The Competitive Impact of Vertical Integration by Multiproduct Firms

Luco & Marshall (2020, *AER)*

Noah MacDonald

November 30, 2022

Background Info

Two levels of the carbonated beverage industry:

Upstream Firms

Three major players:

1. The Coca-Cola Company
2. PepsiCo
3. Dr Pepper Snapple Group

Bottlers

Hundreds of bottlers, including:

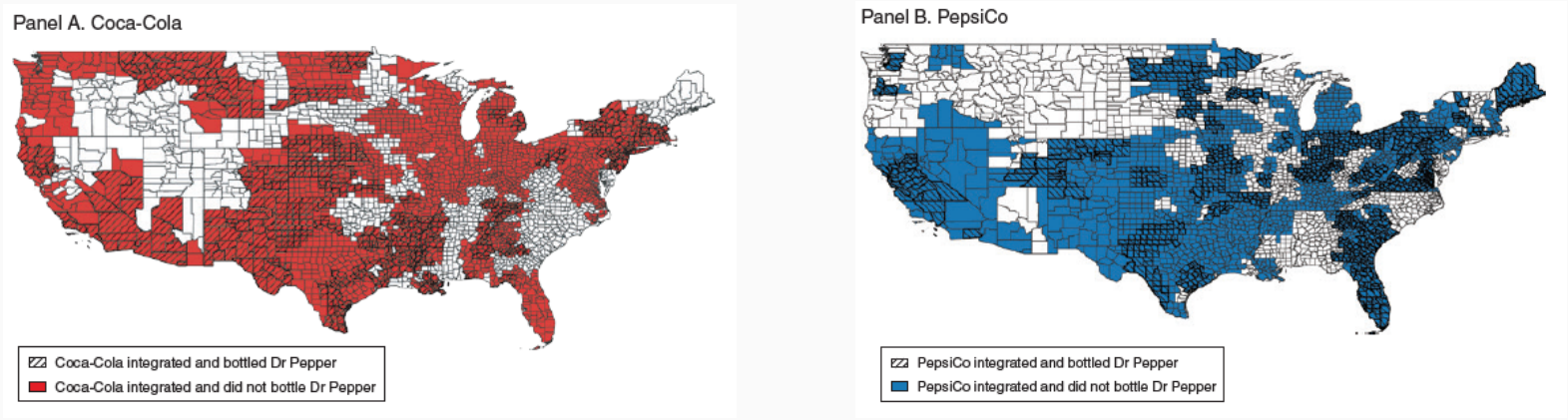
- Pepsi Bottling Group Inc.
- Pepsi Americas Inc.
- Coca-Cola Enterprises
- Pepsi-Cola Bottling Co. of Yuba City Inc.

Important Note: Bottlers can't produce Coke AND Pepsi, but often produce Coke OR Pepsi AND Dr. Pepper products

Motivation

Three large vertical mergers in the soda industry recently:

1. PepsiCo merged w/ PBG and PAS in Aug 2009
2. Coca-Cola merged w/ CCE in Feb 2010
3. PepsiCo merged w/ PYC in Apr 2010



(a) Coca-Cola **(b)** PepsiCo

Figure 1: Areas Affected by Vertical Integration

Motivation

Two opposing effects of vertical integration:

1. Efficiency Effect: $\downarrow$ prices due to elimination of double margin
2. Edgeworth-Salinger Effect: $\uparrow$ prices of non-integrated goods to drive demand toward more profitable integrated goods

RQ: How does vertical integration impact the prices of multiproduct firms, and is the Edgeworth-Salinger effect economically relevant?

Contribution

Three contributions to the vertical-merger enforcement debate:

1. Provide new causal evidence of anticompetitive effects
2. Show that competitive and anticompetitive effects have similar magnitudes
3. Argue that anticompetitive pricing incentives were relevant for many recent mergers

Also contributes to literature surrounding:

- How market structure affects market outcomes in a bilateral oligopoly (Ho & Lee 2017)
- Competitive impact of vertical mergers
- Vertical arrangements between upstream and downstream firms

Preview of Findings

Prices: VI led to a ...

- 1.2-1.5% $\uparrow$ in prices for Dr Pepper SG products
- 0.8-1.2% $\downarrow$ in prices for Coca-Cola & PepsiCo products

Revenues: VI led to a ...

- 1.3% $\downarrow$ in revenue for Dr Pepper SG products
- 1.3% $\uparrow$ in revenue for Coca-Cola products
- 2.2% $\uparrow$ in revenue for PepsiCo products

i.e., strong evidence for the Edgeworth-Salinger effect.

Data

1. Territory maps of the US bottling system
2. Public documents from the FTC investigations of the Coca-Cola & PepsiCo vertical mergers
3. IRI Marketing Dataset
    - price and sales data at the store-week-product level

Summary Statistics

TABLE 2—PRICES AND MARKET SHARES ACROSS COUNTIES BEFORE AND AFTER VERTICAL INTEGRATION

		Before VI			After VI			
	Variable	Untreated (1)	Treated (2)	(2) – (1) (3)	Untreated (4)	Treated (5)	(5) – (4) (6)	(6) – (3) (7)
Coca-Cola	Price	1.379	1.442	0.064	1.48	1.544	0.064	0
		(0.169)	(0.145)	[0]	(0.135)	(0.153)	[0]	[0.987]
Dr Pepper SG	Price	1.343	1.435	0.092	1.367	1.508	0.142	0.05
		(0.166)	(0.16)	[0]	(0.179)	(0.172)	[0]	[0]
PepsiCo	Price	1.326	1.365	0.039	1.432	1.442	0.01	−0.029
		(0.13)	(0.133)	[0]	(0.104)	(0.143)	[0.129]	[0]
Coca-Cola	Market share	0.044	0.042	−0.002	0.043	0.045	0.002	0.003
		(0.031)	(0.026)	[0.147]	(0.024)	(0.029)	[0.143]	[0.039]
Dr Pepper SG	Market share	0.014	0.009	−0.005	0.02	0.01	−0.01	−0.005
		(0.015)	(0.007)	[0]	(0.021)	(0.008)	[0]	[0]
PepsiCo	Market share	0.036	0.036	0	0.034	0.035	0.001	0.002
		(0.032)	(0.029)	[0.868]	(0.025)	(0.028)	[0.334]	[0.387]

Notes: An observation is a store-product-period combination, where period $\in \{premerger, postmerger\}$. The table reports averages of prices and market shares (based on unit count), before and after vertical integration, for treated and untreated counties. The Coca-Cola products include 67 oz Coca-Cola and Diet Coke; the Dr Pepper SG products include 67 oz Dr Pepper and Diet Dr Pepper; the PepsiCo products include 67 oz Pepsi and Diet Pepsi. Standard deviations are in parentheses; p-values of two-sided tests for equality of means are in brackets.

Empirical Strategy: County-level DiD

For product j sold in store s in week w, the authors estimate

$$\log(price_{jsw}) = VI_{jsw}\beta_k + \eta_{js} + \phi_{jw} + \mathbf{X}'_{jsw}\delta + \varepsilon_{jsw}$$

for each $k \in \{\text{PepsiCo, Coca-Cola, Dr Pepper SG}\}$, where $\mathbf{X}$ contains product characteristics (i.e., advertisting intensity) at the store-week level and county-level demographic covariates.

DiD Results: Tables

TABLE 4—THE EFFECT OF VERTICAL INTEGRATION ON PRICES (DIFFERENCE-IN-DIFFERENCES ESTIMATES)

	log(price)		
	Coca-Cola (1)	Dr Pepper SG (2)	PepsiCo (3)
Panel A. Baseline estimates			
Vertical integration	0.003	0.015	−0.006
	(0.005)	(0.003)	(0.005)
Observations	15,756,886	15,935,207	17,051,189
R^2	0.910	0.903	0.891
Panel B. Restricted treatment subsample			
Vertical integration	−0.009	0.012	−0.008
	(0.006)	(0.005)	(0.005)
Observations	1,750,697	2,458,215	1,665,107
R^2	0.936	0.923	0.924

TABLE 5—THE EFFECT OF VERTICAL INTEGRATION ON PRICE INDEXES (DIFFERENCE-IN-DIFFERENCES ESTIMATES)

	log(price index)			
	All products (1)	Coca-Cola (2)	Dr Pepper SG (3)	PepsiCo (4)
Vertical integration	−0.001	−0.006	0.048	−0.022
	(0.006)	(0.007)	(0.008)	(0.006)
Observations	528,838	528,491	526,527	524,762
R^2	0.809	0.860	0.867	0.878

DiD Results: Event Study

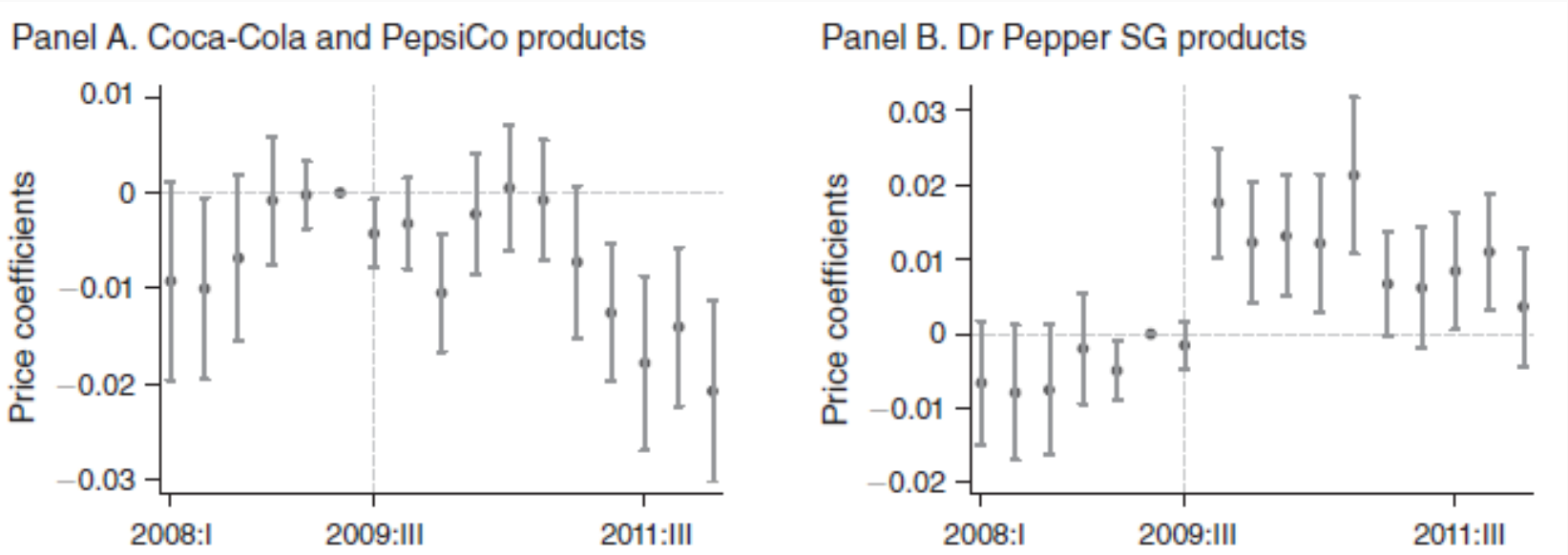


FIGURE 3. DYNAMICS OF THE IMPACT OF VERTICAL INTEGRATION ON PRICES
(DIFFERENCE-IN-DIFFERENCES ESTIMATES)

Notes: Standard errors clustered at the county level (443 clusters). The coefficient for 2009:II is normalized to zero. All specifications include controls for feature and display, time-varying county-level controls, and product–week and product–store fixed effects. The sample of prices is restricted to regular prices and includes all directly treated observations in the treated group and both untreated and indirectly treated observations in the control group.

Empirical Strategy: Within-Store Analysis

The authors also estimate

$$\log(price_{jsw}) = VI_{jsw}^{CC/Pepsi}\beta^{CC/Pepsi} + VI_{jsw}^{DrP}\beta^{DrP} + \eta_{js} + \phi_{jw} + \gamma_{sw} + \mathbf{X}'_{jsw}\delta + \varepsilon_{jsw}$$

to better isolate the opposing effects with $\beta^{CC/Pepsi}$ and β^{DrP}.

Within-Store Results

TABLE 6—THE EFFECT OF VERTICAL INTEGRATION ON PRICES (WITHIN-STORE ESTIMATES)

	log(price)	
	(1)	(2)
Vertical integration	−0.012	
× Coca-Cola/PepsiCo product	(0.003)	
Vertical integration	0.015	
× Dr Pepper SG product	(0.002)	
Vertical integration (Coca-Cola)		−0.011
× Coca-Cola product		(0.003)
Vertical integration (Coca-Cola)		0.022
× Dr Pepper SG product		(0.003)
Vertical integration (PepsiCo)		−0.012
× PepsiCo product		(0.005)
Vertical integration (PepsiCo)		0.007
× Dr Pepper SG product		(0.003)
Observations	48,743,027	48,743,027
R^2	0.911	0.911

Notes: Standard errors clustered at the county level (443 clusters). All specifications include store–week, product–week, and product–store fixed effects, as well as controls for feature and display.

Thoughts & Concerns

Thoughts:

- Impressive to get the exact same point estimate on Dr. Pepper's price effect using two different identification strategies!
- Props to the authors for bringing attention to a lesser known anticompetitive effect.

Concerns:

- Only 23/443 countries had no VI $\Rightarrow$ small control group
- Why have people stopped putting stars/significance levels in their tables??