Bargaining Power Revealed by Wholesale Prices

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Motivation

- International trend to have fewer and larger Supermarkets (Walmart in the US, Tesco in the UK).
- Practitioners and academics interested in understanding causes and consequences of the bargaining between upstream manufacturers and downstream retailers.
- Limited evidence since negotiated wholesale prices are usually not available.
- Evidence from estimated wholesale prices (Crawford and Yurukoglu (2011), Villas-Boas (2007)) or average wholesale prices (Leibtag et al (2007)).

This paper

- Characterize bargaining power using Chilean data on product-specific wholesale and retail prices.
- Two dimensions of bargaining power: **Profit-Sharing** (share of total profits each player earns), and **Risk-Sharing** (the risk exposure to cost shocks each player bears).
- Focused on coffee industry to take advantage of suitable features.

Preview of the Results

Profit-Sharing:

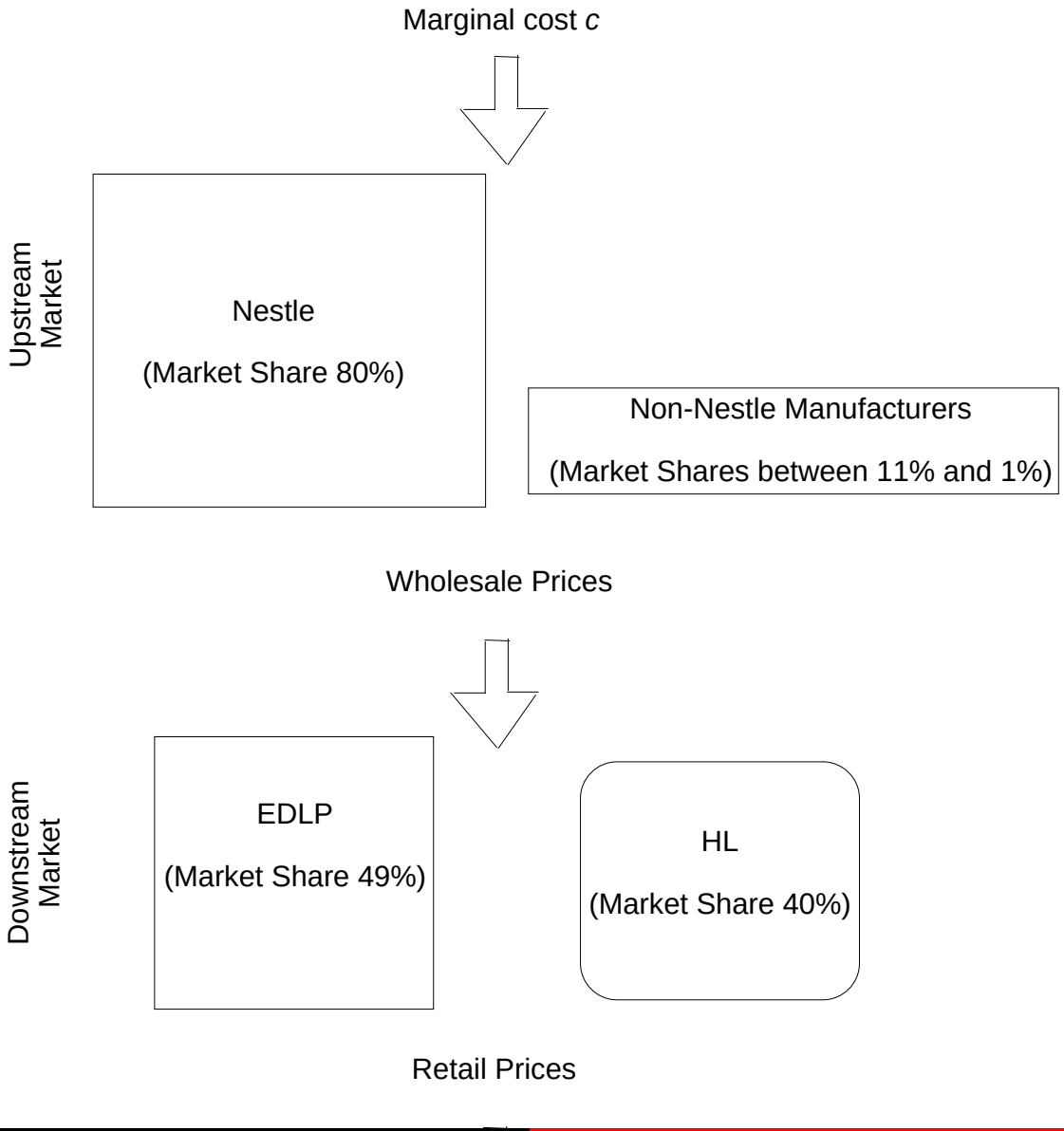
- The largest upstream player (80% of the market) obtains about 70% of the total profits.
- Smaller manufacturers (between 11% and 1% of the market) obtain between 30% and 50% of total profits.

Risk-Sharing:

- Upstream producers absorb most of the shocks.
- More popular products bear less risk.

Why coffee?

- Technology is simple and homogenous among coffee manufacturers.
- Easy to estimate production costs.
- Fluctuations in commodity prices as large as 40%.
- Coffee is not pivotal for the choice of retailer.


Marginal cost c
Upstream Market
Nestle
(Market Share 80%)
Non-Nestle Manufacturers
(Market Shares between 11% and 1%)
Wholesale Prices
Downstream Market
EDLP
(Market Share 49%)
HL
(Market Share 40%)
Retail Prices

Data Description

Time Span: 94 weeks between 2005 and 2007.

- Retail Level dataset includes 120,884 weekly observations of scan data **at store level**, for 180 stores own by 12 supermarkets located in 34 counties within Santiago
- Wholesale Level data of the two largest supermarket chains. Chains negotiate and purchase from suppliers at a national level. Thus, we have 5,175 observations at product level.
- We gather extra data on characteristics at product (UPC) level.

Nestle is the main Upstream Player

Market Share of Coffee Suppliers by Retailer

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

- Instantaneous coffee represents 95% of the market and Nestle only sells instantaneous coffee.
- Nestle is more expensive than non Nestle brands, but still large brand loyalty.

Two Largest Downstream Players

Market Share of Retailers by Coffee Supplier

	Nestle	Non Nestle	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

- Similar size of supermarkets.
- Different price strategy.

Different pricing strategies

- Every-Day-Low-Prices strategy (**EDLP**): the retailer maintains shelf prices as low as possible and only rarely offers specials or discounts. (American example: Walmart)
- High-Low strategy (**HL**): combination of relatively high shelf prices with frequent promotions and discounts. (American example: Safeway)
- EDLP has lower average price than HL in our Chilean data.
- HL has larger variance of prices than EDLP in our Chilean data.
- (The same pattern can be found in their wholesale prices)

Nash Bargaining Model

Denote upstream manufacturer by U, and downstream retailer by D.

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

where π^x is the profit of player x under agreement, and $\pi^x(na)$ under disagreement; and $\lambda \in [0,1]$ is the bargaining parameter.

Then

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

Profits of the upstream manufacturer U

Assuming that: 1) Bargaining is over the entire bundle of upstream products; and 2) Disagreements do not generate consumer's switching between retailers.

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

where Q_i is the demand when all brands are available.

Need to estimate production cost, $\widehat{c}_i$.

Upstream Production Cost: $\widehat{c}_i$

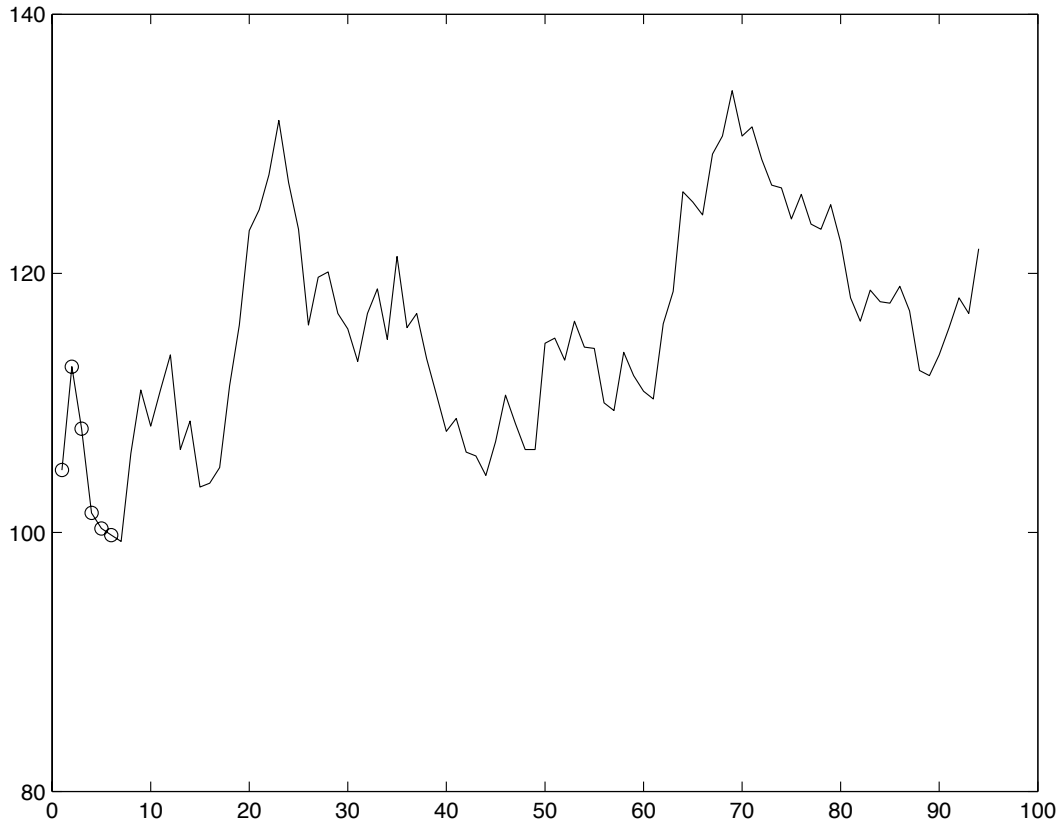
Known function of marginal cost:

$$\widehat{c}_i = (m_i^C + m^O) = \left(m_i^C + \frac{\alpha}{1-\alpha} \mathbb{E}(m^C) \right) \tag{4}$$

where m_i^C is product-specific marginal cost, m^O is non-coffee cost,

- 1 kg of soluble coffee = 2.6 kg of green coffee beans.
- 1 kg of roasted coffee = 1.19 kg of green coffee beans.
- α is the proportion of non-coffee component in total costs ($\alpha \in [0.3, 0.5]$).

Large Cost Shocks due to the Price of Coffee Beans



Profits of the downstream supermarket D

- If a coffee brand is not available, consumers substitute amongst available brands.
- Denote by $\widehat{p}_i^r$ and $\widehat{Q}_i$ the optimal price and demand when U's products are not available.

Therefore:

$$\pi^D - \pi^D(na) = \sum_{i \in \mathcal{D}} (p_i^r - p_i^w) Q_i - \sum_{i \in \{\mathcal{D} \cap \mathcal{U}^C\}} (\widehat{p}_i^r - p_i^w) \widehat{Q}_i \qquad (5)$$

Need to estimate counterfactual demand, $\widehat{Q}_i$, and counterfactual prices, $\widehat{p}_i^r$.

BLP Structural Demand to compute counterfactuals

- Structural demand to compute consumers substitution and pricing within the supermarket when one brand is not available.
- Counterfactual prices, $\widehat{p}_j^r$, using FOC of Bertrand Differentiated Products using the restricted choice set.
- Counterfactual demands, $\widehat{Q}_j$, evaluate demand system using counterfactual prices and restricted choice set.

Yearly Negotiation of Allowances

- Yearly Negotiation: Conditions for discount, splitting promotional activities, due dates for payments, new-store fee, etc. (basically fixed costs over the year, so called "allowances")
- We use the values obtained in informal conversations with insiders. They state that Nestle paid 9.5% of their annual revenues while the non Nestle producers paid 11%.

Estimated Markups of Coffee Producers: $\left(\frac{p_i^w - \widehat{c}_i}{p_i^w}\right)$

	EDLP		HL	
	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Markups of Nestle in Instant Coffee				
Weighted Av.	54.1	45.9	52.5	44.2
Std Dev	11.1	12.7	12.2	14.3
Markups of Non-Nestle in Instant Coffee				
Weighted Av.	35.3	24.4	34.1	22.9
Std Dev	12.0	13.1	17.3	19.1
Markups of Non-Nestle Manufacturers in Ground Coffee				
Weighted Av.	57.0	48.1	55.9	46.8
Std Dev	5.8	7.0	7.1	8.4

Retail Pricing: Actual Markups of Supermarkets: $\left(\frac{p_i^r - p_i^w}{p_i^r}\right)$

Nestle Instant Coffee

	EDLP	HL
Weighted Av.	7.2	9.4
Std Dev	4.6	5.6

Non-Nestle Instant Coffee

	EDLP	HL
Weighted Av.	11.6	14.7
Std Dev	5.4	11.3

Non-Nestle Ground Coffee

	EDLP	HL
Weighted Av.	10.0	14.1
Std Dev	8.3	10.3

Bargaining Parameter Estimates: $\widehat{\lambda}_{(U,D)}$

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

	EDLP-Nestle	EDLP-Non N.	HL-Nestle	HL-Non N.
Lower Bound	0.33	0.49	0.33	0.55
Upper Bound	0.38	0.69	0.38	0.78

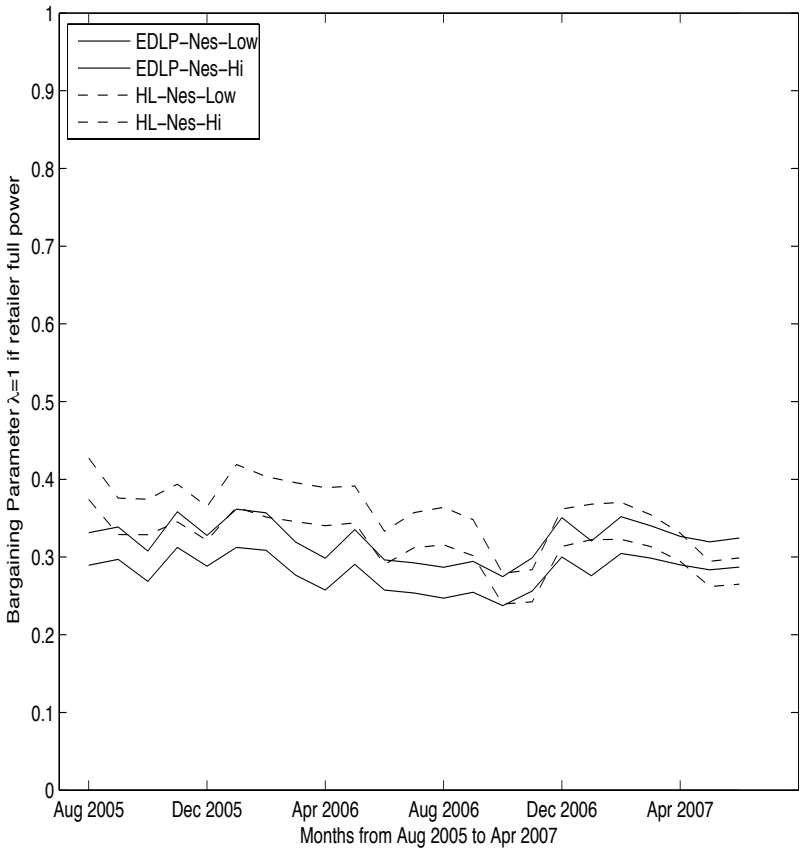
$\widehat{\lambda}_{(U,D)}$ considering No Consumer Substitution

	EDLP-Nestle	EDLP-Non N.	HL-Nestle	HL-Non N.
Lower Bound	0.29	0.46	0.32	0.47
Upper Bound	0.33	0.58	0.36	0.56

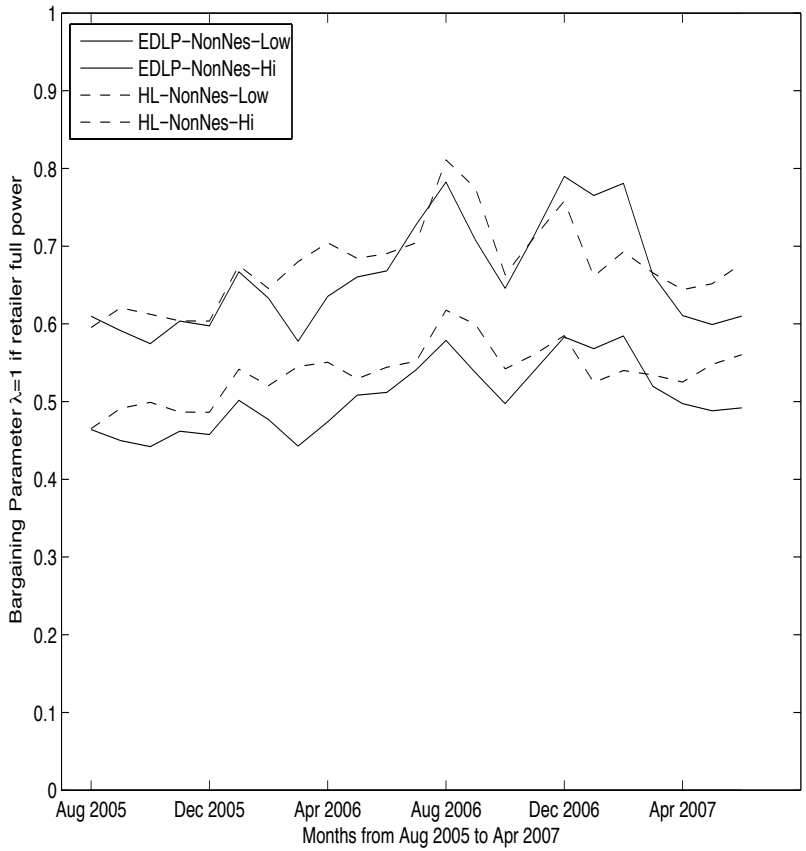
- Strikingly, non Nestle producers obtain a sizable share of the profits, despite their tiny market shares.

Evolution over time of Bargaining Parameter for Instant Coffee ($\lambda = 1 \Leftrightarrow$ full power for the supermarket)

Retail Barg. with Nestle



Retail Barg. with non-Nestle



Risk Sharing and Pass-Through Analysis

- The largest source of uncertainty is the international price of green coffee beans.
- Who bears the risk?

Wholesale Pass-Through

Our reduced form approach:

$$\log(WP_{jt}) = \varphi_0 \log(IP_t) + \varphi_1 \log(NER_t) + \varphi_2 D_j + \varepsilon_{jt}$$

where IP represents the international price of green coffee beans and NER the nominal exchange rate, time invariant dummies, D_j (decaf, ground, inst, flavored and bean).

- $\varphi_0 = 1$, the supermarket bears all the risk.
- $\varphi_0 = 0$, the producer bears all the risk.

Wholesale Price Regressions at EDLP

Nestle-EDLP (Sample Size 973)

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

non Nestle-EDLP (Sample Size 1,158)

	1	2	3-Weight	4-Weight
log(Int Price)	0.11 (0.05)	0.12 (0.05)	0.13 (0.01)	0.11 (0.01)
log(NER)	- 0.22 (0.11)		0.61 (0.04)	

Wholesale Price Regressions at HL

Nestle-HL (Sample Size 1,121)

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

non Nestle-HL(Sample Size 1,897)

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

Retail Pass-Through

Our reduced form approach:

$$\log(RP_{jt}) = \phi_0 \log(WP_{jt}) + \phi_1 \log(IP_t) + \phi_2 \log(NER_t) + \phi_3 D_{jt} + \varepsilon_{jt}$$

- $\phi_0 = 1$, the supermarket are neutral pass-through intermediaries.
- $\phi_0 = 0$, the supermarket absorbs the fluctuations.

Retail Pass-through Results

- Retail Pass-though at EDLP Supermarket: 70 percent in Nestle products, 80 percent in Non Nestle products.
- Retail Pass-though at HL Supermarket: 40 percent in general. When weighting by quantity, Nestle coefficient falls by 10 percent and Non Nestle increases by 10 percent.

Final Remarks

- Using novel data on wholesale prices we explore two dimensions of bargaining power.
- Even small manufacturers are doing OK in the profit-sharing dimension.
- Implications for the role of brand loyalty and market size.
- Upstream manufacturers are absorbing most of the shocks in the risk-sharing dimension.
- Implications for the role of Risk-aversion and retailer's pricing strategies.