in Tables 21 and 22, for Nestlé and non-Nestlé, respectively. Similarly, Tables 23 and 24 present the pass-through behavior of Nestlé and non-Nestlé products at supermarket HL.

At supermarket EDLP we find high but incomplete pass-through. At supermarket HL the pass-through coefficients are lower, and indeed surprisingly low in comparison to EDLP. The equally weighted EDLP regressions suggest that the pass-through of wholesale price variations to retail prices

Table 21: Retail Price Regressions for **EDLP-Nestlé**
Standard deviations below the coefficients in parenthesis

	1	2	3	1-W	2-W	3-W
log(WP)	0.73	0.73	0.75	0.61	0.61	0.60
	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)
log(Int Price)	-0.00	0.00		-0.01	-0.02	
	(0.01)	(0.01)		(0.00)	(0.00)	
log(NER)	0.06			-0.20		
	(0.02)			(0.00)		
Sample Size	32,262	32,262	32,262	32,262	32,262	32,262

Table 22: Retail Price Regressions for **EDLP-non-Nestlé**
Standard deviations below the coefficients in parenthesis

	1	2	3	1-W	2-W	3-W
log(WP)	0.80	0.80	0.83	0.82	0.81	0.85
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
log(Int Price)	-0.04	-0.03		-0.07	-0.06	
	(0.01)	(0.01)		(0.00)	(0.00)	
log(NER)	0.20			0.30		
	(0.04)			(0.01)		
Sample Size	23,933	23,933	23,933	23,933	23,933	23,933

Table 23: Retail Price Regressions for **HL-Nestlé**
Standard deviations below the coefficients in parenthesis

	1	2	3	1-W	2-W	3-W
log(WP)	0.42	0.42	0.38	0.33	0.33	0.25
	(0.03)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)
log(Int Price)	-0.02	-0.01		0.00	0.01	
	(0.01)	(0.01)		(0.00)	(0.00)	
log(NER)	0.26			0.18		
	(0.03)			(0.00)		
Sample Size	23,191	23,191	23,191	23,191	23,191	23,191

Table 24: Retail Price Regressions for **HL-non-Nestlé**
Standard deviations below the coefficients in parenthesis

	1	2	3	1-W	2-W	3-W
log(WP)	0.40	0.40	0.40	0.54	0.54	0.53
	(0.03)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)
log(Int Price)	-0.09	-0.10		-0.11	-0.11	
	(0.01)	(0.01)		(0.00)	(0.00)	
log(NER)	-0.04			-0.04		
	(0.04)			(0.01)		
Sample Size	13,454	13,454	13,454	13,454	13,454	13,454

is 75 percent for Nestlé products, and 82 percent for non-Nestlé products. The pass-through at HL is about 40 percent, regardless of the manufacturer.

These results suggest that price volatility at the retail level is not necessarily due to fluctuations in wholesale prices. A probable explanation is that the low retail markups at supermarket EDLP force the retailer to follow a larger degree of retail pass-through. The low pass-through at HL supermarket suggests that promotional activity is not generated by wholesale price changes. This is along the lines of Nakamura (2008) who finds that most observed price variation arises from demand and supply shocks at the level of the retailer rather than manufacturer.

When weighting by quantity at EDLP, the Nestlé pass-through decreases by 14 basis points (reaching 61 percent) while the non-Nestlé pass-through remains unchanged. Conversely, at HL, the Nestlé pass-through decreases slightly while the non-Nestlé pass-through increases by 14 basis points (reaching 54 percent).

Retail pass-through behavior, when weighting by quantity, is similar to behavior at the wholesale level for the EDLP-Nestlé and non-Nestlé-HL combinations. We think this is consistent with the pricing strategies of each retailer. The top Nestlé products show lower pass-through at EDLP, having a low and stable price pattern at the retail and wholesale levels. The most popular non-Nestlé products have higher pass-through at the HL retailer, implying that prices fluctuate with the international price of coffee beans.

This is a novel finding that suggests a link between the marketing literature on pricing strategy and the economic literature on bargaining models.

Leibtag, Nakamura, Nakamura, and Zerom (2007) find that retail prices adjust almost exactly, cent-for-cent, to changes in manufacturers' prices when estimated in levels rather than logs, which is a specification that they consider more meaningful. We therefore replicate our estimations using levels. The results for EDLP show that a one Chilean peso increase in the wholesale price implies an 85 cent increase in Nestlé retail prices and a 92 cent increase in non-Nestlé retail prices. Roughly speaking, in levels, these coefficients are closer to full pass-through for EDLP, although the markups are not constant in percentage terms. The HL estimations in levels also show very low pass-through for both types of coffee producers: a one peso increase in wholesale prices leads to a 73 cent increase in Nestlé retail prices and only 50 cent increase in non-Nestlé prices.

The documented pass-through behavior for each retailer is robust to different sets of lags, firm subsamples, random effect estimations, and Colombian international prices. In addition, we strongly reject any asymmetric response.

In general, pass-through behaviors capture differences in production functions, or perhaps particular demand features. Cost pass-through be-

havior is linked to "super-elasticity", a term coined by Klenow and Willis (2006); that term describes the change in price elasticity after price changes. Nevertheless, we believe that the different estimated risk-sharing policies at wholesale and retail levels do not support the usual assumption that retailers and manufacturers are risk-neutral, and actually suggest what might be a large heterogeneity in these risk preferences. The source of that heterogeneity in risk-aversion might be the consumers targeted by the pricing strategies of retailers. This issue merits deeper analysis in future research.

6 Conclusions

We empirically study bargaining power using novel, proprietary data on wholesale prices between supermarkets and coffee manufacturers for the two largest retailers in Chile. To uncover patterns of the bargaining outcome, we focus on the share of total profits each player earns and the level of risk exposure to cost shocks that each player bears.

Based on a Nash bargaining model, the bargaining power parameter is captured by the share of total profits (net of disagreement payoffs) that each player obtains. Since we know the retail and wholesale prices, disagreement payoffs and production costs are the only missing pieces of information that are needed to identify the size of the pie and the portion that each player receives. We estimate structural demand using the BLP model to compute disagreement payoffs for retailers. In estimating upstream costs, we follow the existing economic literature on the coffee industry to calculate conservative bounds for production costs. We complement our data with anecdotal information on allowances, which are fixed advance payments from manufacturers to retailers, to include non-linearities in the contract.

We consistently find that Nestlé obtains more than two-thirds of the total profits generated by their products in both retailers. Strikingly, non-Nestlé manufacturers obtain a very sizable portion of the total profits despite their small market shares. Counterfactual demands have little impact on the overall results since consumer substitution is rather limited. We see this as direct evidence of bargaining power driven by brand differentiation rather than market size.

In order to identify the risk exposure of each player, we study pass-through behavior from cost shocks to wholesale prices. We find that less than 20 percent of cost shocks are passed through to wholesale prices, with small manufacturers absorbing more risk than larger players.

We also find remarkable features specific to retailers that are consistent with their different pricing strategies and targeted consumers. At supermarket EDLP, Nestlé wholesale prices are more sensitive to cost shocks than non-Nestlé wholesale prices; this is consistent with Nestlé bearing less

risk than other coffee manufacturers, Supermarket HL does not show large pass-through differences between Nestlé and non-Nestlé wholesale prices.

In this paper, we have documented multiple, novel facts about wholesale prices, revealing interesting and rich features of bargaining power between manufacturers and retailers. Brand loyalty seems to play an important role in offsetting market size in terms of bargaining power. We believe our evidence supports a strong link between traditional economic literature on bargaining and marketing literature on retailers' pricing strategies and consumer brand loyalty.

Interestingly, we find that risk-sharing behavior seems manufacturer-retailer specific with different risk-sharing policies being agreed with respect to the frequent and massive fluctuations of international prices. This finding is against the standard assumption of risk-neutral players. The documented aversion to price volatility seems directly related to bargaining outcomes, making it a topic for future research.

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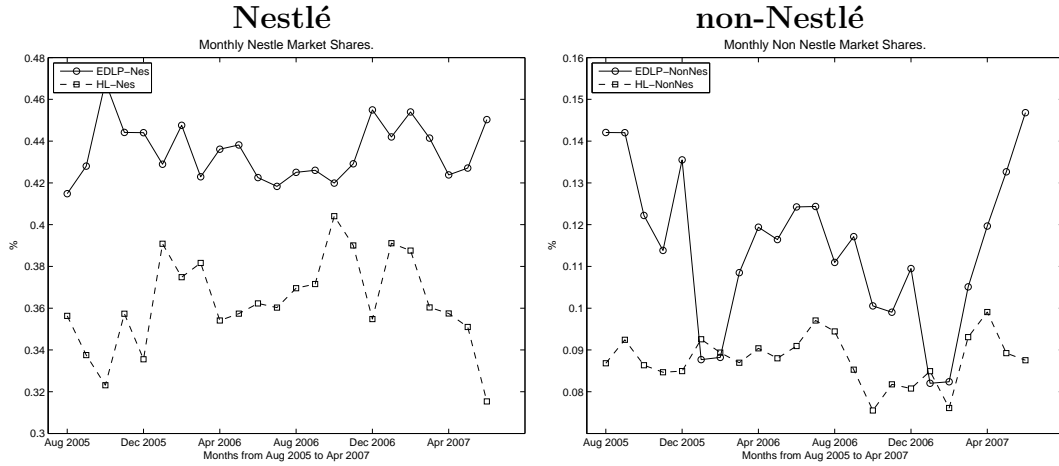
APPENDIX SECTIONS

A   Details on Market Shares

Table 25: **Average Market Shares of Coffee Manufacturers**

Name of Manufacturer	Market Share Percentage
Nestlé	80.9250
Tres Montes	10.9845
Cafe Haiti	3.9710
Iguazu	2.2976
Cafe Bomdia	0.4122
Comercial Caribe	0.3973
Kraft	0.3693
Colcafe	0.2601
Jumbo	0.2136
Cocam Cia	0.0691
Cabrales	0.0359
Melitta	0.0301
Cafe do Brasil	0.0139
Illy Cafe	0.0060
Di Carlo	0.0059
Quindio Gourmet	0.0037
Kruger	0.0024
Cafes Valiente	0.0019
Hansewappen	0.0005
Najjar SAL	0.0002
Total	100.00

Figure 8: **Coffee Market Shares by Supermarket and Manufacturer**

B   Details of Manufacturers

This appendix provides details on production cost estimations. Tables 28 and 27 present lower and upper bound averages for the industry for instant and ground coffee. Tables 29 and 30 summarize wholesale and retail prices.

Figures 9-12 present histograms of product-specific markups for instant coffee, while Figures 13-14 are for ground coffee.

Table 26: **Cost Estimation Bounds**

	$\mathbb{E}(m^C)$	$\mathbb{E}(m^O)$	VAT	Marginal Cost, $\widehat{c}_i$
Upper Bound	419	279	133	831
Lower Bound	409	175	111	695

Table 27: **Cost Estimation Bounds**

	$\mathbb{E}(m^C)$	$\mathbb{E}(m^O)$	VAT	Marginal Cost, $\widehat{c}_i$
Upper Bound	419	279	133	831
Lower Bound	409	175	111	695

Table 28: **Cost Estimations for Instant Coffee and Ground Coffee**

	$\mathbb{E}(m^C(\mathbf{Inst}))$	$\widehat{c}_i(\mathbf{Inst})$	$\mathbb{E}(m^C(\mathbf{Gro}))$	$\widehat{c}_i(\mathbf{Gro})$
Upper Bound	477	899	379	783
Lower Bound	465	762	370	648

Table 29: **Weighted Wholesale prices.**

	EDLP -Nestlé	HL-Nestlé	EDLP-non-Nestlé	HL-non-Nestlé
Mean	1,615	1,645	1,228	1,316
Std Dev	53	72	60	76
Min	1,506	1,545	1,120	1,166
Max	1,764	1,824	1,380	1,482

Table 30: **Weighted Retail prices.**

	EDLP -Nestlé	HL-Nestlé	EDLP-non-Nestlé	HL-non-Nestlé
Mean	1,747	1,827	1,387	1,540
Std	70	80	82	94
Min	1,615	1,660	1,243	1,376
Max	1,938	2,096	1,596	1,755

Figure 9: **Nestlé's Markups for Instant Coffee at EDLP**
Lower Bound   **Upper Bound**
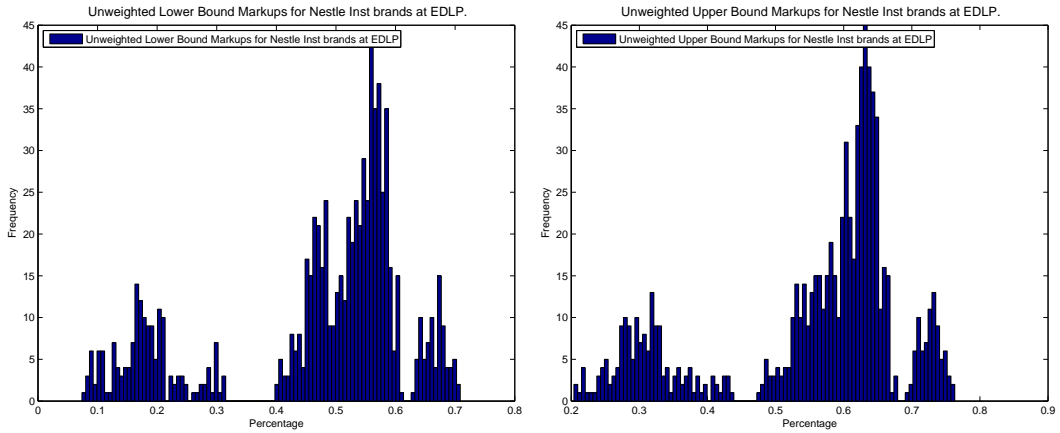
Figure 10: **Nestlé's Markups for Instant Coffee at HL**

Lower Bound   **Upper Bound**
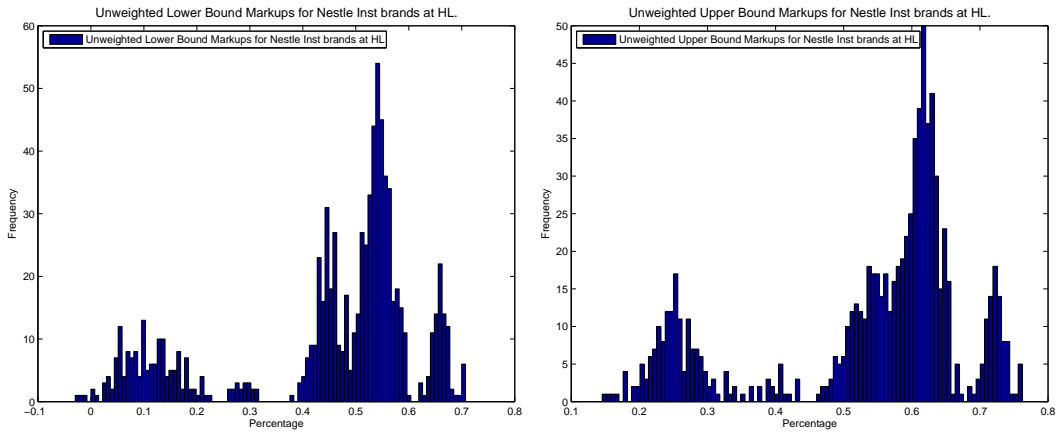
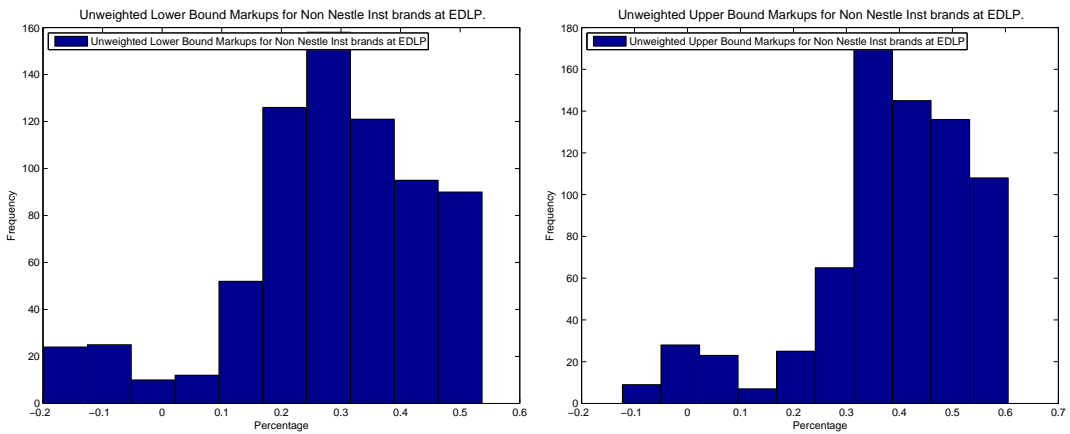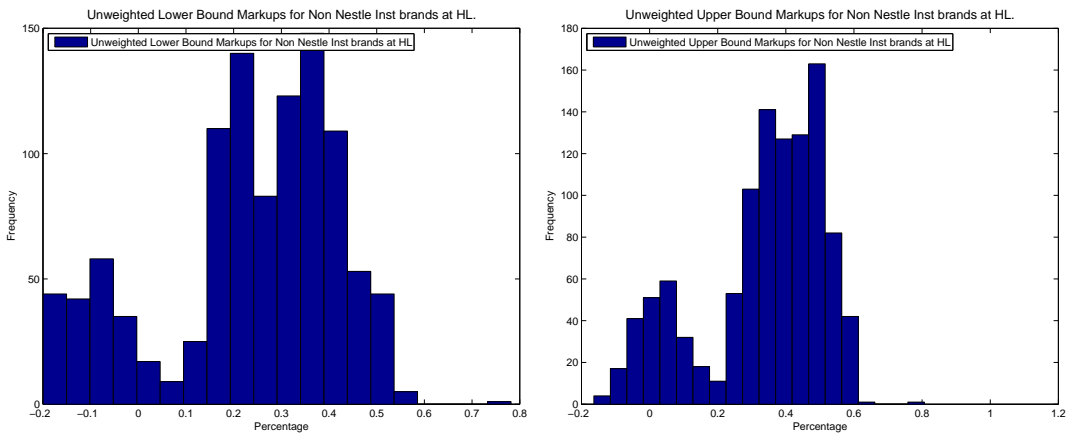Figure 11: **Non-Nestlé's Markups for Instant Coffee at EDLP**

Lower Bound   **Upper Bound**

Figure 12: **Non-Nestlé's Markups for Instant Coffee at HL**

Lower Bound   **Upper Bound**

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Figure 13: **Non-Nestlé's Markups for Ground Coffee at EDLP**

Lower Bound   **Upper Bound**
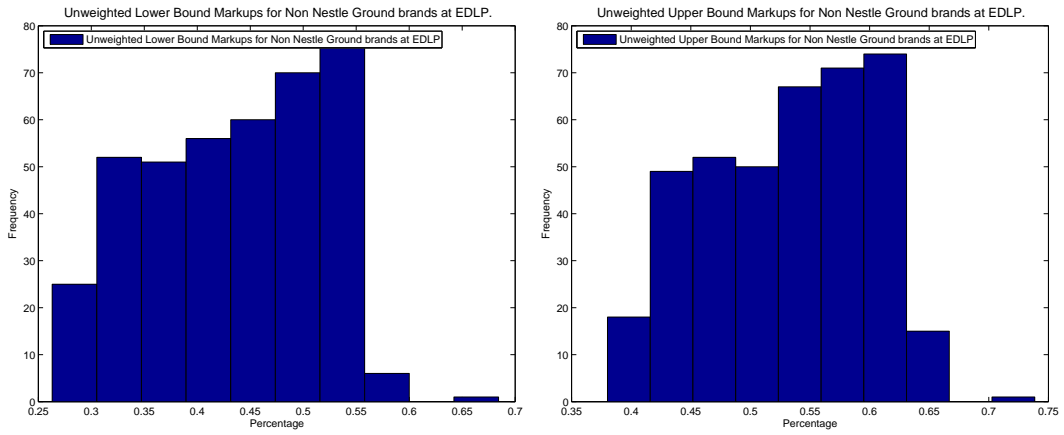
Figure 14: **Non-Nestlé's Markups for Ground Coffee at HL**

Lower Bound   **Upper Bound**
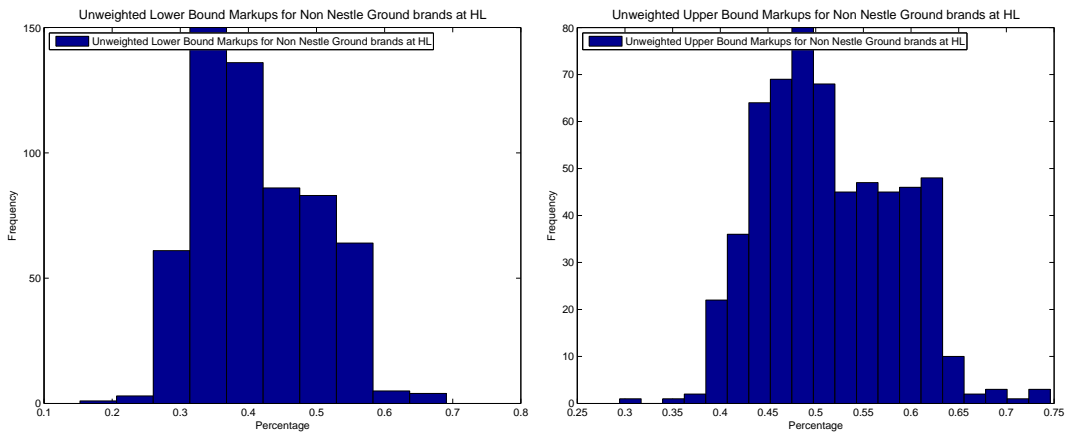
C   Details of Retailers

This appendix contains histograms of retailers' actual markups. Figures 15 and 16 are for instant coffee and Figure 17 for ground coffee.

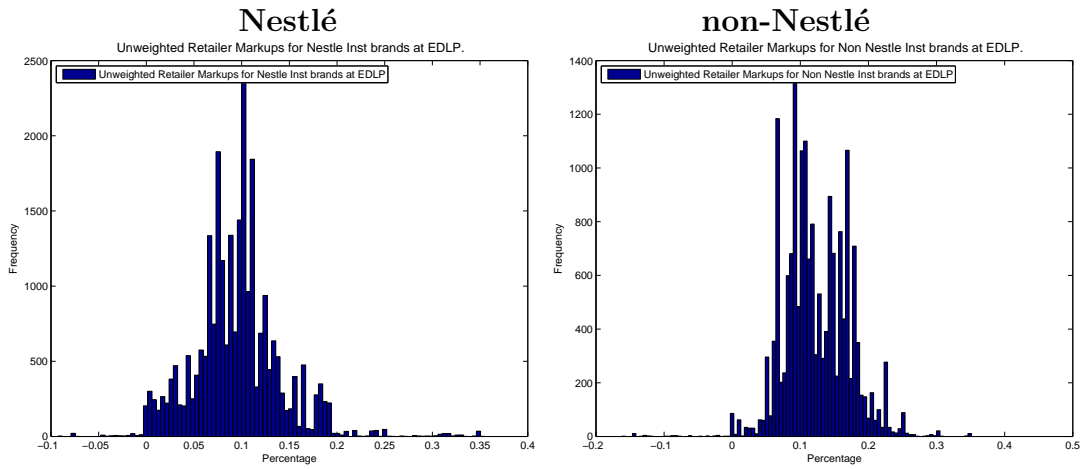Figure 15: **Actual Retailer's Markups for Instant Coffee at EDLP**

| Nestlé | non-Nestlé |

Figure 16: **Actual Retailer's Markups for Instant Coffee at HL**

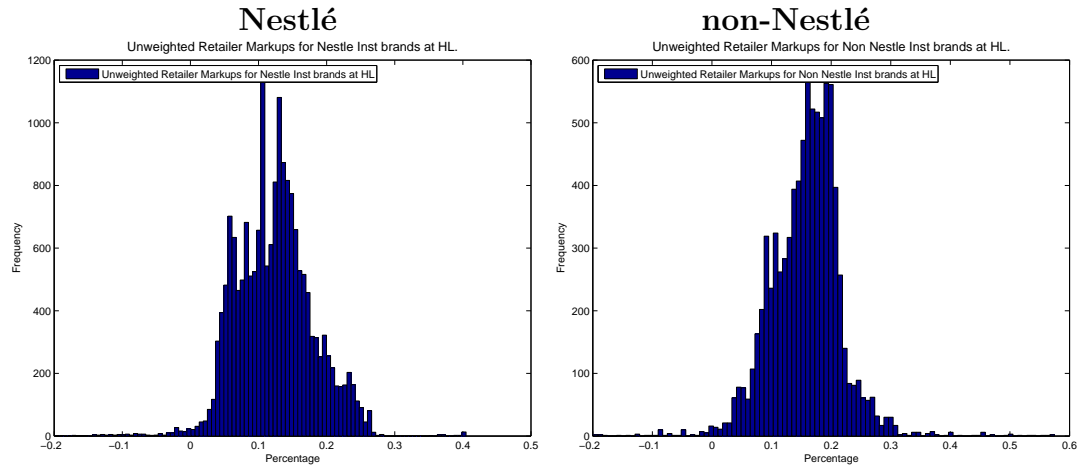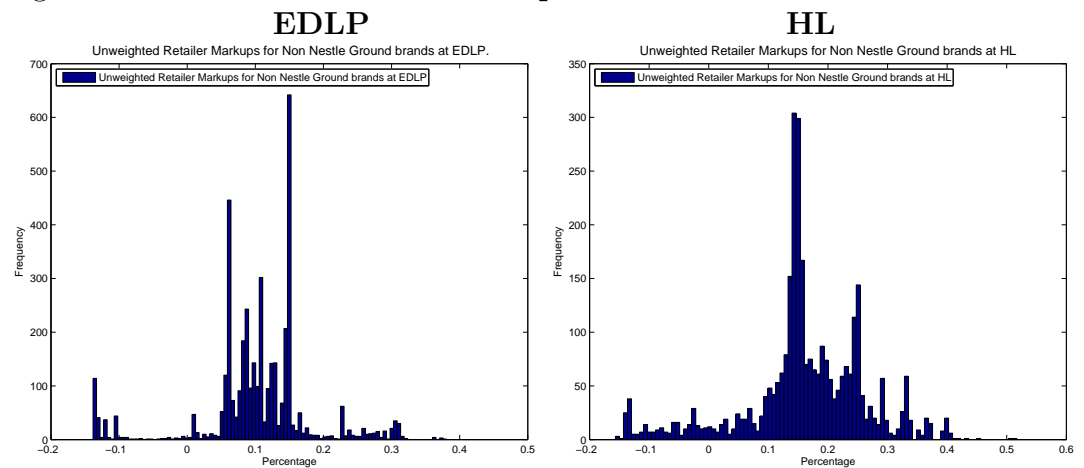| Nestlé | non-Nestlé |

Figure 17: **Actual Retailer's Markups for Non-Nestlé Ground Coffee.**

| EDLP | HL |

D   Structural Demand Estimation

This appendix provides details of the structural demand a la BLP that is estimated in section 4.5. Figure 18 presents histograms of the elasticities from demand estimations in La Florida for supermarkets EDLP and HL. Histograms of the predicted and real markups are depicted in Figure 19.
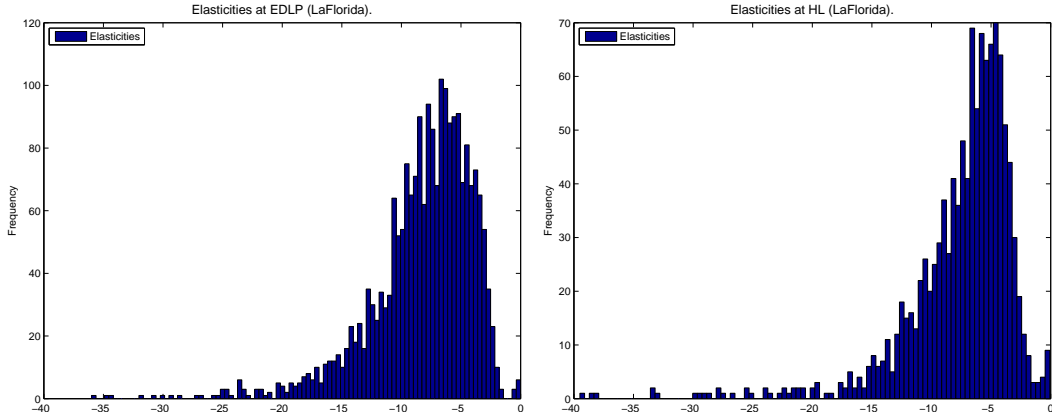
Figure 18: **Elasticities in La Florida by Retailer**

EDLP   HL

Figure 19: **Actual and Estimated Markups by Retailer**

EDLP   HL

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