

# Merger spillovers on profitability and sales

Klaus Gugler and Florian Szücs

July 12, 2012

14th Centre for Competition and Regulatory Policy Workshop

Wirtschaftsuniversität Wien



**WIRTSCHAFTS  
UNIVERSITÄT  
WIEN** VIENNA  
UNIVERSITY OF  
ECONOMICS  
AND BUSINESS

# Motivation and research questions

- Quantity and price-setting oligopolies: merger insiders profit less (if at all) than outsiders
  - Quantities are strategic substitutes: merging firms lower, outsiders increase output (Salant et al. 1983, Perry & Porter 1985, Farrell & Shapiro 1990)
  - Prices are strategic complements: both merging firms and outsiders increase prices, merging firms more (Deneckere & Davidson 1985)
- In both cases the competitors increase their market share and profits
  - ⇒ well-developed theory, no empirics

# Approach

- Relevant rivals in merger cases from DG Competition's market investigation
- Delineation of spillover via relevant geographic market
- Estimation of causal effect of spillover
  - Propensity-score matching
  - Difference in difference estimation

## Related literature: price-effects on rivals

- Dafny (2009): hospital mergers induced price increases in rivals
- Kim & Singal (1993): airline mergers increased rivals' prices on the same routes
- Prager & Hannan (1998): mergers in US banking led to lower deposit rates of rivals
- Survey: Weinberg (2008)

⇒ empirical studies indicate, that rival prices increase significantly after a merger

# Predictions from theory

- $n$ -player Cournot oligopoly,  $MC = 1$ ,  $p = a - \sum_{i=1}^n q_i$
- $\Pi_i^{pre} = \left(\frac{a-c}{n+1}\right)^2$
- Merger efficiencies  $c_M < c \rightarrow \Pi_i^{post} = \left(\frac{a-2c+c_M}{n}\right)^2$
- Critical values for  $c_M$  such that  $\Pi_i^{post} \geq \Pi_i^{pre}$ :

Table: Critical values of  $c_M$

	$a = 2$	$a = 4$	$a = 10$
$n = 3$	$\frac{3}{4}$	$\frac{1}{4}$	0
$n = 5$	$\frac{5}{6}$	$\frac{1}{2}$	0
$n = 10$	$\frac{10}{11}$	$\frac{8}{11}$	$\frac{2}{11}$

# Constructing the dataset

## Data

- 241 EU merger cases: merging parties, relevant competitors, geographic markets
- Firm-level data: yearly time-series data on profitability, sales, total assets, Tobin's Q, ...

## Two samples

- Consolidated firms: 59 consolidated entities, 173 competitors
- Acquirers: 129 acquiring firms, 354 competitors

# Propensity-score matching

Table: Propensity score estimation

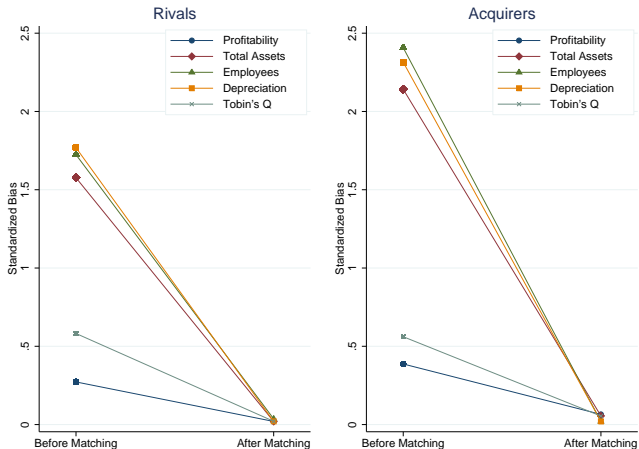
	Rivals		Acquirers	
Profitability	0.267	(0.330)	1.136*	(0.602)
Total Assets	0.092***	(0.027)	0.051	(0.045)
Employees	0.120***	(0.022)	0.208***	(0.038)
Depreciation	0.074***	(0.027)	0.104**	(0.048)
Tobin's Q	0.029**	(0.014)	0.043*	(0.023)
Observations	322173		322173	
Pseudo $R^2$	0.211		0.281	
Treated	354		129	

Standard errors in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Categorical matching on: time, geographic market

## Balance

Figure: Standardized biases before and after matching



Controls for selection on observables



# Difference in difference

Estimation occurs in contrast to a control group:

$$\Delta\pi_{ij} = \alpha + \sum_{j=1}^5 \delta_{ij} + \varepsilon_{ij} \quad (1)$$

Controls for time-constant, individual effects and macro/time trends

## Remaining issues

Temporary individual shocks

Pre-merger profit levels of acquirers and competitors are largely constant

⇒ no evidence for systematic shocks

# Remaining issues

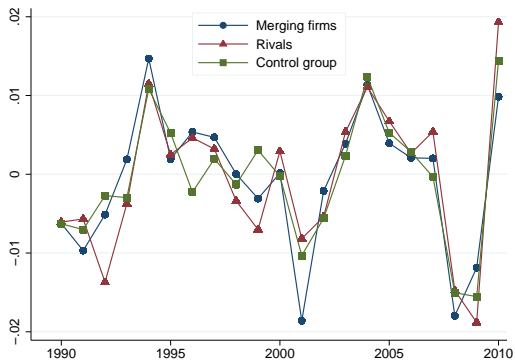
Temporary individual shocks

Pre-merger profit levels of acquirers and competitors are largely constant

⇒ no evidence for systematic shocks

Differential trends

Figure: Average yearly change in profitability



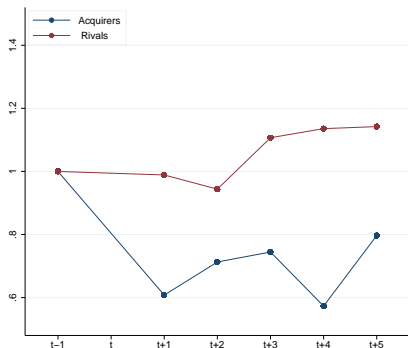
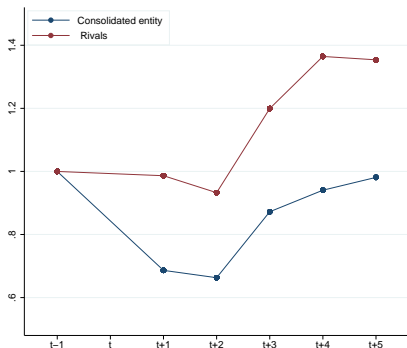
## Spillover on sales

Table: Spillover on sales

		Consolidated firms		Acquirers	
Rivals vs. control group	Rival t+1	-0.080***	(0.029)	-0.041**	(0.021)
	Rival t+2	-0.066**	(0.030)	-0.028	(0.021)
	Rival t+3	-0.001	(0.031)	0.015	(0.022)
	Rival t+4	0.056*	(0.033)	0.029	(0.023)
	Rival t+5	0.103***	(0.035)	0.041	(0.026)
	Observations	1438		2772	
Merging firms vs. control group	Merging t+1	-0.080*	(0.043)		
	Merging t+2	-0.080*	(0.044)	-0.037*	(0.022)
	Merging t+3	-0.017	(0.047)	-0.023	(0.023)
	Merging t+4	-0.044	(0.050)	-0.028	(0.024)
	Merging t+5	0.029	(0.053)	-0.002	(0.026)
	Observations	482		805	
Rivals vs. merging firms	Rival t+1	0.037	(0.034)		
	Rival t+2	0.057*	(0.034)	-0.021	(0.017)
	Rival t+3	0.105***	(0.035)	0.020	(0.018)
	Rival t+4	0.155***	(0.036)	0.039**	(0.018)
	Rival t+5	0.195***	(0.038)	0.070***	(0.020)
	Observations	908		1391	

# Evolution of profitability

Figure: Evolution of profitability in the post-merger period



## Spillover on profitability

Table: Spillover on profitability

		Consolidated firms		Acquirers	
Rivals vs. control group	Rival t+1	-0.002	(0.004)	0.001	(0.003)
	Rival t+2	-0.002	(0.004)	-0.000	(0.003)
	Rival t+3	0.005	(0.004)	0.005*	(0.003)
	Rival t+4	0.012***	(0.004)	0.004	(0.003)
	Rival t+5	0.010**	(0.005)	0.010***	(0.003)
	Observations	1417		2735	
Merging firms vs. control group	Merging t+1	-0.008	(0.005)	-0.012***	(0.005)
	Merging t+2	-0.008	(0.006)	-0.012**	(0.005)
	Merging t+3	-0.003	(0.006)	-0.012**	(0.005)
	Merging t+4	-0.005	(0.006)	-0.013**	(0.005)
	Merging t+5	0.006	(0.007)	-0.010*	(0.006)
	Observations	477		1043	
Rivals vs. merging firms	Rival t+1	0.001	(0.005)	0.009**	(0.003)
	Rival t+2	0.002	(0.005)	0.007*	(0.003)
	Rival t+3	0.009*	(0.005)	0.013***	(0.004)
	Rival t+4	0.016***	(0.005)	0.012***	(0.004)
	Rival t+5	0.013**	(0.005)	0.019***	(0.004)
	Observations	896		1794	

# Conclusion

- We evaluate the reaction of 173 (354) rival firms to a merger in the industry, finding that:
  - they increase their output by 7-20% relative to the merging firms
  - their relative profitability (ROA) increases by 1-2 percentage points
- The merging firms lose market shares and their profitability decreases
- Apparently, merger simulation in oligopoly models tells us something about the real world

- Dafny, L. (2009), 'Estimation and identification of merger effects: An application to hospital mergers', *Journal of Law and Economics* 52(3), 523–550.
- Deneckere, R. & Davidson, C. (1985), 'Incentives to form coalitions with bertrand competition', *The RAND Journal of Economics* pp. 473–486.
- Farrell, J. & Shapiro, C. (1990), 'Horizontal mergers: An equilibrium analysis', *The American Economic Review* pp. 107–126.
- Kim, E. & Singal, V. (1993), 'Mergers and market power: Evidence from the airline industry', *The American Economic Review* pp. 549–569.
- Perry, M. & Porter, R. (1985), 'Oligopoly and the incentive for horizontal merger', *The American Economic Review* 75(1), 219–227.
- Prager, R. & Hannan, T. (1998), 'Do substantial horizontal mergers generate significant price effects? evidence from the banking industry', *The Journal of Industrial Economics* 46(4), 433–452.



- Salant, S., Switzer, S. & Reynolds, R. (1983), 'Losses from horizontal merger: the effects of an exogenous change in industry structure on cournot-nash equilibrium', *The Quarterly Journal of Economics* **98**(2), 185.
- Weinberg, M. (2008), 'The price effects of horizontal mergers', *Journal of Competition Law and Economics* **4**(2), 433.