THE COMPETITIVE EFFECTS OF COMMON OWNERSHIP: THEORY, APPLICATIONS, AND MIS-APPLICATIONS

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I. INTRODUCTION

In the 1990s, I helped develop a theory of partial ownership to analyze the competitive effects of partial, common ownership of competing firms.[2] Twenty years later, empirical work purportedly motivated by that theory claimed to show that the common ownership of airlines and banks by institutional investors raises airfares and banking fees.[3] Because a large fraction of publicly-traded stock is held by institutional investors, these papers had a huge impact.[4] Academic interest in common ownership by institutional investors took off, and policy interest rose in tandem.[5] The impact is wide-ranging: Some commentators suggest that the rise in common ownership might explain historically high profit margins;[6] antitrust investigations have weighed the impact of common ownership by institutional investors in their decisions;[7] the law and economics conference community has held multiple sessions on common ownership;[8] the OECD and U.S. Federal Trade Commission have held meetings and hearings on the topic, etc.[9]

2 O'Brien, Daniel, & Stephen Salop, "Competitive Effects of Partial Ownership: Financial Interest and Corporate Control," *Antitrust Law Journal*, 67, no. 3 (2000): 559-614. The theory is developed in detail in the Appendices.

3 Azar, J., Schmalz, M.C. & Tecu, I., 2018, "Anticompetitive Effects of Common Ownership," *The Journal of Finance*, *73*(4), pp.1513-1565; Azar, José, Sahil Raina & Martin C. Schmalz, "Ultimate ownership and bank competition," (2016), Available at https://ssrn.com/abstract=2710252 or http://dx.doi.org/10.2139/ssrn.2710252.

4 It became the second most downloaded paper in history in the relevant SSRN category about a year after it was first posted.

5 See, e.g. the following papers and the references therein: O'Brien, Daniel P. & Keith Waehrer, "The Competitive Effects of Common Ownership: We Know Less Than We Think," *Antitrust Law Journal* 81, no. 3 (2017): 729-776; "Common Ownership by Institutional Investors and its Impact on Competition," OECD, October 30, 2017; Backus, Matthew, Christopher Conlon & Michael Sinkinson, *Common Ownership in America: 1980-2017*. No. w25454. National Bureau of Economic Research, 2019.

6 See Shambaugh, Jay, Ryan Nunn, Audrey Breitwieser & Patrick Liu, "The State of Competition and Dynamism: Facts about Concentration, Start-Ups, and Related Policies," *Economic Facts. Washington, DC: Brookings Institute, June* (2018). The rise of margins is documented in De Locker, Jan & Jan Eeckhout, "The Rise of Market Power and the Macroeconomic Implications," NBER Working paper 23687, August 1017, available at https://www.nber.org/papers/w23687.pdf.

7 For example, the European's decision regarding the Dow/Dupont merger devoted an entire annex to the issue of common ownership by institutional investors. See http://ec.europa.eu/competition/mergers/cases/decisions/m7932_13668_3.pdf, Annex 5.

8 For example: "Family Ties: Antitrust Issues with Common Ownership," ABA Spring Meetings, 67th ABA Section of Antitrust Law Spring Meeting, March 26-29, 2019; and "Cross Holdings in the Crosshairs: The Potential Anticompetitive Impact of Industry-Focused Minority Shareholdings," ABA Section of Antitrust Law, October 3, 2018.

9 Common Ownership by Institutional Investors and Its Impact on Competition, OECD, Paris, December 6, 2017, http://www.oecd.org/competition/common-ownership-and-its-impact-on-competition.htm. FTC Hearings on Competition and Consumer Protection in the 21st Century, Hearing Number 8: Common Ownership, December 6, 2018, transcripts available at https://www.ftc.gov/news-events/events-calendar/ftc-hearing-8-competition-consumer-protection-21st-century.

Unfortunately, many commentators and even some researchers are out over their skis on this issue. Although it is not controversial that common ownership can harm competition in some cases — a complete merger, after all, is a special case — and the theory for how this can happen is now quite well understood, many claims about common ownership are based on a misapplication of the theory of partial ownership to the common ownership question. The purpose of this paper is to take a step back and assess what the theory of partial ownership does and does not say about the competitive effects of common ownership and evaluate the empirical work and policy debate in that light.

II. WHAT IS PARTIAL OWNERSHIP AND WHY DO WE NEED A THEORY ABOUT IT?

Most economic theory, and most applications of economics to policy, assume that the firm is a monolithic decision-maker whose objective is to maximize the firm's profits. The economics we see in textbooks is built on this assumption. But this assumption is an abstraction. Many firms have more than one owner, and each owner partially owns the firm. If the owners agree that the firm's objective should be to maximize the profits of the firm, then the assumption that the firm behaves as a monolith is fine. But if different owners want the firm to pursue different objectives for whatever reason, how will the firm behave?

The theory of partial ownership addresses this question by distilling potentially divergent objectives of each firm's owners into a single objective for the firm. This objective, which I discuss in detail below, is based on the ownership and control structure of the firms under analysis, and it can be quite different from the standard objective of maximizing the firm's own profits. The theory then analyzes how markets function when each firm independently pursues its objective.

I have been using the term "partial ownership." Where does "common ownership" fit in? Common ownership occurs when one or more owners of a company also owns one or more other companies.[10] The companies are said to be commonly owned in this case because they have some owners in common. A pure merger generates a special case of common ownership where the merging firms become commonly owned through merger. Interesting questions arise when both common ownership and partial ownership are present at the same time and partial owners have influence over management. When different partial owners have different common ownership interests in firms whose profits are interrelated in some way, different owners are apt to have divergent interests.

For example, a non-common owner that holds shares of firm A and does not hold shares in competing firm B wants firm A's manager to pursue strategies that maximize the profits of firm A. But a common owner that owns shares of firm A and competing firm B may want the manager of firm A to compete less aggressively to increase its returns from its partial ownership of firm B. Similarly, a common owner of firm A and a *complementary* firm C may want the manager of firm A to charge a *lower* price than preferred by non-common owners because a lower price increases the common owner's returns from its ownership of complementary firm C. These examples illustrate how different degrees of partial, common ownership by different owners can create divergent interests among the owners, which is the situation the theory of partial ownership addresses.

III. THREE CORE ELEMENTS OF THE THEORY OF PARTIAL, COMMON OWNERSHIP

In weighing owners' divergent interests and distilling them into an objective for the firm, the theory assumes, naturally enough, that each manager pursues strategies in the interests of its firm's owners. Specifically, the theory assumes that the objective of each firm's manager is to maximize a *control-weighted* average of the *investment returns* to the firm's owners from the owners' shareholdings in the *relevant common ownership group*. The usefulness of this theory for understanding specific cases of common ownership depends upon the accuracy of assumptions that relate to the three italicized elements, each of which I will unpack.

A. Control Weights

The theory assumes that managers care about the returns to their owners, but because the owners typically have different common ownership interests in related firms, the owners have different preferences over the manager's choices. Therefore, the manager has to decide how much weight to give each owner's preferences in deciding what to do. The weight given to a particular owner is the owner's control weight. Under the

10 Thus, partial ownership encompasses common ownership. Some authors refer to situations where *firms* own shares of other *firms* as "cross ownership," distinguishing it from common ownership. This case can be analyzed in partial ownership framework presented in O'Brien & Salop (2000) by recognizing how profits and control rights flow through to ultimate shareholders.

theory, this is just a number between 0 and 1 such that the control weights sum to 1 across owners of a given firm. In practice, the magnitude of these weights is critical. If common owners' control weights are 0, for example, common ownership has no effect; if their control weights are positive, common ownership of competitors can have anticompetitive effects, and common ownership of producers of complements can have procompetitive effects. The size of these effects depends in a complex way on the full panoply of owners' financial interests and control weights across interrelated firms.

Here is a dose of economic humility. Economists do not have robust, tested theories about how ownership shares translate into control weights when owners have divergent interests. The theory of partial ownership recognizes this point, and while it presents a theory that depends on control weights, the theory itself does not choose these weights. Ultimately, the choice of control weights is an empirical issue, and it may also be governed by legal constraints as discussed below. Nevertheless, many applications of the theory of partial ownership, including the airline and banking papers that elevated common ownership questions to the fore, simply *assume* that control weights equal ownership shares ("proportional control").[11] However, the theory of partial ownership does not make this assumption, and there is no empirical basis for it that I know of.[12]

The proportional control assumption has some counterintuitive implications. Suppose a company is owned by a set of common owners that hold significant shares of the company and a large number of non-common owners that hold small shares of the company, i.e. non-common ownership is diffuse. Under proportional control, the non-common owners in this situation have essentially *no say* in the direction of the firm. Their control weights are near zero. On the other hand, a common owner that holds even 1 percent of the firm has almost complete control over the firm if the remaining ownership is diffuse. Under proportional control, if a single common owner held 1 percent of every competing firm and the remaining ownership were diffuse, the industry would be monopolized.[13]

This is a prediction of the theory under the proportional control assumption, but is it reasonable? There are at least two issues, both of which expose gaps in the literature.

First, if common ownership through minority positions carried a degree of control (e.g. proportional control) that tended to monopolize a market, a natural question is whether this could persist given natural forces in the market for corporate control. It seems likely in this situation that an outside investor could and likely would purchase a block of shares of one of the competitors, use its influence to convince management to lower the firm's price, and increase its investment returns by taking business from the firm whose governance structure supports monopoly pricing.[14] In short, the theory of partial ownership and applications of the theory to date assume that the ownership positions of third parties that are not involved in the transaction under analysis are fixed. However, if minority positions that involve common ownership carried control or influence capable of monopolizing markets, forces would likely emerge in the market for corporate control that would tend to unravel the monopoly behavior. To my knowledge, the role of the market for corporate control in constraining potential anticompetitive effects of common ownership has not been addressed in the literature.

Second, legal constraints may also play an important role in determining appropriate control weights. In the U.S., a firm's directors have a fiduciary obligation to the firm and to the firm's owners, as to their interest in the firm. In other words, the law technically obligates directors to pursue strategies in the best interest of the firm they direct, which means they should *not* permit managers to place weight in their objective functions on returns to shareholders from the shareholders' ownership interests in other firms. Instead, they should require management to place all weight in their objectives on owners' interests in the firm they manage. Of course, there are costs to enforcing fiduciary obligation laws, which

11 The *assumption* of proportional control apparently first appeared in an unpublished working paper by Julio Rotemberg in 1984 (Rotemberg, Julio J., "Financial Transaction Costs and Industrial Performance," Working paper 1554-84, Alfred P. Sloan School of Management, 1984.) O'Brien & Salop were unaware of Rotemberg's paper when they developed their analysis. They presented the proportional control assumption as nothing more than a convenient way to allow an owner's control weight to go from zero to one as the owner's financial interest goes from zero to 100 percent. Recognizing that the relationship between ownership and control is more complex and may be subject to legal constraints, O'Brien & Salop considered a range of possible control scenarios, and the predictions of the theory depend heavily on which scenario applies.

12 Some have argued the price-MHHI regressions in the airline and banking papers measure control weights. This is not correct. As discussed below, because the theory of partial ownership does not predict a specific relationship between price and the MHHI, a price-MHHI regression cannot measure control weights or test statistically whether they are equal to or different from some hypothesized value.

13 It should be noted that control scenarios predicted by voting models (e.g. the Banzhaf Power Index) also have this property. The notion that small minority shareholders have *no say* in the direction of the firm and are at the mercy of larger (but still small) shareholders runs counter to both intuition and the law and suggest that these control scenarios are missing something. One missing element is the ability of shareholders to form blocks and vote their shares that way. Another missing element is the market for corporate control, e.g. the ability of outside shareholders to purchase blocks of shares.

14 Because the best response of firm A to a rival firm B that sets the monopoly price or output is to set a lower price or higher output, an investor would have an incentive to acquire a block of shares in firm A at existing share prices and move management in this direction.

may limit their impact. However, it is noteworthy that the compensation of most corporate managers is based partly on the firm's stock, and this gives the manager at least a short run incentive to price in way that maximize the profits of the firm, consistent with fiduciary obligations, and inconsistent with anticompetitive price effects from common ownership.

Some have argued that laws on fiduciary obligation do not prevent common ownership from causing anticompetitive effects because non-common owners benefit from allowing common owners to use their influence to encourage higher prices. This argument fails to recognize the difference between the unilateral effects of common ownership that arise in the theory of partial ownership and coordinated competitive effects. All owners — common and non-common — can benefit from collusion, but non-common owners have unilateral incentives to encourage their managers to pursue strategies in the interest of the firm that do not result in collusion.[15]

B. Relevant Common Ownership Group

This group consists of firms that are commonly owned and whose profits are interrelated in some way. For example, airlines that are commonly owned and compete for travelers are in a relevant common ownership group. Similarly, if the airlines' suppliers and customers are also owned by the same set of common owners, they are in the same relevant common ownership group.[16] Most empirical studies of common ownership, including the airline and banking papers, assume that the relevant common ownership group consists of a single industry and ignores effects on the companies' suppliers and customers. However, the same institutional investors that own the airlines, for example, also own airline suppliers (e.g. Boeing, Rockwell, United Technologies, etc.) and customers (virtually all companies that have business travel).

Why is this important? The modified Herfindahl-Hirschman Index ("MHHI") used to proxy[17] common ownership in the airline paper (and the banking paper) ignores the impact of airline prices on airline suppliers and business travelers, yet an increase in airfares has a *negative effect* on both groups. Both impacts give common owners incentives to *lower* price rather than raise it. Similarly, in the European Commission's use of the MHHI to analyze the Dow-Dupont merger, they assume that institutional investors would ignore the impact of the agrochemical companies' strategies on their suppliers and buyers, which institutional investors also partially own. These impacts can give common owners incentives to reduce price rather than raise it. In essence, common ownership by institutional investors involves both horizontal and vertical (or complementary) effects, but the empirical work to date does not account for this fact.

In addition, antitrust analysis focuses on behavior in specific markets using what economists call "partial equilibrium" analysis. That analysis assumes that it is reasonable to hold constant effects in markets that are not at issue when analyzing effects in specific markets. The justification for this approach is that the markets in question are generally "small" relative to the entire economy. However, common ownership by institutional investors involves investment in practically every industry in the economy. It is likely not appropriate to apply partial equilibrium analysis — e.g. an analysis that focuses on only on one industry like airlines — to address questions about common ownership by institutional investors that involve the entire economy.[18] The general equilibrium effects of common ownership are an active area of research.[19]

The MHHI used to proxy common ownership in the airline and banking papers has other serious deficiencies as a measure of common ownership, as discussed further below. The point here is that even with those other deficiencies, the MHHI calculated for a specific industry like airlines does not account for the fact that the relevant common ownership group for institutional investors is practically the entire economy. Even if institutional investors had control over the strategic decisions of the firms they own, the analysis of the effects of that ownership would have to

15 Of course, evidence that non-common owners of different firms coordinated to influence their management to behave anticompetitively or that common owners induced anticompetitive behavior could provide economic grounds for antitrust intervention.

16 The literature on partial, common ownership, including O'Brien & Salop (2000), has tended to focus on the common ownership of competing firms. However, the main contribution of the theory of partial ownership is to distill potentially divergent interests of owners into a single objective for the firm, and this does not depend on whether commonly-owned products are substitutes or complements or whether they are sold in vertically-related markets. The method for determining the firm's objective applies to all these cases.

17 The MHHI itself has major problems as a proxy for common ownership, as discussed below. The point here is that this index also ignores effects from having suppliers and customers in the same relevant common ownership group.

18 The theory of partial ownership of O'Brien & Salop assumes that managers account for the effects of their actions on investors' portfolio returns but not on the prices they pay for the products of the commonly-owned firms. This assumption may be reasonable if the common owners' consumption of the products in the relevant common ownership group is small relative to their portfolio returns. However, it likely is not reasonable when the relevant common ownership group is the entire economy.

19 The rise in institutional investing has brought portfolio diversification to the masses at low transaction costs, creating large benefits for consumers. A complete general equilibrium analysis of the effects of common ownership by institutional investors would incorporate these benefits.

account for these macro-level effects. The airline and banking papers do not do this.

C. Investment Returns as the Objective

The theory assumes that owners' objectives are to maximize the value of their shareholdings. However, institutional investors make money by attracting retail investors and charging for their services. It is not obvious that an institutional investor would accomplish this by instructing company A to pull its competitive punches against competing company B to increase the value of the institution's shareholdings in company B. Suppose, for example, that Vanguard instructed United Airlines to raise price to increase the value of Vanguard's position in American Airlines. If Fidelity owns a larger share of American than Vanguard does, Vanguard's strategy would increase the value of Fidelity's portfolio by more than it increases the value of its own portfolio.

The general point is that institutional investors that purchase shares for their retail investors likely have different incentives than investors that purchase shares for themselves. The theory of partial ownership was built to capture the incentives of investors that hold their own shares. It was not built to capture the incentives of institutional investors that compete with each other in another market. It is not immediately obvious how this affects the analysis, but at a minimum, more research is warranted to understand this before drawing conclusions from the theory of partial ownership about the effects of common ownership by institutional investors.

I conclude this section by summarizing circumstances where I think the theory of partial ownership is properly and improperly applied. The theory can be (and in my experience has been) quite useful when three conditions are met: (1) Control weights are reasonably clear or can be bounded in ways that bound the predictions in useful ways; (2) the relevant common ownership group is properly defined; and (3) owners have the objective of maximizing their returns across the relevant common ownership group. These conditions often hold in transactions that involve changes in partial ownership among a few companies or investors, and in these cases, the theory often yields insights. However, for macro-level common ownership by institutional investors, a specific set of problems arise: (1) Control weights are not clear; (2) the empirical research to date assumes the wrong relevant common ownership group; and (3) there is likely a mismatch between the objectives of actual asset managers and the objectives of owners assumed in the theory.

IV. EVALUATING THE EMPIRICAL WORK

The empirical work in the airline paper proxies common ownership with the MHHI or related concentration measures derived under two faulty assumptions: (1) The relevant common ownership group consists of only airlines (ignoring commonly owned suppliers and customers); and (2) institutional investors care only about portfolio returns. These assumptions are not correct, and this by itself raises significant doubt about the empirical research.

For the purposes of discussing additional issues with the empirical evidence, I abstract from these issues. I do not mean to suggest that these problems are unimportant, but abstracting from them facilitates a coherent discussion of other critical empirical issues that arise in assessing the competitive effects of common ownership.

Let's start with the empirical question. The heart of the question is whether common ownership causes firms to behave less competitively by raising price, reducing output, cutting capacity or investment, etc. The way this happens under the theory is as follows. First, each firm's manager accounts for the effects of its decisions on the returns to owners from their holdings of all firms in the market. Effectively, each firm's manager places weight on both the profits of the firm it manages and the profits of other firms in the industry according to ownership and control structure of the industry. This causes the managers of commonly owned firms to pull their competitive punches. The way managers account for rivals' profits is captured in "common ownership incentives terms," which reflect the fraction of each rival's profit a manager accounts for in making strategic decisions for the firm it manages.[20] In a market with N firms, there are N^2-N common ownership incentive terms (because there are N-1 such terms for each of N firms, and N x (N-1) is N^2-N). The question of whether common ownership affects competition under the theory comes down to whether some set of common ownership incentive terms are positive. In principle, this is something that can be measured empirically.

20 The common ownership incentive terms arise from algebra that boils down owners' financial holdings and control weights into managers' incentives. O'Brien & Salop (2000) derive these incentive terms and show that they depend on a simple ratio of the "across-firms" concentration of ownership and control divided by "within-firm" concentration of ownership and control. See Appendix C of O'Brien & Salop for more details.

In industrial organization, there are basically two approaches to measuring these terms econometrically. One approach, commonly called the "reduced-form" approach, is to estimate a relationship between price and some measure of common ownership, which should include all of the common ownership incentives terms because each one matters. This is the spirit of the approach in the airline and banking papers. But a difficulty with this approach is that theory implies that prices depend on the full panoply of common ownership incentive terms, the interactions of these terms with each other, and the interaction of these terms and cost and demand factors.[21] This makes it impractical to estimate a true reduced form because there are just too many variables. The airline and banking papers addressed this problem by using an index to summarize common ownership — the MHHI — but this creates problems that I discuss in a moment.

The other empirical approach is to build an oligopoly model and measure the common ownership incentive terms as they appear in that model. The advantage of this approach is that it is possible to capture the full panoply of interactions in a rigorous way. This is the approach taken in *Kennedy et al.* (2017) and *Backus et al.* (2018), which do not find support for anticompetitive effects of common ownership in the airline industry and ready-to-eat breakfast cereal industry, respectively.[22]

With these two accepted approaches to the empirical question in mind, consider the empirical approach in the airline paper that claims to find that common ownership by institutional investors raised price. That paper uses two approaches, a price regression that relates airfares to the route-specific MHHI, and what purports to be a difference-in-differences analysis that examines the effects of the change in common ownership caused by the Blackrock-Barclays merger on airfares. Both approaches are supposed to be reduced-form approaches, but they have serious shortcomings.

The problem with the price-MHHI regression is that the MHHI is a measure of concentration, not a measure of common ownership. There are two issues. First, theory does not predict a particular relationship between price and the MHHI. It is possible for a change in common ownership that raises the MHHI to raise or lower price, and it is possible for a change in common ownership that lowers the MHHI to raise or lower price. The reasons behind the failure of the MHHI to predict price are somewhat complex. One reason is that common ownership has multiple dimensions — the N^2-N common ownership incentive terms I described above — and the MHHI has only a single dimension. It is generally not possible to capture the multi-dimensional effects of common ownership on price with a single dimensional index. A second reason is that the MHHI depends on market shares, and market shares can move in ways that raise or lower the MHHI for any given change in common ownership.[23] These issues mean that changes in common ownership that raise the MHHI can raise or lower price, and similarly, changes in common ownership that lower the MHHI can raise or lower price. Therefore, it is not possible to determine the effects of common ownership just by looking at the correlation between price and the MHHI as was done in the airline and banking papers.

Because the MHHI depends on both common ownership and shares, the correlation between price and MHHI can yield false positives or false negatives. Consider a simplified example. Let's say it just snowed in the Lake Tahoe area, it's ski season, and the demand for air travel to Tahoe has risen. Airfares rise, and an airline with flexible capacity takes advantage and sees its market share rise relative to the market shares of less flexible airlines. If the flexible airline had a large share to begin with, price and the MHHI may both rise. The reason is that an increase in a large firm's share may increase the MHHI. On the other hand, if the flexible airline has a small share, snow may cause the MHHI to go down, but price to go up. The reason is that an increase in a small firm's share may reduce the MHHI.

This example illustrates two points about the price-MHHI relationship. One point is that price and the MHHI can move in the same direction or in opposite directions. The second point is that the relationship between price and the MHHI in data need not have anything to do with common ownership. None of the movements of price and the MHHI in this example have anything to do with changes in common ownership. They are driven by changes in snow.[24]

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21 See Kennedy, Pauline, O'Brien, Daniel P., Song, Minjae & Waehrer, Keith, "The Competitive Effects of Common Ownership: Economic Foundations and Empirical Evidence," (July 24, 2017), Available at https://ssrn.com/abstract=3008331 or http://dx.doi.org/10.2139/ssrn.3008331 and Backus, Matthew, Christopher Conlon & Michael Sinkinson, "Common Ownership and Competition in the Ready-to-Eat Cereal Industry," New York University Stern Working Paper (2018).

22 *Id.*

23 For a detailed discussion of both issues, see O'Brien, Daniel P., "Price-Concentration Analysis: Ending the Myth, and Moving Forward," (July 24, 2017) Available at https://ssrn.com/abstract=3008326 or http://dx.doi.org/10.2139/ssrn.3008326, and the references therein.

24 It is tempting to describe this problem as "endogeneity" that can be solved by using instrumental variable techniques, e.g. by using instruments for the MHHI. However, the deeper issue is that the correlation between price and the MHHI — whether instrumented or not — is not sufficient to identify the effects of common ownership. Thus, instrumenting for the MHHI does not solve the problem. See O'Brien (2017).

The airline paper also presents what purports to be a difference-in-differences analysis of the effects of the Blackrock-Barclays merger, which increased common ownership in many pair-wise markets. In principle, that merger provides an experiment that should allow determining the effects of common ownership under the theory. *Kennedy et al.* have studied this problem using a difference-in-differences technique applied to the same data as the airline paper and find that the change in common ownership caused by the Blackrock-Barclays merger did not raise airfares. This finding differs from the findings of the quasi-difference-in-differences analysis in the airline paper, which does find effects. But if you look closely, the key explanatory variable in airline paper's quasi difference-in-differences analysis is based on the MHHI. While the MHHI is a reasonable measure of concentration in the presence of common ownership, the relationship between price and the MHHI does not identify the relationship between price and common ownership.

Kennedy et al. (2017) also estimate a structural oligopoly model that allows testing between different control assumptions.[25] That analysis does not reject the hypothesis that institutional investors have no control over airline prices, and it rejects the hypothesis of proportional or Banzhaf control, which would lead to common ownership having positive price effects. The main difference between the analysis of *Kennedy et al.* and that of *Azar et al.* is that *Kennedy et al.* use a methodology rooted in the economic theory of partial ownership. When they do that, they do not find effects.

As I indicated at the beginning of this section, the airline paper and other applications of the theory of partial ownership to the question of common ownership by institutional investors have other problems relating to the definition of the relevant common ownership group and the mismatch between institutional investors' objectives and the objectives assumed in the theory. The analysis in this section exposes a third problem, which is that the empirical methodology in the airline paper does not identify the effects of common ownership. My conclusion, at least at this juncture, is that the empirical findings in the airline paper are spurious.

V. CONCLUSION

There is widespread agreement that common ownership can have anticompetitive effects in some circumstances. After all, a complete merger is a special case. However, much of the controversy over common ownership in recent years is based on mis-applications of the theory of partial ownership to the common ownership question.

I highlighted four main issues. First, the effects of common ownership depend critically on how ownership translates into control, and the literature is unsettled on this point. Second, the empirical literature that brought the common ownership issue to the fore assumes that the relevant common ownership group is a single industry (e.g. airline or banking). However, the investments of institutional investors cover practically the entire economy, including many firms that sell complementary products. The partial ownership framework that undergirds the empirical work does not take this into account, nor does it recognize general equilibrium issues associated with economy-wide investments. Third, the incentives of institutional investors that compete with each other for retail investors are likely different than the incentives of non-institutional owners modelled by the theory. Finally, correlations between price and the MHHI estimated in the empirical literature do not identify the competitive effects of common ownership.

Where does this leave us? From a policy perspective, the theory of partial ownership has value for the analysis of specific transactions such as joint ventures, partial acquisitions of one firm by another, and changes in common ownership where the relevant common ownership group is small and well-defined, and the nature of control is relatively clear. From a more academic perspective, the theory may also have value as a starting point for additional modelling to address common ownership by institutional investors in a general equilibrium context, and the theory has been used that way. But I do not think that either the theoretical work or empirical work to date provides a basis for altering antitrust or regulatory policy toward common ownership by institutional investors.

25 See also *Backus et al.* (2018), who find that classic competition (with no effect of common ownership) is most consistent with demand and supply data in that industry.

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