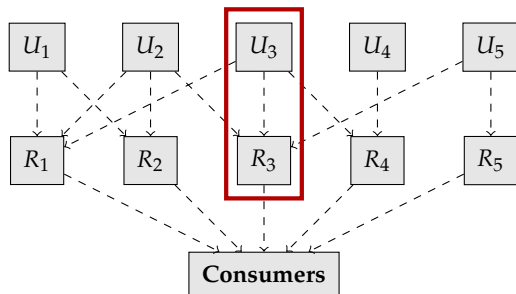


Vertical Integration with Multiproduct Firms:
When Eliminating Double Marginalization May
Hurt Consumers

Fernando Luco
Texas A&M

Guillermo Marshall
University of Illinois

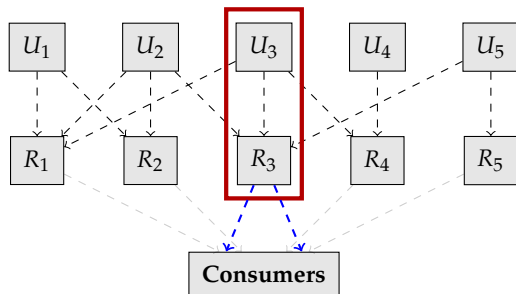
Motivation



Vertical mergers are often evaluated based on the trade-off between

- Efficiencies
- Market foreclosure

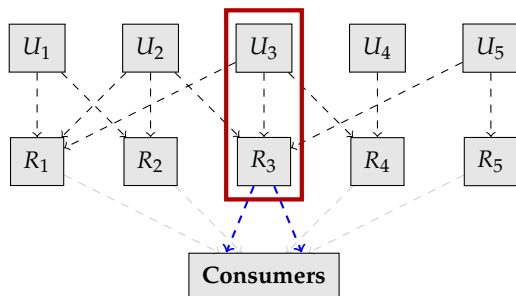
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Motivation



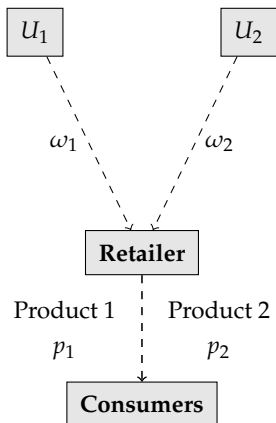
Vertical mergers are often evaluated based on the trade-off between

- Efficiencies
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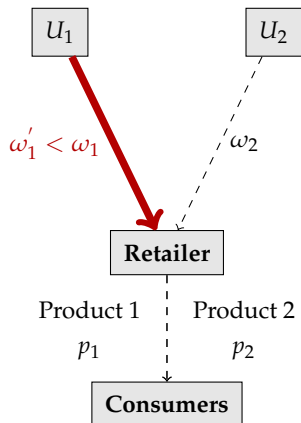
A third effect comes into play in multiproduct industries

- Partial elimination of double margins changes pricing incentives
- May cause price increases even in absence of market foreclosure

Example



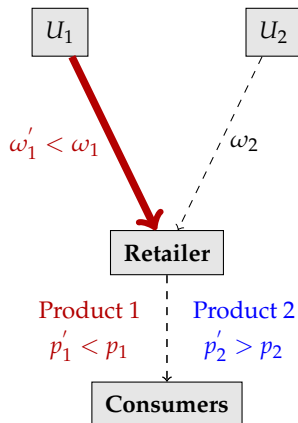
Example



Suppose the Retailer integrates with U_1 , partially eliminating double margins.

ω_1 decreases, causing

Example

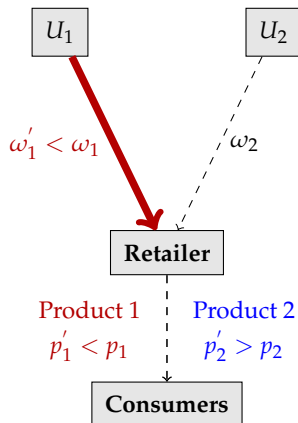


Suppose the Retailer integrates with U_1 , partially eliminating double margins.

ω_1 decreases, causing

- a *downward* pressure on p_1
 - **Efficiency effect**
- an *upward* pressure on p_2 to divert demand to product 1, if products are substitutes

Example



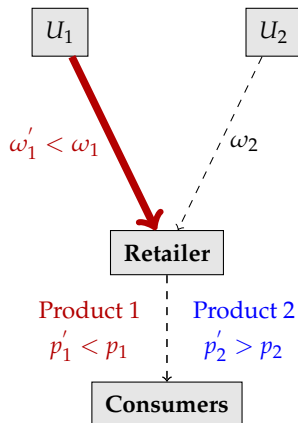
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If products are substitutes, both prices may increase and welfare decrease (Edgeworth 1925, Salinger 1991).

Example



Suppose the Retailer integrates with U_1 , partially eliminating double margins.

ω_1 decreases, causing

- a *downward* pressure on p_1
 - **Efficiency effect**
- an *upward* pressure on p_2 to divert demand to product 1, if products are substitutes
 - **Edgeworth-Salinger effect**

If products are substitutes, both prices may increase and welfare decrease (Edgeworth 1925, Salinger 1991).

This Paper

Is the Edgeworth-Salinger effect relevant for the evaluation of vertical mergers?

- Should it be considered when evaluating vertical mergers?
- What is its magnitude?
- How does it interact with efficiency gains?

Literature

Context: Carbonated Beverage Industry in the U.S.

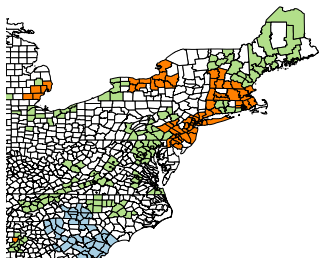
- Upstream firms sell syrup to downstream bottlers
 - Bottlers can work with more than one upstream firm and have exclusive territories. Bottler Agreement
- In 2009 and 2010, PepsiCo and The Coca-Cola Company integrated with some of their bottlers.
 - Not all areas of the country were affected by vertical integration
 - Bottlers bottled Dr Pepper Snapple Group brands in some areas of the country
 - Partial elimination of double marginalization
- No evidence of market foreclosure.
 - Coca Cola and PepsiCo acquired licenses to continue selling Dr Pepper SG products
 - The FTC cleared the transactions subject to behavioral remedies

Data

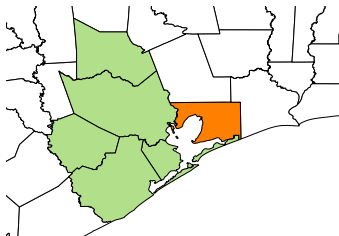
- IRI Marketing Data Set
 - Weekly scanner data for the years 2007 to 2012 across 50 MSAs
 - An observation is a store-week-brand-size combination
 - We focus on popular products: 105 brand-size combinations
 - Example: 67oz bottle of Diet Coke
- Beverage Digest territory maps
 - Territory of each bottler
- FTC documents
 - Counties that were exposed to Edgeworth-Salinger effect [Show map](#)

Identification in Practice: The Coca-Cola Company




a) North-East



b) Houston



Legend

-  *No VI*
-  *VI, Coke bottler does not bottle Dr Pepper*
-  *VI, Coke bottler bottles Dr Pepper*

Dealing with Identification Concerns

Panel structure

Summary statistics

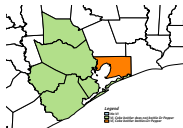
Dynamic Differences-in-Differences

Specification

We estimate several versions of

$$\begin{aligned}\log(\text{price}_{j,s,w}) = & VI_{\text{bottler}(j,s),w} \cdot \text{OwnBrand}_j \beta_{\text{Own}} \\ & + VI_{\text{bottler}(j,s),w} \cdot \text{DrPepperBrand}_j \beta_{\text{DrPepper}} \\ & + \lambda_s + \gamma_{w,\text{county}(s)} + \delta_{j,\text{county}(s),\text{season}(w)} + \phi_{\text{firm}(j),w} + \varepsilon_{j,s,w}\end{aligned}$$

- $\phi_{\text{firm}(j),w}$: national changes at the parent-firm level.
- $\gamma_{w,\text{county}(s)}$: local shocks.
- λ_s and $\delta_{j,\text{county}(s),\text{season}(w)}$: local conditions and seasonal effects.
- $\varepsilon_{j,s,w}$: clustered at the county level.



Edgeworth-Salinger Effect is Economically Relevant

	$\frac{\log(\text{price})}{}$
Average effect on Own Brands (β_{Own})	-0.014*** (0.003)
Average effect on Dr Pepper Brands (β_{DrPepper})	0.039*** (0.002)
Observations	37,106,025
R^2	0.893

Notes: Standard errors clustered at the county level in parentheses. *** $p < 0.01$.

Back-of-the-Envelope: Weighted effect, by pre-merger market shares, is a 0.9% decrease in paid prices.

Vertical Integration Increased Prices

	<u>log(<i>price</i>)</u>
Average effect of Vertical Integration ($\beta_{Own} = \beta_{DrPepper}$)	0.018*** (0.003)
Observations	37,106,025
R^2	0.893

Notes: Standard errors clustered at the county level in parentheses. *** $p < 0.01$.

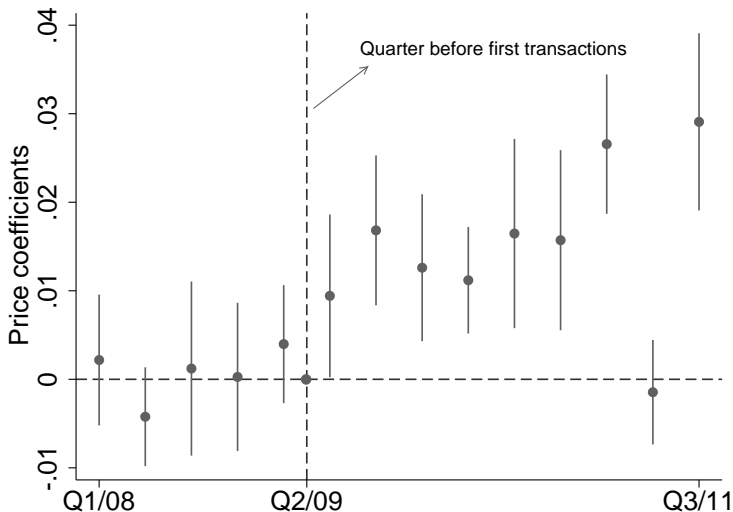
Edgeworth-Salinger Effect is Economically Relevant

	$\log(\text{price})$
Average effect on Own Brands (Coca-Cola) ($\beta_{\text{Own,CocaCola}}$)	-0.010*** (0.004)
Average effect on Dr Pepper Brands (Coca-Cola) ($\beta_{\text{DrPepper,CocaCola}}$)	0.042** (0.004)
Average effect on Own Brands (PepsiCo) ($\beta_{\text{Own,Pepsi}}$)	-0.021*** (0.006)
Average effect on Dr Pepper Brands (PepsiCo) ($\beta_{\text{DrPepper,Pepsi}}$)	0.031*** (0.003)
Observations	37,106,025
R^2	0.893

Notes: Standard errors clustered at the county level in parentheses. *** $p < 0.01$.

Dynamic Difference-in-Differences

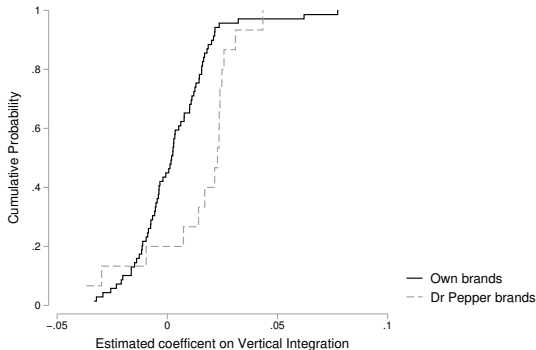
- Price differences over time: VI versus no VI



Product-level Analysis: Prices

We estimate

$$\log(\text{price}_{j,s,w}) = VI_{\text{bottler}(j,s),w} \cdot \beta_{VI}^j + \lambda_s + \phi_w + \varepsilon_{j,s,w} \quad \forall j$$



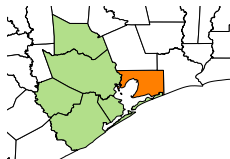
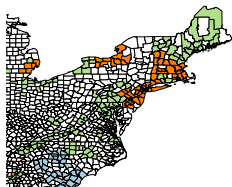
Efficiency without Edgeworth-Salinger

	$\log(\text{price})$	
Average effect on Own Brands (β_{Own})	-0.014*** (0.003)	-0.024*** (0.004)
Average effect on Dr Pepper Brands ($\beta_{DrPepper}$)	0.039*** (0.002)	
Observations	37,106,025	2,967,386
R^2	0.893	0.910

Notes: Standard errors clustered at the county level in parentheses. *** $p < 0.01$.

Additional Exercises

1 Bordering Counties Results



2 Regular and Sale Price Results

3 Alternative specifications of fixed effects Results

We find the same results.

Alternative Explanations

- ① Market foreclosure: Unlikely.
- ② Capacity constraints: Maybe in the short run, unlikely in the long run.
- ③ Post-merger changes in the frequency of sales of non-VI bottlers:
We reject this. Results

Discussion

- Vertical mergers often evaluated based on trade-off between efficiencies and foreclosure
- Theory: Partial elimination of double margins may hurt consumers in multiproduct industries
- Evidence suggesting the Edgeworth-Salinger effect is economically relevant for vertical merger evaluation
 - Counteracts efficiency gains

Thank you!

Literature Review

The impact of vertical integration on prices and consumer welfare

- Theory: Salinger (1988), Perry (1989), Ordover et al (1990), Hart et al (1990), Bolton and Whinston (1991), Reiffen (1992), Riordan and Salop (1995), Riordan (1998), Choi and Yi (2000), Chen (2001), Lafontaine and Slade (2007), and others
- Empirical evidence: Chipty (2001), Hastings and Gilbert (2005), Hortacsu and Syverson (2007), Crawford et al (2017), and others

Edgeworth paradox + vertical integration

- Edgeworth (1925), Hotelling (1932), Salinger (1991)

Bottler Agreement

The Bottler Agreement governs the relationship between the upstream firm and the bottlers. In general, it establishes that

- ① Upstream firms have the right to set the price at which they sell to the bottler. BA 1
- ② Bottlers have the right to choose the price at which they sell to their customers, subject to a maximum price. BA 2
- ③ Local advertising and marketing campaigns are the responsibility of the bottler, while national campaigns are responsibility of the upstream firm. BA 3

Bottler Agreement 1

V. CONDITIONS OF PURCHASE AND SALE

2. (a) The Company reserves the right, by giving written notice to the Bottler, to establish and to revise from time to time and at any time, in its sole discretion, the price of the Concentrate, the Authorized Supplier, the supply point and alternate supply points for the Concentrate, the conditions of shipment and payment, and the currency or currencies acceptable to the Company or the Authorized Suppliers.
- (b) If the Bottler is unwilling to pay the revised price in respect of the Concentrate, then the Bottler shall so notify the Company in writing within thirty (30) days from receipt of the written notice from the Company revising the aforesaid price. In such event, this Agreement shall terminate automatically without liability by any party for damages three (3) calendar months after receipt of the Bottler's notification.
- (c) Any failure on the part of the Bottler to notify the Company in respect of the revised price of the Concentrate pursuant to subclause (b) hereof shall be deemed to be acceptance by the Bottler of the revised price.
- (d) The Company reserves the right, to the extent permitted by the law applicable in the Territory, to establish and to revise, by giving written notice to the Bottler, maximum prices at which the Beverage in Approved Containers may be sold by the Bottler to wholesalers and retailers and the maximum retail prices for the Beverage. It is recognized in this regard that the Bottler may sell the Beverage to wholesalers and retailers and authorize the retail sale of the Beverage at prices which are lower than the maximum prices. The Bottler shall not, however, increase the maximum prices established or revised by the Company at which the Beverage in Approved Containers may be sold to wholesalers and retailers nor authorize an increase in the maximum prices for the Beverage without the prior written consent of the Company.
- (e) The Bottler undertakes to collect from or charge to retail or wholesale outlets, as applicable, for each refillable Approved Container and each returnable case delivered to retail or wholesale outlets, such deposits as the Company may determine from time to time by giving written notice to the Bottler, and to make all reasonably diligent efforts to recover all empty refillable Approved Containers and cases and, upon recovery, to refund or to credit the deposits for said refillable Approved Containers and returnable cases returned undamaged and in good condition.

Bottler Agreement 1

The Company reserves the right, by giving written notice to the Bottler, to establish and to revise from time to time and at any time, in its sole discretion, the price of the Concentrate, the Authorized Supplier, the supply point and alternate supply points for the Concentrate, the conditions of shipment and payment, and the currency or currencies acceptable to the Company or the Authorized Suppliers.

Bottler Agreement 2

V. CONDITIONS OF PURCHASE AND SALE

22. (a) The Company reserves the right, by giving written notice to the Bottler, to establish and to revise from time to time and at any time, in its sole discretion, the price of the Concentrate, the Authorized Supplier, the supply point and alternate supply points for the Concentrate, the conditions of shipment and payment, and the currency or currencies acceptable to the Company or the Authorized Suppliers.
- (b) If the Bottler is unwilling to pay the revised price in respect of the Concentrate, then the Bottler shall so notify the Company in writing within thirty (30) days from receipt of the written notice from the Company revising the aforesaid price. In such event, this Agreement shall terminate automatically without liability by any party for damages three (3) calendar months after receipt of the Bottler's notification.
- (c) Any failure on the part of the Bottler to notify the Company in respect of the revised price of the Concentrate pursuant to subclause (b) hereof shall be deemed to be acceptance by the Bottler of the revised price.
- (d) The Company reserves the right, to the extent permitted by the law applicable in the Territory, to establish and to revise, by giving written notice to the Bottler, maximum prices at which the Beverage in Approved Containers may be sold by the Bottler to wholesalers and retailers and the maximum retail prices for the Beverage. It is recognized in this regard that the Bottler may sell the Beverage to wholesalers and retailers and authorize the retail sale of the Beverage at prices which are lower than the maximum prices. The Bottler shall not, however, increase the maximum prices established or revised by the Company at which the Beverage in Approved Containers may be sold to wholesalers and retailers nor authorize an increase in the maximum prices for the Beverage without the prior written consent of the Company.
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Bottler Agreement 2

[...] It is recognized in this regard that the Bottler may sell the Beverage to wholesalers and retailers and authorize the retail sale of the Beverage at prices which are lower than the maximum prices. The Bottler shall not, however, increase the maximum prices established or revised by the Company at which the Beverage in Approved Containers may be sold to wholesalers and retailers nor authorize an increase in the maximum prices for the Beverage without the prior written consent of the Company.

Bottler Agreement 3

7. The Bottler must, for its own account, budget and expend such funds for advertising, marketing and promoting the Beverage as may be reasonably required by the Company to create, stimulate and sustain the demand for the Beverage in the Territory, provided that the Bottler shall submit all advertising, marketing and promotional projects relating to the Trade Marks or the Beverage to the Company for its prior approval, and shall use, publish, maintain or distribute only such advertising, marketing or promotional material relating to the Trade Marks or the Beverage as the Company shall approve and authorize. The Company may agree from time to time and subject to such terms and conditions as it shall stipulate in each case to contribute financially to the Bottler's marketing programs. The Company may also undertake, at its own expense and independently from the Bottler, any additional advertising or sales promotion activities in the Territory it deems useful or appropriate.

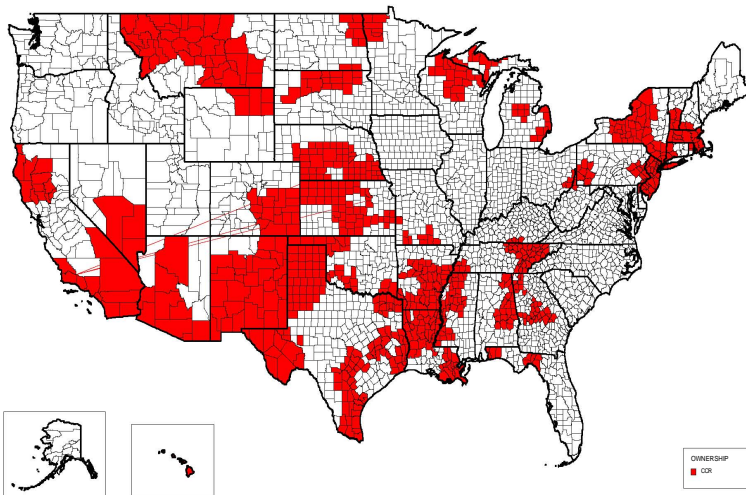
[Go back](#)

Data: FTC Documents

Counties where Dr Pepper was bottled by the bottler acquired by Coca Cola

Cola [Go back](#)

Source: FTC's Complaint, Appendix B.



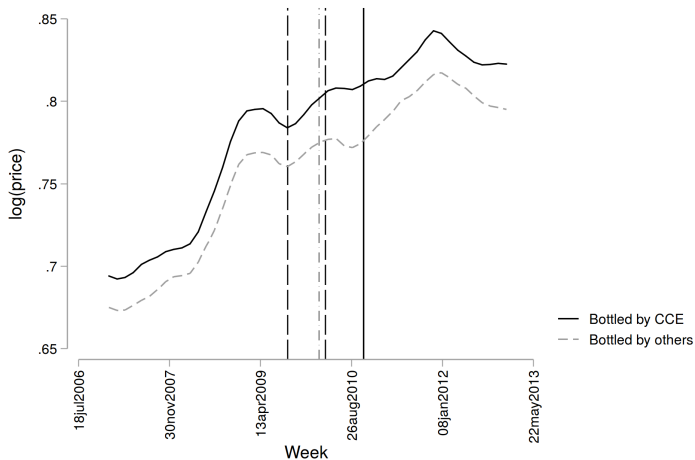
Threats to Identification

- ① Changes in advertising, rebate policies, or input costs at the upstream firm level.
- ② VI may have happened in markets where PepsiCo and Coca-Cola had greater market power.
- ③ Preexisting price trends specific to areas eventually impacted by VI

We use the panel structure to tackle (1)–(2); and address (3) both using summary statistics and a dynamic difference-in-difference framework

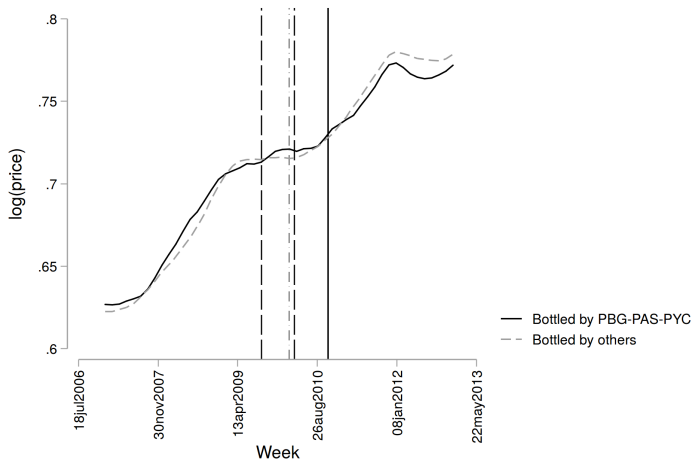
Threats to Identification: Data

- Coca-Cola products



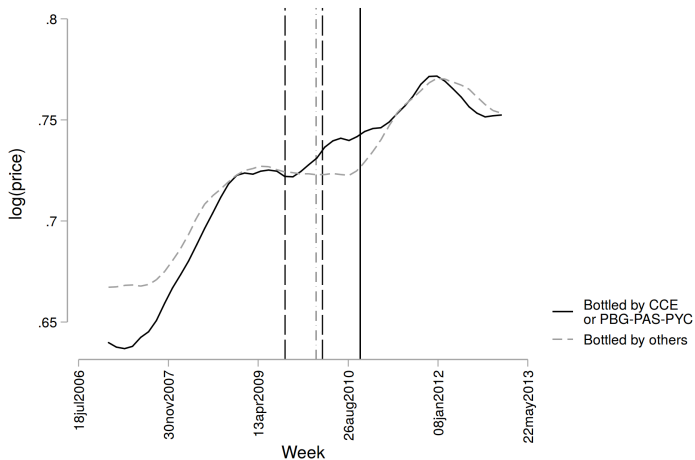
Threats to Identification: Data

- Pepsi products

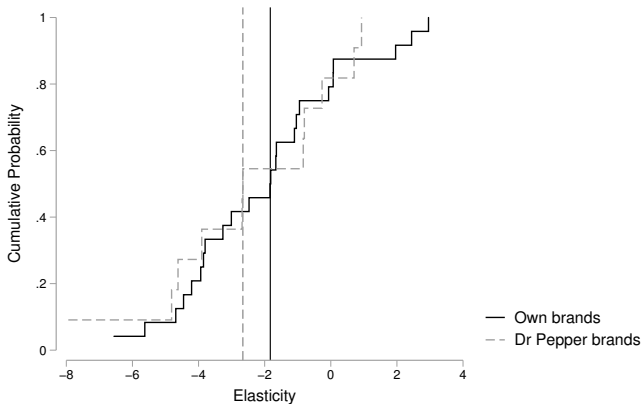


Threats to Identification: Data

- Dr Pepper products

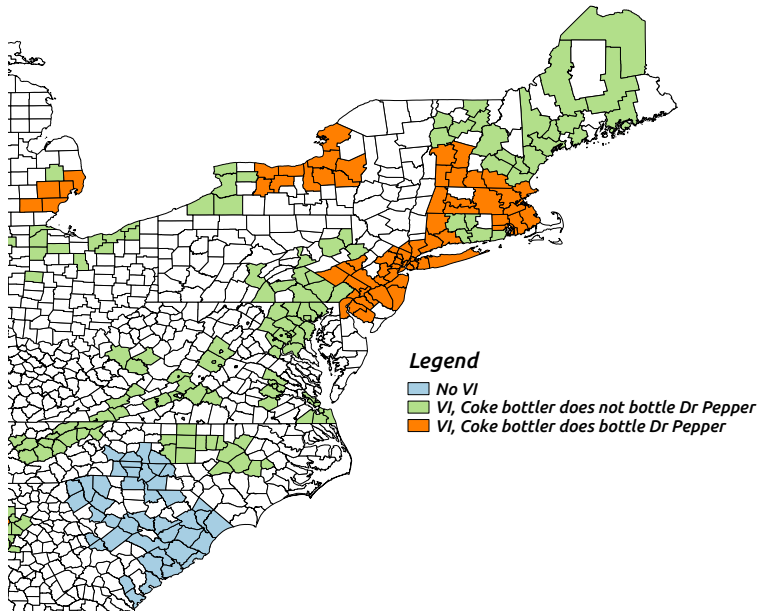


Product-level Analysis: Elasticities



Vertical lines denote median elasticities

Bordering Counties



Bordering Counties [Go back](#)

	<u>log(<i>price</i>)</u>	
Average effect on Own Brands (β_{Own})	-0.012*** (0.003)	
Average effect on Dr Pepper Brands ($\beta_{DrPepper}$)	0.037*** (0.003)	
Average effect on Own Brands (Coca-Cola) ($\beta_{Own,CocaCola}$)		-0.015*** (0.005)
Average effect on Dr Pepper Brands (Coca-Cola) ($\beta_{DrPepper,CocaCola}$)		0.031** (0.005)
Average effect on Own Brands (PepsiCo) ($\beta_{Own,Pepsi}$)		-0.006 (0.005)
Average effect on Dr Pepper Brands (PepsiCo) ($\beta_{DrPepper,Pepsi}$)		0.029*** (0.005)
Observations	14,285,223	14,285,223
R^2	0.886	0.886

Notes: Standard errors clustered at the county level in parentheses. *** $p < 0.01$.

Regular and Sale Price

	(1)	(2)	(3)	(4)
	Regular Price	log(<i>price</i>) Sale Price		Sale indicator
	Subsample	Subsample	Full Sample	Full Sample
VI · Own product bottled by Coca-Cola or PepsiCo bottler	-0.018*** (0.003)	-0.013*** (0.003)	-0.014*** (0.003)	-0.006 (0.005)
VI · Rival product bottled by Coca-Cola or PepsiCo bottler	0.052*** (0.003)	0.026*** (0.003)	0.039*** (0.002)	0.009** (0.003)
Observations	21,679,165	15,422,052	37,106,025	37,124,313
R^2	0.935	0.921	0.893	0.383

Notes: Standard errors clustered at the county level (436 clusters) in parentheses.
 ** $p < 0.05$, *** $p < 0.01$. All specifications include controls for feature and display, store FE, week \times parent company FE, week \times county FE, and product \times county \times season-of-year FE.

Alternative Sets of Fixed Effects

	(1)	(2)	(3)	(4)
	$\log(\text{price})$			
β_{Own}	-0.004 (0.005)	-0.004 (0.005)	-0.016*** (0.003)	-0.017*** (0.003)
β_{DrPepper}	0.032*** (0.004)	0.031*** (0.004)	0.042*** (0.002)	0.039*** (0.002)
Observations	37,106,832	37,106,832	37,106,679	37,106,025
R^2	0.875	0.882	0.892	0.893
Prod FE	Yes	Yes	No	No
Prod \times County FE	No	No	Yes	No
Prod \times County \times Quarter-of-year FE	No	No	No	Yes
Store FE	No	Yes	Yes	Yes

Notes: Standard errors clustered at the county level in parentheses. *** $p < 0.01$. Specifications include controls for feature and display, week \times parent company FE, and week \times county FE.