Mergers and Acquisitions under Common Ownership

By Miguel Antón, Florian Ederer, Mireia Giné, and Bruno Pellegrino*

Over the past quarter century, the U.S. economy has seen an increase in employment and revenue concentration across many industries (Grullon, Larkin and Michaely, 2019) and a concentration of corporate equity ownership among a small number of large institutional investors leading to the rise of common ownership (Azar, 2012; Backus, Conlon and Sinkinson, 2021). These trends have raised concerns about the role of antitrust enforcement, in particular its effectiveness of dealing with mergers. In this paper we show that mergers increasingly occur between firms that sell similar products to consumers and also share the same set of owners. We further show that the economy-wide effects of mergers on profits, consumer surplus and total surplus are substantial even when firms are assumed to internalize common ownership concerns before mergers occur.

The relationship between mergers and common ownership has a long intellectual history. Hansen and Lott (1996) and Matvos and Ostrovsky (2008) show how common ownership of the target by acquirer shareholders may help explain the negative acquirer announcement return puzzle as the increase in value of the target could offset losses on the acquirer side.[1] Anton et al. (2022) point out that diversified acquirer shareholders, who hold broad portfolios of industry firms, can internalize not only gains from the target, but also gains from non-merging rival firms which may further reduce shareholder incentives to oppose deals with negative acquirer returns. Their findings are in line with Brooks, Chen and Zeng (2018) who document that common ownership between two firms increases the probability of them merging. Most recently, Conlon (2022) warns that incorporating common ownership into merger analysis may make product markets appear less competitive pre-merger and limit the extent to which the merger can further reduce competition. This would weaken the ability of the agencies to enforce horizontal mergers in product markets relative to the status quo.

I. Theory

We employ the general equilibrium model of Pellegrino (2019) and Ederer and Pellegrino (2022) in which n single-product granular firms with overlapping ownership produce differentiated products and compete in a network game of Cournot oligopoly. Goods are modeled as linear bundles of characteristics. A representative agent consumes all the goods produced in the economy, supplies labor as a production input, and receives income from owning shares of the firms in the economy. This agent has quadratic utility over product characteristics which yields the following linear demand system

$$\mathbf{p} = \mathbf{b} - (\mathbf{I} + \mathbf{\Sigma})\,\mathbf{q}. \tag{1}$$

where $\mathbf{p}$ and $\mathbf{q}$ are the price and quantity vectors, $\mathbf{b}$ is the vector of demand intercepts which can be interpreted as measures of product quality, and $\mathbf{\Sigma}$ is the $n \times n$ matrix of price-quantity derivatives for all pairs of products.

Under common ownership each firm i's objective function is given by

$$\phi_i \;\propto\; \pi_i + \sum_{j \neq i} \kappa_{ij} \pi_j \tag{2}$$

* Antón: IESE Business School, manton@iese.edu. Ederer: School of Management, Yale University; and NBER, florian.ederer@yale.edu. Giné: IESE Business School, mgine@iese.edu. Pellegrino: Robert H. Smith School of Business, University of Maryland, bpellegr@umd.edu.

[1] However, Harford, Jenter and Li (2011) argue that cross-ownership at the shareholder level is not significant enough to compensate acquirer shareholders in value-reducing acquisitions.

where κ_{ij} is the weight that firm i attaches to firm j's profits. It is defined as

$$\kappa_{ij} \equiv \frac{\sum_z s_{iz} s_{jz}}{\sum_z s_{iz} s_{iz}} \tag{3}$$

where s_{iz} is the ownership share of firm i accruing to shareholder z. κ_{ij} is 0 when firms i and j do not have any shareholders in common and, loosely speaking, κ_{ij} is higher when the two firms are more similar in terms of their shareholders. The $n \times n$ matrix $\mathbf{K}$ contains the bilateral common ownership weights κ_{ij} for all the firms in the economy.

The Cournot-Nash equilibrium quantity allocation under common ownership $\mathbf{q}^{\Xi}$ in which each firm i chooses its quantity q_i to maximize the weighted portfolio profits ϕ_i of its shareholders is

$$\mathbf{q}^{\Xi} = (2\mathbf{I} + \mathbf{\Sigma} + \mathbf{K} \circ \mathbf{\Sigma})^{-1} \left(\mathbf{b} - \mathbf{c}^0\right) \tag{4}$$

where the $\circ$ operator denotes the Hadamard (element-by-element) product and $\mathbf{c}^0$ is the vector of marginal costs.

Under standard Cournot competition there are no common ownership effects and thus $\kappa_{ij} = 0$. Each firm i simply sets q_i to maximize π_i without any regard for the profit impact of its production decisions on other firms. The Cournot allocation $\mathbf{q}^{\Psi}$ is

$$\mathbf{q}^{\Psi} = (2\mathbf{I} + \mathbf{\Sigma})^{-1} \left(\mathbf{b} - \mathbf{c}^0\right). \tag{5}$$

II. Data

To estimate the model presented in Section I, we map the various theoretical concepts to observed and identified variables and parameters.

A. Firm Financials

We measure revenues, variable costs, and fixed costs in our model by using data from Compustat. These variables correspond to accounting revenues, Costs of Goods Sold (COGS), and Selling General and Administrative (SGA) costs, respectively.

B. Text-Based Product Similarity

Hoberg and Phillips (2016) provide an empirical estimate of the matrix of product-based cosine similarities between firms by text-mining the business description section of 10-K forms of all publicly-listed U.S. firms. Specifically, for each firm i they use a vocabulary of 61,146 words to construct a normalized vector of word occurrences. Pellegrino (2019) shows how to identify the matrix $\mathbf{\Sigma}$ from the Hoberg and Phillips (2016) cosine similarity data.

C. Ownership Data

We calculate the matrix of common ownership profit weights $\mathbf{K}$ from 13(f) filings. We combine 13(f) data from Thomson Reuters obtained through the WRDS platform and from Backus, Conlon and Sinkinson (2021) who directly parsed the data contained in 13(f) forms.

III. Results

A. Features of Mergers

To describe patterns of mergers between public firms and how these patterns have changed over time we use the database of announced mergers between public firms constructed by Ewens, Peters and Wang (2019) and Phillips and Zhdanov (2013) which covers publicly-traded companies up to 2016. During this time there is no significant trend in the intensity of M&A activity among public corporations. The ratio of the number of merging firms to the number of total firm pairs has steadily remained at around 12 per million over our sample period.

Using the cross-price elasticities for all public firm pairs we can examine the evolution of M&A activity in terms of product substitutability. To measure product market interaction among merging companies we utilize the diversion ratio DR_{ij} which is the change in quantity q_i demanded of product i for a price change p_j in product j that yields a unit decrease in the quantity

Deciles of Diversion Ratio	Deciles of Common Ownership: 1	2	3	4	5	6	7	8	9	10	
1	4.8%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.7%	0.9%	2.2%	9.0%
2	1.3%	0.7%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.2%	0.9%	3.4%
3	0.1%	1.3%	0.2%	0.0%	0.0%	0.0%	0.1%	0.1%	0.3%	0.9%	2.9%
4	0.0%	0.5%	0.6%	0.1%	0.0%	0.0%	0.1%	0.1%	0.1%	0.5%	2.0%
5	0.0%	0.1%	0.5%	0.3%	0.0%	0.0%	0.0%	0.0%	0.1%	0.4%	1.5%
6	0.0%	0.0%	0.2%	0.3%	0.3%	0.0%	0.0%	0.1%	0.1%	0.5%	1.6%
7	0.0%	0.0%	0.1%	0.5%	0.3%	0.2%	0.1%	0.1%	0.1%	0.4%	1.7%
8	0.0%	0.0%	0.0%	0.3%	0.7%	0.6%	0.4%	0.3%	0.4%	1.0%	3.6%
9	0.0%	0.0%	0.0%	0.2%	1.7%	0.9%	1.8%	0.5%	0.8%	2.2%	8.2%
10	0.0%	0.0%	0.0%	0.0%	5.9%	16.0%	4.0%	16.8%	6.3%	17.0%	66.0%
	6.3%	2.6%	1.6%	1.6%	8.9%	18.0%	6.8%	19.0%	9.3%	26.0%	

Deciles of Diversion Ratio	Deciles of Common Ownership: 1	2	3	4	5	6	7	8	9	10	
1	2.3%	0.0%	0.0%	0.0%	0.0%	0.2%	0.3%	0.5%	0.9%	1.8%	6.0%
2	1.3%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	0.3%	0.3%	0.7%	3.0%
3	0.3%	0.7%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.2%	0.6%	2.1%
4	0.0%	0.7%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.1%	1.4%
5	0.0%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.3%	1.1%
6	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.3%	1.3%
7	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.3%	1.1%
8	0.0%	0.0%	0.8%	1.2%	0.1%	0.2%	0.2%	0.4%	0.5%	1.0%	4.3%
9	0.0%	0.0%	0.1%	3.3%	0.1%	0.3%	0.3%	0.7%	1.0%	2.1%	8.1%
10	0.0%	0.0%	0.0%	18.5%	9.9%	3.0%	4.7%	6.9%	9.2%	19.5%	71.7%
	3.9%	1.9%	2.1%	23.0%	10.3%	4.0%	6.1%	9.2%	12.7%	26.8%	

FIGURE 1. DISTRIBUTION OF MERGERS (1996-2005 AND 2006-2015)

Note: Distribution of merging firm pairs by common ownership weight and diversion ratio deciles for 1996-2005 (left) and 2006-2015 (right).

demanded of product j:

$$DR_{ij} \equiv \frac{\partial q_i}{\partial p_j}\left(\frac{\partial q_j}{\partial p_j}\right)^{-1} = \frac{(\mathbf{I}+\mathbf{\Sigma})^{-1}_{ij}}{(\mathbf{I}+\mathbf{\Sigma})^{-1}_{jj}}$$

For every firm pair ij we compute common ownership weights and implied diversion ratios. We then construct (within-year) decile bins for both dimensions and compute what proportion of mergers between a pair of two firms falls into each one of the resulting bins. Figure 1 reports the distribution of mergers of public firms for 1996-2005 and 2006-2015 ordered along these two dimensions, the estimated diversion ratio and the level of common ownership between the two merging parties.

Over the entirety of our sample mergers were heavily concentrated among firm pairs with high diversion ratios. 67.9% of all mergers between public firms involved pairs of firms in the highest decile of diversion ratios. Mergers were also particularly frequent between firms with degrees of common ownership. 26.3% of all mergers fell in the highest decile of common ownership. Thus, taken together mergers were particularly frequent between firms that share a high degree of product similarity and ownership.

The tendency of mergers to occur between firms with high diversion ratios and high levels of common ownership also intensified over time. In the first part of sample 66.0% of mergers were among firm pairs in the highest decile of diversion ratios with this number rising to 71.7% in the second part. This increasing tendency of mergers to occur between firms with high diversion ratios between them is mostly driven by the extremes. From 1996 to 2015 the median diversion ratio only marginally increased from 0.964 to 0.987 whereas the mean increased from 0.767 to 0.848. The increase over time of mergers with high common ownership mirrors that for product similarity. Between 1996 and 2005 35.3% of mergers were between firms in the two highest deciles of common ownership whereas between 2006 and 2015 the same number rose to 39.5%. As with the diversion ratio this increase is not because mergers have higher common ownership across the board. From 1996 to 2015 the median and the mean common ownership between merging parties actually decreased from 0.776 to 0.718 and 0.658 to 0.633, respectively.

However, our analysis should not lead to the premature conclusion that the trend we document constitutes incontrovertible evidence of a harm to competition or consumers. Our analysis does not capture merger-related efficiencies which may lower production cost or increase quality as doc-

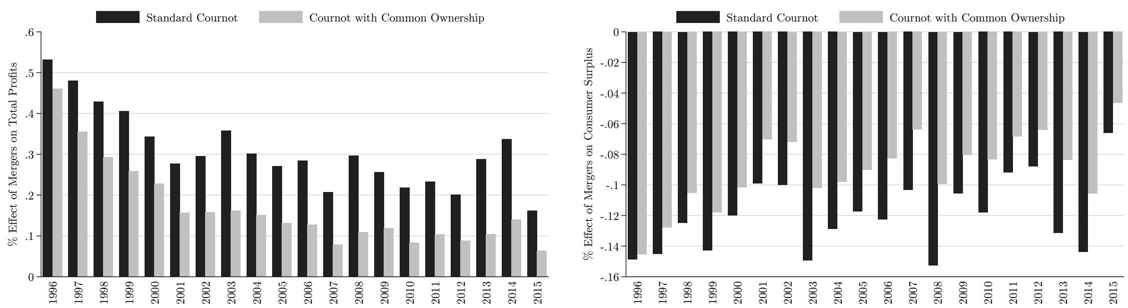

FIGURE 2. EFFECT OF MERGERS ON PROFITS AND CONSUMER SURPLUS

Note: Estimates of the annual effect of mergers on profits (left) and consumer surplus (right) under standard Cournot competition (black bars) and Cournot competition with common ownership (gray bars).

umented by Hoberg and Phillips (2010). However, this trend towards concentration of M&A activity between firms that overlap in their product characteristics and their ownership warrants further investigation of the welfare impact of mergers.

B. *Distributional Effects of Mergers*

We now turn to analyzing the distributional effects of mergers under different assumptions of firm governance and behavior. In each year, we simulate all of the mergers that are announced the following year. We estimate the counterfactual scenario of what firm profits, consumer surplus and total surplus would be if all the mergers that are announced in the following year were already consummated this year. Thus, rather than having two merging firms operate separately and compete with each other (and all other firms) for another year we simulate what outcomes would obtain if the two firms already merged and coordinated their quantity decisions this year. Critically, we do so for two different assumptions of firm behavior: standard Cournot competition leading to the allocation in equation (5) and Cournot competition with common ownership which results in the allocation shown in equation (4).

The left panel of Figure 2 reports the effect of mergers on firm profits under standard Cournot competition (black bars) and Cournot competition with common ownership (gray bars). Under the assumption of standard Cournot competition, mergers raise total firm profits by between 0.17% to 0.53%. However, the profit-increasing effect of mergers is substantially smaller if firms are assumed to internalize the common ownership concerns of their shareholders. Mergers raise profits by between 0.06% and 0.47% under this scenario. The reduction in the profit-enhancing effect of mergers due to common ownership is particularly pronounced in the later part of our sample in which the profit increase from mergers under common ownership is only about 40% the effect under standard Cournot competition. This is due to the fact that mergers increasingly occur between firms that share a lot of common owners and thus already internalize the profit impact on each other even before the merger. Common ownership acts like a partial merger between firms and thus mergers have less of a profit impact. Although common ownership on its own is beneficial for profits, it dampens the profit increases resulting from mergers.

The reverse picture emerges from the right panel of Figure 2 which reports the effect of mergers on consumer surplus. In a given year mergers reduce consumer surplus by between 0.06% and 0.15% under standard Cournot competition and by between 0.05% and 0.14% under Cournot competition with common ownership. This reduction in consumer surplus occurs even though mergers raise profits which are redistributed to the representative agent thus allowing her to purchase and consume more

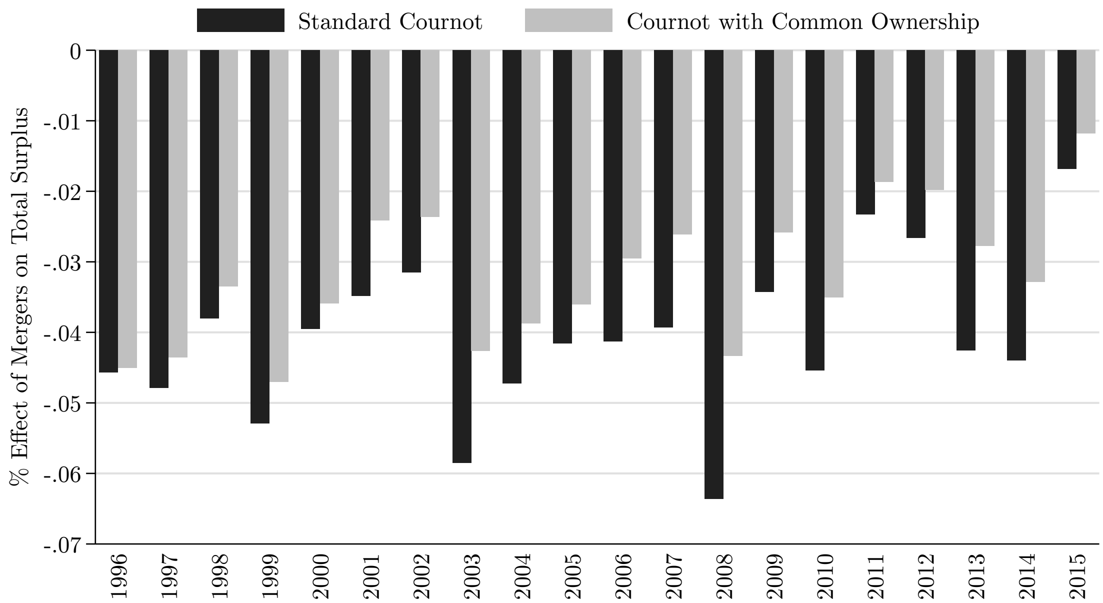

FIGURE 3. MERGERS AND TOTAL SURPLUS

Note: Estimates of the annual effect of mergers on total surplus under standard Cournot competition (black bars) and Cournot competition with common ownership (gray bars).

goods. Although the presence of common ownership concerns reduces the magnitude of the effect of mergers on consumer surplus, this dampening effect is much less pronounced than for profits. The harm to consumer surplus from mergers under common ownership is essentially the same as the harm under standard Cournot competition in 1996 and slightly over 70% in 2015.

Figure 3 combines the impact on firm profits and consumer surplus and reports the effect of mergers on total surplus taking into account that consumer surplus constitutes about 80% of total surplus. Mergers reduce total surplus by as much as 0.06% under Cournot competition and 0.05% under Cournot competition with common ownership. Thus, even in the presence of common ownership the estimated welfare loss resulting from mergers remains large.

IV. Conclusion

We document the high and increasing tendency of mergers to occur between firms that are similar in terms of their product characteristics and ownership. Although common ownership leads to a pre-merger internalization of profits between firms and thereby diminishes the estimated effects of mergers, even under high and increasing levels of common ownership mergers continue to substantially affect profits, consumer surplus, and total surplus.

REFERENCES

Anton, Miguel, José Azar, Mireia Gine, and Luca X Lin. 2022. "Beyond the target: M&A decisions and rival ownership." *Journal of Financial Economics*, 144(1): 44–66.

Azar, José. 2012. "A new look at oligopoly: Implicit collusion through portfolio diversification." *Ph.D. Thesis, Princeton University.*

Backus, Matthew, Christopher Conlon, and Michael Sinkinson. 2021. "Common Ownership in America: 1980–2017." *American Economic Journal: Microeconomics*, 13(3): 273–308.

Brooks, Chris, Zhong Chen, and Yeqin Zeng. 2018. "Institutional cross-ownership and corporate strategy: The case of mergers and acquisitions." *Journal of Corporate Finance*, 48: 187–216.

Conlon, Christopher. 2022. "Comment on Common Ownership and Merger Guidelines." *NYU Stern School of Business.*

Ederer, Florian, and Bruno Pellegrino. 2022. "A Tale of Two Networks: Common Ownership and Product Market Rivalry." *NBER Working Paper.*

Ewens, Michael, Ryan H Peters, and Sean Wang. 2019. "Measuring intangible capital with market prices." *NBER Working Paper.*

Grullon, Gustavo, Yelena Larkin, and Roni Michaely. 2019. "Are US industries becoming more concentrated?" *Review of Finance*, 23(4): 697–743.

Hansen, Robert G, and John R Lott. 1996. "Externalities and corporate objectives in a world with diversified shareholder/consumers." *Journal of Financial and Quantitative Analysis*, 31(1): 43–68.

Harford, Jarrad, Dirk Jenter, and Kai Li. 2011. "Institutional cross-holdings and their effect on acquisition decisions." *Journal of Financial Economics*, 99(1): 27–39.

Hoberg, Gerard, and Gordon Phillips. 2010. "Product market synergies and competition in mergers and acquisitions: A text-based analysis." *The Review of Financial Studies*, 23(10): 3773–3811.

Hoberg, Gerard, and Gordon Phillips. 2016. "Text-based network industries and endogenous product differentiation." *Journal of Political Economy*, 124(5): 1423–1465.

Matvos, Gregor, and Michael Ostrovsky. 2008. "Cross-ownership, returns, and voting in mergers." *Journal of Financial Economics*, 89: 391–403.

Pellegrino, Bruno. 2019. "Product Differentiation and Oligopoly: A Network Approach." *WRDS Research Paper.*

Phillips, Gordon M, and Alexei Zhdanov. 2013. "R&D and the incentives from merger and acquisition activity." *Review of Financial Studies*, 26(1): 34–78.