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Common Ownership, Concentration and Corporate Conduct

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Abstract

The question of whether and how partial common-ownership links between strategically interacting firms affect firm behavior has been the subject of theoretical inquiry for decades. Since then, consolidation and increasing concentration in the asset-management industry has led to more pronounced common ownership concentration (CoOC). Moreover, recent empirical research has provided evidence consistent with the literature's key predictions. The resulting antitrust concerns have received much attention from policy makers worldwide. However, the implications are more general: CoOC affects the objective function of the firm, and therefore has implications for all subfields of economics studying corporate conduct - including corporate governance, strategy, industrial organization, and all of financial economics. This article connects the papers establishing the theoretical foundations, reviews the empirical and legal literatures, and discusses challenges and opportunities for future research.

Keywords: ownership, control, network, industry concentration, antitrust, objective of the firm, shareholder unanimity.

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1. INTRODUCTION

A long literature examines the extent to which common-ownership concentration (CoOC_o) affects firm behavior and equilibrium outcomes. The core of the question concerns the objective function of the firm. In particular, the assumption that self-interested, entrepreneurial firms maximize their own value forms the basis for the notion going back at least to Smith (1776) that competition maximizes social welfare, and is central to most research in corporate finance and industrial organization.

This assumption is intuitive if one considers the ownership structures of iconic firms such as those reported in **Table 1**. Until recently, Richard Branson was the largest shareholder of Virgin America, Warren Buffett controls Berkshire Hathaway, Jeff Bezos is by far the largest shareholder of Amazon, and the Waltons control Walmart. If these firms act in their largest shareholders' financial interest, they should indeed maximize their own value – and disregard the impact their actions may have on other firms' bottom lines. The basis for this intuition is that the largest shareholders don't also have significant holdings in other firms, and that holdings in other firms by diversified minority shareholders (e.g., BlackRock and Vanguard) have no significant influence on corporate strategy.

However, most US corporations' ownership structure looks quite different from the above examples. The various panels of **Table 2** show the top shareholders of the largest US airlines, banks, and various supermarkets, respectively. Strikingly, the top shareholders across the major players in all of these industries are very similar. Berkshire Hathaway is not only the largest shareholder of two of the nation's largest four banks (and the third-largest shareholder in a sixth bank), but also of three of the largest four airlines (and the third-largest shareholder in the fourth). PRIMECAP holds similarly sized stakes in *each* of the largest six airlines. The mutual fund families BlackRock, Vanguard, State Street, Fidelity, and T. Rowe Price are among the major holders of most of the largest airlines as well. Indeed, almost any one of the top shareholders of any one of the largest airlines is also a shareholder in other major carriers, and whereas each one typically holds less than

Table 1: “Entrepreneurial” firms.

This table shows the largest institutional and non-institutional beneficial owners and corresponding stakes for some US firms as of 2017Q2 unless otherwise noted. The data source is *S&P Capital IQ*.

<i>Virgin America (2016 Q2)</i>	<i>[%]</i>	<i>Berkshire Hathaway</i>	<i>[%]</i>
- Richard Branson -	30.99	- Warren Buffett -	17.94
Cyrus Capital Partners	23.69	Vanguard	5.05
Vanguard	2.91	BlackRock	4.15
BlackRock	2.27	State Street	3.33
Alpine Associates Advisors	2.12	Bill & Melinda Gates Foundation	2.67
Hutchin Hill Capital	2.10	Fidelity	2.36
Societe Generale	1.85	Optinova Asset Mgt.	2.23
<i>Amazon</i>	<i>[%]</i>	<i>Walmart</i>	<i>[%]</i>
- Jeffrey Bezos -	16.72	Walton Enterprises	46.97
Vanguard	5.62	Walton Family	3.78
Capital Research	5.47	Vanguard	3.51
BlackRock	5.01	BlackRock	2.97
Fidelity	3.82	State Street	2.38
T. Rowe Price	3.67	Dodge & Cox	0.70
State Street	3.40	Northern Trust	0.59

15% in a given carrier, cumulatively, the top-10 shareholders hold between 39% and 55% of the stock.

Table 2: Panel A: Airlines.

This table shows the largest institutional and non-institutional beneficial owners and corresponding stakes for America’s largest airlines as of 2017Q2. The data source is *S&P Capital IQ*.

<i>Delta Air Lines</i>	<i>[%]</i>	<i>Southwest Airlines Co.</i>	<i>[%]</i>	<i>American Airlines</i>	<i>[%]</i>
Berkshire Hathaway	7.25	Berkshire Hathaway	15.03	T. Rowe Price	12.89
Vanguard	6.13	PRIMECAP	11.87	PRIMECAP	10.46
BlackRock	5.84	Vanguard	6.28	Berkshire Hathaway	9.54
Lansdowne Partners Limited	3.90	Fidelity	5.41	Vanguard	6.15
PRIMECAP	3.75	BlackRock	5.04	BlackRock	5.20
State Street Global Advisers	3.68	State Street Global Advisers	3.69	Fidelity	3.71
J.P. Morgan Asset Mgt.	3.48	Columbia Mgt. Inv. Adv.	1.46	State Street Global Advisers	3.58
Evercore	2.09	J.P. Morgan Asset Mgt.	1.29	Geode Capital Mgt.	1.03
PAR Capital Mgt.	1.78	Egerton Capital (UK) LLP	1.26	Morgan Stanley	1.00
BNY Mellon Asset Mgt.	1.24	T. Rowe Price	1.16	Northern Trust Global Inv	0.97
<i>United Continental Holdings</i>	<i>[%]</i>	<i>Alaska Air</i>	<i>[%]</i>	<i>JetBlue Airways</i>	<i>[%]</i>
Berkshire Hathaway	9.11	Vanguard	9.57	Vanguard	8.14
Vanguard	7.33	T. Rowe Price	9.26	BlackRock	8.04
PRIMECAP	7.19	BlackRock	5.48	PRIMECAP	6.13
BlackRock	6.72	PRIMECAP	4.89	Fidelity	5.71
PAR Capital Mgt.	5.26	State Street Global Advisers	3.55	Dimensional Fund Advisors	3.31
T. Rowe Price	3.37	Franklin Resources	2.71	Goldman Sachs Asset Mgt.	2.95
Altimeter Capital Mgt.	3.33	Egerton Capital (UK) LLP	2.39	State Street Global Advisers	2.49
State Street Global Advisers	3.33	PAR Capital Mgt.	2.02	Wellington	2.45
J.P. Morgan Asset Mgt.	2.98	Wellington	1.98	Donald Smith Co.	1.84
Henderson Global Investors	2.25	BNY Mellon Asset Mgt.	1.77	AQR Capital Management	1.73

Perhaps even more strikingly, among United’s top 100 investors, which hold more than 91% of outstanding shares, only *five don’t* also hold stock of another top-4 airline; the

largest of these shareholders ranks as #42. Cumulatively, these “mavericks” hold 1% of United’s stock, and are thus presumably powerless, even as a group. American Airlines has seven such shareholders, who hold a total of 1.4% of the stock. (Four of them are individuals whose private portfolios cannot be observed, and who might thus in fact hold non-reportable competitor stock.) Delta has five mavericks in the top 100, holding 6.8% of the stock, and SWA has nine, who hold a cumulative 2.7% of the outstanding stock. Ownership patterns in many other industries look similar.¹

Table 2: Panel B: Banks.

This table shows the largest (institutional and non-institutional) beneficial owners and corresponding stakes for America’s largest banks as of 2017Q2. The data source is *S&P Capital IQ*.

<i>JP Morgan Chase</i>	<i>[%]</i>	<i>Bank of America</i>	<i>[%]</i>	<i>Citigroup</i>	<i>[%]</i>
Vanguard	7.03	Berkshire Hathaway	7.03	BlackRock	6.97
BlackRock	6.40	BlackRock	6.71	Vanguard	6.66
State Street Global Advisers	4.69	Vanguard	6.65	State Street Global Advisers	4.50
Capital Research	3.78	State Street Global Advisers	4.45	Fidelity	4.42
Fidelity	2.68	Fidelity	3.27	Wellington	1.77
<i>Wells Fargo</i>	<i>[%]</i>	<i>PNC Financial</i>	<i>[%]</i>	<i>U.S. Bancorp</i>	<i>[%]</i>
Berkshire Hathaway	9.85	Wellington	7.59	BlackRock	6.41
Vanguard	6.30	Vanguard	6.73	Vanguard	6.26
BlackRock	5.43	BlackRock	5.68	Berkshire Hathaway	6.08
State Street Global Advisers	4.01	State Street Global Advisers	4.80	State Street Global Advisers	4.38
Capital Research	3.55	Capital Research	4.37	Fidelity	3.84

Table 2: Panel C: Supermarkets.

This table shows the largest institutional and non-institutional beneficial owners and corresponding stakes for a selection of American supermarket chains as of 2017Q2. The data source is *S&P Capital IQ*.

<i>Kroger</i>	<i>[%]</i>	<i>Target</i>	<i>[%]</i>	<i>Costco</i>	<i>[%]</i>
BlackRock	7.89	State Street	9.42	Vanguard	7.67
Vanguard	7.71	BlackRock	8.37	Capital Research	6.24
Capital Research	7.45	Vanguard	6.73	BlackRock	5.68
Fidelity	5.37	Franklin Resources	3.80	State Street	4.14
State Street	4.39	Dodge & Cox	3.63	Wellington	3.31
Janus Capital Mgt.	2.64	Capital Research	3.34	Fidelity	2.46
J.P. Morgan Asset Mgt.	2.23	BNY Mellon Asset Mgt.	1.64	Northern Trust	1.49

The crux is the following. If firms act in their largest shareholders’ interest, they should *not* maximize their own value, but instead their owners’ utilities, which in the case of institutional investors likely corresponds to their beneficial owners’ *portfolio* values.

¹Both active and passive investment strategies can lead to such patterns. Absent a deliberate attempt to monopolize industries such as in voting trusts of the 19th and 20th century, a highly consolidated asset-management sector can mechanically lead to the same outcome. The World Bank reports 2016 global stock market capitalization at \$65 trn. An asset manager with \$3 trn invested in equity would thus hold almost 5% of the shares of every firm on the planet, even if the holdings were not clustered in particular industries or geographies.

Importantly, own-firm profit maximization and portfolio value maximization are not always the same. For example, aggressive price reductions or capacity expansions may increase one firm's value. However, one firm's increase in market share comes at the expense of its competitors, and at the cost of lower equilibrium prices. Aggressive competition can thus be in the interest of an individual firm's owners, but decrease a common owners' portfolio value. Shareholder diversification across competitors can thus remove firms' incentives to compete, and thus void Smith's idea that the pursuit of individual self-interest leads to a maximization of social welfare.

More generally, shareholder-value-maximizing firms should internalize externalities they impose on other firms that are horizontally or vertically connected or otherwise affect each other with their actions, to the extent their influential shareholders hold shares in these other firms. As I discuss below, some such effects can be welfare-improving as well. By contrast, I am not aware of reasons for or mechanisms by which firms are supposed to act in their self-interest and compete in the absence of incentives to do so.

A large number of questions arises: Do between-firm common-ownership links indeed affect the way firms behave? (If not, why?) Do firms behave more cooperatively with each other when their largest owners overlap? Does the ownership structures of firms such as Virgin America, Amazon, or Walmart lead these firms to compete more aggressively against their more commonly-owned product-market peers? What are the implications for equilibrium outcomes – specifically, are product prices higher in markets in which the natural competitors are more commonly owned? Do the usual corporate-governance mechanisms suffice to implement such outcomes?

Theory suggests the answer to all these questions is “yes” – I review a more than three-decades-long literature to this effect below. The theories' implications are potentially foundational not only for antitrust policy, but also for the basic way researchers think about firm strategy and corporate conduct. Moreover, given the economy-wide high level and continued secular increase in common ownership, the rise of CoOCo also offers a potential solution to several macroeconomic puzzles, such as the confluence of low real interest rates amid high profitability, low investment, a declining labor share of income, and others. Indeed, CoOCo has implications for all areas of financial economics: asset prices of more profitable firms – perhaps due to common ownership – should be higher; disagreement between shareholders about the firm's competitive strategy should affect voting; the formation and stability of shareholder coalitions should depend on their portfolio interests, and so on. In short, CoOCo potentially affects all aspects of corporate governance.

Adding to the scope of the topic, CoOCo is an international and fast-rising phenomenon. For example, with close to \$6 trn assets under management, BlackRock is not only the most powerful investor of a large and increasing fraction of US corporations, but is also the largest shareholder of a third of the FTSE 100 companies as well as a top-5 shareholders of 89 of them, the largest shareholder of one-third of the DAX-30 companies, and so on. Vanguard, with more than \$4.5 trn assets under management in a similarly diversified portfolio, is almost as large, and growing at an even faster rate.

Despite the richness of the falsifiable predictions of the theory and the broad scope of common ownership patterns in the real world, the empirical literature examining the theories' predictions is relatively young. Indeed, the theoretical predictions were largely viewed as no more than a curiosity until empirical evidence supporting some of its key predictions emerged in recent years. Until then, researchers simply assumed common ownership doesn't change the dictum that firms maximize their own value, irrespective of whether doing so is

consistent with shareholders' interests. As I discuss in the next section, this assumption is only tenable if firms are price takers in all markets, including factor and product markets. The remainder of the review discusses the papers that tackle the non-trivial and arguably more relevant case in which firms are strategic actors.

The structure of this survey is as follows. Section 2 first discusses the history of financial economics theory leading to the common assumption that firms maximize their own value, as well as the pathbreaking papers that explore the consequences of relaxing that assumption. I then discuss alternative approaches to measuring common ownership and CoOCo at the firm, firm-pair, market and industry level, and various challenges involved with using these measures in empirical applications. Section 3 first reviews papers providing direct evidence that portfolio considerations enter the way investors engage in governance, and thus affect firm behavior. I then discuss the empirical evidence regarding how CoOCo affects product-market outcomes and other strategic interactions between firms. Section 4 reviews the legal literature, as well as policy proposals triggered by the empirical findings. Section 5 outlines important unanswered questions for future research. Section 6 concludes.

Whereas I attempt to give a comprehensive review of the significant academic literature on CoOCo and corporate conduct, many related streams of thought exist that I cannot cover within the confines of this survey. One omitted category of papers concerns the boundaries of the firm. If “a firm is exactly a set of assets under common ownership” (Holmström & Roberts 1998), the question arises in which sense assets under partial common ownership belong to one firm or another, neither (but instead to the common owners, in various proportions), or both. I also have to omit the relation between CoOCo and the large literature examining the relation between product-market competition and corporate financial policy, as well as a smaller literature examining asset-pricing effects of common ownership (see, e.g. Antón & Polk (2014); Bond & Garcia (2017)). ETFs are one contributor to common ownership, and their impact on corporate behavior is subsumed in this survey; Ben-David et al. (2017a) survey the literature on ETF's impact on asset-market quality.

Another closely related literature studies the effect of minority-share acquisitions by competitor firms and common asset holdings by competitors. I briefly refer to this literature in section 2. I wish to clarify here, however, that absent agency frictions, direct “cross-ownership” links are economically similar to horizontal common-ownership links, which makes a distinction between the two literatures somewhat artificial conceptually. However, the practical manifestations differ significantly. Antitrust authorities worldwide are keenly aware of cross-ownership links and partial mergers. Perhaps as a result, in most advanced economies, direct cross-holdings are relatively rare compared to common-ownership links. By contrast, partial common-ownership links created by institutional investors have only recently gained prominence. Keeping this review focused on CoOCo may be justified also because the governance mechanisms and policy solutions differ substantially as well.

Also beyond the scope of this review are the literatures examining the extent to which firm objectives and behavior are affected by ownership of company stock by a particular set of actors, such as activists (Brav et al. 2015), employees, foreign sovereign wealth funds, “passive” investors, blockholders (Edmans 2014; Edmans & Holderness 2017), or institutional investors more generally (see, e.g., McCahery et al. (2016)). Making a clear distinction from these literatures is difficult for various reasons. One is that governance activities, including voting, are often conducted at the fund-family level, also in families that host both active and passive funds. As a result, questions such as whether “index funds” engage in corporate governance are mute – index funds may not, but their families do, along

with the power of the votes from the “active” part of the business. Also, increases in firm ownership by passive investors imply a decrease in ownership by active investors, making it difficult to judge which of the two is responsible for any change in corporate conduct. A second reason is that the boundaries between activist investors and shareholders without an explicit interest in affecting corporate behavior are blurry when the so-called “passive” investors’ voting power becomes large enough to be pivotal in corporate events such as proxy fights; see Gelles & de la Merced (2014); Schmalz (2015); Flaherty & Kerber (2016a) for recent examples. In short, passive ownership may not practically exist when the ownership position is large. The common ownership research agenda therefore puts a unique focus on the actors’ economic incentives, which are perhaps more objectively measurable and less arbitrarily defined than “active” or “passive” labels. That said, labels matter, if only because of their regulatory and legal implications. I therefore discuss in section 5 how interactions between these omitted literatures and the common-ownership agenda are likely to offer a fruitful area for future research.

Lastly, all of the above literatures operate under the premise that corporations do or should act in the interest of their shareholders; Hart & Zingales (2017) are perhaps the latest paper challenging that premise.

2. THEORY AND MEASUREMENT

2.1. Competition and shareholders’ unanimous preference for the maximization of firm value

Corporations generally have many shareholders with potentially differing interests. Determination of the firm’s objective thus constitutes a social choice problem. Nevertheless, much of corporate finance and industrial organization theory implicitly assumes that firms simply maximize their own value, irrespective of the shareholders’ potentially heterogeneous interests. Instead of taking the assumption that firms maximize their own value as an article of faith, one should derive it from economic principles.²

The assumption of own-firm profit (or, more accurately, value) maximization has appeared in formal economic thinking at least since Fisher (1930). Indeed, the Fisher Separation Theorem, which stipulates that corporations maximize their own value, regardless of shareholder preferences, forms the core of much of financial economics theory that followed. Among its assumptions is that firms are price takers not only in capital markets, but also in all factor and product markets. In such a world, no shareholder is hurt if firms simply maximize their own value: any divergence from this policy is without effect, given there are no strategic choices to make in the first place. In other words, when markets are competitive, unanimous support for own-profit maximization obtains, but the result is vacuous. As DeAngelo (1981) points out, there is no strict support for profit maximization, but merely unanimous indifference.

A substantial literature in the 1970s develops sufficient conditions for unanimous profit maximization to be satisfied. Hart (1979) shows the essential assumption is that markets are competitive (rather than complete). Hart also anticipates the literature that followed by noting shareholders may not want firm-value-maximizing behavior when they hold shares in other firms, or when they are consumers of the firm’s products. Hart’s result raises the

²I thank Stefan Nagel for suggesting this notion.

question: Then what *is* the firm’s objective function when firms interact strategically? In other words, “To what extent will the conduct of firms be different from the assumed profit maximization behavior in classical theory; and if it differs, what ramifications does that have for market outcomes”? (Hart & Holmström 1987).

The answer must grapple with Arrow (1951)’s impossibility theorem, as perhaps most clearly explained by Milne (1981). Either no objective function exists that reflects shareholders’ diverging preferences, or at least one of Arrow’s axioms has to be violated. Specifically, assuming all shareholders are identical violates Arrow’s *unrestricted domain* assumption, but in return yields degenerate cases in which unanimity obtains even when firms have market power and in the presence of uncertainty. One such case is when all identical shareholders hold stakes in only one firm. Then the traditionally-assumed profit maximization objective can be unanimously agreeable. Another special case is when all shareholders hold the market portfolio, as I now discuss.

2.2. Diversification and maximization of industry value

Beginning in the early 1980s, various authors have remarked that shareholder diversification can lead to firms’ internalizing the externalities they impose on other firms. When applied to models of competition, diversification can thus lead to monopolistic outcomes.

Rubinstein et al. (1983) note that two investors, each owning one of two competitors, have an incentive to acquire shares in each others’ firms. Doing so removes incentives to compete and allows the shareholders to realize monopoly profits. Rotemberg (1984) points out that a more benign motivation – mere diversification benefits – can similarly motivate risk-averse shareholders to diversify their portfolios. Notwithstanding the original motivation for diversification, the effect is the same regardless: full diversification can lead to an industry- (or economy-) wide monopoly.

Rotemberg makes the ad-hoc assumption that, instead of maximizing their own profits, firms j maximize a weighted average of their M stockholder i -s’ utilities:

$$\max_{x_j} \tilde{\Pi}_j = \sum_{i=1}^M \gamma_{ij} U_i. \quad (1)$$

Shareholders have quadratic utility, and the weights γ_{ij} are given by investor i ’s share of firm j ’s capital. The literature that followed, discussed below, has since used – or derived – a structurally similar objective function, but has considered variations in the control weights as well as the shape and arguments of shareholder utilities. Rotemberg’s main result is that when identical shareholders are fully diversified, that is, hold equal fractions of shares in all (symmetric) firms, firms’ incentives to compete in the product market are annihilated, with the result of output falling to the monopoly level. Whereas he refers to this outcome as “collusive,” he points out that in contrast to the conventional use of the phrase, diversification takes away incentives to deviate from the monopolistic outcome, and therefore no punishment strategies or communication are necessary to sustain this outcome. Each firm’s behavior is simply the result of managers maximizing their shareholders’ unilateral interests. Moreover, in his model, aggregate uncertainty negatively affects output, the more so the larger the individual investors’ shares of total equity capital.

Perhaps surprisingly, heterogeneity in shareholder portfolios (and thus objectives) need not imply shareholders disagree about the objective function and thus competitive strategy of the firm, as Rotemberg discusses in a section on unanimity. Indeed, undiversified owners,

who wish to maximize the value of their holding of a single firm's stock, may nevertheless agree with diversified owners to soften competition against rivals. The reason is that a soft equilibrium response by said rivals can increase the own firms' profits to a greater level than what would be obtained with an aggressive product-market strategy. Hence, unanimity with respect to soft competition can prevail even when not all shareholders are fully diversified and hence have heterogeneous objectives.³

What if shareholders also have interests as consumers, and firms internalize these interests? Would Rotemberg's result be overturned? Farrell (1985) proves that when all shareholder-consumers' consumption share equals their ownership share, they unanimously vote for competitive product markets. Otherwise, the profit motive dominates internalization of consumer interests, and output is reduced relative to the competitive level.⁴

The implications of shareholder diversification on corporate behavior extend beyond competition, however. Gordon (1990, 2003) advances the notion that shareholder diversification should not only reduce competition, but also induce managers to internalize *any externality* imposed on commonly owned firms.⁵ He also develops a model to rationalize the scarcity of relative performance evaluation of top managers observed in the data; he argues this finding is easy to understand when shareholders are diversified and thus want firm to maximize industry profits as opposed to firm profits. Various authors have since elaborated on this point both theoretically and empirically; see, for example, Rubin et al. (2006); Antón et al. (2016); Liang (2016).

Apparently independently from the earlier papers on the same subject, Hansen & Lott Jr (1996) reiterate several of the previous points, but also explore a number of new hypotheses that common ownership may explain, including the internalization of R&D spillovers, litigation costs, and the internalization of interests of shareholders that are also employees of the firm. Perhaps more importantly, these authors also offer a first empirical analysis; see section 3.

2.3. Alternative objectives of the firm, managerial incentives, and firms' production choices when shareholders disagree

The above discussion relied on unanimous support of industry value maximization as an objective of all firms. However, monopolization by way of diversification can also arise when unanimity fails, that is when shareholders disagree about the firms' objective functions. This claim is clearly true if one assumes only one shareholder controls the firm (violating Arrow's non-dictatorship axiom) and if one endows that dominating shareholder (or set of identical shareholders) with a fully diversified portfolio, and hence an interest in maximizing the total value of all firms. As Rotemberg discussed as well, battles for control between diversified and undiversified shareholders may thus determine firms' competitive strategies.

³Rotemberg relies on symmetric firms and ex-ante identical shareholders to derive unanimity; shareholders may have divergent interests ex post because they may choose different portfolios. As Milne (1981) explained previously, holding identical portfolios is not sufficient for unanimity to obtain amid uncertainty and in the presence of market power. Differences in consumption sets, endowments, or beliefs, or differences in risk preferences amid uncertainty about the future can also lead to disagreement about the firm's optimal strategy.

⁴Azar (2017) develops a modified Herfindahl index that takes ownership and control by consumers into account.

⁵Crès & Tvede (2005) show how unanimous support for full internalization can obtain in a formal voting model.

Along these lines, Gordon (1990, 2003) develops a model of competition for corporate control between diversified and undiversified shareholders, which also discusses some asset-pricing implications of a change of control. Ex post, a single dominant shareholder (or block of shareholders with aligned incentives) controls the firm. A single parameter then reflects the extent to which the dominant shareholder also holds stakes in related firms, and hence the degree to which firms internalize externalities imposed on others. That parameter can then be used to derive comparative statics with respect to common ownership and guide empirical analyses. Antón et al. (2016) use such a model to study executive compensation under common ownership (a topic first proposed by Rotemberg for future research, and previously discussed by Gordon and various other papers since). Antón et al.’s key insight is that active engagement in governance by common shareholders is not necessary for anticompetitive effects of common ownership to materialize. The reason is that an active *steepening* of managerial incentive slopes can be necessary to induce more aggressive competition between firms.⁶ Their model thus shows agency conflicts between shareholders and managers do not necessarily weaken the predictions of the above theories; instead, agency conflicts that may reduce incentives especially of passively diversified investors to engage in governance (Bebchuk et al. 2017) can be the vehicle by which CoOCo reduces investment, output, and at the same time increases industry profits. Because shareholders design incentive contracts the manager takes as given, their model also clarifies that managers need not be aware of theirs and competitor firms’ ownership structures for common ownership to affect corporate behavior.

Absent a dominant shareholder, the search for a theoretically grounded objective function of the firm amid shareholder disagreement becomes much more challenging. An applied theoretical and empirical literature in industrial organization has hence employed an ad-hoc objective function similar to (1) primarily to enable the study of competitive effects of direct shareholdings of one firm in a competitor, or of common ownership of individual assets by competitors (although some also explicitly discuss partial common ownership of competitors).⁷ Specifically, O’Brien & Salop (2000) assume firms (indexed by j) maximize a weighted average of their M shareholders’ (i) portfolio profits, arising from enjoying cash-flow rights β_{ik} in N different firms (k) that generate profits π_k , whereas the weights γ_{ij} correspond to the respective shareholders’ control shares:

$$\max_{x_j} \tilde{\Pi}_j = \sum_{i=1}^M \gamma_{ij} \sum_{k=1}^N \beta_{ik} \pi_k = \pi_j + \sum_{k \neq j} \underbrace{\sum_i \gamma_{ij} \beta_{ik}}_{\lambda_{jk}} \pi_k. \quad (2)$$

This objective has several attractive properties:

⁶The omission by common owners to engage in designing steep managerial incentives can lead to less competition in equilibrium, because flatter top-management incentives imply attenuated incentives to reduce costs and increase output, which in industry equilibrium can lead to higher prices, margins, and profits.

⁷Areeda & Turner (1978); Rubinstein et al. (1983); Bernheim & Whinston (1985); Reynolds & Snapp (1986); Bresnahan & Salop (1986); Farrell & Shapiro (1990); Ellerman (1991); Flath (1991, 1992); Bolle & Güth (1992); Maluog (1992); Nye (1992); Reitman (1994); Alley (1997); Parker & Röller (1997); Dietzenbacher et al. (2000); O’Brien & Salop (2000); Allen & Phillips (2000); Ono et al. (2004); Clayton & Jorgensen (2005); Gilo et al. (2006); Foros et al. (2011); Shelegia & Spiegel (2012); Brito et al. (2014); Nain & Wang (2016); Fotis & Zevgolis (2016); Heim et al. (2017)

1. It reflects the notion that firm j internalizes externalities on other firms k (*only*) to the extent λ_{jk} that owners with financial interest in firm k (β_{ik}) have control over firm j (γ_{ij}), relative to the control and cash-flow rights they have in firm j .
2. Absent common-ownership links, it collapses to own-profit maximization.
3. More common ownership and control are reflected in a continuous fashion. That is, the measure imposes no artificial ownership cutoffs, but can be implemented as to reflect any desired cutoffs.
4. Full diversification implies firms maximize the total value of all firms.
5. It reflects that large shareholders have relatively more influence on the firm's behavior than a collection of small shareholders with diverging interests that is equally large in aggregate.
6. Its elements have empirical counterparts, and are thus measurable.

Another attractive feature of objective (2) is that it can be microfounded in economic theory. Specifically, Azar (2017) (based on Azar (2012)) offers probabilistic voting models in which managers propose strategies with the goal of maximizing either the vote share cast in their favor or the probability of winning, and that yield an objective function with the structure of (2). The fact that voting can yield this objective is important because it clarifies that no mechanism other than voting is necessary to make firms behave in accordance with their shareholders' interests: managers simply execute their previously advertised strategic plans. Azar's model also generalizes Rotemberg's result along various dimensions, such as the model of competition, and shows that the conclusion that full shareholder diversification leads to monopoly can persist amid some forms of *ex-ante* shareholder heterogeneity. Brito et al. (2017) offer an otherwise similar voting model that can jointly capture not only common ownership, but also direct equity stakes of firms in competitors ("cross-ownership"); they also derive a common-ownership-generalized GUPPI, which is a useful tool for applied antitrust analyses.

Small variations in these models' assumptions yield empirically meaningful variation in predictions with respect to how the control weights γ_{ij} in equation (2) should be measured. For example, depending on whether candidate managers maximize the probability of winning an election, the vote share, or whether they choose strategy proposals to maximize the expected utility from holding office, control weights are best captured by vote shares (as in Rotemberg) or Banzhaf indexes (as first proposed in an earlier version of Azar (2017)). That distinction is potentially important: it determines whether a single common owners (or set of beneficial owners) holding 51% of the voting shares of an industry's firms can bring about full monopoly, or whether the remaining 49% of potentially undiversified owners still have a voice. Yet other variations yield the prediction that Shapley values should be used to measure control.

Because according to objective (2), what matters for the role of common ownership in corporate conduct is not merely the degree to which various sets of shareholders are diversified, but the extent to which *the firms' most powerful shareholders* hold shares in related firms, it also captures why increasing consolidation in the asset-management industry (see, e.g., Figure 1 of Ben-David et al. (2017b)) and coordination between diversified investors can contribute to an exacerbation of the competitive concerns due to common ownership: these events make common owners *relatively* more powerful shareholders.

Note that a simple measure of the overlap of two firms' shareholder bases does not share many or all of the above features. Moreover, a dummy reflecting the presence of common ownership absorbs much useful information. For example, a dummy equal to 1 if a

common blockholder exists between two firms ignores whether larger investors are present that render a common blockholder powerless, and also ignores how large any common blockholder's position is. (Is it 5.1% for both firms, or is it 51%?)⁸ To distinguish between such simple “dummy” measures and more involved measures such as (2), I suggest the following definitions:

DEFINITIONS

Common ownership

Incidence or frequency of shareholder overlap between firms.

Common-ownership concentration (CoOCo)

The extent to which influential shareholders in one firm also hold ownership stakes in firms that are affected by the firm they have influence over, and vice versa.

I next demonstrate a fifth appealing feature of objective function (2): it can be used to condense the information contained in all firms' ownership structures into a scalar measure of the extent to which common-ownership incentives affect a given market's competitiveness.

2.4. Predictions about product market equilibria

Replacing the own-profit-maximization assumption with the objective function (2) in a standard Cournot model, O'Brien & Salop (2000) show that industry markups (the wedge between price P minus marginal cost C') are proportional (η is the price elasticity of demand) to a modified Herfindahl Index $MHHI = HHI + MHHIdelta$, where s_j is the market share of firm j :

$$\eta \sum_j s_j \frac{P - C'_j(x_j)}{P} = \underbrace{\sum_j \sum_k s_j s_k \frac{\sum_i \gamma_{ij} \beta_{ik}}{\sum_i \gamma_{ij} \beta_{ij}}}_{MHHI} = \underbrace{\sum_j s_j^2}_{HHI} + \underbrace{\sum_j \sum_{k \neq j} s_j s_k \frac{\sum_i \gamma_{ij} \beta_{ik}}{\sum_i \gamma_{ij} \beta_{ij}}}_{MHHIdelta}. \quad (3)$$

Similar to equation (2), the $MHHIdelta$ term reflects the extent to which influential shareholders of firm i have economic interests in firm k , relative to their interests in firm j . In the language of network theory, it reflects the density of the network of ownership and control between the firms under consideration. HHI is the special case that obtains when firms maximize their own profits. In sum, equation (3) predicts higher markups (or

⁸Many other measures have been proposed repeatedly in the literature (see, e.g., Harford et al. (2011); Azar (2012); Gilje et al. (2017); Banal-Estanol et al. (2017)) – including the minimum of shares held by the same actor in a pair of firms, the product of these shares, the maximum of these shares, and so on. These measures appear less economically meaningful because they don't explicitly recognize the relative power of different shareholders in shaping firms' behavior. That said, which measure best describes firm behavior empirically is an important open question. Therefore, experimentation with different measures is a valued direction for future research.

prices, conditional on cost), along with lower output, and hence lower consumer welfare, in markets with more CoOCo.

However, López & Vives (2016) show horizontal common-ownership links need not be welfare-decreasing, in theory, because common ownership can mitigate firms' well-known disincentives to innovate that can arise from technological spillovers. Under restrictive conditions, common ownership can thus increase cost-reducing innovation to an extent that increases output and welfare. Under more general conditions, however, the anti-competitive effects of common ownership dominate, and welfare decreases with increasing common ownership. To derive more differentiated testable predictions, Antón et al. (2017) extend that model and derive comparative statics of the common-ownership effect on innovation with respect to differential degrees of technological and product-market spillovers, respectively. Shelegia & Spiegel (2017)'s model studies innovation in a duopoly model that allows for asymmetric common-ownership links.

These predictions about the effect of CoOCo on product market equilibria can, in principle, be tested empirically. However, before thinking about empirical designs, several measurement and data challenges have to be overcome.

2.5. Measurement and data challenges

Although theoretically appealing as derived from an economic model, and perhaps useful as a screening tool for regulators, several disadvantages come with using *MHHI delta* as a measure of CoOCo in some empirical applications. One is that it only varies at the market level (as opposed to λ_{jk} from equation (2), which varies at the market-firm level); when no market-level data but only firm-level market shares are available, the measure only varies at the industry level, perhaps unnecessarily limiting the usable variation in the data. A second disadvantage is that the measure contains not only ownership and control variables, which are potentially endogenous, but also market shares, which are almost surely endogenous; see O'Brien (2015) for a discussion. Although rarely discussed as such, these concerns could perhaps also apply to analyses relating to *changes* in prices and concentration. A third disadvantage is that even product-market studies often only observe the price but not marginal costs as an outcome variable; hence, even regressions of price conditional on proxies for costs such as market-firm fixed effects and time-fixed effects are not a precise measure of the left-hand side of equation (3). In short, reduced-form tests that use *MHHIdelta* as a measure of CoOCo can raise questions of interpretation. Hence, alternative measures of CoOCo may be desirable.

In what follows, I discuss a number of measurement and data challenges that apply to all measures the literature has used. Specifically, the challenges concern the measurement of control shares, ownership data sources and aggregation of ownership stakes to the level at which control is exercised, and issues of market definition.

First, the control share of owner i , γ_{ij} , is not necessarily the same as the share of control rights owner i holds. For example, a beneficial owner controlling 51% of the voting rights may have 100% control over the firm. As this example illustrates, the divergence between control-right shares and share of control (or "control shares") becomes particularly acute when a small number of individuals control a large fraction of control rights, as is often the case in firms with dual-class shares. Knowing how to measure "control share" more generally is difficult. A measure based on voting shares might be sufficient, but the share of board seats, or even the influence specific board seats yield, could matter, too.

Researchers should thus ensure robustness of their results to alternative ways of measuring control shares. For example, Azar et al. (forthcoming) offer baseline results assuming a 1:1 correspondence between control rights and control shares, but show robustness to the assumption that control shares correspond to Banzhaf voting-power indexes.

Relatedly, relying solely on ownership data from institutional shareholdings (typically 13f filings) to construct measures of CoOC_o can be inadequate. First, all of the largest owners of the firms in **Table 1** would not be accounted for, although in many cases, they are the shareholders with the most significant control rights. Ignoring individuals, in particular those undiversified ones at the top of individual firms' ownership structures and those holding dual-class shares, will tend to give undue weight to common-ownership links.⁹ To illustrate, consider the notion that BlackRock and Vanguard's holdings in Walmart or Berkshire Hathaway conferred infinitely more control over strategy than what the Walton family or Warren Buffett enjoy, respectively. That scenario appears unlikely to most, but solely relying on 13F data could implicitly lead common-ownership measures to reflect that notion. Solely relying on institutional owners thus can artificially inflate measures of CoOC_o.¹⁰

Third, in various instances, mutual fund companies file separate 13f's for their various subsidiaries or sets of funds. However, governance and voting is often conducted at the family level. Failing to aggregate 13f's at the family level hence leads to an underestimation of the combined clout of a fund family's votes, and can lead to an underestimation of CoOC_o.¹¹ Subsidiaries with different names from the parent are another source of potential error. For instance, New England Asset Management (US Bancorp's 10th-largest shareholder) is a subsidiary of Berkshire Hathaway.

Azar et al. (forthcoming) address the latter two problems by complementing institutional-holdings data with information from manually collected proxy filings for each airline and quarter, and by manually aggregating ownership and control shares of funds within the same family. This approach is of course more challenging for studies involving a larger number of firms, but no less important. For across-industry studies, the only feasible solution may be to source the data from providers that offer consolidated and aggregated ownership and control information from 13f filings, proxy statements, and other sources.

Fourth, predictions about effects of CoOC_o on corporate conduct in general, and on competition in particular, of course suppose the commonly owned firms in fact interact. Interacting is not equivalent to sharing the same NAICS or SIC code, because industry definitions don't necessarily correspond to markets. Suppose two airlines, W and E, fly non-overlapping sets of routes in the Western and Eastern United States, respectively. One might reasonably assume no significant competitive effects obtain if these airlines were put

⁹The incidence of dual-class shares is perhaps surprisingly large, also in the United States. S&P Capital IQ flags 931 corporations that are publicly traded on a major US stock exchange as having dual class shares. The list includes some of the world's most valuable companies; 162 of them have a market cap greater than USD \$1bn; 252 have a market value greater \$500m. The list includes traditional firms such as Comcast, Ford, Nike, and UPS; technology firms such as Alphabet, Expedia, Facebook, and Snapchat; finance firms such as Berkshire Hathaway, Interactive Brokers, and Visa; media companies such as CBS and Twenty-First Century Fox.

¹⁰In preliminary work, Wilson (2017) finds *MHHI deltas* calculated from 13f's alone are up to three times larger than *MHHI deltas* based on a data set that also captures individual owners.

¹¹The aggregation problem is independent of the well-known errors in the Thomson Reuters 13f data, which occur especially during the later years of the sample and the largest mutual fund families.

under common ownership. However, common ownership of carriers that compete head-to-head on most of their routes is more likely to affect competition. Studies that use industry codes as the market definition do not differentiate between these scenarios, and are therefore more likely to produce biased results. Note this issue is a general concern with using industry-concentration measures, not just with *MHHI*. In sum, the delineation of the market in which researchers can reasonably expect competitive effects of common ownership is important, and industry-level studies are likely to define markets too broadly.

An implication of industry definitions not neatly corresponding to markets is that measures of market concentration calculated at the industry level can be very misleading about the actual degree of market concentration. To illustrate the empirical importance of this point, **Figure 1**, taken from Azar et al. (2016), illustrates time trends in average market concentration and industry concentration in US deposit banking. Because the number of banks in the United States is very large, the level of concentration measured at the national (“industry”) level is small. Concentration at the local (“market”) level is several times larger, because not every bank competes in every market. At either level, concentration that takes both common-ownership and cross-ownership links into account (GHHI) is much greater than concentration measured with the HHI, which counterfactually assumes a complete absence of common ownership or cross-ownership.

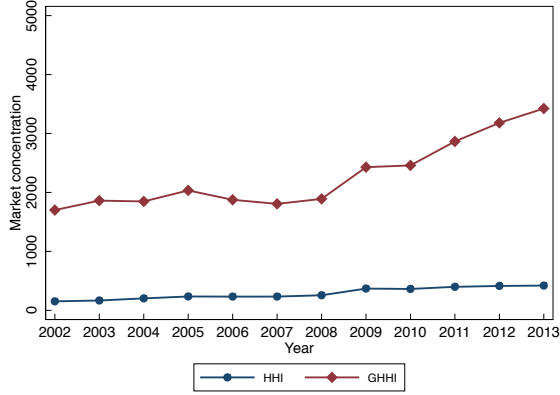
Of course, for many applications, tradeoffs have to be made between the above-mentioned criteria. For example, most studies of corporate behavior are limited to firm-level data; product-level information is rare. Studies that have the ambition to speak to changes in competitiveness at the scale of the macroeconomy have no choice but to define industries at a level much broader than individual markets. Hence, the tradeoff between internal and external validity will be particularly stark for many common ownership studies, as will become apparent in the next section.

3. EMPIRICAL EVIDENCE

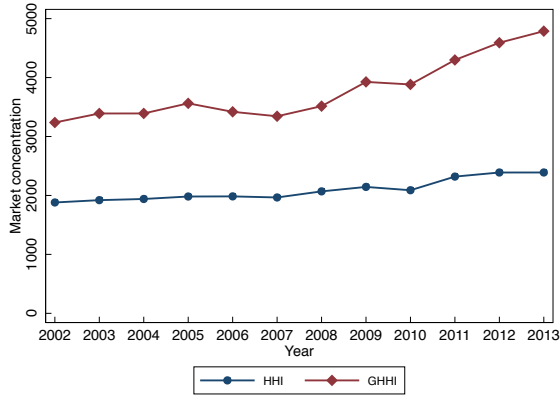
3.1. Documentation of common-ownership links

In his conclusions, Rotemberg (1984) explicitly points to the possibility that mutual funds – and specifically sector funds – could bring about the predicted reductions in competition.¹² The first targeted empirical analysis to this effect that I am aware of is by Hansen & Lott Jr (1996), who document common-ownership links in the computer and auto industries. Whereas Gilo (2000)’s legal analysis focuses on cross-ownership cases, he also motivates his paper with examples of common-ownership links in the rental car and “on-line computer services” industries. Davis & Yoo (2003) document the number of blockholdings by mutual funds in connected firms, and refers to them as “common ownership.” Davis (2008) sees a “new finance capitalism” in the “re-concentration” of US industries through mutual funds. Matvos & Ostrovsky (2008) provide ownership tables similar to those provided in this review across merging parties in the financial industry. Harford et al. (2011) document

¹²Because mutual fund families derive their revenues primarily from charging a percentage of the value of assets under management as a fee, their incentives are largely aligned with the ultimate investors’ interest of maximizing portfolio values. Note also that, in most large fund families, fund managers delegate voting and governance to one centralized proxy and governance office. Hence, *fund manager* incentives have little to do with the incentives relevant for the exercise of shareholder rights; a frequent mischaracterization involves citing fund managers’ focus on maximizing (relative) returns or minimizing tracking error.



(a)



(b)

Figure 1: (a) National-Level Bank Concentration, 2002-2013, taking the entire United States as a unified market. Bank concentration is measured using the HHI and GHHI; (b) County-Level Bank Concentration, 2002-2013, calculated as the deposit-weighted average across counties of county-level bank concentration as measured with HHI and GHHI.

the increase in common-ownership links between firms in the S&P 500 from 1985 to 2005, and “conclude that, by 2005, most institutional investors in S&P 500 firms do not want corporate managers to narrowly maximize the value of their own firm. Instead, investors would see their portfolio values maximized if managers internalized a large percentage of any externalities imposed on other index firms.” Importantly, these statements refer to institutional investors alone, whereas no documentation to date takes into account the role of individual owners. This omission is potentially very important, because in many firms, individuals who (presumably) don’t own significant stakes in competitors control the firm, sometimes employing a dual class share structure. In such cases, common ownership between competitors can increase without resulting in a significant increase of common ownership *concentration*. Azar (2012) reports an increase in the ownership network density

within broad industry classifications, also calculated from 13f institutional holdings. Azar et al. (forthcoming) and Azar et al. (2016) are the first to document an increase in CoOC_o at the market (as opposed to the industry) level in the US airline and deposit banking industries, respectively. They furthermore show that variation in CoOC_o dwarfs variation in the traditional HHI, and that the levels of CoOC_o vastly exceed commonly used thresholds for antitrust screens.

3.2. Direct evidence for the internalization of portfolio interests

Hansen & Lott Jr (1996), examining a sample of 252 mergers from 1985-1991, argue that negative acquirer returns in mergers can be better understood by taking into account the bidder's shareholders' holdings in the target. The idea is that positive target returns compensate common owners of bidder and target for negative bidder returns, at least partially. Matvos & Ostrovsky (2008) find similar results on announcement returns in a larger sample; Gompers & Xuan (2009); Masulis & Nahata (2011) find similar results for VC acquisitions. Matvos & Ostrovsky (2008) moreover show that mutual funds that hold shares in both the target and acquirer are more likely to vote for mergers with negative announcement effects (for which they are at least partially compensated with positive target announcement returns). The voting evidence is difficult to explain with theories other than the internalization of shareholders' interests in other firms. Given that votes on mergers are binding, votes should also directly translate to the firm's objective function.¹³

Cici et al. (2015) and Freeman (2016) find a greater incidence and robustness of business relationships between vertically connected firms, mirroring the results by Fee et al. (2006) who show longer-lasting customer-supplier relationships when the customers directly own shares in the supplier ("cross-ownership"). Geng et al. (2017) find vertical common-ownership links mitigate hold-up problems arising from patent complementarities. product-market competition

The above papers focus on effects of common-ownership links on outcomes at the firm-pair level. One advantage of studying common ownership at the firm-pair level is that the evidence quite directly supports the hypothesis that shareholder portfolio interests enter firms' objective function; another advantage is that reduced-form measures of common ownership are easy to come by. However, many of the policy-relevant implications of common ownership concern the effect of horizontal common-ownership links on product-market competition. To study such equilibrium outcomes, the entire ownership and control network of the relevant competitors has to be taken into account.

3.3. Effects of horizontal common-ownership links on corporate conduct and market outcomes

Everything else equal, based on the above theoretical considerations (and ignoring potential efficiency gains from common ownership for a moment), one would expect more aggressive competition in markets in which the relevant competitors are controlled by investors that have limited holdings in competitors. Amazon and Walmart are perhaps examples of such

¹³Harford et al. (2011) argue the shareholder overlap between targets and acquirers is not large enough to plausibly influence bidder behavior, and show that a different measure of common ownership yields insignificant results on bidder announcement returns. However, they do not challenge Matvos & Ostrovsky (2008)'s main result on voting.

closely-held corporations with aggressive low-margin product-market strategies. By comparison, one would expect higher margins in markets in which the major competitors are commonly owned to a great extent, such as in many banking and airlines markets in the United States. Cross-industry comparisons are not well suited to measure causal effects, however, because many things other than common ownership (e.g., the cost structure) differ across industries. A first approach to tackle this problem is to use variation in common ownership in a given industry over time for identification.

Azar (2012) shows that increases in a reduced-form measure of a within-industry common-ownership density predict industry margins, but industry margins don't predict common ownership. He also shows that common-ownership links *across* industries are associated with *lower* markups. The latter finding is at odds with the hypothesis that common owners simply select into holding more profitable firms, whereas both the within- and the across-industry findings are consistent with an internalization of shareholder portfolio interests in corporate conduct. He & Huang (2017) report that firms sharing common blockholders experience greater market-share growth and operating profitability, which jointly suggests cost synergies from common ownership. Both studies only consider the presence of owners holding blocks of at least 5% in the affected firms, and omit individual owners, which may raise concerns discussed in section 2.5. More generally, unobserved time trends at the industry level could potentially drive the documented correlations, and concerns related to measuring common ownership at the industry as opposed to the market level further complicates the interpretation of the evidence. An omitted size control in He & Huang (2017)'s analysis moreover raises the potential for a spurious relationship between percentage-point market-share growth (which mechanically depends on size) and the presence of a common 5% blockholder (which correlates with size).

The first examination of the effects of common ownership concentration on market-level outcomes is the airlines study by Azar et al. (forthcoming).¹⁴ They find that prices are 3%-12% higher than in a counterfactual world without common ownership. The sensitivity of prices to increases in CoOCo is similar in size to the sensitivity to changes in market concentration as measured by *HHI*. Notably, the authors use variation in prices charged by the same firm at a given time in different markets, which mitigates the potential for omitted variables beyond what can be achieved with firm-level across-industry studies. Moreover, they use BlackRock's acquisition of BGI to construct a market-level instrument to further enhance the internal validity and accuracy of their estimates. The latter approach yields the larger estimates. Furthermore, they find that only common-ownership links created by the firms' largest shareholders are related to prices, which suggests that not common ownership per se, but within-industry diversification of competing firms' largest shareholders affects product prices. The finding also indicates the endogeneity of market shares does not drive

¹⁴I use "common ownership concentration" here as shorthand for the density of partial common-ownership links between firms. Parker & Röller (1997) have previously shown in a structural estimation that common ownership of an asset is linked to higher prices: when telecom companies commonly own licenses in a given market, prices are estimated to be higher. Similarly, Lundin (2016) shows that common owners of Swedish nuclear plants choose to perform maintenance, and thus withdraw capacity from the market in a coordinated way and when the price effect of doing so is particularly large. Such behavior fits a model of joint profit maximization better than profit maximization at the individual plant level.

the main results.¹⁵

Azar et al. (2016) find a positive effect of CoOCo on the prices of retail deposit products and a negative effect on deposit interest rates. In contrast to the airlines study, direct cross-holdings of shares in competitors significantly contribute to ultimate ownership concentration in the US banking sector. The paper also shows that regressions of price on industry structure (as measured by HHI) may not yield significant coefficients, because HHI and ultimate ownership concentration (GHHI delta) are negatively correlated. Therefore, omitting ownership structure from measures of industry structure leads to a negative omitted variable bias. These results inform a debate in industrial organization on the appropriateness of inferring changes in competitiveness from changes in industry structure, which have been dismissed in part based on the ineffectiveness of HHI in capturing variation in markups; see, e.g., Schmalensee (1989).

Market-level studies are attractive because they feature relatively well-defined markets, which I have illustrated above can have very different ownership characteristics than broadly defined national industries. However, data limitations would dramatically constrain the scope of studies of CoOCo on corporate conduct if only market-level studies were “permissible.” To study potentially systemic effects of CoOCo, some internal validity has to be sacrificed for external validity. Gutiérrez & Philippon (2016) show that the rise of industry concentration and common ownership is correlated with firms’ reluctance to invest despite high profits, both within and across industries. The rise of common ownership may thus help explain the confluence of low real interest rates and low investment amid high corporate profits that has puzzled macroeconomists (Krugman 2007, 2014; Summers 2016).

The above papers document likely anti-competitive effects of horizontal common-ownership links. However, as discussed in section 2, welfare-enhancing effects are also possible, for example, when common ownership facilitates investments in cost-reducing technologies. Antón et al. (2017) show that CoOCo increases R&D investments and innovation output when technological spillovers are large, thus preserving the possibility of a bright side of common ownership.

3.4. Governance channels

Some have suggested that the empirical link between changes in CoOCo and changes in product prices raises the question of which corporate governance mechanisms translate the diversified common shareholders’ interests to corporate policy. This question should be somewhat surprising, as it is generally accepted that firms act, to some extent, in their shareholders’ interest. It thus stands to reason that if shareholders’ incentives change, so should firm behavior. Specifically, if firms have no incentives to compete, why would they? It is unclear for which reason or by which mechanism firms are supposed to maximize their own value, in particular when such behavior contradicts shareholder preferences. Instead, when common owners dominate a firm’s ownership structure, there is simply no powerful investor present who has incentives and ability to induce the firm to maximize its own profits. All that said, Azar et al. (forthcoming) offer the most comprehensive discussion of what we know of the particular governance activities common owners perform; I provide a

¹⁵An alternative approach to avoiding the potential endogeneity of market shares is to use the incentive terms λ_{jk} from equation (2) directly. Antón et al. (2016); Gramlich & Grundl (2017) are working papers employing that approach.

short summary and a few additional points here.

First, it is important to clarify that passive investment strategies don't imply a passive approach to ownership. Passive ownership would involve not voting shares, but all of the large mutual fund families do. Indeed, all mechanisms that are known to be used to translate shareholder interests into corporate behavior are also at the disposal of common shareholders, whether they employ active investment strategies (e.g., Berkshire Hathaway or PRIMECAP, referencing Table 2) or primarily passive strategies (e.g., Vanguard). The active/passive distinction is furthermore complicated because, within a fund family, active and passive funds' shares tend to be voted jointly by a centralized corporate governance office,¹⁶ muting the question whether "passive ownership" or "index funds" have an effect on governance outcomes. The current policy discussion on whether *index funds* have an adverse effect on competition and therefore should be prohibited is severely misguided for that reason alone; another reason is that much common ownership is driven by purely active strategies or sector funds that concentrate rather than diversify risks; see Schmalz (2017) for a more comprehensive discussion.

Relatedly, some have argued that, despite the passive funds' public statements, in fact competitive pressures imply their primary objective is cost reduction, leading to reduced incentives to engage to increase the value of the firms they beneficially own on behalf of their investors. Antón et al. (2016) show that common owners may indeed have reduced incentives to engage with the goal of enhancing efficiency or reducing cost. The reason is that cost reductions in multiple firms of the industry don't lead to higher industry profits; instead, they lead to higher compensation costs, increased output, and lower product prices and margins in industry equilibrium. Hence, less engagement to increase individual firms' value can lead to the maximization of industry value, perhaps even as an unconscious outcome of limited involvement in corporate governance. In other words, "doing nothing" is a mechanism by which common owners can induce anti-competitive outcomes. Thus, the seemingly competing explanations for the increasing disconnect between profitability and investment – agency conflicts (Krugman 2007) and market power (Krugman 2014) – may in fact be complementary. In other words, passive investors can be "lazy" owners (as *The Economist* has alleged) and harm competition at the same time.

That said, if common owners engage with the explicit aim to reduce competition, they can also consciously use (i) voice, (ii) incentives, and (iii) their vote to do so. Azar et al. (forthcoming) provide anecdotal evidence for the voice channel.¹⁷ Gilo (2000) provides de-

¹⁶E.g., State Street employs "a centralized governance and stewardship process covering all discretionary holdings across our global investment centers. This allows us to ensure we speak and act with a single voice and maximize our influence with companies by leveraging the weight of our assets." (<https://www.ssga.com/products-capabilities/capabilities/corporate-governance-and-voting-policy.html>). Fund families with predominantly active investment strategies such as Fidelity and T. Rowe Price appear to be exceptions to this rule. These important facts appear to be not well understood in the legal literature, e.g. (Rock & Rubinfeld 2018).

¹⁷See Flaherty & Kerber (2016b) for an example of engagement by a common shareholder of competitors; see Waldmeir & Kwan (2017) for an example of shareholders putting United Airline's CEO "under pressure for slashing fares and for increasing the supply of flights and seats." Interestingly, United management did not face similar investor pressure following the display of "capacity discipline" featuring the forceful removal of a passenger from a plane in April 2017. This is not surprising, given that United's largest shareholders gained financially in the wake of the incident, as gains in their holdings in United's competitors more than compensated for the decline in the decline of United's stock price; see Levine (2017) for a discussion.

tailed numerical examples on how compensation contracts can be used to align managerial incentives with those of shareholders holding stakes in competitors. Antón et al. (2016) document that such examples are quantitatively important and widespread: common ownership is associated with lower wealth-performance sensitivities.¹⁸ Matvos & Ostrovsky (2008) show the most direct evidence that shareholders take portfolio considerations into account in voting decisions. Azar (2012) shows that firms that share common owners are also more likely to share common directors. Schmalz (2015) illustrates with a case study how proxy votes can be used to prevent activist involvement that would lead to increased competition. Buhayar (2016) reports an example in which one firm's shareholders choose a representative of a competitor's largest shareholder as a director. A detailed study of voting behavior as a function of ownership structure is among the open questions for future research discussed in section 5.¹⁹

In sum, irrespective of how active common owners' governance activities are, as long as they encumber voting rights that could otherwise be used by undiversified concentrated shareholders, common owners' incentives are likely to be reflected in corporate behavior at least to some extent, whereas any of the usual corporate-governance channels can be used. However, empirical support for most channels and their relative importance is limited. Thus, there is scope for numerous research projects to identify the various potential governance channels, further discussed in section 5. For the same reason, shutting down particular governance channels does not seem a promising policy tool. A more promising route to prevent anti-competitive outcomes is to reduce the anti-competitive incentives. The policy proposals discussed in the following section are primarily based on that premise.

4. LEGAL ASPECTS OF HORIZONTAL SHAREHOLDINGS AND POLICY RESPONSES

As reflected in the review thus far, perhaps the most consequential documented effects of CoOC are anti-competitive product-market outcomes. Long before such empirical results were on the horizon, Roe (1990)'s analysis of the legal limitations to institutional shareholdings touched on several aspects of the antitrust problem. For perspective, at the time of Roe's writing, mutual funds in aggregate controlled assets worth \$548bn (about \$1trn in 2017-dollars). Nowadays, a single mutual fund family alone controls close to \$6trn.

Roe cites from the 1934 Senate securities ("Pecora") report: "The investment company has become the instrument ... to facilitate acquisition of concentrated control of ... the industries of the country. [...] The concentration of control ... the mutual funds facilitated served no productive function, served merely to pervert the use of the controlled companies and was detrimental to the public welfare. [...] Congress must prevent the diversion of these trusts from their normal channels of diversified investment to the abnormal avenues

¹⁸Antón et al. (2016) also document a negative association between relative performance incentives and common ownership, as first predicted by Gordon (1990). Liang (2016) finds similar results using different measures and methodologies. Kwon (2016) reported a positive association based on different industry definitions, data sources, and ownership measures; however, his study has been withdrawn from SSRN and is no longer publicly available.

¹⁹Fichtner et al. (2016) analyze the voting behavior of BlackRock, Vanguard, and State Street, but not of common owners more generally. Edmans et al. (2016) study the effect of common ownership on incentives and ability to engage in governance, and conclude that common ownership can strengthen governance.

of control of industry.” The resulting Investment Company Act of 1940 declared that “the national public interest ... is adversely affected ... when investment companies have great size and have excessive influence on the national economy.” FDR himself called out the shift from individual and independent ownership of business to the concentration of unwarranted economic power in such “holding companies,” thus creating a form of “private socialism” and threatening to bring about government socialism.²⁰ Roe also notes that “institutional investors have considered joint action to affect management and, I understand, an important consideration militating against joint action was fear that political regulation would follow.”

By stark contrast, the nation’s largest common owners nowadays convene for “secret summits,” in which they discuss how they can most effectively influence their portfolio firms (Foley & McLannahan 2016). These actions occurred several years after the SEC began to exert significant pressure on institutional investors to take a more active stance in corporate governance (see, e.g., 17 CFR Part 275 RIN 3235-AI65). This perspective seems rife with the potential to conflict with antitrust laws, thus boxing institutional shareholder into a difficult position.

Roe also discusses the conflicting goals of diversification mutual funds offer, while at the same time avoiding antitrust problems that come with control, and yet maintaining good governance of the portfolio firms. Azar (2012) refers to this conflict as a “trilemma,” because only two of these three goals can be perfectly and simultaneously attained. Roe appears to see less of a conflict as he voices skepticism of large institutions’ ability and incentives to effectively monitor to the benefit of social welfare, consistent with the theoretical considerations and empirical evidence in Antón et al. (2016): “The networks could siphon resources for banker profit and still fail to monitor managers effectively; they could become politically intolerable concentrations of economic power.”

Gilo (2000) is the first legal analysis I know of that specifically focuses on the anticompetitive effects of common and cross-ownership. He discusses the potential for Clayton Act Section 7 violations in the context of purely passive investments in competitors, emphasizing such investments may substantially harm competition “even when firms are not colluding,” and proposes that executive compensation schemes that reward managers for competitor performance should be banned through section 5 of the Federal Trade Commission Act. He also anticipates the current literature in his discussion of potential efficiency gains from common ownership. Finally, he agrees with current policy proposals (see below) that the only effective remedy to avert anti-competitive effects of passive investments in competitors is (“obviously”) to divest.

Wilkinson & White (2006) discuss antitrust concerns and enforcement actions related to partial common ownership acquisitions in private equity. In particular, they point to legal precedents that give competition authorities “green light to scrutinize the investments ... in two competing portfolio companies – even where the investments result in no controlling interest by either competitor and the levels of cross-ownership are relatively small.” They also recommend the calculation of modified HHIs to assess the competitive risks arising from the change in incentives from partial common-ownership links.

²⁰The underlying logic is that common ownership removes incentives to compete, and thus the foundation of capitalism as a successful system of production – irrespective of whether the common owners are private actors or the government. A question not discussed in his paper is whether the resulting limitations imposed on funds also apply to fund *families* that exercise joint control over a large number of funds.

Elhauge (2016) offers the first assessment of the concrete legal implications of the empirical findings of anti-competitive effects of common ownership by Azar et al. (forthcoming) and Azar et al. (2016). In short, he emphasizes that even if no evidence of collusion exists²¹ and hence a clear violation of the Sherman Act's Section 1, Clayton Act Section 7 still prohibits acquisitions of assets – explicitly also below a level that confers control – that lessen competition.²² A key argument in his paper is that the so-called passive-investor exemption to the Clayton Act requires that shareholders do not vote or otherwise influence companies *and* that their ownership does not in fact have the effect of lessening competition. Given that even so-called “passive” institutions do vote their shares, and given Azar et al. (forthcoming)'s results, Elhauge concludes that existing patterns of common ownership do not satisfy the requirements for the passive-investor exemption. Elhauge also details the potential for large-scale HSR violations, a concern since reflected in the press (Flaherty & Kerber 2016a) and by regulators (Feinstein et al. 2015), and discusses the potential role of CoOCo in explaining otherwise puzzling macroeconomic trends.

Baker (2016) offers a “qualified agreement” with Professor Elhauge's assessment. Scott Morton & Hovenkamp (2017) likewise argue that patterns and effects of common ownership can be a violation of existing antitrust laws, but offer a more focused guidance on how suits may be organized in the U.S.. A vivid theoretical debate continues in the law journals (see, e.g., Patel (2017); Rock & Rubinfeld (2018)). Unfortunately, some of the contributions remain largely disconnected from the empirical evidence to date, and thus offer variable degrees of novel insights. Elhauge (2017a) offers a review.

Given the international scope of the antitrust risks associated with partial common-ownership links, Elhauge (2017b) offers an assessment of how anti-competitive effects of common ownership can be addressed within the confines of EU competition law. Elhauge (2017b) also updates his earlier HLR paper with respect to the applicability of existing US antitrust law, and in particular Sherman Act Section 1, to competitive risks from common ownership.

It is important to keep in mind that the question of whether present-day common-ownership links violate existing antitrust laws is different from the question of whether enforcing any such violations would improve economic welfare. With such welfare considerations in mind, a first policy proposal by Posner et al. (2017) points out an apparent problem with suits according to the Clayton Act as proposed by Elhauge: if a concentrated owner sells her shares to small individual investors and thus creates greater CoOCo (imagine Jeff Bezos liquidating his Amazon shares), institutions with pre-existing common-ownership links could be liable although they didn't do anything to bring about the increase in CoOCo. The authors thus propose a safe haven for institutions that would require them to either limit their holdings in any one company to 1% of the outstanding stock, or to concentrate their holdings in one firm per industry. They also offer a first quantitative eval-

²¹The key insight from both the theoretical and empirical literature is indeed that horizontal CoOCo can lessen competition by changing unilateral incentives. In fact, the potential for collusion becomes less acute when unilateral incentives to compete are lessened by CoOCo and drive markets toward monopolistic outcomes already; see de Haas & Paha (2016) for the most recent formal model of collusion under common ownership.

²²Indeed, O'Brien & Salop (2000) share this assessment in the context of direct cross-holdings of one firm in another: “Section 7 of the Clayton Act covers the acquisition of ‘any part’ of the stock of another company if deemed anticompetitive. The statute does not require acquisition of stock sufficient to confer control; nor does it contain a threshold or a minimum stock purchase amount.”

uation of the loss of diversification benefits due to diversifying across industries alone. They conclude such a loss would be negligible compared to the increase in economic efficiency from more competitive product markets. In addition, a concentration of shareholdings in one firm per industry would enhance institutional owners' incentives to improve corporate governance. The alternative policy of restricting common owners' voting rights would lead to a greater divergence between cash flow and control rights, and thus create greater corporate-governance frictions.

Antitrust authorities worldwide have begun to examine the competitive implications of common-ownership links.²³ As a result, the asset-management industry has invested significant resources in discrediting the underlying research and discouraging policy responses. A detailed discussion of non-academic papers on the subject is beyond the scope of this review. Popular misconceptions – in particular that “index funds” are the only or key culprit in bringing about anti-competitive effects, and that addressing the competitive risks from common ownership implies prohibiting index funds – are discussed by Schmalz (2017).

5. OPEN QUESTIONS AND CHALLENGES FOR FUTURE RESEARCH

Given that the recent empirical findings challenge no less than a decades-old assumption about the objective of the firm, some expect they are “likely to spawn a whole field of study” (Solomon 2016), with the literature reviewed above being just the beginning. Indeed, many old questions can be revisited through the lens of shareholder value maximization rather than own-firm-profit maximization. Moreover, new questions arise for theorists and empiricists alike.

An example of the first type of open question is Gordon (1990)'s study of optimal managerial incentives under common ownership, which revisits Holmström (1982) chiefly by changing the assumed objective.

Another example is to reexamine studies of product markets while allowing for the possibility of competitive effects of common ownership. In particular, quantitative estimates are important in addressing the welfare consequences of changes in common ownership, and in evaluating policy proposals that try to balance the partially conflicting goals of shareholder value maximization, competition in factor and product markets, innovation, and ultimate shareholder diversification. A first step in evaluating these tradeoffs would be to provide credible structural estimates of the competitive effects of common ownership, complementing the reduced-form estimates of Azar et al. (forthcoming) (AST) and Azar et al. (2016).²⁴ Another open question regards a quantitative assessment of the benefits from

²³See European Commission Article 8(2) Regulation (EC) 139/2004, Case M.7932 – Dow/DuPont; or the OECD's conference on common ownership and competition, including the review by Capobianco (2017). Azar & Schmalz (2017) and Azar et al. (2017b) cover additional developments.

²⁴In a study sponsored by ICI (a lobby organization of institutional investors), Kennedy et al. (2017) (KOSW), after confirming the panel-regression results of AST, make a first attempt to provide a structural estimate for price effects of common ownership in the US airline industry, given that no known model yields the precise reduced-form regression AST estimate. However, KOSW do so using a selected subsample one-tenth the size of AST's sample, and, in contrast to the structural airline literature (e.g., Berry & Jia (2010)), jointly estimate demand and supply. The latter can be superior if the authors possess the true model of the world, but otherwise may lead to bias; Akerberg et al. (2007) discuss the additional conditions needed for identification. KOSW's resulting estimates are economically insensible, including a negative effect of route length on marginal cost, and no significantly positive effect of common ownership, which calls into question

diversifying across versus within-industries, which would help evaluate the likely welfare effect of some of the policy proposals. Estimating factor market effects (e.g., monopsony in the labor market) would likewise be necessary to obtain a full picture of the welfare effects of common ownership. Empirical investigations of effects of vertical common-ownership links are constrained not only by a dearth of data, but also by the absence of clear theoretical guidance.

A question for mechanism design is whether and how some of the benefits of common ownership (e.g., ultimate shareholder diversification) can be largely retained without sacrificing others (e.g., product-market competition). Because diversification at the financial intermediary level is not obviously a goal per se, understanding empirically and theoretically the separation between the level at which diversification is attained (the household level) and the level at which governance and voting is conducted (the asset-manager level) appears to be a promising route towards informing future policy proposals.

Which governance mechanisms are chiefly responsible for common-ownership effects appears to be of interest to corporate-governance researchers, legal scholars, and policy makers. Which (type of) shareholders are chiefly responsible for any anti-competitive or pro-competitive effects of common ownership? Are the effects due to commission of anti-competitive actions or omission of pro-competitive directions one would expect from non-common concentrated owners? Variations of these questions include whether the effects are due to the presence and power of diversified investors or the absence of a large, even more powerful undiversified investor; whether they are due to the presence of passive shareholders or the absence of active shareholders, and so on. Of course, because shareholders have to sum to 100%, one alternative is just the flip side of the other, shedding doubt on whether these questions are well defined. Various researchers are working on the more interesting question of whether, how, and under which conditions different shareholder types interact in an explicitly or implicitly coordinated fashion. Studying voting behavior as a function of strategic preferences (as implied by portfolio holdings) may further inform that debate.

The literature on anti-competitive effects of horizontal common ownership thus far relates market outcomes to the ownership and control structure of the network of competitors, holding constant the size and identity of competitors, that is, the market structure. However, investigating whether product-market structure is endogenous to the ownership and control links between incumbents and potential entrants could also be interesting. Also, the extent to which product market structure and competitiveness may drive CoOCo is not well understood. Studying any such dependences may be a fruitful area for research for both theorists and empiricists. For example, anecdotal evidence suggests some forms of activism are contingent on other investors' holdings and preferences, whereas activism is known to lead to changes in product-market structure (Aslan & Kumar 2016). An empirical study of such a dependence would likely necessitate a selection model with endogenous firm strategies, asset prices, and ownership by at least some shareholders: if firm profits depend

the validity of their estimates; see Azar et al. (2017a) for more details. Dennis et al. (2017)'s critique of AST's paper, by contrast, is purely empirical, and has the potential to advance the debate. At the time of this writing, however, their claim that "Common Ownership Does Not Have Anti-Competitive Effects in the Airline Industry" is based on known-to-be-incorrect ownership data sourced directly from Thomson Reuters 13Fs without the necessary modifications to the filings the finance literature has adopted, and without fixing other measurement issues discussed in section 2.5. In particular, they only consider institutional owners, and thus ignore individual owners such as Richard Branson.

on common ownership, equilibrium asset prices should likewise be a function of ownership and market structure.

More generally, understanding the endogeneity of ownership structures of competitors is a very interesting theoretical question for future research. López & Vives (2016) characterize socially optimal levels of common ownership amid the potential for technological spillovers, but it is not known under which conditions a decentralized equilibrium would implement the socially optimal allocation. Anecdotally, the socially and privately optimal levels of common ownership don't align. Whereas socially optimal levels of common ownership increase in the number of firms and with the level of innovation and the potential for technological spillovers in Lopez and Vives' model, the tech sector appears to feature very low levels of common ownership concentration (due to control by a small number of individuals who presumably don't hold significant stakes in competitors), whereas high levels of CoOCo are present for example in the airlines and banking sectors.

Perhaps the most consequential question for future studies in both industrial organization and financial economics is, what is the objective function of the firm? I have pointed out in section 2 that we lack a theoretical foundation for own-profit maximization under realistic conditions. At the same time, the literature lacks an agreed-upon alternative objective, or an answer to the question of how we should study firm behavior if an alternative objective function does not exist. The various alternative objective functions the literature has entertained are only candidates, and many of them are ad hoc. A first-order goal for future research should thus be to develop and test voting models that take into account shareholders' varying portfolio interests.²⁵

6. CONCLUSIONS

Unless all firms are price takers, firms' objectives and hence behaviors depend on the degree to which the interacting firms are owned and controlled by the same investors. In other words, the commonly made assumption that firms maximize their own value ceases to have a robust theoretical foundation when firms interact strategically. Indeed, both theory and empirical evidence indicate a more realistic model of corporate conduct takes into account shareholders' portfolio interests.

Yet no one "correct" model has been identified. In addition, existing theories have made a large number of falsifiable predictions both about corporate behavior and about resulting equilibrium outcomes that have not been tested. Moreover, new research in the area can have immediate policy implications. I conclude that both theoretical and empirical research on CoOCo and corporate conduct will likely remain an attractive area of study in the foreseeable future.

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²⁵Future models may also attempt to include some of the following elements: (i) heterogeneous voting power, (ii) incentives and agency conflicts at the level of the beneficial owner in addition to the ultimate owner, (iii) endogenous (iii-a) ownership, (iii-b) control and firm strategies, (iii-c) product market and factor market equilibrium, (iii-d) asset prices, and (iii-v) interaction between various shareholders' voting strategies.

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LITERATURE CITED

- Akerberg D, Benkard CL, Berry S, Pakes A. 2007. Econometric tools for analyzing market outcomes. In *The Handbook of Econometrics*, eds. H J, L E, vol. 6A. Amsterdam: North-Holland, 4171–4276
- Allen JW, Phillips GM. 2000. Corporate equity ownership, strategic alliances, and product market relationships. *The Journal of Finance* 55:2791–2815
- Alley WA. 1997. Partial ownership arrangements and collusion in the automobile industry. *The Journal of Industrial Economics* 45:191–205
- Antón M, Ederer F, Giné M, Schmalz MC. 2016. Common ownership, competition, and top management incentives. *Available at SSRN 2802332*
- Antón M, Ederer F, Giné M, Schmalz MC. 2017. Innovation: The bright side of common ownership? *Working Paper*
- Antón M, Polk C. 2014. Connected stocks. *The Journal of Finance* 69:1099–1127
- Areeda P, Turner D. 1978. Antitrust law. Little Brown
- Arrow KJ. 1951. Social choice and individual values. John Wiley & Sons
- Aslan H, Kumar P. 2016. The product market effects of hedge fund activism. *Journal of Financial Economics* 119:226–248
- Azar J. 2012. A new look at oligopoly: Implicit collusion through portfolio diversification. *Ph.D. thesis, Princeton University*
- Azar J. 2017. Portfolio diversification, market power, and the theory of the firm. *Available at SSRN 2811221*
- Azar J, Raina S, Schmalz MC. 2016. Ultimate ownership and bank competition. *Available at SSRN 2710252*
- Azar J, Schmalz MC. 2017. Common ownership of competitors raises antitrust concerns. *Journal of European Competition Law and Practice* 8:329–332
- Azar J, Schmalz MC, Tecu I. 2017a. The competitive effects of common ownership: Economic foundations and empirical evidence: Reply. *Working paper*
- Azar J, Schmalz MC, Tecu I. 2017b. Why common ownership creates antitrust risks. *Competition Policy International* June
- Azar J, Schmalz MC, Tecu I. forthcoming. Anti-competitive effects of common ownership. *The Journal of Finance*
- Baker JB. 2016. Overlapping financial investor ownership, market power, and antitrust enforcement: My qualified agreement with professor elhauge. *Harvard Law Review* 129
- Banal-Estanol A, Vives X, Selleslachts J. 2017. The financial crisis's impact on common ownership and competition. *Working paper*
- Bebchuk LA, Cohen A, Hirst S. 2017. The agency problems of institutional investors. *Journal of Economic Perspectives* 31:89–112
- Ben-David I, Franzoni F, Moussawi R. 2017a. Exchange-traded funds. *Annual Review of Financial Economics* 9:6.1–6.21
- Ben-David I, Franzoni F, Moussawi R, Sedunov J. 2017b. The granular nature of large institutional investors. *Working Paper*
- Bernheim BD, Whinston MD. 1985. Common marketing agency as a device for facilitating collusion.

- The RAND Journal of Economics* :269–281
- Berry S, Jia P. 2010. Tracing the woes: An empirical analysis of the airline industry. *American Economic Journal: Microeconomics* 2:1–43
- Bolle F, Güth W. 1992. Competition among mutually dependent sellers. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft* :209–239
- Bond P, Garcia D. 2017. The equilibrium consequences of indexing. *Working paper*
- Brav A, Jiang W, Kim H. 2015. Recent advances in research on hedge fund activism: Value creation and identification. *Annual Review of Financial Economics* 7:579–595
- Bresnahan TF, Salop SC. 1986. Quantifying the competitive effects of production joint ventures. *International Journal of Industrial Organization* 4:155–175
- Brito D, Ribeiro R, Vasconcelos H. 2014. Measuring unilateral effects in partial horizontal acquisitions. *International Journal of Industrial Organization* 33:22–36
- Brito D, Ribeiro R, Vasconcelos H. 2017. Quantifying the coordinated effects of partial horizontal acquisitions. *Working Paper*
- Buhayar N. 2016. Buffett’s investing deputy combs named to jpmorgan’s board. *Bloomberg*
- Capobianco A. 2017. Common ownership by institutional investors and its impact on competition. *Background Paper for 128th meeting of the OECD Competition Committee*
- Cici G, Gibson S, Rosenfeld CM. 2015. Cross-company effects of common ownership: Dealings between borrowers and lenders with a common blockholder. *Available at SSRN 2705856*
- Clayton MJ, Jorgensen BN. 2005. Optimal cross holding with externalities and strategic interactions. *The Journal of Business* 78:1505–1522
- Crès H, Tvede M. 2005. Portfolio diversification and internalization of production externalities through majority voting. *Working paper*
- Davis GF. 2008. A new finance capitalism? mutual funds and ownership re-concentration in the united states. *European Management Review* 5:11–21
- Davis GF, Yoo M. 2003. Le monde toujours plus petit des grandes entreprises américaines: Participations communes et liens dans les conseils d’administration (1990-2001) – (the shrinking world of the large american corporation: common ownership and board ties, 1990–2001). *Gerer et comprendre* 74:51–62
- de Haas S, Paha J. 2016. Partial cross ownership and collusion. Tech. rep., Joint Discussion Paper Series in Economics
- DeAngelo H. 1981. Competition and unanimity. *The American Economic Review* 71:18–27
- Dennis P, Gerardi K, Schenone C. 2017. Common ownership does not have anti-competitive effects in the airline industry. *Working paper*
- Dietzenbacher E, Smid B, Volkerink B. 2000. Horizontal integration in the dutch financial sector. *International Journal of Industrial Organization* 18:1223–1242
- Edmans A. 2014. Blockholders and corporate governance. *Annu. Rev. Financ. Econ.* 6:23–50
- Edmans A, Holderness CG. 2017. Blockholders: a survey of theory and evidence. In *Handbook of the Economics of Corporate Governance*, eds. BE Hermalin, MS Weisbach. Elsevier: Amsterdam, 541–636
- Edmans A, Levit D, Reilly D. 2016. Governing multiple firms. *Available at SSRN 2482935*
- Elhauge E. 2016. Horizontal shareholding. *Harvard Law Review* 129
- Elhauge E. 2017a. The growing problem of horizontal shareholding. *Competition Policy International* June
- Elhauge E. 2017b. Tackling horizontal shareholding: an update and extension to the sherman act and eu competition law. *Background Paper for 128th meeting of the OECD Competition Committee*
- Ellerman DP. 1991. Cross ownership of corporations: a new application of input-output theory. *Metroeconomica* 42:33–46
- Farrell J. 1985. Owner-consumers and efficiency. *Economics Letters* 19:303–306
- Farrell J, Shapiro C. 1990. Asset ownership and market structure in oligopoly. *The RAND Journal*

- of *Economics* :275–292
- Fee CE, Hadlock CJ, Thomas S. 2006. Corporate equity ownership and the governance of product market relationships. *The Journal of Finance* 61:1217–1251
- Feinstein D, Libby K, Lee J. 2015. “investment-only” means just that. <https://www.ftc.gov/news-events/blogs/competition-matters/2015/08/investment-only-means-just>
- Fichtner J, Heemskerk EM, Garcia-Bernardo J. 2016. Hidden power of the big three? passive index funds, re-concentration of corporate ownership, and new financial risk. Available at SSRN 2798653
- Fisher I. 1930. The theory of interest. The Macmillan Company
- Flaherty M, Kerber R. 2016a. U.s. lawsuit against activist valueact puts mutual funds on alert. *Reuters*
- Flaherty M, Kerber R. 2016b. U.s. regulator sues valueact over halliburton-baker hughes disclosures. *Reuters*
- Flath D. 1991. When is it rational for firms to acquire silent interests in rivals? *International Journal of Industrial Organization* 9:573–583
- Flath D. 1992. Horizontal shareholding interlocks. *Managerial and Decision Economics* 13:75–77
- Foley S, McLannahan B. 2016. Top us financial groups hold secret summits on long-termism. *Financial Times*
- Foros Ø, Kind HJ, Shaffer G. 2011. Mergers and partial ownership. *European Economic Review* 55:916–926
- Fotis P, Zevgolis N. 2016. The competitive effects of minority shareholdings: legal and economic issues. Bloomsbury Publishing
- Freeman K. 2016. The effects of common ownership on customer-supplier relationships. Available at SSRN 2873199
- Gelles D, de la Merced MJ. 2014. New alliances in battle for corporate control. *The New York Times*
- Geng H, Hau H, Lai S. 2017. Patent success, patent holdup, and the structure of property rights. *Working paper*
- Gilje EP, Gormley T, Levit D. 2017. The rise of common ownership. *Working Paper*
- Gilo D. 2000. The anticompetitive effect of passive investment. *Michigan Law Review* 99:1–47
- Gilo D, Moshe Y, Spiegel Y. 2006. Partial cross ownership and tacit collusion. *RAND Journal of Economics* :81–99
- Gompers PA, Xuan Y. 2009. Bridge building in venture capital-backed acquisitions. *Working paper*
- Gordon RH. 1990. Do publicly traded corporations act in the public interest? Tech. rep., National Bureau of Economic Research
- Gordon RH. 2003. Do publicly traded corporations act in the public interest? *The B.E. Journal of Economic Analysis and Policy* 3
- Gramlich J, Grundl S. 2017. Testing for competitive effects of common ownership. *Working paper*
- Gutiérrez G, Philippon T. 2016. Investment-less growth: An empirical investigation. Tech. Rep. November, National Bureau of Economic Research
- Hansen RG, Lott Jr JR. 1996. Externalities and corporate objectives in a world with diversified shareholder/consumers. *Journal of Financial and Quantitative Analysis* :43–68
- Harford J, Jenter D, Li K. 2011. Institutional cross-holdings and their effect on acquisition decisions. *Journal of Financial Economics* 99:27–39
- Hart O, Zingales L. 2017. Should a company pursue shareholder value? *Working Paper*
- Hart OD. 1979. On shareholder unanimity in large stock market economies. *Econometrica: Journal of the Econometric Society* :1057–1083
- Hart OD, Holmström B. 1987. The theory of contracts. Cambridge University Press
- He J, Huang J. 2017. Product market competition in a world of cross ownership: Evidence from institutional blockholdings. *Review of Financial Studies* 30:2674–2718
- Heim S, Hüschelrath K, Laitenberger U, Spiegel Y. 2017. Minority share acquisitions and collusion:

- Evidence from the introduction of national leniency programs. *Working paper*
- Holmström B. 1982. Moral hazard in teams. *The Bell Journal of Economics* :324–340
- Holmström B, Roberts J. 1998. The boundaries of the firm revisited. *The Journal of Economic Perspectives* 12:73–94
- Kennedy P, O'Brien DP, Song M, Waehrer K. 2017. The competitive effects of common ownership: Economic foundations and empirical evidence. *Working Paper*
- Krugman P. 2007. Another economic disconnect. <http://www.nytimes.com/2007/04/30/opinion/30krugman.html>
- Krugman P. 2014. The profits-investment disconnect. perma.cc/DCJ7-SUKJ
- Kwon HJ. 2016. Executive compensation under common ownership. *Working Paper*
- Levine M. 2017. Airline shares and whistleblowers. <https://www.bloomberg.com/view/articles/2017-04-12/airline-shares-and-whistleblowers>
- Liang LM. 2016. Common ownership and executive compensation. *UT Dallas Working Paper*
- López AL, Vives X. 2016. Cross-ownership, r&d spillovers, and antitrust policy. Available at SSRN 2795078
- Lundin E. 2016. Market power and joint ownership: Evidence from nuclear plants in sweden. Available at SSRN 2743221
- Malueg DA. 1992. Collusive behavior and partial ownership of rivals. *International Journal of Industrial Organization* 10:27–34
- Masulis RW, Nahata R. 2011. Venture capital conflicts of interest: Evidence from acquisitions of venture-backed firms. *Journal of Financial and Quantitative Analysis* 46:395–430
- Matvos G, Ostrovsky M. 2008. Cross-ownership, returns, and voting in mergers. *Journal of Financial Economics* 89:391–403
- McCahery JA, Sautner Z, Starks LT. 2016. Behind the scenes: The corporate governance preferences of institutional investors. *The Journal of Finance*
- Milne F. 1981. The firm's objective function as a collective choice problem. *Public Choice* 37:473–486
- Nain A, Wang Y. 2016. The product market impact of minority stake acquisitions. *Management Science*
- Nye W. 1992. Can a joint venture lessen competition more than a merger? *Economics Letters* 40:487–489
- O'Brien DP. 2015. Anticompetitive effects of common ownership: Overview of the theory, and review of the empirical findings of azar, et al. *Transportation, Energy & Antitrust* :3–17
- O'Brien DP, Salop SC. 2000. Competitive effects of partial ownership: Financial interest and corporate control. *Antitrust Law Journal* 67:559–614
- Ono H, Nakazato T, Davis C, Wilson A. 2004. Partial ownership arrangements in the japanese automobile industry; 1990-2000. *Journal of Applied Economics* 7:355
- Parker PM, Röller LH. 1997. Collusive conduct in duopolies: multimarket contact and cross-ownership in the mobile telephone industry. *The RAND Journal of Economics* :304–322
- Patel M. 2017. Common ownership, institutional investors, and antitrust. *Antitrust Law Journal* forthcoming
- Posner EA, Scott Morton FM, Weyl EG. 2017. A proposal to limit the anti-competitive power of institutional investors. *Antitrust Law Journal*
- Reitman D. 1994. Partial ownership arrangements and the potential for collusion. *The Journal of Industrial Economics* :313–322
- Reynolds RJ, Snapp BR. 1986. The competitive effects of partial equity interests and joint ventures. *International Journal of Industrial Organization* 4:141–153
- Rock EB, Rubinfeld DL. 2018. Antitrust for institutional investors. *Antitrust Law Journal* forthcoming
- Roe MJ. 1990. Political and legal restraints on ownership and control of public companies. *Journal of financial economics* 27:7–41
- Rotemberg J. 1984. Financial transaction costs and industrial performance. *Working Paper, Alfred P. Sloan School of Management*

- Rubin A, et al. 2006. Diversification and corporate decisions. *Corporate Ownership and Control* 3:209–212
- Rubinstein A, Yaari ME, et al. 1983. The competitive stock market as cartel maker: Some examples. Tech. rep., Suntory and Toyota International Centres for Economics and Related Disciplines, LSE
- Schmalensee R. 1989. Inter-industry studies of structure and performance. *Handbook of industrial organization* 2:951–1009
- Schmalz MC. 2015. How passive funds prevent competition. <http://ericposner.com/martin-schmalz-how-passive-funds-prevent-competition/>
- Schmalz MC. 2017. Common ownership and competition: Facts, misconceptions, and what to do about it. *Background Paper for 128th meeting of the OECD Competition Committee*
- Scott Morton FM, Hovenkamp HJ. 2017. Horizontal shareholding and antitrust policy. *Yale Law Journal* forthcoming
- Shelegia S, Spiegel Y. 2012. Bertrand competition when firms hold passive ownership stakes in one another. *Economics Letters* 114:136–138
- Shelegia S, Spiegel Y. 2017. Cost-reducing investments under partial cross-ownership. *Working paper*
- Smith A. 1776. An inquiry into the nature and causes of the wealth of nations. W. Strahan and T. Cadell, London
- Solomon SD. 2016. Rise of institutional investors raises questions of collusion. *New York Times Dealbook*
- Summers L. 2016. Corporate profits are near record highs. here's why that's a problem. *Washington Post* March
- Waldmeir P, Kwan YP. 2017. United boss under fire as price war bites. <https://www.ft.com/content/62d690f4-b4e9-11e7-a398-73d59db9e399>
- Wilkinson LA, White JL. 2006. Private equity: Antitrust concerns with partial acquisitions. *Antitrust* 21:28
- Wilson EJ. 2017. Common ownership and industry returns. *Working Paper*