

Using Mergers to Test a Model of Oligopoly

**Matthew
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Introduction

- On average each year the FTC and DOJ conduct 75 major investigations of horizontal mergers.
- Two types of merger studies: retrospective and simulation studies.
- Retrospectives provide important information on antitrust policy, but often unclear on how this information guides decision making in specific cases.
- Simulating a merger with demand estimates for differentiated products and a static Bertrand pricing model

Contributions

- Study two consumer product mergers with data that covers a period before and after the mergers occurred.
- Various demand systems are estimated on pre-merger data and used to simulate mergers with a static Bertrand model.
- Syrup merger had large simulated price changes (typically larger than 5%) and the oil merger had small price changes (less than 5%).
- We then add to the sample post-merger data and estimate the actual price effects with a difference and a difference-in-difference estimator.
- Simulations reverse the rank order of the price effects: predict a large price increase when actuals are low and vice versa.

Contributions

- We then study different explanations for the difference

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Simulations

- Assuming demand, marginal costs, and the nature of competition do not change, post-merger prices solve merged firms' first-order conditions:

$$\sum_{j \in J_f} \left(\frac{p_{j,i} - mc_j}{p_j} \right)^2 z_{j,i}(p_1) = 0$$

Backcasts $2am6mc_j$

Data

- IRI Scanner Data
- Pennzoil/Quaker State
- Consummated in December of 1998. Data from January, 1997 until December, 2000 over 10 regions.
- Log Cabin/Mrs. Butterworth
- Consummated in July of 1997. Data from October, 1996 until March, 1998 over 49 regions.

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Estimated and Simulated Oil Percentage Price Effects

Products	Estimated Price Changes		Simulated Price Changes
	Difference in Difference	Difference	<u>AIDS</u> OLS
Pennzoil/Quaker State Merger			
Castrol GTX	8.05 (1.78)	6.77 (1.46)	1.19 (0.52, 1.99)
Havoline	-4.32 (1.54)	-6.43 (1.54)	0.78 (0.27, 1.37)
Mobil	7.48 (1.25)	5.45 (1.11)	0.21 (-0.01, 0.51)
Pennzoil	3.71 (1.91)	1.95 (1.79)	2.59 (0.08, 5.68)
Private Label	- -	-2.14 (0.67)	1.41 (-0.20, 4.30)
Quaker State	7.65 (1.53)	5.63 (1.45)	7.49 (2.81, 13.58)
Valvoline	5.60 (2.61)	3.78 (1.93)	0.78 (0.02, 1.49)

Estimated and Simulated Oil Percentage Price Effects

Products	Estimated Price Changes		Simulated Price Changes	
	Difference in Difference	Difference	OLS	<u>AIDS</u> IV
Pennzoil/Quaker State Merger				
Castrol GTX	8.05 (1.78)	6.77 (1.46)	1.19 (0.52, 1.99)	-1.36 (-37.95, 11.43)
Havoline	-4.32 (1.54)	-6.43 (1.54)	0.78 (0.27, 1.37)	-27.82 (-116.00, -4.67)
Mobil	7.48 (1.25)	5.45 (1.11)	0.21 (-0.01, 0.51)	3.12 (-9.30, 25.37)
Pennzoil	3.71 (1.91)	1.95 (1.79)	2.59 (0.08, 5.68)	216.17 (25.19, 3272.03)
Private Label	- (0.67)	-2.14 (0.67)	1.41 (-0.20, 4.30)	24.49 (3.25, 167.30)
Quaker State	7.65 (1.53)	5.63 (1.45)	7.49 (2.81, 13.58)	115.79 (26.14, 1094.64)
Valvoline	5.60 (2.61)	3.78 (1.93)	0.78 (0.02, 1.49)	32.75 (1.02, 169.87)

Estimated and Simulated Oil Percentage Price Effects

Products	Estimated Price Changes		Simulated Price Changes					
	Difference in Difference	Difference	AIDS		Linear		Logit	
			OLS	IV	OLS	IV	OLS	IV
Pennzoil/Quaker State Merger								
Castrol GTX	8.05 (1.78)	6.77 (1.46)	1.19 (0.52, 1.99)	-1.36 (-37.95, 11.43)	0.26 (0.01, 0.58)	0.05 (-0.23, 0.41)	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)
Havoline	-4.32 (1.54)	-6.43 (1.54)	0.78 (0.27, 1.37)	-27.82 (-116.00, -4.67)	0.36 (0.04, 0.82)	-0.67 (-2.84, 1.13)	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)
Mobil	7.48 (1.25)	5.45 (1.11)	0.21 (-0.01, 0.51)	3.12 (-9.30, 25.37)	0.16 (0.02, 0.34)	0.11 (-0.14, 0.50)	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)
Pennzoil								
Private Label	3.71 (1.91)	1.95 (1.79)	2.59 (0.08, 5.68)	216.17 (25.19, 3272.03)	0.40 (-0.16, 1.04)	1.55 (0.58, 3.86)	0.05 (0.04, 0.06)	0.04 (0.03, 0.05)
Quaker State								
Valvoline	- (1.53)	-2.14 (0.67)	1.41 (-0.20, 4.30)	24.49 (3.25, 167.30)	0.16 (-0.99, 1.58)	-0.01 (-0.79, 0.73)	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)
	7.65 (1.53)	5.63 (1.45)	7.49 (2.81, 13.58)	115.79 (26.14, 1094.64)	4.12 (1.60, 7.21)	5.10 (1.02, 12.15)	0.16 (0.14, 0.19)	0.15 (0.12, 0.17)
	5.60 (2.61)	3.78 (1.93)	0.78 (0.02, 1.49)	32.75 (1.02, 169.87)	0.42 (0.07, 0.79)	0.47 (0.10, 1.46)	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)

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Percentage Changes in Marginal Costs Necessary to Equate Simulated and Actual Price Changes

Products	<u>Simulation Model</u>					
	<u>AIDS</u>		<u>Linear</u>		<u>Logit</u>	
	OLS	IV	OLS	IV	OLS	IV
Pennzoil/Quaker State Merger						
Pennzoil	-1.27	-75.25	2.67	5.37	2.99	2.78
Quaker State	-5.14	-67.17	-0.03	-1.50	9.01	8.36
Log Cabin/Mrs Butterworth Merger						
Log Cabin	-22.44	315.06	1.33	153.02	-10.02	-9.29
Mrs Butterworth	-23.81	599.74	-11.74	250.25	-18.46	-17.63

Simulated Percentage Price Changes with Di[®]erent Overall Elasticities of Demand and OLS AIDS at Bottom Stage

Products

Simulated Percentage Price Changes with Di[®]erent Outside Shares for IV Logit

Products	$2\frac{1}{3}$ Quarts per Month	$1\frac{2}{3}$ per Month	1 per Month	$\frac{1}{3}$ per month
Pennzoil/Quaker State Merger				
Pennzoil	0.008 (0.007, 0.01)	0.024 (0.021, 0.029)	0.040 (0.034, 0.048)	0.056 (0.048, 0.068)
Quaker State	0.027 (0.023, 0.034)	0.083 (0.071, 0.101)	0.139 (0.119, 0.167)	0.195 (0.166, 0.236)
	1 Serving per Day	4 per Month	2 per Month	1 per Month
Log Cabin/Mrs Butterworth Merger				
Log Cabin	0.19 (0.17, 0.22)	1.43 (1.30, 1.67)	2.89 (2.60, 3.36)	5.78 (4.99, 6.89)
Mrs Butterworth	0.22 (0.20, 0.25)	1.66 (1.51, 1.94)	3.42 (3.07, 3.96)	7.38 (6.37, 8.79)

Conclusions

- Simulations reverse the rank order of price changes.
- Large simulated price changes for competitively benign merger, small simulated price changes for merger that resulted in moderate price increases.
- However, oil simulations are similar to actual price changes in magnitude and rank order of merging brands.
- Results are similar to Peters (2007) in reversing rank order of price effects.