Evidence on Horizontal Mergers

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Evidence on Horizontal Mergers

Today we are going look for empirical evidence on the effect of mergers, and that our models to predict the effect of mergers work. We will be looking for evidence for mergers having the effect that our Cournot, Bertrand, Differentiated Product Bertrand, and Monopoly models predict.

- ▶ Do we have the right model?
- ▶ Are there any additional assumptions that we need to change?
- ▶ Can we learn about other reasons for mergers other than market power, such as cost efficiencies.

Cross-Sectional Studies

Suppose we have data on prices in many different, but similar market. For instance local markets.

$$p_i = \alpha_M \text{Monopoly}_i + \alpha_D \text{Duopoly}_i + \alpha_D \text{Triopoly}_i + \underbrace{X_i \beta}_{\text{Controls for the market}}$$

- ▶ It is a good idea that have some market level controls X_i. Some markets may have higher marginal costs. For instance, suppose we had data on gasoline stations, it turns out that there are large difference in the rack rate across markets.
- ▶ The other issue is that market structure (number of competitors), might be related to characteristics of the market. For example, high cost places might also not see a lot of entry.

Time-series and Cross-Sectional Studies

- If there is data on prices before and after the merger, we can run a different type of analysis.
- Run the following:

$$p_{it} = \mu_i + \delta_t + \alpha 1\text{merger}_{it} + X_{it}\beta + \epsilon_{it}$$

- So this really looks like an analysis of changes in prices:

$$\Delta p_{it} = \alpha 1\text{merger}_{it} + \Delta X_{it}\beta + \epsilon_{it}$$

and you might want to have controls for anything that changes marginal costs.

- The main issue is what causes mergers in the first place. Perhaps, like Sirius and XM, consolidation happened because of negative news about the profitability of the industry.

Ashenfelter, Hosken and Weinberg on Beer Mergers

- There has been substantial consolidation in the beer market in the last 30 years.
  - Anheuser-Busch Inbev merged with SAB Miller.
  - Of course, Anheuser-Busch merged with Inbev (Belgian company), and SAB merged with Miller.
  - Molson merged with Coors previously, then Miller with Coors.
- There is a question of how these mergers affect prices.
- You might be thinking about all the craft beers, Sierra Nevada, Poneysaurus, but they have fairly small market share.
- Ashenfelter, Hosken and Weinberg "Efficiencies brewed: pricing and consolidation in the US beer industry" looks at the merger between Miller and Coors.

Williamson Tradeoff for Beer

- ▶ There is market power in the beer market: these are differentiated products, like the hoteling model considered last class: budweiser and coors light are imperfect substitutes.
- ▶ This market is fairly concentrated pre-merger (see next slide), and the merger would further increase concentration (from HHI of 1941 to 365).
- ▶ However, there are potential cost efficiencies due to shipping costs.

Pre Merger Market Share

TABLE 1   Premerger Market Shares

Parent Company	Revenue Share
Anheuser-Busch	36.47%
Miller	17.52%
Molson/Coors	10.43%
Grupo Modelo	9.93%
Heineken	8.67%
InBev	2.99%
Boston Beer Co.	1.88%
Diageo Guinness USA	1.75%
Pabst Blue Ribbon	1.62%
D.G. Yuengling	0.9%
National HHI	1941
Predicted Δ HHI	365

Notes: Revenue shares were calculated using sales data on all beer sold in the 48 Information Resources Incorporated (IRI) regions for which we have complete data. Shares were calculated from sales data from January 2008 through May 2008. The table contains national revenue shares for the 10 largest firms.
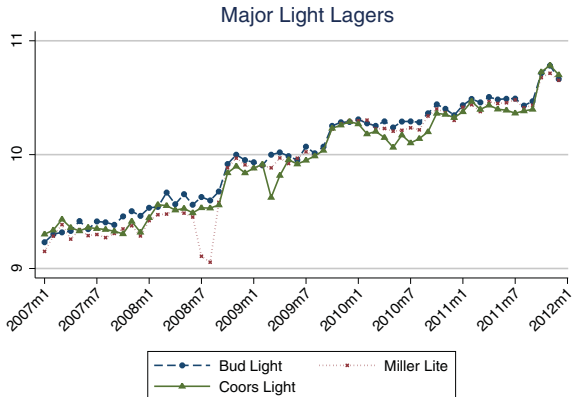
But: Price don't seem to go up so much around the merger...

Merger happens in late 2007...

FIGURE 1

AVERAGE NATIONAL PRICE OF MAJOR LIGHT LAGERS, 2007–2011

Notes: The figure plots the average price of a 144-ounce package of beer by brand over the 48 regions in our data. The regions are listed in the Appendix.


Major Light Lagers

Bud Light · · · · · Miller Lite · · · · · Coors Light

Market by Market Changes in HHI from the Merger

► Coors and Miller have different popularity across the country. So the merger affects concentration differentially across the country.

► We should see increases in prices in markets that became more concentrated...

FIGURE 2

DISTRIBUTION OF SIMULATED CHANGE IN HHI RESULTING FROM MILLER/COORS MERGER

Notes: The figure plots the distribution of two times the product of Miller's and Coors' revenue shares across geographic markets. The revenue shares were calculated on IRI scanner data covering the supermarket channel from 48 regions during the five months preceding the merger approval date (January 2008 through May 2008). These regions are listed in the Appendix.
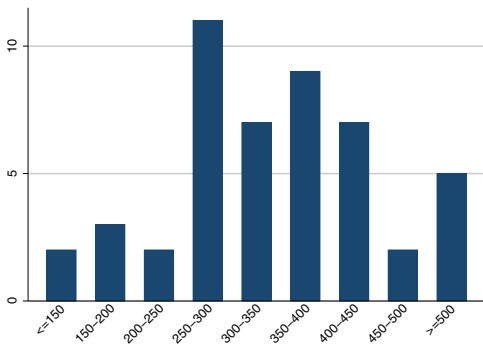
Efficiencies: Shipping Costs

- ▶ Beer is heavy, shipping is a large part of costs.
- ▶ You can see this in that a lot of "imported beer" is brewed in Canada under license.
- ▶ Coors was distinct in that it had two plants: Golden, Colorado, and Virginia, so shipping to say, San Diego would be quite expensive.
- ▶ Thus, markets which had drops in shipping cost could have lower prices...

FIGURE 3

DISTRIBUTION OF CHANGE IN DISTANCE TO NEAREST COORS BREWERY RESULTING FROM MILLER/COORS MERGER

Notes: The figure plots the distribution of the change in the number of miles to the nearest Coors brewery from each of the 48 IRI regions. Distances were calculated as the number of road miles between each IRI region and each brewery using Google Maps. The IRI regions are listed in the Appendix.
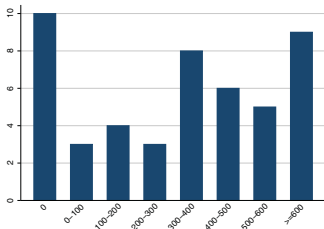
Putting it Together: Efficiencies and Concentration

FIGURE 4

AVERAGE LOG PRICE CHANGES AGAINST PREDICTED CHANGE IN HHI AND REDUCTION IN DISTANCE TO NEAREST COORS BREWERY BY MARKET

Notes: The two graphs in the first row plot the average log price change in a lager-style beer after the Miller/Coors merger against the predicted increase in the HHI and the reduction in distance to the nearest Coors brewery. Each point represents one of 48 geographic markets. Distance is measured as the reduction in hundreds of driving miles to the nearest Coors brewery. The predicted change in HHI is calculated using sales data on all beers from the five months preceding the merger's approval date of June 2008 and it is scaled between 0 and 1. The change in average log price is calculated using data from January 2007 through December 2011. The two graphs in the second row plot the residuals from a regression of the average log price change on the reduction in distance (or change in HHI) against the residuals from a regression of the change in HHI (or change in distance) on change in distance (or change in HHI). Least squares fitted lines are drawn through each scatter plot.
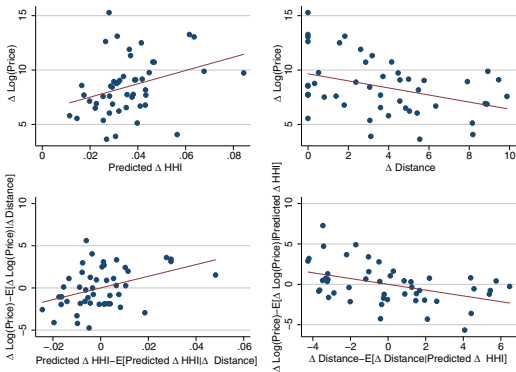
Putting it Together: Now for the regression version

$$log(p) = \alpha_1 \Delta HHI + \alpha_2 \Delta Shipping + \delta_t$$

TABLE 4   Merger Effects on Log Prices

	Dependent Variable=log(price)				
	(1)	(2)	(3)	(4)	(5)
Sim ΔHHI*PostApproval	0.360				
	(0.123)				
Sim ΔHHI*AnnouncementPeriod		0.157	0.161	0.145	0.135
		(0.0801)	(0.0803)	(0.0936)	(0.0971)
Sim ΔHHI*ShortRun		0.294	0.296	0.276	0.230
		(0.147)	(0.146)	(0.176)	(0.218)
Sim ΔHHI*LongRun		0.563	0.564	0.526	0.434
		(0.175)	(0.173)	(0.193)	(0.283)
Δ Distance*PostApproval	−0.0311				
	(0.00709)				
Δ Distance*ShortRun		−0.011	−0.0112	−0.0144	−0.0112
		(0.00551)	(0.00561)	(0.00642)	(0.00560)
Δ Distance*LongRun		−0.0485	−0.0488	−0.0555	−0.0488
		(0.00979)	(0.00989)	(0.0107)	(0.00989)
Covariates	No	No	Yes	Yes	Yes
Census region time trends	No	No	No	Yes	No
Sim ΔHHI*time trend	No	No	No	No	Yes
Average premerger price	9.73	9.73	9.73	9.73	9.73
Average -Δ Distance (thousands of miles)	0.364	0.364	0.364	0.364	0.364
Average Sim ΔHHI	0.036	0.036	0.036	0.036	0.036
Number of observations	345,379	345,379	345,379	345,379	345,379
Number of regions	48	48	48	48	48

Notes: The unit of observation is a brand-package size-region-month. Brand/Package Size/Region and Manufac-turer/Year/Month effects are included in all specifications. The estimates include monthly scanner data from 48 IRI regions from January 2007 through December 2011. Some brand/package size combinations are not sold in particular region/months. Distance is measured as the reduction in thousands of miles to the nearest Coors brewery. Sim Δ HHI is calculated as twice the product of Miller's and Coors' shares of sales by region and was calculated using sales data on all beers from the five months preceding the merger's approval date of June 2008. The HHI is scaled from 0 to 1. The third column adds regional unemployment rates and log(earnings). The fourth column adds region-specific linear time trends for each of the nine US census regions. The fifth column replaces the census region time trends with a time trend interacted with $Sim \Delta HHI$. The sample contains the top 40 selling lager-style beers. The PostApproval dummy is equal to one from June 2008 through December 2011. The AnnouncementPeriod dummy is equal to one from October 2007 until May 2008. The ShortRun dummy is equal to one from June 2008 until December 2009. The LongRun dummy is equal to one in 2010 and 2011. Standard errors clustered by geographic region are in parentheses.

Hospital Mergers: The Data

- About 5,000 hospital in the United States.
- Merger Data:
  Annual Survey of Hospitals, and the Annual Guide to Hospitals, produced by the American Hospital Association (AHA): 97 independent hospital mergers between 1989 and 1996
- Prices
  Source: Healthcare Cost Report Information System (HCRIS), a database maintained by the Centers for Medicare and Medicaid Services (CMS).

  Prices: Average hospital price in a given year is calculated as inpatient revenue per case-mix-adjusted discharge.
- Tricky: Adjustments for quality and severity of treatment. Treating me (or you) for the flu is a lot cheaper than for a 85 year old.

Mergers: Efficiency Confounding Things

- Suppose that a merger reduces costs: mix competitive effects and efficiency effects.
- Merging firms might not want to raise prices, which would attract attention from the regulator.
- Like at rivals to a merging firm.

Hospitals: Summary Stats

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Table 1

Descriptive Statistics: Sample Means

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	All Hospitals	Rivals Sample		
		All	NMW	NMWO
Dependent variables:				
1985 Price ($)	3,223	3,951	3,935	3,953
1988 Price ($)	3,404	4,057	3,737	4,107
1997 Price ($)	3,851	4,091	3,823	4,133
2000 Price ($)	3,908	4,067	4,014	4,075
ln(1988 Price) − ln(1985 price)	.064	.032	−.029	.042
ln(1997 Price) − ln(1988 price)	.132	.010	.020	.009
ln(2000 Price) − ln(1997 price)	.013	.001	.039	−.005
Merger indicators and instruments:				
Merger (%)	4.0			
Colocated (%)	3.6			
Number of rival mergers		.156	1.161	0
Number of colocated rival pairs		.332	.712	.273
Hospital characteristics:				
For profit (%)	15.2	15.2	16.1	15.0
Government (%)	25.5	10.0	8.5	10.3
Teaching hospital (%)	6.4	16.3	18.6	15.9
Medicaid share of discharges (%)	11.4	11.2	15.1	10.6
Debt/asset ratio (%)	55.1	55.7	58.9	55.2
Occupancy rate (%)	56.5	66.3	67.7	66.1
Beds:				
0–99 (%)	41.0	5.4	10.2	4.6

Hospitals: Regressions

(look at columns 3 and 4 for now)

Table 4

Effect of Rival Mergers on Price Growth: ln(1997 Price) − ln(1988 Price)

	Instrumental Variables		Ordinary Least Squares	
	(1)	(2)	(3)	(4)
Number of rival mergers	.376**	.301*	.016	−.003
	(.132)	(.147)	(.026)	(.027)
State fixed effects	No	Yes	No	Yes

Note. Hospital and market characteristics are included for all specifications. $N = 877$.
 * Significant at $p < .05$.
 ** Significant at $p < .01$.

Hospitals: Issue

- What if mergers happen in places where prices are likely to go up (or down)?
- This will confound our merger estimates.
- Need an instrument: something that affects mergers, but not prices. You can think of this as a quasi-experiment: need mergers to happen in a way that is not mixed up with any other trends in the market.
- Instrument
  This paper uses the presence of a lot of co-located rivals: rival hospitals nearby.

Hospitals: Regressions with Instrument

(look at columns 1 and 2 for now)

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30 percent increases!

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