Buyer Alliances in Vertically Related Markets

Hugo Molina

KU Leuven

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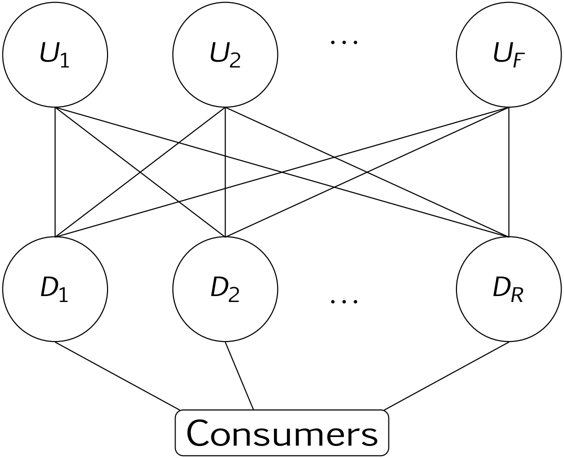
Definition

Figure 1: Buyer alliance in a vertical market



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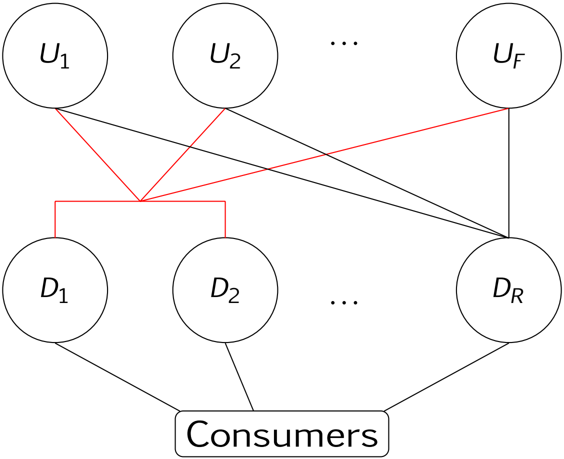

Buyer alliances in practice

- **Alliances** formed by buyers to deal with their suppliers is a **widespread phenomenon** in many industries:
  - **Pharmaceutical industries:** e.g., Numark in the UK, Giphar in France;
  - **Health care sector:** group purchasing organizations (GPOs);
  - **Retail food industries.**

- Antitrust concerns of buyer alliances: **strong presumption of legality** (Carstensen, 2010, Wm. & Mary Bus. L. Rev.).

- Galbraith (1952, 1954): **Countervailing buyer power.**
  No market power effect unlike downstream concentration.

- Do final consumers benefit from buyer alliances?
  How do they affect manufacturers and industry profits?

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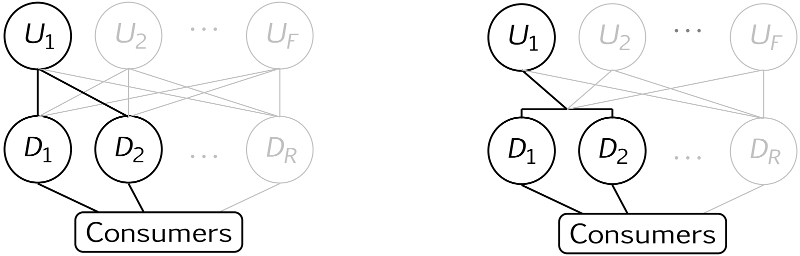
Contributions

Figure 2: Without Alliance

Figure 3: With Alliance



- Shed light on **3 economic forces** generated by buyer alliances:
  - **Status quo effect** (Caprice and Rey, 2015, EJ):
    Deteriorate manufacturers' status quo payoffs in negotiations.
  - **Nondiscrimination effect** (O'Brien, 2014, RAND):
    Impact concessions costs of firms to the detriment of retailers.

  Harsanyi (1977)'s joint-bargaining paradox?
  - **Bargaining ability effect:** Grennan (2013, AER; 2014, MS), Lewis and Pflum (2015, AEJ: Econ. Policy), Grennan and Swanson (2019, JPE).

  The global effect of buyer alliances is an empirical question!

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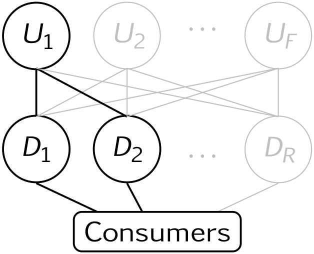

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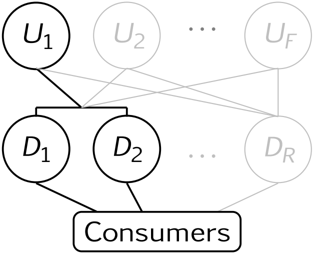

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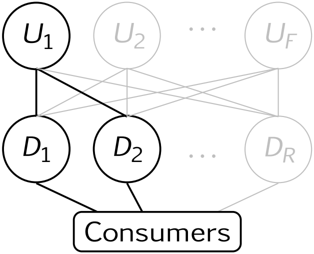

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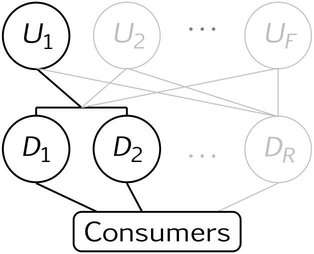

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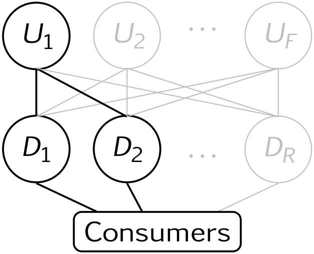

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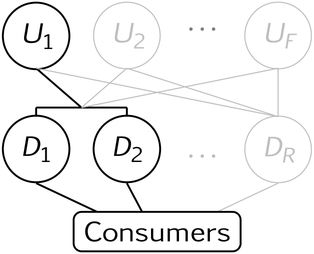

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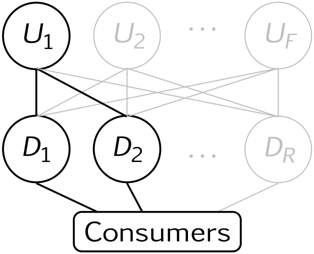

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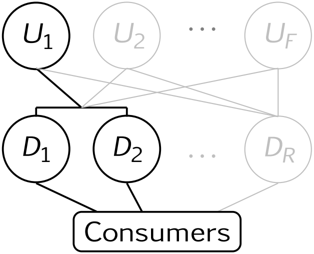

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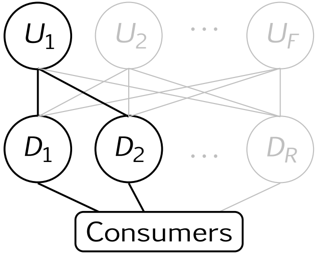

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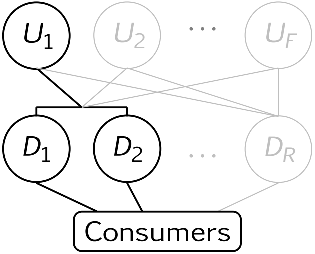

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Contributions

- Use a structural model of demand and supply to estimate the bargaining power of firms **before and after the formation of 3 buyer alliances** that occured on the French bottled water industry in 2014.
- Perform **counterfactual scenarios** to gain further insights on the economic forces generated by buyer alliances.

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Relation to literature

- **Buyer power in vertically related markets.**
  - **Retail concentration**: Dobson and Waterson (1997, EJ), Iozzi and Valletti (2014, AEJ: micro), Gaudin (2017, EJ).
  - **Buyer Alliances**: Sorensen (2003, J Ind Econ), Inderst and Shaffer (2007, EJ), Ellison and Snyder (2010, J Ind Econ), Dana (2012, GEB), Caprice and Rey (2015, EJ).

- **Structural models of buyer-seller bargaining (in a given network).** Crawford and Yurukoglu (2012, AER), Grennan (2013, AER), Lewis and Pflum (2015, AEJ: Econ Policy), Gowrisankaran, Nevo and Town (2015, AER), Ho and Lee (2017, ECMTA).

Outline

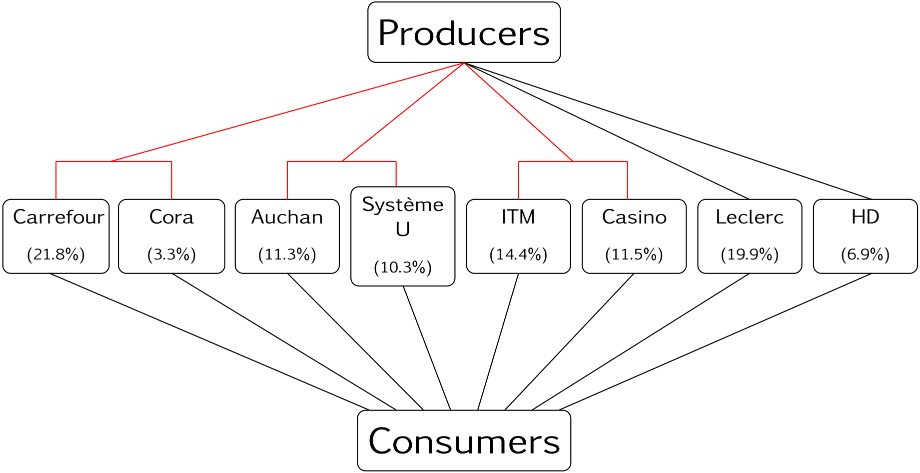
1. Buyer alliances background & Data

2. Demand model
   - Multinomial logit model
   - Identification and estimation of consumer demand
   - Demand results

3. Supply model
   - Stage 2: Downstream price competition
   - Stage 1: Manufacturer-retailer bargaining
   - Identification and estimation of bargaining stage
   - Supply results

4. Counterfactuals

Buyer alliances in the French food retail sector



Market shares in parenthesis (source: Autorité de la concurrence, 2015).

In 2014, three buyer alliances have been formed to negotiate wholesale prices of national brands (excluding fresh products and private labels)

French bottled water market: Micro data

- I use **household-level scanner data on bottled water purchases** (550,059 purchases) in France collected by KANTAR WorldPanel over the year 2013 and 2015 (from March to December).
- I consider purchases of bottled water at **8 retailers**: Carrefour, Leclerc, ITM, Auchan, Systeme U, Casino, Cora, and an aggregate of hard discounters.
- I select the **11 biggest national brands** according to the number of purchases in the sample plus **all private labels** (store brands).
- **Market definition:** All purchases of bottled water for home consumption in France within a month (20 markets).
- I define a product as a **brand-retailer combination:** 111 differentiated products.

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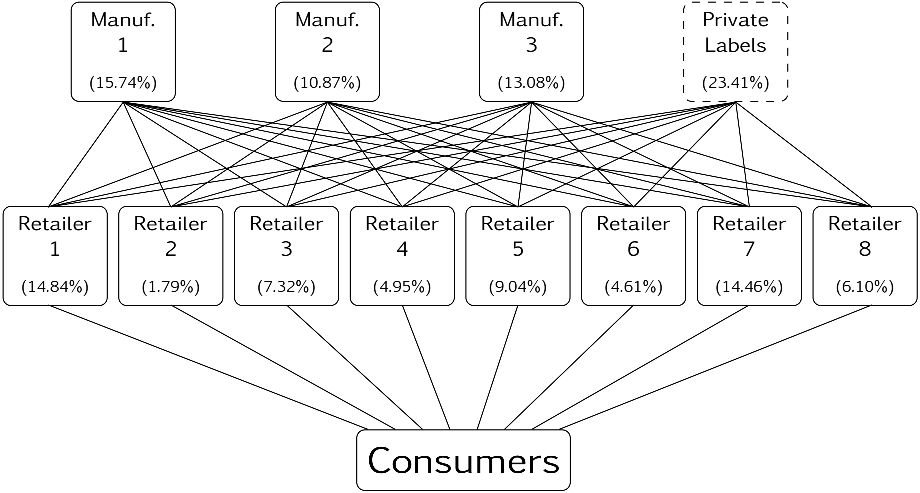
Table 1: Descriptive statistics by firms (pre-alliances)

	Market shares (%)		Retail prices (€/liter)	
	mean	s.d.	mean	s.d.
Manufacturers				
Manufacturer 1	15.74	1.07	0.52	0.02
Manufacturer 2	10.87	0.42	0.45	0.02
Manufacturer 3	13.08	0.76	0.15	0.00
Private labels	23.41	0.53	0.22	0.00
Retailers				
Retailer 1	14.84	0.37	0.34	0.01
Retailer 2	1.79	0.16	0.33	0.02
Retailer 3	7.32	0.42	0.33	0.01
Retailer 4	4.95	0.21	0.37	0.01
Retailer 5	9.04	0.81	0.33	0.01
Retailer 6	4.61	0.19	0.36	0.01
Retailer 7	14.46	0.65	0.30	0.01
Retailer 8	6.10	0.09	0.19	0.01
Outside good	37.09	1.41		

Notes: Standard deviation refers to variation across markets for the year 2013 (pre-alliances).

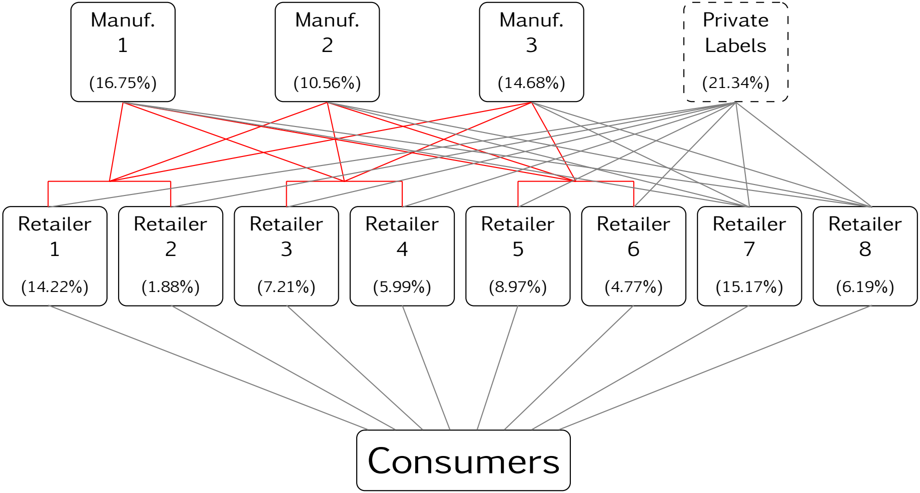
Brands

Market structure in 2013 (pre-alliances)



Notes: Market shares in parenthesis.

Market structure in 2015 (post-alliances)



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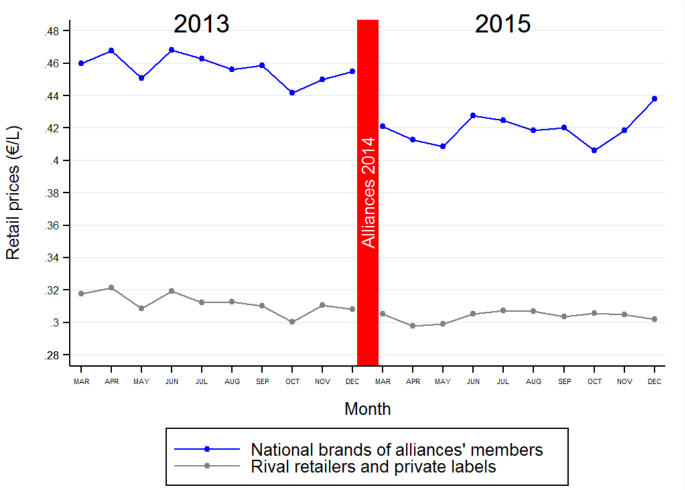
Descriptive retail price analysis

Figure 4: Average retail price trend



Weighted | Log | Alternative

Descriptive retail price analysis

In line with the literature on retrospective merger analysis (e.g., Ashenfelter and Hosken, 2010, JLawEcon):

$$\log(p_{j,t}) = \beta_1 \mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{alliance}\}_{j,t} + \beta_2 \mathbb{1}\{\text{post-alliances}\}_t + \beta_j + \beta_{\text{month}(t)} + u_{j,t}$$

Table 2: Changes in retail prices

Parameters	Value	S.E.	Δ retail price	CI
β_1	–0.056*	0.008	-5.40%	[-6.88% ; -3.92%]
β_2	–0.026*	0.006		
β_j (not shown)				
$\beta_{\text{month}(t)}$ (not shown)				
R^2 adjust.	0.994			
Nb. of observations	2,192			

Notes: OLS estimates. * indicates significance at the 5% level. Heteroskedasticity-robust standard errors. 95% confidence intervals computed using the delta method.

Price | Common trend | Weight

Outline

Multinomial logit model

- Each consumer in the sample chooses among $J_t + 1$ alternatives indexed from $j \in \{0, \ldots, J_t\} = \mathcal{J}_t$ at each shopping trip.

- The utility that consumer i obtains from purchasing product $j \in \mathcal{J}_t \setminus \{0\}$ in market t is specified as follows:

$$U_{i,j,t} = \beta_0 + \beta_{b(j)} + \beta_{r(j)} + \beta_t + \phi x_{\text{spark}(j)} + \psi_i x_{\text{miner}(j)} - \alpha_i p_{j,t} + \xi_{j,t} + e_{i,j,t}$$

where $\psi_i = \psi + \psi_{g(\text{age}_i)}$ and $\alpha_i = \alpha + \alpha_{g(y_i)}$.

- Outside good: $U_{i,0,t} = e_{i,0,t}$.

- $e_{i,j,t}$ is i.i.d. from the standard Gumbel distribution. The probability that consumer i selects product $j \in \mathcal{J}_t$ in market t is:

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Identification and estimation of consumer demand

Retail price endogeneity: 2-step procedure of Berry, Levinsohn and Pakes (2004, JPE), also called BLP-micro.

1. **GMM with a nested fixed point algorithm:** Moments
   Define $\delta_{j,t} = \beta_0 + \beta_{b(j)} + \beta_{r(j)} + \beta_t + \phi x_{\text{spark}(j)} + \psi x_{\text{miner}(j)} - \alpha p_{j,t} + \xi_{j,t}$.
   Estimate $\delta = (\delta_{1,1}, \ldots, \delta_{J,T})^\top$ and $\theta_2^d = (\psi_2, \psi_3, \alpha_2, \alpha_3, \alpha_4)^\top$ by GMM:

$$\min_{\theta_2^d} \mathbf{g}^d(\delta(\theta_2^d), \theta_2^d)^\top A^{-1} \mathbf{g}^d(\delta(\theta_2^d), \theta_2^d)$$

   where $\mathbf{g}^{d,(l)} = \frac{1}{I} \sum_{t=1}^{T} \sum_{i=1}^{I_t} \sum_{j=1}^{J_t} \left(\mathbb{1}_{i,j,t} - s_{i,j,t}(\delta_t, \theta_2^d) \right) X_{j,t}^{(l)} D_i$ and δ is "concentrated out" of the objective function (Berry, Levinsohn and Pakes, 1995, ECMTA).

2. **TSLS:** $\delta_{j,t}(\hat{\theta}_2^d) = \beta_0 + \beta_{b(j)} + \beta_{r(j)} + \beta_t + \phi x_{\text{spark}(j)} + \psi x_{\text{miner}(j)} - \alpha p_{j,t} + \xi_{j,t}$
   2 instrumental variables $\mathbf{Z}^d$ that shift supply but not demand for bottled water:
   - **BLP-type:** number of products sold by rival retailers (shift markup).
   - **Exogenous shifter of the competitive environment** (Berry and Haile, 2014, ECMTA): $\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{alliance}\}_{j,t}$ (see also Miller and Weinberg, 2017, ECMTA).

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   Estimate $\boldsymbol{\delta} = (\delta_{1,1}, \dots, \delta_{J,T})^\top$ and $\boldsymbol{\theta}_2^d = (\psi_2, \psi_3, \alpha_2, \alpha_3, \alpha_4)^\top$ by GMM:

   $$\min_{\boldsymbol{\theta}_2^d} \mathbf{g}^d(\boldsymbol{\delta}(\boldsymbol{\theta}_2^d), \boldsymbol{\theta}_2^d)^\top \mathbf{A}^{-1} \mathbf{g}^d(\boldsymbol{\delta}(\boldsymbol{\theta}_2^d), \boldsymbol{\theta}_2^d)$$

   where $\mathbf{g}^{d,(l)} = \frac{1}{I} \sum_{t=1}^{T} \sum_{i=1}^{I_t} \sum_{j=1}^{J_t} \left(\mathbb{1}_{i,j,t} - s_{i,j,t}(\boldsymbol{\delta}_t, \boldsymbol{\theta}_2^d) \right) X_{j,t}^{(l)} D_i$ and $\boldsymbol{\delta}$ is "concentrated out" of the objective function (Berry, Levinsohn and Pakes, 1995, ECMTA).

2. **TSLS:** $\delta_{j,t}(\hat{\boldsymbol{\theta}}_2^d) = \beta_0 + \beta_{b(j)} + \beta_{r(j)} + \beta_t + \phi x_{\text{spark}(j)} + \psi x_{\text{miner}(j)} - \alpha p_{j,t} + \xi_{j,t}$
   2 instrumental variables $\mathbf{Z}^d$ that shift supply but not demand for bottled water:
   - **BLP-type:** number of products sold by rival retailers (shift markup).
   - **Exogenous shifter of the competitive environment** (Berry and Haile, 2014, ECMTA): $\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{alliance}\}_{j,t}$ (see also Miller and Weinberg, 2017, ECMTA).

Identification and estimation of consumer demand

Retail price endogeneity: 2-step procedure of Berry, Levinsohn and Pakes (2004, JPE), also called BLP-micro.

1. **GMM with a nested fixed point algorithm:** Moments

   Define $\delta_{j,t} = \beta_0 + \beta_{b(j)} + \beta_{r(j)} + \beta_t + \phi x_{\text{spark}(j)} + \psi x_{\text{miner}(j)} - \alpha p_{j,t} + \xi_{j,t}$.

   Estimate $\boldsymbol{\delta} = (\delta_{1,1}, \ldots, \delta_{J,T})^\top$ and $\boldsymbol{\theta}_2^d = (\psi_2, \psi_3, \alpha_2, \alpha_3, \alpha_4)^\top$ by GMM:

$$\min_{\boldsymbol{\theta}_2^d} \mathbf{g}^d(\boldsymbol{\delta}(\boldsymbol{\theta}_2^d), \boldsymbol{\theta}_2^d)^\top \mathbf{A}^{-1} \mathbf{g}^d(\boldsymbol{\delta}(\boldsymbol{\theta}_2^d), \boldsymbol{\theta}_2^d)$$

   where $\mathbf{g}^{d,(l)} = \frac{1}{I} \sum_{t=1}^{T} \sum_{i=1}^{I_t} \sum_{j=1}^{J_t} \left(\mathbb{1}_{i,j,t} - \mathcal{s}_{i,j,t}(\boldsymbol{\delta}_t, \boldsymbol{\theta}_2^d) \right) X_{j,t}^{(l)} D_i$ and $\boldsymbol{\delta}$ is "concentrated out" of the objective function (Berry, Levinsohn and Pakes, 1995, ECMTA).

2. **TSLS:** $\delta_{j,t}(\hat{\boldsymbol{\theta}}_2^d) = \beta_0 + \beta_{b(j)} + \beta_{r(j)} + \beta_t + \phi x_{\text{spark}(j)} + \psi x_{\text{miner}(j)} - \alpha p_{j,t} + \xi_{j,t}$

   2 instrumental variables $\mathbf{Z}^d$ that shift supply but not demand for bottled water:
   - **BLP-type**: number of products sold by rival retailers (shift markup).
   - **Exogenous shifter of the competitive environment** (Berry and Haile, 2014, ECMTA): $\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{alliance}\}_{j,t}$ (see also Miller and Weinberg, 2017, ECMTA).

Demand results

Table 3: Estimates of consumer demand

(a) Preference heterogeneity

Parameters (θ_2^d)	Value	S.E.
α_2: $y_i \in [900; 1,899[$	–0.09*	0.02
α_3: $y_i \in [1,900; 4,449[$	–0.21*	0.01
α_4: $y_i > 4,449$	–0.26*	0.02
ψ_2: $\text{age}_i \in [40; 60]$	0.39*	0.01
ψ_3: $\text{age}_i > 60$	0.70*	0.01
Nb. of observations	550,059	

Notes: GMM estimates. * indicates significance at the 5% level. Heteroskedasticity-robust standard errors.

(b) Mean preferences

Parameters (θ_1^d)	Value	S.E.
β_0	–2.48*	0.50
α (retail price)	15.37*	3.12
ψ (mineral)	0.64*	0.23
ϕ (sparkling)	–0.23	0.20
$\beta_{b(j)}$ (not shown)		
$\beta_{r(j)}$ (not shown)		
β_t (not shown)		
F_{eff}	20.73	
Nb. of observations	2,192	

Notes: TSLS estimates. * indicates significance at the 5% level. Heteroskedasticity-robust standard errors uncorrected for the sampling error in market shares to estimate δ. F_{eff} indicates the robust F-stat of Montiel Olea and Pflueger (2013, JBES).

1st stage

Elasticity of demand

Table 4: Estimates of own-price elasticity of demand

Types of water	Value
Total	-4.66
Still spring water	-2.24
Sparkling spring water	-3.73
Still mineral water	-5.34
Sparkling mineral water	-7.72

Notes: Average own-price elasticity of products are calculated using quantity weights.

Results for spring water products and mineral water products are in line with Bonnet and Dubois (2015) who find respectively -3.09 and -6.70. Density

Outline

1. Buyer alliances background & Data
2. Demand model
   - Multinomial logit model
   - Identification and estimation of consumer demand
   - Demand results
3. Supply model
   - Stage 2: Downstream price competition
   - Stage 1: Manufacturer-retailer bargaining
   - Identification and estimation of bargaining stage
   - Supply results
4. Counterfactuals

Bilateral oligopoly setting

- **Timing and information:**
  - **Stage 1**: Manufacturers and retailers engage **simultaneously** and **secretly** in bilateral bargains to determine wholesale prices of each product $j \in \mathcal{J}_t \backslash \{0\}$.
  - **Stage 2**: Retailers compete in prices on the downstream market with **interim unobservability** (Rey and Vergé, 2004, RAND).

  I assume **complete information** about the cost of production and distribution of each product $j \in \mathcal{J}_t \backslash \{0\}$.

- **Bargaining protocol:** I use the "Nash-in-Nash" bargaining solution (Horn and Wolinsky, 1988, RAND) to determine the division of surplus between up- and downstream firms. Details

Stage 2: Downstream price competition

- In each market t, retail prices are determined in a **pure-strategy Nash equilibrium.** Retailer r solves the following maximization problem

$$\max_{\{p_{j,t}\}_{j\in\mathcal{J}_{r,t}}} \pi_{r,t} \equiv \sum_{j\in\mathcal{J}_{r,t}} \left(p_{j,t} - w_{j,t} - c_{j,t}\right) M_t\, s_{j,t}(\mathbf{p}_{r,t}, \mathbf{p}^*_{-r,t}; \delta_t, \theta_2^d)$$

- The first-order condition w.r.t $k \in \mathcal{J}_{r,t}$

$$s_{k,t}(\mathbf{p}_{r,t}, \mathbf{p}^*_{-r,t}; \delta_t, \theta_2^d) + \sum_{j\in\mathcal{J}_{r,t}} \left(p_{j,t} - w_{j,t} - c_{j,t}\right) \frac{\partial s_{j,t}}{\partial p_{k,t}}(\mathbf{p}_{r,t}, \mathbf{p}^*_{-r,t}; \delta_t, \theta_2^d) = 0$$

- $\forall k \in \mathcal{J}_{r,t}$, I obtain the vector of **price-cost margins of retailer r** in market t

$$\gamma^*_{r,t} \equiv \mathbf{p}^*_{r,t} - \mathbf{w}^*_{r,t} - \mathbf{c}_{r,t} = -\left(\mathbf{I}_r \mathbf{S}_{\mathbf{p}_t} \mathbf{I}_r\right)^+ \mathbf{I}_r\, s_t$$

and **retailer r's marginal costs:** $\mathbf{w}^*_{r,t} + \mathbf{c}_{r,t} = \mathbf{p}^*_{r,t} - \gamma^*_{r,t}$.

Stage 1: Manufacturer-retailer bargaining

Pre-alliances:

- Negotiation between manufacturer f and retailer r over $w_{j,t}$:

$$\max_{w_{j,t}} \left(\pi_{f,t} - d_{f,t}^{-j}\right)^{\lambda_{f,r}^{\text{pre}}} \left(\pi_{r,t} - d_{r,t}^{-j}\right)^{1-\lambda_{f,r}^{\text{pre}}}$$ Details

- First-order condition and sources of bargaining power:

$$\underbrace{\underbrace{\left(1-\lambda_{f,r}^{\text{pre}}\right)}_{\text{r's bargaining weight}} \underbrace{\left(\pi_{f,t} - d_{f,t}^{-j}\right)}_{\text{f's gains from trade}} \underbrace{\frac{\partial \pi_{r,t}}{\partial w_{j,t}}}_{\text{r's concession cost}}}_{\text{r's bargaining power}} + \underbrace{\underbrace{\lambda_{f,r}^{\text{pre}}}_{\text{f's bargaining weight}} \underbrace{\left(\pi_{r,t} - d_{r,t}^{-j}\right)}_{\text{r's gains from trade}} \underbrace{\frac{\partial \pi_{f,t}}{\partial w_{j,t}}}_{\text{f's concession cost}}}_{\text{f's bargaining power}} = 0$$

Post-alliances:

- Negotiation between manufacturer f and retailers' alliance $a(j)$ over $w_{a(j),b(j),t}$:

$$\max_{w_{a(j),b(j),t}} \left(\pi_{f,t} - d_{f,t}^{-a(j),b(j)}\right)^{1-\lambda_{f,a(j)}^{\text{post}}} \left(\pi_{a(j),t} - d_{a(j),t}^{-a(j),b(j)}\right)^{\lambda_{f,a(j)}^{\text{post}}}$$

- First-order condition:

$$\left(1-\lambda_{f,a(j)}^{\text{post}}\right)\left(\pi_{f,t} - d_{f,t}^{-a(j),b(j)}\right) \frac{\partial \pi_{a(j),t}}{\partial w_{a(j),b(j),t}} + \lambda_{f,a(j)}^{\text{post}}\left(\pi_{a(j),t} - d_{a(j),t}^{-a(j),b(j)}\right) \frac{\partial \pi_{f,t}}{\partial w_{a(j),b(j),t}} = 0$$

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Pre-alliances:

- Negotiation between manufacturer f and retailer r over $w_{j,t}$:

$$\max_{w_{j,t}} \left(\pi_{f,t} - d_{f,t}^{-j}\right)^{\lambda_{f,r}^{\text{pre}}} \left(\pi_{r,t} - d_{r,t}^{-j}\right)^{1-\lambda_{f,r}^{\text{pre}}}$$

Details

- First-order condition and sources of bargaining power:

$$\underbrace{\underbrace{\left(1-\lambda_{f,r}^{\text{pre}}\right)}_{r\text{'s bargaining weight}} \underbrace{\left(\pi_{f,t} - d_{f,t}^{-j}\right)}_{f\text{'s gains from trade}} \underbrace{\frac{\partial \pi_{r,t}}{\partial w_{j,t}}}_{r\text{'s concession cost}}}_{r\text{'s bargaining power}} + \underbrace{\underbrace{\lambda_{f,r}^{\text{pre}}}_{f\text{'s bargaining weight}} \underbrace{\left(\pi_{r,t} - d_{r,t}^{-j}\right)}_{r\text{'s gains from trade}} \underbrace{\frac{\partial \pi_{f,t}}{\partial w_{j,t}}}_{f\text{'s concession cost}}}_{f\text{'s bargaining power}} = 0$$

Post-alliances:

- Negotiation between manufacturer f and retailers' alliance $a(j)$ over $w_{a(j),b(j),t}$:

$$\max_{w_{a(j),b(j),t}} \left(\pi_{f,t} - d_{f,t}^{-a(j),b(j)}\right)^{1-\lambda_{f,a(j)}^{\text{post}}} \left(\pi_{a(j),t} - d_{a(j),t}^{-a(j),b(j)}\right)^{\lambda_{f,a(j)}^{\text{post}}}$$

Details

- First-order condition:

$$\left(1-\lambda_{f,a(j)}^{\text{post}}\right)\left(\pi_{f,t} - d_{f,t}^{-a(j),b(j)}\right)\frac{\partial \pi_{a(j),t}}{\partial w_{a(j),b(j),t}} + \lambda_{f,a(j)}^{\text{post}}\left(\pi_{a(j),t} - d_{a(j),t}^{-a(j),b(j)}\right)\frac{\partial \pi_{f,t}}{\partial w_{a(j),b(j),t}} = 0$$

Stage 1: Manufacturer-retailer bargaining

Pre-alliances:

- Negotiation between manufacturer f and retailer r over $w_{j,t}$:

$$\max_{w_{j,t}} \left(\pi_{f,t} - d_{f,t}^{-j}\right)^{\lambda_{f,r}^{\text{pre}}} \left(\pi_{r,t} - d_{r,t}^{-j}\right)^{1-\lambda_{f,r}^{\text{pre}}}$$ Details

- First-order condition and sources of bargaining power:

$$\underbrace{\underbrace{\left(1-\lambda_{f,r}^{\text{pre}}\right)}_{\text{r's bargaining weight}} \underbrace{\left(\pi_{f,t} - d_{f,t}^{-j}\right)}_{\text{f's gains from trade}} \underbrace{\frac{\partial \pi_{r,t}}{\partial w_{j,t}}}_{\text{r's concession cost}}}_{\text{r's bargaining power}} + \underbrace{\underbrace{\lambda_{f,r}^{\text{pre}}}_{\text{f's bargaining weight}} \underbrace{\left(\pi_{r,t} - d_{r,t}^{-j}\right)}_{\text{r's gains from trade}} \underbrace{\frac{\partial \pi_{f,t}}{\partial w_{j,t}}}_{\text{f's concession cost}}}_{\text{f's bargaining power}} = 0$$

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- Negotiation between manufacturer f and retailers' alliance $a(j)$ over $w_{a(j),b(j),t}$:

$$\max_{w_{a(j),b(j),t}} \left(\pi_{f,t} - d_{f,t}^{-a(j),b(j)}\right)^{1-\lambda_{f,a(j)}^{\text{post}}} \left(\pi_{a(j),t} - d_{a(j),t}^{-a(j),b(j)}\right)^{\lambda_{f,a(j)}^{\text{post}}}$$ Details

- First-order condition:

$$\left(1-\lambda_{f,a(j)}^{\text{post}}\right)\left(\pi_{f,t} - d_{f,t}^{-a(j),b(j)}\right)\frac{\partial \pi_{a(j),t}}{\partial w_{a(j),b(j),t}} + \lambda_{f,a(j)}^{\text{post}}\left(\pi_{a(j),t} - d_{a(j),t}^{-a(j),b(j)}\right)\frac{\partial \pi_{f,t}}{\partial w_{a(j),b(j),t}} = 0$$

Stage 1: Manufacturer-retailer bargaining

- From the first-order conditions of each Nash bargaining problem involving manufacturer f, it is possible to formulate its **price-cost margins** in vector-matrix form Details

$$\mathbf{w}^*_{f,t} - \boldsymbol{\mu}_{f,t} = \Gamma^{\text{pre}}_{f,t}(\boldsymbol{s}_t; \boldsymbol{\lambda}^{\text{pre}}) \times \mathbb{1}\{\text{pre-alliance}\}_t + \Gamma^{\text{post}}_{f,t}(\boldsymbol{s}_t; \boldsymbol{\lambda}^{\text{post}}) \times \mathbb{1}\{\text{post-alliance}\}_t$$

where $\boldsymbol{\lambda}^{\text{pre}}$ and $\boldsymbol{\lambda}^{\text{post}}$ are two J_t-dimensional vectors with $\boldsymbol{\lambda}^{\text{pre}}[j,1] = \lambda^{\text{pre}}_{f,r}$ if $j \in \mathscr{J}_{f,t} \cap \mathscr{J}_{r,t}$ and $\boldsymbol{\lambda}^{\text{post}}[j,1] = \lambda^{\text{post}}_{f,a(j)}$ if $j \in \mathscr{J}_{f,t} \cap \mathscr{J}_{a(j),t}$.

Identification and estimation of bargaining stage

- To estimate λ^{pre} and λ^{post}, exploit the **variation in retailers′ marginal costs** for each product **recovered in stage 2** ($w_{j,t} + c_{j,t} = p_{jt} - \gamma_{j,t}$). Decompose retailers′ marginal costs as follows

$$w_{j,t} + c_{j,t} = \underbrace{(w_{j,t} - \mu_{j,t})}_{\text{upstream market power}} + \underbrace{(c_{j,t} + \mu_{j,t})}_{\text{operational costs}}$$

- $w_{j,t} - \mu_{j,t}$ has an expression implied by the FOC of the "**Nash-in-Nash" bargaining model** (pre- and post-alliances).

- **Total marginal cost specification:**

$$c_{jt} + \mu_{j,t} = \kappa_0 + \kappa_{b(j)} + \kappa_t + \kappa_m x_{miner(j)} + \kappa_s x_{spark(j)} + \omega_{j,t}$$

(e.g., Gowrisankaran, Nevo and Town, 2015, AER)

- **Supply-side equation:**

$$\mathbf{w}_t + \mathbf{c}_t = \boldsymbol{\Gamma}^{pre}(\boldsymbol{\mathcal{s}}_t; \boldsymbol{\lambda}^{pre}) \times \mathbb{1}\{\text{pre-al.}\}_t + \boldsymbol{\Gamma}^{post}(\boldsymbol{\mathcal{s}}_t; \boldsymbol{\lambda}^{post}) \times \mathbb{1}\{\text{post-al.}\}_t + \mathbf{v}_t \boldsymbol{\kappa} + \boldsymbol{\omega}_t$$

Identification and estimation of bargaining stage

- To estimate $\boldsymbol{\lambda}^{\text{pre}}$ and $\boldsymbol{\lambda}^{\text{post}}$, exploit the **variation in retailers' marginal costs** for each product **recovered in stage 2** ($w_{j,t} + c_{j,t} = p_{jt} - \gamma_{j,t}$). Decompose retailers' marginal costs as follows

$$w_{j,t} + c_{j,t} \quad = \quad \underbrace{(w_{j,t} - \mu_{j,t})}_{\text{upstream market power}} \quad + \quad \underbrace{(c_{j,t} + \mu_{j,t})}_{\text{operational costs}}$$

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- To estimate λ^{pre} and λ^{post}, exploit the **variation in retailers' marginal costs** for each product **recovered in stage 2** ($w_{j,t} + c_{j,t} = p_{jt} - \gamma_{j,t}$). Decompose retailers' marginal costs as follows

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Identification and estimation of bargaining stage

- To estimate $\boldsymbol{\lambda}^{pre}$ and $\boldsymbol{\lambda}^{post}$, exploit the **variation in retailers' marginal costs** for each product **recovered in stage 2** ($w_{j,t} + c_{j,t} = p_{jt} - \gamma_{j,t}$). Decompose retailers' marginal costs as follows

$$w_{j,t} + c_{j,t} = \underbrace{(w_{j,t} - \mu_{j,t})}_{\text{upstream market power}} + \underbrace{(c_{j,t} + \mu_{j,t})}_{\text{operational costs}}$$

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$$+ \mathbf{v}_t \boldsymbol{\kappa} + \boldsymbol{\omega}_t$$

Identification and estimation of bargaining stage

$$\mathbf{w}_t + \mathbf{c}_t = \underbrace{\boldsymbol{\Gamma}^{\text{pre}}(\boldsymbol{s}_t;\boldsymbol{\lambda}^{\text{pre}}) \times \mathbb{1}\{\text{pre-al.}\}_t + \boldsymbol{\Gamma}^{\text{post}}(\boldsymbol{s}_t;\boldsymbol{\lambda}^{\text{post}}) \times \mathbb{1}\{\text{post-al.}\}_t}_{\text{upstream market power}} + \underbrace{\mathbf{v}_t\boldsymbol{\kappa} + \boldsymbol{\omega}_t}_{\text{operational costs}}$$

- **Endogeneity problem:** correlation of $s_{j,t}$ with $\omega_{j,t}$.
- **Reduce the number of bargaining parameters** to 6 instead of 24.
  Retailers not in any alliance: $\lambda_{na}^{\text{pre}} = \lambda_{na}^{\text{post}} = \lambda_{na}$ (R7, R8).
  Retailers in an alliance:
  - with high market shares and low retail costs: λ_1^{pre} (R1, R3, R5),
  - with low market shares and high retail costs: λ_2^{pre} (R2, R4, R6),
  - λ_a^{post} for each alliance a (R1-R2, R3-R4, R4-R6).
- **8 instrumental variables** for the endogenous market shares $s_{j,t}$:
  - $\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{alliance}\}_{j,t}$ (Miller and Weinberg, 2017, ECMTA),
  - $\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{no alliance}\}_{j,t}$,
  - nb. of rival products in each bottled water segment (mineral, sparkling),

  interacted with a dummy for each type of retailers list.

Identification and estimation of bargaining stage

$$\mathbf{w}_t + \mathbf{c}_t = \underbrace{\Gamma^{pre}(\mathcal{s}_t;\boldsymbol{\lambda}^{pre}) \times \mathbb{1}\{\text{pre-al.}\}_t + \Gamma^{post}(\mathcal{s}_t;\boldsymbol{\lambda}^{post}) \times \mathbb{1}\{\text{post-al.}\}_t}_{\text{upstream market power}} + \underbrace{\mathbf{v}_t\boldsymbol{\kappa} + \boldsymbol{\omega}_t}_{\text{operational costs}}$$

- **Endogeneity problem**: correlation of $\mathcal{s}_{j,t}$ with $\omega_{j,t}$.
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  - $\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{no alliance}\}_{j,t}$,
  - nb. of rival products in each bottled water segment (mineral, sparkling),

  interacted with a dummy for each type of retailers list.

Identification and estimation of bargaining stage

$$\mathbf{w}_t + \mathbf{c}_t = \underbrace{\Gamma^{pre}(\boldsymbol{s}_t;\boldsymbol{\lambda}^{pre}) \times \mathbb{1}\{\text{pre-al.}\}_t + \Gamma^{post}(\boldsymbol{s}_t;\boldsymbol{\lambda}^{post}) \times \mathbb{1}\{\text{post-al.}\}_t}_{\text{upstream market power}} + \underbrace{\mathbf{v}_t\boldsymbol{\kappa} + \boldsymbol{\omega}_t}_{\text{operational costs}}$$

- **Endogeneity problem:** correlation of $s_{j,t}$ with $\omega_{j,t}$.
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  - $\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{no alliance}\}_{j,t}$,
  - nb. of rival products in each bottled water segment (mineral, sparkling),

  interacted with a dummy for each type of retailers list.

Supply results

Table 5: Bargaining Estimates

Parameter	Value	S.E.	CI
Bargaining parameters			
Manufacturers vs. Retailers 1, 3, 5: λ_1^{pre}	0.541	0.058	[0.428 ; 0.651]
Manufacturers vs. Retailers 2, 4, 6: λ_2^{pre}	0.731	0.061	[0.598 ; 0.833]
Manufacturers vs. Retailers 1, 2: λ_1^{post}	0.242	0.127	[0.076 ; 0.555]
Manufacturers vs. Retailers 3, 4: λ_2^{post}	0.380	0.067	[0.260 ; 0.517]
Manufacturers vs. Retailers 5, 6: λ_3^{post}	0.268	0.067	[0.158 ; 0.417]
Manufacturers vs. Retailers 7, 8: λ_{na}	0.000	0.003	[0 ; 1]
Cost parameters			
κ_0	0.139	0.007	
κ_m (mineral)	0.066	0.005	
κ_s (sparkling)	0.048	0.005	
Brand fixed effect (not shown)			
Market fixed effect (not shown)			
GMM objective function value		14.452	
Nb. of observations		2,192	

Notes: Continuously updated GMM estimates. Heteroskedasticity-robust standard errors uncorrected for the demand estimates. 95% confidence intervals. Weak instru.

Supply results

Table 6: Margins, marginal costs, and surplus division

	Alliance		No Alliance		Total	
	Pre	Post	Pre	Post	Pre	Post
Price-cost margins:						
Retail margins: γ	29.40	30.51	39.28	40.80	32.62	33.81
Upstream margins: Γ	16.87	9.15	0.85	0.53	12.88	7.10
Marginal cost:						
Retail mc: $\mathbf{w}+\mathbf{c}$	0.28	0.25	0.20	0.18	0.25	0.23
Total mc: $\mathbf{c}+\boldsymbol{\mu}$	0.24	0.23	0.19	0.18	0.22	0.21
Division of surplus:						
Retailers' share	62.48	76.74	97.27	98.43	68.86	81.18

Notes: Average price-cost margins in percentage of retail prices and average marginal costs are calculated using quantity weights. Average share captured by retailers in bilateral contracts.

Outline

Counterfactuals

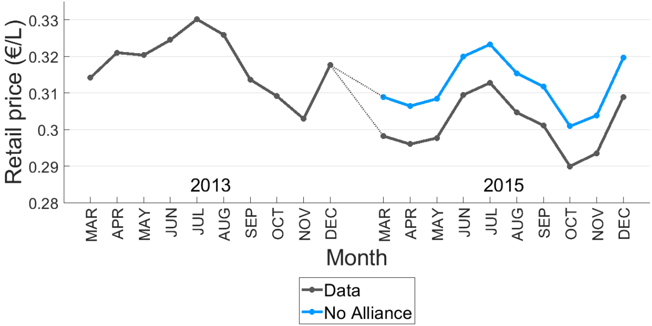
I consider 4 counterfactual scenarios to further analyze the effects of buyer alliances:

- No buyer alliances: go
- Joint-bargaining paradox: go (nondiscrimination vs status quo)
- Status quo effect: go
- Bargaining ability effect: go

Conclusion

Counterfactual 1: No buyer alliances

Figure 5: "No buyer alliances" scenario



Notes: Counterfactual retail prices calculated using quantity weights. DiD Menu

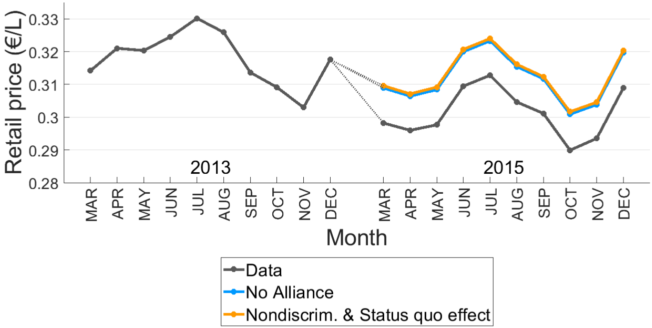
Table 7: Results of the "no buyer alliances" scenario

	Δ Retail price	Δ Margins		Δ Profit		
		Retailers	Manuf.	Retailers	Manuf.	Industry
Total	4.37%	-0.39%	99.10%	-5.46%	57.47%	2.96%

Notes: Percentage changes in retail prices and margins are calculated using quantity weights.

Counterfactual 2: Joint-bargaining paradox (Harsanyi, 1977)

Figure 6: Joint-bargaining paradox



Notes: Counterfactual retail prices calculated using quantity weights. Alliance Menu

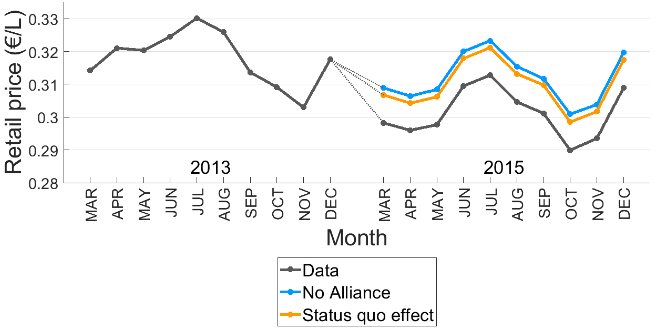
Table 8: Joint-bargaining paradox

	Δ Retail price	Δ Margins		Δ Profit		
		Retailers	Manuf.	Retailers	Manuf.	Industry
Total	0.23%	0.05%	0.86%	-0.04%	-0.47%	-0.13%

Notes: Percentage changes in retail prices and margins with respect to the "no buyer alliance" scenario are calculated using quantity weights.

Counterfactual 3: Status quo effects

Figure 7: Status quo effects



Notes: Counterfactual retail prices calculated using quantity weights Alliance Menu

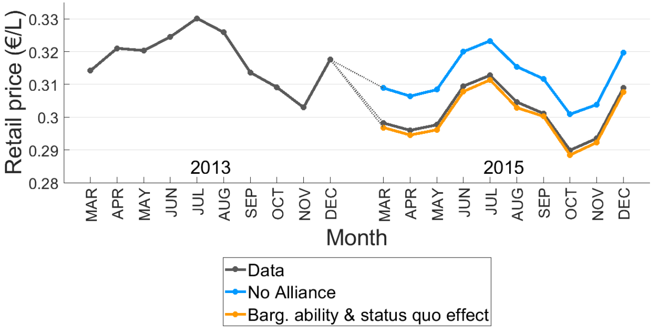
Table 9: Status quo effects

	Δ Retail price	Δ Margins		Δ Profit		
		Retailers	Manuf.	Retailers	Manuf.	Industry
Total	-0.76%	-0.06%	-5.90%	0.96%	-9.22%	-1.12%

Notes: Percentage changes in retail prices and margins with respect to the "no buyer alliance" scenario are calculated using quantity weights.

Counterfactual 4: Bargaining ability effects

Figure 8: Bargaining ability effect



Notes: Counterfactual retail prices calculated using quantity weights. Details Menu

Table 10: Bargaining ability effect

	Δ Retail price	Δ Margins		Δ Profit		
		Retailers	Manuf.	Retailers	Manuf.	Industry
Total	-4.25%	-0.04%	-34.41%	6.45%	-60.75%	-4.55%

Notes: Percentage changes in retail prices and margins with respect to the "no buyer alliance" scenario are calculated using quantity weights.

Concluding remarks

- I study the **economic effects of buyer alliances** formed by retailers to negotiate wholesale prices with manufacturers.
- Using data on the **French bottled water market**, I find evidence that buyer alliances formed in 2014 generate a **price decrease** of:
  - [–6.88%; –3.92%] for the concerned products using a diff-in-diff.
  - –7.97% for the concerned products using a structural model of bargaining.

  The bargaining ability effect plays an important role in this price decrease.
- Although buyer alliances benefit retailers (+5.46%), they generate a drop in manufacturers' profit by more than 50%, thereby **destroying the total industry profit** by 3%.
- Welfare effect: TO BE COMPLETED.

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Autorité de la concurrence (2015):

- ″On 10 September 2014, **Système U gave Auchan a mandate to negotiate the purchase of products sold under national brands** common to the two retailers (around 300), excluding small enterprises and companies providing traditional fresh products (e.g., fruit and vegetables)″.

- ″On 7 November 2014, **Intermarché and Casino entered into a cooperation agreement aimed at negotiating the purchase of some goods under national brands** (excluding retailers′ branded products and traditional fresh products). [...] The two distributors set up a joint undertaking (INCAA) that negotiates exclusively with the suppliers covered by the agreement.″

- ″On 22 December 2014, **Carrefour and Cora in turn entered into a partnership agreement**, providing Cora with access to Carrefour′s listing offices. The cooperation agreement expressly excludes products from the agricultural sector, traditional fresh products and private label products.″

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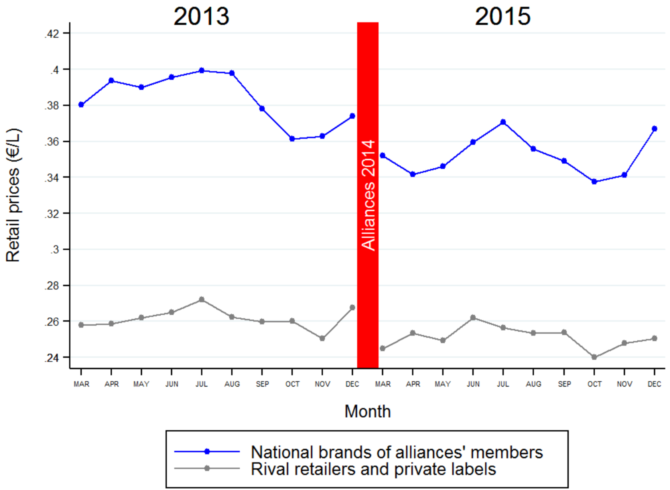
Table 11: Statistics by brands (before buyer alliances)

	Mineral	Sparkling	Market shares (%) mean	Market shares (%) s.d.	Retail prices (€/liter) mean	Retail prices (€/liter) s.d.
Types of water						
Type 1	No	No	25.47	0.92	0.15	0.00
Type 2	No	Yes	0.67	0.06	0.26	0.01
Type 3	Yes	No	20.89	1.13	0.36	0.01
Type 4	Yes	Yes	16.10	1.06	0.52	0.01
National brands						
Brand 1	Yes	Yes	4.49	0.65	0.71	0.03
Brand 2	Yes	No	3.47	0.28	0.36	0.02
Brand 3	Yes	No	3.22	0.30	0.53	0.02
Brand 4	Yes	No	3.36	0.33	0.31	0.02
Brand 5	Yes	Yes	1.50	0.36	0.73	0.04
Brand 6	Yes	No	3.47	0.24	0.41	0.01
Brand 7	Yes	No	2.56	0.35	0.32	0.01
Brand 8	Yes	Yes	2.53	0.18	0.41	0.01
Brand 9	Yes	Yes	2.40	0.28	0.70	0.03
Brand 10	No	No	11.61	0.66	0.13	0.00
Brand 11	Yes	No	1.48	0.15	0.31	0.01
Private labels						
PL 1	No	No	13.88	0.51	0.18	0.00
PL 2	No	Yes	0.67	0.06	0.26	0.01
PL 3	Yes	No	3.54	0.19	0.27	0.01
PL 4	Yes	Yes	5.35	0.26	0.29	0.00

Notes: Standard deviation depicts variation across markets.

back

Figure 9: Average retail price trend



Notes: Average retail price weighted by the number of household purchases in the sample.

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Figure 10: Average (log) retail price trend

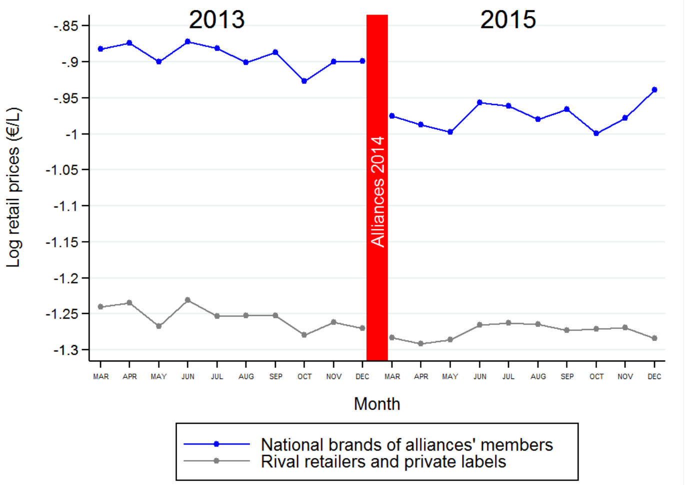

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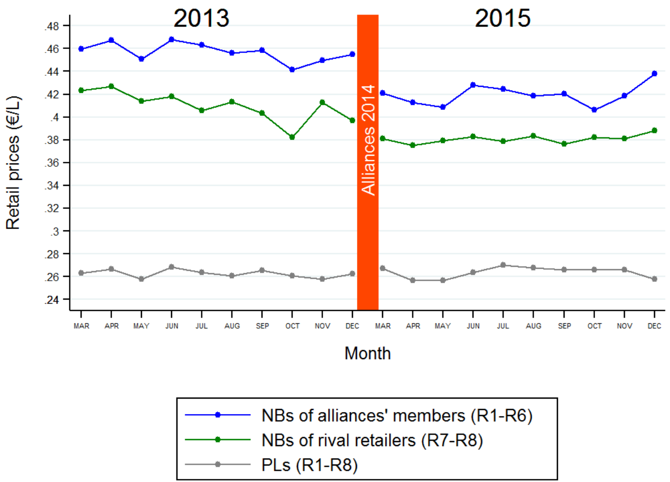
Figure 11: Average retail price trend



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The retail price of product j in market t is constructed as follows:

$$p_{j,t} = \frac{\sum_i \mathbb{1}_{i,j,t} p_{i,j,t} q_{i,j,t}}{\sum_i \mathbb{1}_{i,j,t} q_{i,j,t}}$$

where $\mathbb{1}_{i,j,t}$ is an indicator equal to 1 if consumer i buys product j in market t and $q_{i,j,t}$ stands for the volume bought (in liter).

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$$\log(p_{j,t}) = \beta^a_{\text{month}(t)} \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{alliance}\}_{j,t} + \beta_j + \beta_{\text{month}(t)} + u_{j,t}$$

Table 12: Testing for retail price common trend (pre-alliances)

Variable	Value	S.E.	p-value
β^a_1	–0.013	0.024	0.58
β^a_2	–0.010	0.025	0.68
β^a_3	–0.008	0.024	0.75
β^a_4	–0.012	0.022	0.59
β^a_5	–0.001	0.022	0.96
β^a_6	–0.019	0.023	0.41
β^a_7	–0.010	0.023	0.66
β^a_8	–0.022	0.025	0.37
β^a_9	–0.009	0.022	0.69
β_j (not shown)			
$\beta_{\text{month}(t)}$ (not shown)			
R^2 adjusted		0.995	
Nb. of observations		1,097	

Notes: OLS estimates. * indicates significance at the 5% level. Heteroskedasticity-robust standard errors.

Table 13: Changes in retail prices

Parameters	Value	S.E.	Δ retail price	CI
β_1	–0.038*	0.000	-3.68%	[-3.77% ; -3.59%]
β_2	–0.019*	0.000		
β_j (not shown)				
$\beta_{\text{month}(t)}$ (not shown)				
R^2 adjust.	0.997			
Nb. of observations	2,192			

Notes: OLS estimates with observations weighted by the number of household purchases. * indicates significance at the 5% level. Heteroskedasticity-robust standard errors. 95% confidence intervals computed using the delta method.

back

First set of moments: system of market shares

Match the observed aggregated market shares of products with those predicted by the demand model

$$s_{j,t} - \mathscr{s}_{j,t}(\boldsymbol{\delta}_t, \theta_2^d) = 0 \tag{1}$$

where $\boldsymbol{\delta}_t = (\delta_{1,t}, \ldots, \delta_{J,t})^\top$ is a J_t-dimensional vector. Use the contraction procedure of Berry, Levinsohn and Pakes (1995, ECMTA) to recover $\boldsymbol{\delta}_t$.

Second set of moments: micro-moments

Defined L moments as follows

$$\frac{1}{I}\sum_{t=1}^{T}\sum_{i=1}^{I_t}\sum_{j=1}^{J_t}\Big(\mathbb{1}_{i,j,t} - \mathscr{s}_{i,j,t}(\boldsymbol{\delta}_t, \theta_2^d)\Big) X_{i,j,t}^{d,(l)} = 0$$

back

Table 14: First-stage regression (TSLS)

Variable	Value	S.E.
Nb. products of rival retailers	–0.004	0.004
$\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t}$ $\times \mathbb{1}\{\text{alliance}\}_{j,t}$	–0.025*	0.004
$\beta_{b(j)}$ (not shown)		
$\beta_{r(j)}$ (not shown)		
β_t (not shown)		
F_{eff}	20.73	
R^2 adjusted	0.986	
Nb. of observations	2,192	

Notes: * indicates significance at the 5% level. F_{eff} is the robust F-stat of Montiel Olea and Pflueger (2013, JBES). The critical value for testing that the TSLS bias exceeds 10% of the OLS bias is 6.363.

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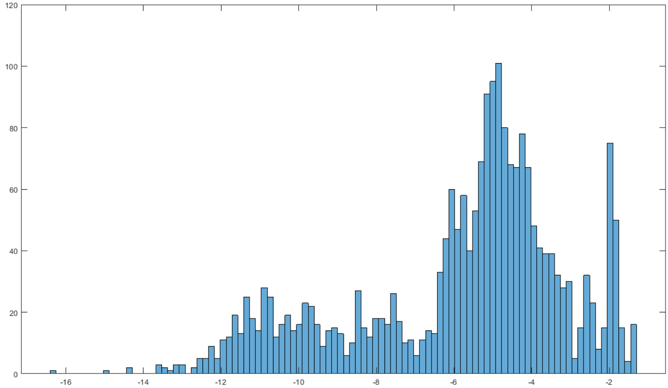
Figure 12: Own-price Elasticity of Demand



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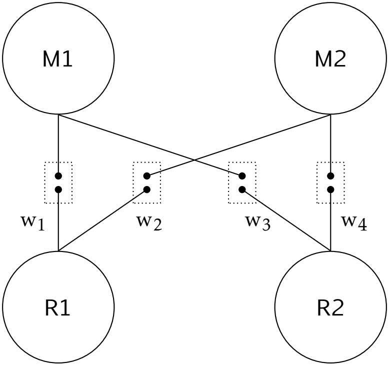
″**Nash-in-Nash″ bargaining solution** (Horn and Wolinsky, 1988, RAND; Collard-Wexler, Gowrisankaran and Lee, 2019, JPE).

Figure 13: Delegated agents model



back

Bilateral bargaining between manufacturer f and retailer r over $w_{j,t}$ (pre-alliances).

- Agreement payoffs (pre-alliances).

$$\pi_{f,t} = \left(w_{j,t} - \mu_{j,t}\right) M_t\, s_{j,t}(\mathbf{p}_{r,t}(w_{j,t}, \mathbf{w}^*_{-j,t}), \mathbf{p}^*_{-r,t}; \delta_t, \theta_2^d) + \sum_{k \in \mathcal{J}_{f,t} \setminus \{j\}} \left(w^*_{k,t} - \mu_{k,t}\right) M_t\, s_{k,t}(\mathbf{p}_{r,t}(w_{j,t}, \mathbf{w}^*_{-j,t}), \mathbf{p}^*_{-r,t}; \delta_t, \theta_2^d)$$

$$\pi_{r,t} = \left(p_{j,t}(w_{j,t}, \mathbf{w}^*_{-j,t}) - w_{j,t} - c_{j,t}\right) M_t\, s_{j,t}(\mathbf{p}_{r,t}(w_{j,t}, \mathbf{w}^*_{-j,t}), \mathbf{p}^*_{-r,t}; \delta_t, \theta_2^d) + \sum_{k \in \mathcal{J}_{r,t} \setminus \{j\}} \left(p_{k,t}(w_{j,t}, \mathbf{w}^*_{-j,t}) - w^*_{k,t} - c_{k,t}\right) M_t\, s_{k,t}(\mathbf{p}_{r,t}(w_{j,t}, \mathbf{w}^*_{-j,t}), \mathbf{p}^*_{-r,t}; \delta_t, \theta_2^d)$$

- Status quo payoffs (pre-alliances).

$$d^{-j}_{f,t} = \sum_{k \in \mathcal{J}_{f,t} \setminus \{j\}} \left(w^*_{k,t} - \mu_{k,t}\right) M_t\, \tilde{s}^{-j}_{k,t}(\tilde{\mathbf{p}}^{-j}_t; \delta_t, \theta_2^d)$$

$$d^{-j}_{r,t} = \sum_{k \in \mathcal{J}_{r,t} \setminus \{j\}} \left(\tilde{p}^{-j}_{k,t}(\mathbf{w}^*_{-j,t}) - w^*_{k,t} - c_{k,t}\right) M_t\, \tilde{s}^{-j}_{k,t}(\tilde{\mathbf{p}}^{-j}_t; \delta_t, \theta_2^d)$$

$$\text{with } \tilde{\mathbf{p}}^{-j}_t[k,1] = \begin{cases} +\infty & \text{if } k = j \\ \tilde{p}^{-j}_{k,t} & \text{if } j \neq k \text{ and } j,k \in \mathcal{J}_{r,t} \\ p^*_{k,t} & \text{otherwise} \end{cases}$$

back

Bilateral bargaining between manufacturer f and alliance $a(j)$ over $w_{a(j),b(j),t}$ (post-alliances).

- Agreement payoffs (post-alliances).

$$\pi_{f,t} = \sum_{h \in \mathscr{J}_{a(j)} \cap \mathscr{J}_{b(j)}} \left(w_{a(j),b(j),t} - \mu_{h,t} \right) M_t \mathfrak{s}_{h,t}(\mathbf{p}_{a(j),t}(w_{a(j),b(j),t}, \mathbf{w}^*_{-a(j),b(j),t}), \mathbf{p}^*_{-a(j),t}) \dots$$

$$+ \sum_{k \in \mathscr{J}_f \setminus \mathscr{J}_{a(j)} \cap \mathscr{J}_{b(j)}} \left(w^*_{a(k),b(k),t} - \mu_{k,t} \right) M_t \mathfrak{s}_{k,t}(\mathbf{p}_{a(j),t}(w_{a(j),b(j),t}, \mathbf{w}^*_{-a(j),b(j),t}), \mathbf{p}^*_{-a(j),t})$$

$$\pi_{a(j),t} = \sum_{h \in \mathscr{J}_{a(j)} \cap \mathscr{J}_{b(j)}} \left(p_{h,t}(w_{a(j),b(j),t}, \mathbf{w}^*_{-a(j),b(j),t}) - w_{a(j),b(j),t} - c_{h,t} \right) M_t \mathfrak{s}_{h,t}(\mathbf{p}_{a(j),t}(w_{a(j),b(j),t}, \mathbf{w}^*_{-a(j),b(j),t}), \mathbf{p}^*_{-a(j),t}) \dots$$

$$+ \sum_{k \in \mathscr{J}_{a(j)} \setminus \mathscr{J}_{b(j)}} \left(p_{k,t}(w_{a(j),b(j),t}, \mathbf{w}^*_{-a(j),b(j),t}) - w^*_{a(j),b(k),t} - c_{k,t} \right) M_t \mathfrak{s}_{k,t}(\mathbf{p}_{a(j),t}(w_{a(j),b(j),t}, \mathbf{w}^*_{-a(j),b(j),t}), \mathbf{p}^*_{-a(j),t})$$

- Status quo payoffs (post-alliances).

$$d^{-a(j),b(j)}_{f,t} = \sum_{k \in \mathscr{J}_f \cap \mathscr{J}_{a(j)} \setminus \mathscr{J}_{b(j)}} \left(w^*_{a(k),b(k),t} - \mu_{k,t} \right) M_t \tilde{\mathfrak{s}}^{-a(j),b(j)}_{k,t}(\tilde{\mathbf{p}}^{-a(j),b(j)}_t)$$

$$d^{-a(j),b(j)}_{a(j),t} = \sum_{k \in \mathscr{J}_{a(j)} \setminus \mathscr{J}_{b(j)}} \left(\tilde{p}^{-a(j),b(j)}_{k,t} - w^*_{a(j),b(k),t} - c_{k,t} \right) M_t \tilde{\mathfrak{s}}^{-a(j),b(j)}_{k,t}(\tilde{\mathbf{p}}^{-a(j),b(j)}_t)$$

with $$\tilde{\mathbf{p}}^{-a(j),b(j)}_t[k,1] = \begin{cases} +\infty & \text{if } k \in \mathscr{J}_{a(j)} \cap \mathscr{J}_{b(j)} \\ \tilde{p}^{-a(j),b(j)}_{k,t} & \text{if } k \in \mathscr{J}_{a(j)} \setminus \mathscr{J}_{b(j)} \\ p^*_{k,t} & \text{otherwise} \end{cases}.$$

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FOC of the "Nash-in-Nash" (pre-alliances):

$$\lambda^{pre}_{f,r}\left(\pi_{f,t}-d^{-j}_{f,t}\right)\left(\frac{\partial \pi_{r,t}}{\partial w_{j,t}}\right)+\left(1-\lambda^{pre}_{f,r}\right)\left(\pi_{r,t}-d^{-j}_{r,t}\right)\left(\frac{\partial \pi_{f,t}}{\partial w_{j,t}}\right)=0$$

$$\Leftrightarrow \left(\Gamma_{j,t}\mathscr{s}_{j,t}+\sum_{k\in\mathscr{J}_f\setminus\{j\}}\Gamma_{k,t}\left(\mathscr{s}_{k,t}-\tilde{s}^{-j}_{k,t}(\tilde{p}^{-j}_t;\delta_t,\theta^d_2)\right)\right)\left(\sum_{k\in\mathscr{J}_{r,t}}\frac{\partial p_{k,t}}{\partial w_{j,t}}\mathscr{s}_{k,t}-\mathscr{s}_{j,t}+\sum_{k\in\mathscr{J}_{r,t}}\gamma_{k,t}\sum_{l\in\mathscr{J}_{r,t}}\frac{\partial \mathscr{s}_{k,t}}{\partial p_{l,t}}\frac{\partial p_{l,t}}{\partial w_{j,t}}\right)\dots$$

$$+\frac{\lambda^{pre}_{f,r}}{1-\lambda^{pre}_{f,r}}\left(\gamma_{j,t}\mathscr{s}_{j,t}+\sum_{k\in\mathscr{J}_{r,t}\setminus\{j\}}\gamma_{k,t}\mathscr{s}_{k,t}-\tilde{\gamma}_{kt}(\tilde{p}^{-j}_t)\tilde{s}^{-j}_{k,t}(\tilde{p}^{-j}_t;\delta_t,\theta^d_2)\right)\left(\mathscr{s}_{j,t}+\sum_{k\in\mathscr{J}_{f,t}}\Gamma_{k,t}\sum_{l\in\mathscr{J}_{r,t}}\frac{\partial \mathscr{s}_{k,t}}{\partial p_{l,t}}\frac{\partial p_{l,t}}{\partial w_{j,t}}\right)=0$$

where $\Gamma_{j,t}\equiv w_{j,t}-\mu_{jt}$; $\gamma_{j,t}\equiv p_{j,t}-w_{j,t}-c_{j,t}$; $\tilde{\gamma}_{k,t}\equiv\tilde{p}^{-j}_{k,t}-w_{k,t}-c_{k,t}$.

FOC of the "Nash-in-Nash" (post-alliances):

$$\lambda^{post}_{f,a(j)}\left(\pi_{f,t}-d^{-a(j),b(j)}_{f,t}\right)\frac{\partial \pi_{a(j),t}}{\partial w_{a(j),b(j),t}}+\left(1-\lambda^{post}_{f,a(j)}\right)\left(\pi_{a(j),t}-d^{-a(j),b(j)}_{a(j),t}\right)\frac{\partial \pi_{f,t}}{\partial w_{a(j),b(j),t}}=0$$

$$\Leftrightarrow \left(\sum_{h\in\mathscr{J}_{a(j)}\cap\mathscr{J}_{b(j)}}\Gamma_{a(j),b(j),t}\mathscr{s}_{h,t}+\sum_{k\in\mathscr{J}_f\setminus\mathscr{J}_{a(j)}\cap\mathscr{J}_{b(j)}}\Gamma_{a(k),b(k),t}\left(\mathscr{s}_{k,t}-\tilde{\mathscr{s}}^{-a(j),b(j)}_{k,t}(\tilde{p}^{-a(j),b(j)}_t;\delta_t,\theta^d_2)\right)\right)\dots$$

$$\left(\sum_{h\in\mathscr{J}_{a(j)}}\frac{\partial p_{h,t}}{\partial w_{a(j),b(j),t}}\mathscr{s}_{h,t}-\sum_{k\in\mathscr{J}_{a(j)}\cap\mathscr{J}_{b(j)}}\mathscr{s}_{k,t}+\sum_{k\in\mathscr{J}_{a(j)}}\gamma_{k,t}\sum_{l\in\mathscr{J}_{a(j)}}\frac{\partial \mathscr{s}_{k,t}}{\partial p_{l,t}}\frac{\partial p_{l,t}}{\partial w_{a(j),b(j),t}}\right)\dots$$

$$+\frac{1-\lambda^{post}_{f,a(j)}}{\lambda^{post}_{f,a(j)}}\left(\sum_{h\in\mathscr{J}_{a(j)}\cap\mathscr{J}_{b(j)}}\gamma_{h,t}\mathscr{s}_{h,t}+\sum_{k\in\mathscr{J}_{a(j)}\setminus\mathscr{J}_{b(j)}}\gamma_{k,t}\mathscr{s}_{k,t}-\tilde{\gamma}^{-a(j),b(j)}_{k,t}\tilde{\mathscr{s}}^{-a(j),b(j)}_{k,t}(\tilde{p}^{-a(j),b(j)}_t;\delta_t,\theta^d_2)\right)\dots$$

$$\left(\sum_{h\in\mathscr{J}_{a(j)}\cap\mathscr{J}_{b(j)}}\mathscr{s}_{h,t}+\sum_{k\in\mathscr{J}_f}\Gamma_{a(k),b(k),t}\sum_{l\in\mathscr{J}_{a(j)}}\frac{\partial \mathscr{s}_{k,t}}{\partial p_{l,t}}\frac{\partial p_{l,t}}{\partial w_{a(j),b(j),t}}\right)=0$$

back

8 supply-side instruments.

nb. of rival products in each bottled water segment (mineral, sparkling)

$\times \mathbb{1}\{\text{pre-alliances}\}_{r(j)=\{1,3,5\}}$

$\times \mathbb{1}\{\text{pre-alliances}\}_{r(j)=\{2,4,6\}}$

$\times \mathbb{1}_{r(j)=\{7,8\}}$

$\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{alliance}\}_{j,t}$

$\times \mathbb{1}_{a(j)=\{1\}}$

$\times \mathbb{1}_{a(j)=\{2\}}$

$\times \mathbb{1}_{a(j)=\{3\}}$

$\mathbb{1}\{\text{post-alliances}\}_t \times \mathbb{1}\{\text{national brand}\}_{j,t} \times \mathbb{1}\{\text{no alliance}\}_{j,t}$

$\times \mathbb{1}_{r(j)=\{7\}}$

$\times \mathbb{1}_{r(j)=\{8\}}$

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Gandhi and Houde (2017) test. *(Gauss-Newton regression)*
From a first-order Taylor expansion of $\boldsymbol{\omega}(\theta^s)$ around the true parameters θ_0^s, we can linearize the structural bargaining model as follows: $\boldsymbol{\omega}(\hat{\theta}^s) = \frac{\partial \boldsymbol{\omega}(\hat{\theta}^s)}{\partial \theta^s}\theta^{GN} + \mathbf{u}$.

Because we have a linear model with multiple endogenous variables (i.e., $\frac{\partial \boldsymbol{\omega}(\hat{\theta}^s)}{\partial \boldsymbol{\lambda}}$), we can estimate the model by TSLS in which first-stage equations correspond to $\frac{\partial \boldsymbol{\omega}(\hat{\theta}^s)}{\partial \boldsymbol{\lambda}} = \mathbf{Z}^s \boldsymbol{\beta} + \mathbf{e}$.

Table 15: First-stage diagnostics for the bargaining model

Test	$\frac{\partial\omega}{\partial\lambda_1^{\text{pre}}}$	$\frac{\partial\omega}{\partial\lambda_2^{\text{pre}}}$	$\frac{\partial\omega}{\partial\lambda_1^{\text{post}}}$	$\frac{\partial\omega}{\partial\lambda_2^{\text{post}}}$	$\frac{\partial\omega}{\partial\lambda_3^{\text{post}}}$	$\frac{\partial\omega}{\partial\lambda_{na}}$
F_{eff}	1,835.96	1,872.96	253.19	3,976.30	1,707.16	6.82
SW-F	211.91	30.91	174.09	705.10	83.21	1.21

Notes: F_{eff} is the robust F-stat of Montiel Olea and Pflueger (2013, JBES). The critical value for testing that the TSLS bias exceeds 10% of the OLS bias is around 20.

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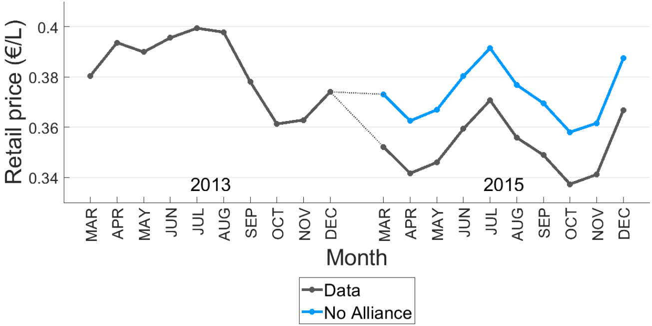
Figure 14: "No buyer alliances" scenario



Notes: Counterfactual retail prices for national brands of alliances' members. Average retail prices calculated using quantity weights.

Table 16: Retail price effect of buyer alliances

	Diff-in-Diff	Simulation
Alliances' members (treatment)	[-6.88% ; -3.92%]	-7.97%
No Alliances (control)	0%	-0.15%

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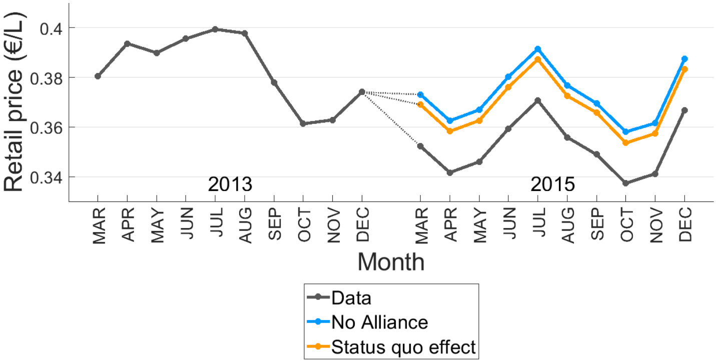
Figure 15: Status quo effect



Notes: Counterfactual retail prices for national brands of alliances' members. Average retail prices using quantity weights.

Δ retail prices: -1.43% with respect to the "no buyer alliance" scenario.

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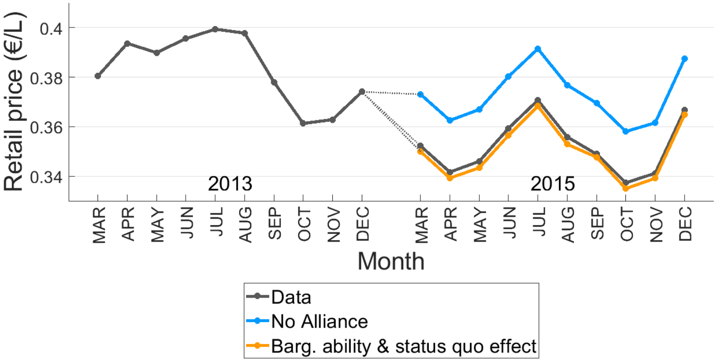
Figure 16: Bargaining ability effect



Notes: Counterfactual retail prices for national brands of alliances' members. Average retail prices using quantity weights.

Δ retail prices: -8.00% with respect to the "no buyer alliance" scenario.

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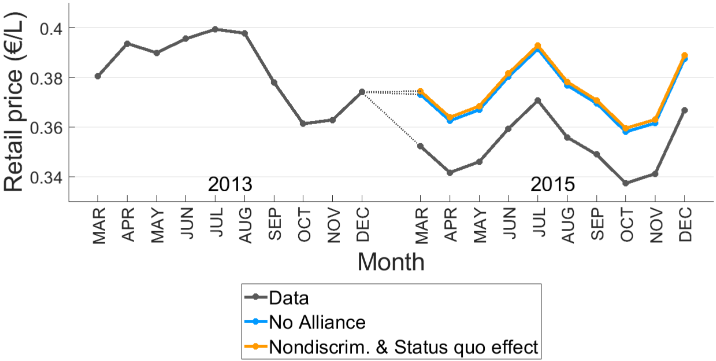
Figure 17: Joint-bargaining paradoc



Notes: Counterfactual retail prices for national brands of alliances′ members. Average retail prices using quantity weights.

Δ retail prices: 0.45% with respect to the ″no buyer alliance″ scenario.

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Ashenfelter, Orley, and Daniel Hosken. 2010. "The Effect of Mergers on Consumer Prices: Evidence from Five Mergers on the Enforcement Margin." Journal of Law & Economics, 53(3): 417–466.

Berry, Steven T., and Philip Haile. 2014. "Identification in Differentiated Products Markets Using Market Level Data." Econometrica, 82(5): 1749–1797.

Berry, Steven T., James Levinsohn, and Ariel Pakes. 1995. "Automobile Prices in Market Equilibrium." Econometrica, 63(4): 841–890.

Berry, Steven T., James Levinsohn, and Ariel Pakes. 2004. "Differentiated Products Demand Systems from a Combination of Micro and Macro Data: The New Car Market." Journal of Political Economy, 112(1): 68–105.

Bonnet, Céline, and Pierre Dubois. 2015. "Non Linear Contracting and Endogenous Buyer Power between Manufacturers and

Retailers: Empirical Evidence on Food Retailing in France." Unpublished.

Caprice, Stéphane, and Patrick Rey. 2015. "Buyer Power from Joint Listing Decision." Economic Journal, 125(589): 1677–1704.

Carstensen, Peter C. 2010. "Buyer Cartels Versus Buying Groups: Legal Distinctions, Competitve Realities, and Antitrust Policy." William & Mary Business Law Review, 1(1).

Collard-Wexler, Allan, Gautam Gowrisankaran, and Robin S. Lee. 2019. """Nash-in-Nash" Bargaining: A Microfoundation for Applied Work." Journal of Political Economy, 127(1): 163–195.

Crawford, Gregory S., and Ali Yurukoglu. 2012. "The Welfare Effects of Bundling in Multichannel Television Markets." American Economic Review, 102: 643–685.

Dana, James D. 2012. "Buyer groups as strategic commitments." Games and Economic Behavior, 74(2): 470–485.

Dobson, Paul W., and Michael Waterson. 1997. "Countervalling Power and Consumer Prices." Economic Journal, 107(441): 418–430.

Ellison, Sara Fisher, and Christopher M. Snyder. 2010. "Countervailing Power in Wholesale Pharmaceuticals." Journal of Industrial Economics, 58(1): 32–53.

Galbraith, John Kenneth. 1952. American Capitalism: The Concept of Countervailing Power. Houghton Mifflin.

Galbraith, John Kenneth. 1954. "Countervailing Power." American Economic Review: Papers and Proceedings, 44(2): 1–6.

Gandhi, Amit, and Jean-François Houde. 2016. "Measuring Substitution Patterns in Differentiated Products Industries." Unpublished.

Gaudin, Germain. 2017. "Vertical Bargaining and Retail Competition: What Drives Countervailing Power?" forthcoming at *Economic Journal*.

Gowrisankaran, Gautam, Aviv Nevo, and Robert Town. 2015. "Mergers When Prices Are Negotiated: Evidence from the Hospital Industry." American Economic Review, 105(1): 172–203.

Grennan, Matthew. 2013. "Price Discrimination and Bargaining: Empirical Evidence from Medical Devices." American Economic Review, 103(1): 145–177.

Grennan, Matthew, and Ashley Swanson. 2019. "Transparency and Negotiated Prices: The Value of Information in Hospital-Supplier Bargaining." Forthcoming at Journal of Political Economy.

Harsanyi, John C. 1977. Rational Behaviour and Bargaining Equilibrium in Games and Social Situations. Cambridge University Press.

Ho, Katherine, and Robin S. Lee. 2017. "Insurer Competition in Health Care Markets." Econometrica, 85(2): 379–417.

Horn, Henrik, and Asher Wolinsky. 1988. "Bilateral Monopolies and Incentives for Merger." RAND Journal of Economics, 19(3): 408–419.

Inderst, Roman, and Greg Shaffer. 2007. "Retail Mergers, Buyer Power and Product Variety." Economic Journal, 117(516): 45–67.

Iozzi, Alberto, and Tommaso Valletti. 2014. "Vertical Bargaining and Countervailing Power." American Economic Journal: Microeconomics, 6(3): 106–135.

Lewis, Matthew S., and Kevin E. Pflum. 2015. "Diagnosing Hospital System Bargaining Power in Managed Care Networks." American Economic Journal: Economic Policy, 7(1): 243–274.

Miller, Nathan H., and Matthew C. Weinberg. 2017. "Understanding the Price Effects of the Millercoors Joint Venture." Econometrica, 85(6): 1763–1791.

Montiel Olea, José, and Carolin Pflueger. 2013. "A Robust Test for Weak Instruments." Journal of Business & Economic Statistics, 31(3): 358–369.

O'Brien, Daniel P. 2014. "The welfare effects of third-degree price discrimination in intermediate good markets: the case of bargaining." RAND Journal of Economics, 45(1): 92–115.

Rey, Patrick, and Thibaud Vergé. 2004. "Bilateral control with vertical contracts." RAND Journal of Economics, 35(4): 728–746.

Sorensen, Alan T. 2003. "Insurer-Hospital Bargaining: Negotiated Discounts in Post-Deregulation Connecticut." Journal of Industrial Economics, 51(4): 469–490.