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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 objectives and behavior has been the subject of theoretical inquiry for decades. Since then, the growth of intermediated asset management and consolidation in the asset management sector has led to more pronounced common-ownership links at the beneficial-owner level. Recent empirical research has provided evidence consistent with the literature's prediction that common-ownership concentration (CoOCo) can affect product market outcomes. The resulting antitrust concerns have received worldwide attention. However, because CoOCo can change the objective function of a firm, the potential implications span all fields of economics that involve corporate conduct, including corporate governance, strategy, industrial organization, and 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.

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1. INTRODUCTION

A long literature examines how ownership structure affects firm objectives, behavior, and equilibrium outcomes. In particular, the ubiquitous assumption that self-interested, entrepreneurial firms seek to maximize their own value is at the core of the notion that free-market competition maximizes social welfare. The assumption goes back at least to Smith (1776), but remains central to most research in corporate finance and industrial organization to this day.

This assumption is intuitive if one considers the ownership structures of classic entrepreneurial firms such as those reported in **Table 1**. Richard Branson was until recently the largest shareholder of Virgin America, Warren Buffett controls Berkshire Hathaway, Jeff Bezos is by far the largest shareholder of Amazon, and the Walton family controls 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. For example, Walmart and Amazon can increase their value by competing aggressively against rivals. The basis for this intuition is that the largest shareholders do not 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' present-day ownership structure looks quite different from the above examples. **Tables 2–4** show the top shareholders[1] of the largest US airlines, largest US banks, and a selection of supermarkets. Strikingly, the top shareholders across the major

Table 1 Entrepreneurial firms

Virgin America (2016 Q2)		Berkshire Hathaway	
Shareholder	**Stake (%)**	**Shareholder**	**Stake (%)**
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 Management	2.23
Amazon		**Walmart**	
Shareholder	**Stake (%)**	**Shareholder**	**Stake (%)**
Jeff 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

This table shows the largest institutional and noninstitutional beneficial owners and corresponding stakes for some US firms as of 2017 Q2 unless otherwise noted. Data from S&P Capital IQ.

[1]To clarify terminology, I use the label "shareholder" to refer to any beneficial (and in some cases record) owner of shares and discuss ownership and control at the level control tends to be de facto exercised. An implicit assumption is that each investor maximizes the value of assets she holds, whether on behalf of clients or for her own account. I discuss consequences of as well as deviations from that assumption later.

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Table 2 Airlines

Delta Air Lines		Southwest Airlines		American Airlines	
Shareholder	**Stake (%)**	**Shareholder**	**Stake (%)**	**Shareholder**	**Stake (%)**
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	3.68	State Street	3.69	Fidelity	3.71
J.P. Morgan Asset Mgt.	3.48	Columbia Mgt. Inv. Advisers	1.46	State Street	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)	1.26	Morgan Stanley	1.00
BNY Mellon Asset Mgt.	1.24	T. Rowe Price	1.16	Northern Trust Global Inv.	0.97
United Continental Holdings		**Alaska Air**		**JetBlue Airways**	
Shareholder	**Stake (%)**	**Shareholder**	**Stake (%)**	**Shareholder**	**Stake (%)**
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	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)	2.39	State Street	2.49
State Street	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 Inv.	2.25	BNY Mellon Asset Mgt.	1.77	AQR Capital Mgt.	1.73

This table shows the largest institutional and noninstitutional beneficial owners and corresponding stakes for America's largest airlines as of 2017 Q2. Data from S&P Capital IQ.

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.[2] Indeed, almost all of the top shareholders of any one of the largest airlines are also shareholders in other major carriers. Whereas each one shareholder typically holds less than 15% in a given carrier, the top-ten shareholders as a group hold between 39% and 55% of the stock in each carrier.

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-four 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,

[2]I show both individual and institutional ownership, aggregated to the fund family level if applicable. I discuss alternative treatments of ownership and aggregation later.

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Table 3 Banks

JPMorgan Chase		Bank of America		Citigroup	
Shareholder	**Stake (%)**	**Shareholder**	**Stake (%)**	**Shareholder**	**Stake (%)**
Vanguard	7.03	Berkshire Hathaway	7.03	BlackRock	6.97
BlackRock	6.40	BlackRock	6.71	Vanguard	6.66
State Street	4.69	Vanguard	6.65	State Street	4.50
Capital Research	3.78	State Street	4.45	Fidelity	4.42
Fidelity	2.68	Fidelity	3.27	Wellington	1.77
Wells Fargo		**PNC Financial**		**U.S. Bancorp**	
Shareholder	**Stake (%)**	**Shareholder**	**Stake (%)**	**Shareholder**	**Stake (%)**
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	4.01	State Street	4.80	State Street	4.38
Capital Research	3.55	Capital Research	4.37	Fidelity	3.84

This table shows the largest (institutional and noninstitutional) beneficial owners and corresponding stakes for America's largest banks as of 2017 Q2. Data from S&P Capital IQ.

which 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 nonreportable competitor stock.) Delta has five such mavericks in the top 100, holding 6.8% of the stock, and Southwest Airlines has nine, which hold a cumulative 2.7% of the outstanding stock.

Ownership patterns in many other industries look similar.[3] The scope of the phenomenon also extends beyond the United States; CoOCo is an international and fast-rising trend. For example,

Table 4 Supermarkets

Kroger		Target		Costco	
Shareholder	**Stake (%)**	**Shareholder**	**Stake (%)**	**Shareholder**	**Stake (%)**
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 Global Inv.	1.49

This table shows the largest institutional and noninstitutional beneficial owners and corresponding stakes for a selection of American supermarket chains as of 2017 Q2. Data from S&P Capital IQ.

[3] Both active and passive investment strategies at the fund level can lead to such patterns; the key development is consolidation of voting and beneficial ownership rights at a more aggregate level than that of ultimate ownership. Absent a deliberate attempt to monopolize industries such as in voting trusts of the nineteenth and twentieth centuries, a high level of consolidation in the asset management sector can mechanically and perhaps inadvertently lead to the same outcome. The World Bank reports the 2016 global stock market capitalization at $65 trillion. An asset manager with $3 trillion invested in equity would thus hold almost 5% of the shares of every firm on the planet, and more if the holdings were clustered in particular industries or geographies.

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on the basis of Capital IQ data, with more than $6 trillion in 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 one-third of FTSE 100 companies as well as a top-five shareholder of 89 of them, the largest shareholder of one-third of DAX-30 companies, and so on. Vanguard, with more than $5 trillion in assets under management in a similarly diversified portfolio, is almost as large, and growing at an even faster rate.

The crux is: Unless a firm has a controlling shareholder (or shareholders) that has (or have) no economic interests outside that firm, there is no economic reason for a firm to maximize its own value, or for shareholders to induce management to do so. The reason is that shareholders' economic interests are to maximize portfolio value. When the portfolio firms interact, own-firm value maximization and shareholder (portfolio) value maximization are not equivalent. For example, aggressive product price reductions or capacity expansions can increase one firm's value. However, one firm's increase in market share comes at the expense of its competitors and may result in lower equilibrium product prices and industry profits. Aggressive competition can therefore at the same time be in the interest of an individual firm but decrease a common owner's portfolio value. Shareholder diversification across competitors can therefore remove firms' incentives to compete and void Adam Smith's idea that the pursuit of shareholders' self-interest leads to maximization of social welfare.

These insights extend beyond the application to product market competition. Firms maximizing shareholder should internalize all types of externalities they impose on other firms that are horizontally or vertically connected or otherwise mutually affecting, to the extent that their influential shareholders hold shares in these other firms. Even the most mundane corporate financial decisions can have different value implications for a single firm in isolation than for a portfolio of firms. For example, payouts in one firm reduce that firm's ability to invest, but may enable another, formerly more constrained firm that receives these funds to exercise growth options. Large, diversified owners should therefore aim for optimal governance of a portfolio of firms, whereas existing academic research focuses on governance of single firms in isolation. This consideration is meant to convey that vast and immediately policy-relevant research opportunities present themselves as a result of the secular change in ownership structures illustrated above.

Many questions arise: Do between-firm common-ownership links indeed affect corporate conduct? (If not, why do firms not act in their shareholders' interest, and what is the objective firms maximize instead, if any?) Do firms behave more cooperatively with each other when their largest owners overlap? Do the ownership structures of firms such as Virgin America, Amazon, and Walmart lead these firms to compete more aggressively against their more commonly owned product-market peers? Do commonly owned firms have incentives to innovate more or less intensely than more closely held firms? What are the implications for equilibrium outcomes—specifically, are product prices higher, and is output lower 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. This review connects more than three decades' worth of research to this effect. Indeed, the implications of these theories are potentially foundational for the way researchers think about firm strategy and corporate conduct.

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. A likely reason is that the key theoretical predictions were largely ignored until empirical evidence supporting some of them emerged in recent years. Until then, researchers simply assumed that common ownership would not change the dictum that firms maximize their

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own value, irrespective of whether doing so has a theoretical foundation or 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 or if shareholders are not diversified and have no interests outside the firm. The remainder of this review discusses the papers that tackle the nontrivial case in which firms strategically interact and at least some shareholders are diversified.

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. It then explores alternative approaches in the literature to measuring common ownership and CoOCo at the firm, firm-pair, market, and industry levels and discusses various challenges involved with using these measures in empirical applications. Section 3 first reviews papers documenting the rise of common ownership, then those providing direct evidence that portfolio considerations enter the way investors engage in governance, and then those providing empirical evidence indicating that 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, p. 77), 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—Lindsey (2008) is the first in the finance literature to make this point.

I must 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 indexing and common ownership (see, e.g., Antón & Polk 2014; Bond & Garcia 2017; Kacperczyk, Nosal & Sundaresan 2018). Exchange-traded funds (ETFs) are one contributor to common ownership, and their impact on corporate behavior is subsumed in this review; Ben-David, Franzoni & Moussawi (2017) review the literature on ETF's impact on the quality of asset markets.

Another closely related literature studies the effect of minority-share acquisitions by competitor firms and of common asset holdings by competitors. I briefly refer to this literature in Section 2. Absent agency frictions, such direct cross-ownership links are economically similar to horizontal common-ownership links. However, no alternative assumptions about objective functions of the firm are necessary for cross-ownership to affect firm behavior, because the value of stakes in competitors is directly reflected in the firm's own value. Also, the practical manifestations differ significantly. Antitrust authorities worldwide are keenly aware of cross-ownership links and partial mergers. By contrast, partial common-ownership links created by institutional investors have only recently gained prominence.

Also beyond the scope of this review are the literatures examining the extent to which shareholder incentives and firm objectives and behavior are affected by ownership of company stock by a particular set of actors, such as activists (Brav, Jiang & Kim 2015), employees (Agrawal 2011), foreign sovereign wealth funds (Dewenter, Han & Malatesta 2010), passive investors, blockholders (Edmans 2014, Edmans & Holderness 2017), or institutional investors more generally (see, e.g., McCahery, Sautner & Starks 2016). Making a clear distinction from these literatures is difficult for various reasons. One is that the evidence reviewed in the body of this article indicates that governance activities, including voting, are often conducted at the fund-family level, including in families that host both active and passive funds. In such a situation, questions such as whether

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index funds engage in corporate governance are moot—index funds may not engage, but their sponsoring families do, jointly with the active part of the family. 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 (for recent examples, see Gelles & de la Merced 2014, Schmalz 2015, Flaherty & Kerber 2016a). 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 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 "narrow and orthodox view" (Tirole 2010) that corporations do or should act in the interest of shareholders—whether these shareholders are diversified across related firms or not (for a recent discussion of alternative views, see Hart & Zingales 2017.) Within that narrow view, the key insight emphasized in this review may be that optimal governance (including investment strategy, incentive structure, and payout policy) and therefore the meaning of the terms overinvestment, underinvestment, and good governance can differ across investors, depending on whether they take the perspective of firm-value maximization or the perspective of portfolio-value maximization.

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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. In this section, instead of taking the assumption that firms maximize their own value as an article of faith, I review papers that derive firm objectives from economic principles.

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 the 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 shareholder support for profit maximization. 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

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or when they are consumers of the firm's products. Hart's result raises the question: If not profit maximization, what is the firm's objective function when firms interact strategically? In other words (Hart & Holmström 1987, p. 2), "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?"

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.

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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 & Yaari (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. The original motivation for diversification notwithstanding, the effect is the same: Full diversification can lead to an industry- (or economy-)wide monopoly.

Rotemberg (1984) makes the ad-hoc assumption that, instead of maximizing their own profits, firms j maximize a weighted average of the utilities of their M stockholders, indexed by i:

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

Shareholders have quadratic utility U_i, and the utility 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 in the shape and arguments of shareholder utilities.

Rotemberg's (1984) benchmark result is that when identical shareholders are fully diversified, that is, when they 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 term, diversification takes away incentives to deviate from the monopolistic outcome, and therefore no punishment strategies or communication are necessary to sustain this strategy. Each firm's behavior is simply the result of managers unilaterally maximizing their shareholders' interests.

Perhaps surprisingly, heterogeneity in shareholder portfolios (and thus shareholder objectives) need not imply that shareholders disagree about the firm's competitive strategy, as Rotemberg (1984) 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

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increase their own firms' profits to a greater level than what could be achieved 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.[4,5]

What if shareholders also have interests as consumers, and firms internalize these interests? Would Rotemberg's (1984) 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.[6]

The implications of shareholder diversification on corporate behavior extend beyond competition, however. Gordon (1990, 2003) advances the notion that shareholder diversification should also induce managers to internalize any other externality imposed on commonly owned firms. (On how unanimous support for full internalization can obtain in a formal voting model, see Crès & Tvede 2005.) Gordon (1990, 2003) also develops a model to rationalize the scarcity of relative performance evaluation of top managers observed in the data; he argues that this finding is easy to understand when shareholders are diversified and thus want the firm to maximize industry profits as opposed to firm profits and to avoid compensation schemes that reward managers for embarking on projects that increase the value of one firm at the expense of another. Macho-Stadler & Verdier (1991) similarly show that managerial incentives to deviate from profit maximization depend on the degree of cross-participation in the ownership structure, concluding that such links can make firms less aggressive competitors.[7]

Apparently independently from these earlier papers, Hansen & Lott (1996) reiterate several of the previous points, but also explore a number of new hypotheses that common ownership may explain, including the internalization of research and development 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 relies 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 firms' objective functions and strategies. This claim is trivially true if one assumes that one shareholder with a fully diversified portfolio controls all firms (violating Arrow's *nondictatorship* axiom in each firm), whereas a sufficient mass of other shareholders has different portfolio interests but no control.

In less extreme cases, discussed by Rotemberg (1984) as well, battles for control between diversified and undiversified shareholders may determine firms' competitive strategies. Along these lines, Gordon (1990, 2003) develops a model of competition for corporate control between

[4]Rotemberg (1984) 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 due to transaction costs.

[5]As Milne (1981) had 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.

[6]Azar (2017) develops a modified Herfindahl index that takes ownership and control by shareholder-consumers into account (see also Brito et al. 2018).

[7]Various authors have since elaborated on these points (see, for example, Rubin 2006, Kraus & Rubin 2010, Antón et al. 2018). Kraus & Rubin (2010) and Antón et al. (2018) also offer empirical evidence consistent with their models' predictions.

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diversified and undiversified shareholders, and 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. (2018) use such a model to study executive compensation under common ownership, a topic first proposed by Rotemberg (1984) for future research. The key insight of Antón et al. (2018) is that active engagement in governance by common shareholders is not necessary for internalization of portfolio interests, including but not limited to 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. The 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. Their model thus shows that agency conflicts between shareholders and managers do not necessarily weaken the predictions of the above theories. Instead, agency conflicts that may reduce incentives, especially those of passively diversified investors to engage in governance (Bebchuk, Cohen & Hirst 2017), can be the vehicle by which CoOCo reduces investment and output, and at the same time increases industry profits. Because shareholders design incentive contracts that the manager takes as given, their model also clarifies that managers need not be aware of their 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 Equation 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 researchers also explicitly discuss partial common ownership of competitors); see Areeda & Turner (1978); Rubinstein & Yaari (1983); Bernheim & Whinston (1985); Reynolds & Snapp (1986); Bresnahan & Salop (1986); Farrell & Shapiro (1990); Ellerman (1991); Flath (1991, 1992); Bolle & Güth (1992); Malueg (1992); Nye (1992); Flath (1994); Bøhren & Michalsen (1994); Reitman (1994); Flath (1996); Alley (1997); Parker & Röller (1997); Bøhren & Norli (1997); Dietzenbacher, Smid & Volkerink (2000); Allen & Phillips (2000); Amundsen & Bergman (2002); Dasgupta & Tsui (2004); Ono et al. (2004); Clayton & Jorgensen (2005); Gilo, Moshe & Spiegel (2006); Foros, Kind & Shaffer (2011); Shelegia & Spiegel (2012); Brito, Ribeiro & Vasconcelos (2014); Nain & Wang (2018); Fotis & Zevgolis (2016); Heim et al. (2017); and Levy, Spiegel & Gilo (2018). Specifically, O'Brien & Salop (2000) assume firms (indexed by j) maximize a weighted average of their M shareholders' portfolio profits that arise from cash-flow rights β_{ik} in N different firms that generate profits π_k, whereas the γ_{ij}s are the respective shareholder i's control shares:

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

This objective has several attractive properties:

1. It reflects the notion that firm j internalizes externalities on other firms k (only) to the extent, captured by 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. In particular,

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if there is a costless action firm j can take that benefits other firms in j's most powerful investors' portfolio, it will do so.
2. Absent common-ownership links, the objective 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.
4. Full diversification implies that firms maximize total industry profits.
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, when shareholder interests are heterogeneous, at least in principle.
6. Its elements have empirical counterparts and are thus measurable.

Another attractive feature of the objective in Equation 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, which yield an objective function with the structure of Equation 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 (2017) model also generalizes Rotemberg's (1984) 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. (2018) 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 gross upward pricing pressure index (GUPPI) and propose an algorithm to compute the Banzhaf power index in antitrust cases involving indirect cross-ownership holdings, both of which are useful tools 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 1984) or Banzhaf indexes (as first proposed in an earlier version of Azar 2017). That distinction is potentially important: It determines whether a single common owner (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. In Moskalev's (2017) otherwise similar model, a key distinction is that shareholders with similar portfolios will have similar voting strategies and can be regarded as one block.

According to the objective in Equation 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. As a result, this objective also captures why increasing consolidation in the asset management industry (see, e.g., Ben-David et al. 2017, figure 1) and coordination between diversified investors can affect corporate conduct: Aggregation of ownership and control can not only increase common ownership but also make common owners relatively more powerful shareholders.

Note that a simple measure of the overlap of two firms' shareholder bases, such as a dummy equal to 1 if a common blockholder exists between two firms, does not share many or all of the above features and absorbs much useful information. For example, such an approach ignores whether very large controlling investors are present that render smaller common blockholders

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powerless. It also ignores how large any common blockholder's position is.[8] (Is it 5.1% for both firms, or is it 51%?)

I next demonstrate a fifth appealing feature of the objective function in Equation 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 of Equation 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:

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

Similar to λ_{jk} in 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, and vice versa. 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. Equation 3 predicts higher markups (or prices conditional on cost), along with lower output, and hence lower consumer welfare, in markets with more CoOCo, as measured by MHHIdelta.

2.4.1. Why the rise and consolidation of intermediated asset management can matter for firms' competitive incentives. As we approach empirical applications using this measure, it is important to understand some of its key properties. Perhaps most importantly, the measure reflects that the reduction in competitive incentives is greatest when the firms' most influential shareholders—those with the highest control shares (γ)—have relatively greater economic interests (β) in competitor firms. Whereas there is no consensus in the literature on how shareholder structure translates into control shares, a popular and intuitive assumption is that more votes correspond to more control.[9] That assumption implies that if a set of ultimate shareholders or fund managers de facto assigns their voting rights to a common, centralized institution such as a voting trust or a governance and proxy voting office of a mutual fund family, the resulting entity has a greater control share of portfolio firms than the individual ultimate investors or fund managers jointly conferred. If that centralized entity acts in the interest of the portfolio of cash flow rights attached

[8]Many other measures have been proposed in the literature, 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 (see, e.g., Harford, Jenter & Li 2011; Azar 2012; Banal-Estanol, Vives & Seldeslachts 2017; Gilje; Gormley & Levit 2017). These measures appear less economically meaningful because they do not 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.

[9]Rotemberg (1984) assumes that control shares are proportional to the fraction of shares. This assumption is only valid in special cases, however, such as when all shareholders are small. Moreover, increasing control rights can also have the counterintuitive effect of reducing control shares: Parsons, Maxwell & O'Brien (1999) point out such apparent paradoxes that arise when cross-ownership links are present at the same time as common-ownership links and Shapley values are used to quantify control. Incidentally, these authors are also the first to my knowledge to explore the suitability of MHHI to quantify the increase of concentration due to common ownership of firms by industry outsiders.

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to the pool of shares it represents (which can have different characteristics than the portfolio of each individual ultimate investor or fund), CoOCo can be higher than it would be in a disintermediated world in which many small, ultimate shareholders have diversified portfolios, but relatively larger, undiversified shareholders have greater control shares. It is thus that the rise and consolidation of intermediated asset management can make diversified owners relatively more powerful shareholders and lead to a reduction in competitive incentives of portfolio firms. This consideration also illustrates why it is important in empirical applications to measure beneficial ownership at the level control is de facto exercised to compute the βs and γs entering measures of CoOCo.

2.4.2. Discussion of key assumptions and properties of MHHIs. When we attempt an empirical evaluation of the above predictions, it is important to keep in mind the assumptions underlying the derivation of the common ownership measure used. Focusing on MHHIdelta, one key assumption is that market shares as well as ownership and control are taken as given; in practice, all of them are likely endogenous to firm strategy. For example, entry—and therefore market shares—may depend on margins, which according to the theory depend on ownership. The incentives to enter may themselves depend on the ownership structure between incumbent and potential entrant (for evidence, see Gerakos & Xie 2018). Relatedly, entry could occur not only by different firms, but also by corporate raiders or activist investors. Activists should be more willing to acquire target shares if they can expect support for their proposed strategic plans from existing shareholders (for evidence, see Brav, Jiang & Li 2017). Moreover, the activist's willingness to enter by buying shares should depend on the price at which the necessary shares can be acquired, whereas both the share price and the required vote share the raider has to acquire to be able to influence the firm depend on the entire industry's ownership structure. The literature lacks models that conclusively clarify that endogeneity; see Section 5. For these reasons, empirical tests of the predicted effect of common ownership on product market outcomes have to attempt to isolate exogenous variation in ownership from endogenous variation in both ownership and market structure.

Moreover, these considerations make it reasonable to expect that the empirical relevance of the above theories may vary across industries with different barriers to entry. Managerial agency problems over and above the desire to remain in office are also not explicitly reflected in this measure. The empirical importance of this feature is uncertain at this point, and presents an attractive area for future research. Relatedly, there is a debate among legal scholars whether constraints imposed by corporate officers' fiduciary duty would prevent firms from acting in the interest of diversified shareholders: If the correct or customary interpretation of the duty were that it required maximizing the own firm's value (as opposed to acting in shareholders' economic interest), and if deviations from this duty were observable and likely to come with adverse consequences to officers, then firms might not internalize the externalities they imposed on related firms even if all shareholders of the firm held the market portfolio (for a discussion of whether taking actions that benefit different shareholders differently is consistent with officers' fiduciary duty, see Easterbrook & Fischel 1982). The above models do not take the possibility of such frictions into account, which underscores the importance of empirical work to validate the models' predictions.[10]

While attractive for reasons laid out above, an undesirable property of MHHI is that it varies only at the market level (as opposed to λ_{jk} from Equation 2, which varies at the market–firm-pair

[10]A common misunderstanding of the economic theory of competition between firms with heterogeneous shareholder structures is that undiversified shareholders are harmed when firms implement less aggressive product market strategies, in line with common shareholders' preferences. Each firm's and each shareholder's profits can increase when firms reduce output to jointly monopolistic levels (for the general principle, see Vickers 1985).

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level); when no market-level data but only firm-level data are available, MHHI may vary only at the industry level. This property perhaps unnecessarily limits the usable variation in the data. Another disadvantage concerns the measurability of the key variables entering Equation 3. Specifically, even product-market studies often observe only prices, not margins. 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 side of Equation 3.[11] In short, reduced-form tests that use MHHIdelta as a measure of CoOCo can raise questions of interpretation. Hence, developing alternative measures of CoOCo and supplying structural models of competition under common ownership are desirable avenues for future research.

Researchers should also keep in mind that the above model does not allow for an endogenous choice of cost parameters. López & Vives (2016) show that common ownership can mitigate firms' well-known disincentives to innovate that can arise from technological spillovers. Under restrictive conditions, common ownership can even increase cost-reducing innovation to an extent that increases output and welfare. To derive more testable predictions, Antón et al. (2017) extend the model of López & Vives (2016) and derive comparative statics of the effect of common ownership on innovation with respect to differential degrees of technological and product-market spillovers, respectively. Shelegia & Spiegel (2017) study innovation in a duopoly model that allows for asymmetric common-ownership links.

Before thinking about empirical designs to test these predictions, several measurement and data challenges have to be overcome.

2.5. Measurement and Data Challenges

A number of measurement and data challenges apply to all measures of common ownership 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, as well as 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 the share of control rights an investor commands and the share of control that investor exercises becomes particularly acute when a small number of investors controls a large fraction of control rights. This is often the case in firms with dual-class shares. Measuring control share is difficult not only because there is no generally agreed-upon voting model that translates ownership structure to control structure, but also because the share of board seats, or even the influence specific board seats yield, could matter significantly, too. Researchers should thus ensure that their results are robust to alternative ways of measuring control shares. For example, Azar, Schmalz & Tecu (2018a) 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.

Second, and relatedly, relying solely on ownership data from institutional shareholdings (typically 13F filings) to construct measures of CoOCo can be inadequate. Some 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

[11] For a critical discussion, see O'Brien (2015). Although not discussed as such, these concerns could perhaps also apply to analyses relating changes in prices to changes in CoOCo. O'Brien's (2015) critique does not supply evidence that the examples in which MHHIdelta and price covary negatively in theory are empirically relevant.

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at the top of individual firms' ownership structures and those holding dual-class shares, will tend to give undue weight to common-ownership links.[12] Solely relying on 13F data could wrongly suggest that BlackRock and Vanguard's holdings in Walmart and Berkshire Hathaway conferred infinitely more control over strategy than is enjoyed by the Walton family and Warren Buffett, respectively, and can artificially inflate measures of the level of CoOCo.

Third, in various instances, asset owners such as insurance companies and asset managers such as mutual fund companies file separate 13F forms for various subsidiaries or sets of funds, respectively. However, governance and voting are usually conducted at the family level, especially for the larger fund families with a predominantly passive investment approach.[13] Failing to aggregate 13F forms at the family level can therefore lead to an underestimation of the combined clout of a fund family's votes or those of an asset owner splitting 13F reporting across subdivisions, and can thus lead to an underestimation of the respective control share of the beneficial owner and noisy measures of CoOCo. (This 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.) Subsidiaries with different names from the parent are another source of potential error. For instance, New England Asset Management (US Bancorp's tenth-largest shareholder) is a subsidiary of Berkshire Hathaway.

Azar, Schmalz & Tecu (2018a) 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. [Azar, Schmalz & Tecu (2018b) show that attenuated estimates of product market effects of common ownership reported by Dennis, Gerardi & Schenone (2017) are due in part to omitting aggregation.]

Fourth, predictions about effects of CoOCo on corporate conduct in general, and on competition in particular, of course suppose that the commonly owned firms in fact interact. Interacting is not equivalent to sharing the same NAICS or SIC code, because industry definitions do not necessarily correspond to markets. Suppose two airlines, W and E, fly nonoverlapping sets of routes in

[12] The incidence of dual-class shares is perhaps surprisingly large, including 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 capitalization greater than USD $1 billion; 252 have a market value greater $500 million. 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; and media companies such as CBS and Twenty-First Century Fox.

[13] Posner, Scott Morton & Weyl (2017, p. 675) note that State Street's governance and voting policy states that they employ "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." Bioy, Garcia-Zarate & Bryan (2017) cite a survey finding that "at BlackRock, Amundi, and UBS, the policy is for active fund managers to vote consistently across all funds, but they retain the authority to vote differently from the house view. This contrasts with the approach adopted at Vanguard, SSgA, and LGIM, where the corporate-governance teams have ultimate authority on the final votes." Empirically, Fichtner, Heemskerk & Garcia-Bernardo (2017) show that Vanguard funds do not vote with one voice on only 0.0006% of proposals. The respective number for BlackRock is 0.00018% and 0.00195% at State Street. This compares to much higher (but still low) within-family disagreement at Fidelity, with 3,144 divergent votes per 100,000 events; see also a discussion in Elhauge (2018). Because 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. Hence, fund manager incentives have little to do with the incentives relevant for the exercise of shareholder rights; a frequent mischaracterization of fund families' incentives involves citing fund managers' focus on maximizing (relative) returns or minimizing tracking error (Fisch, Hamdani & Davidoff Solomon 2018).

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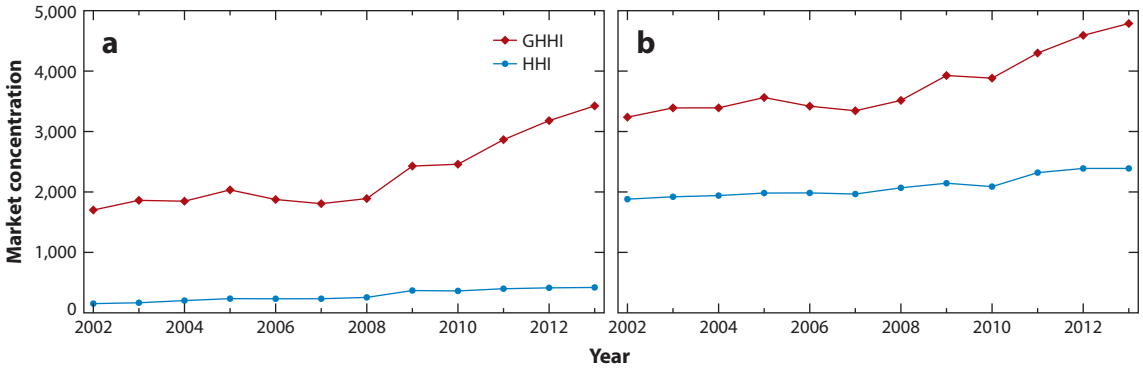

Figure 1

(*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 using HHI and GHHI. Figure adapted from Azar, Raina & Schmalz (2016). Abbreviation: (G)HHI, (generalized) Herfindahl–Hirschman index.

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the Western and Eastern United States, respectively. One might reasonably assume no significant competitive effects obtain if these airlines were put 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 may not differentiate between these scenarios, and are therefore more likely to produce biased results. Note that 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.

Ignoring the issue of market definition can lead to misleading impressions about the actual degree of market concentration. To illustrate, **Figure 1** shows 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. (HHI counterfactually assumes a complete absence of common ownership or cross-ownership.)

Of course, for many applications, trade-offs 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.

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. The first

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empirical documentation of institutional investors' common ownership of competitors I am aware of is by Hansen & Lott (1996), who show such 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 online computer services industries. Davis & Yoo (2003) document the number of blockholdings by mutual funds in connected firms and refer to them as common ownership. Davis (2008) sees a new finance capitalism in the reconcentration of US industries through mutual funds. Matvos & Ostrovsky (2008) provide ownership tables similar to those provided in this review (**Tables 1–4**) across merging parties in the financial industry. Lindsey (2008) documents that alliances are more frequent among companies sharing a common venture capitalist and provides evidence that such links help overcome contracting frictions and have the effect of blurring firm boundaries. Harford, Jenter & Li (2011) document the increase in common-ownership links between S&P 500 firms 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" (p. 37). Azar (2012) reports an increase in the ownership network density within broad industry classifications, also calculated from 13F institutional holdings. Azar, Schmalz & Tecu (2018a) and Azar, Raina & Schmalz (2016) are the first to document an increase in CoOCo at the market (as opposed to the industry) level in the US airline and deposit banking industries, respectively. They furthermore show that variation in CoOCo dwarfs variation in the traditional HHI, and that the levels of CoOCo, as measured by MHHIdelta, vastly exceed commonly used thresholds for antitrust screens. Antón et al. (2018) provide evidence of increasing CoOCo within various industries over the past decade.

3.2. Direct Evidence for the Internalization of Portfolio Interests

Hansen & Lott (1996), examining a sample of 252 mergers from 1985–1991, argue that negative acquirer returns can be better understood by taking into account the bidder's shareholders' holdings in the target. The idea, perhaps first reflected in Easterbrook & Fischel (1982), is that positive target returns at least partially compensate common owners for negative bidder returns. Matvos & Ostrovsky (2008) find similar results on announcement returns in a larger sample; Gompers & Xuan (2009) and Masulis & Nahata (2011) find results similar in spirit for VC acquisitions.

Matvos & Ostrovsky (2008) moreover show that mutual funds that hold shares in both the target and acquirer are relatively more likely to vote for mergers with negative acquirer announcement returns compared to shareholders with holdings only in the acquirer. This voting evidence is difficult to explain with theories other than the internalization of shareholders' interests in other firms, and thus constitutes perhaps the clearest evidence at the time that common ownership concerns are present and important in corporate governance decisions. They are also the first to point out the conflict of interest between different shareholders in the context of mergers and acquisitions.[14]

Another important result in Matvos & Ostrovsky's (2008) contribution is that funds that do not have holdings in the target are more likely to vote for the merger if other funds of the fund family they belong have holdings in the target. Hence, they provide evidence consistent with

[14]Harford, Jenter & Li (2011) argue that 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's (2008) main result on voting.

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within-family across-fund subsidization for the benefit of the overall family and consistent with at least some degree of centralization of effective decision making regarding the governance of portfolio firms. Given that votes on mergers are binding, one may conjecture, as suggested in Matvos & Ostrovsky's (2008) conclusions, that common ownership makes mergers more likely. Brooks, Chen & Zeng (2018) provide evidence consistent with that hypothesis.

An interesting question that all of the above papers leave open is how merger terms and prices are set as a function of the ownership structure not only of the merging parties but also of the other firms in the industry. It is possible, for example, that common owners may support a merger without benefiting from either acquirer or target returns. They may benefit instead as a shareholder of a third firm in the industry.

The above papers focus on effects of common-ownership links on outcomes at the shareholder and firm-pair level. One advantage 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 at the firm-pair level are relatively easy to develop. 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.

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3.3. Effects of Horizontal Common-Ownership Links on Corporate Conduct and Product-Market Outcomes

This section discusses evidence indicating a relationship between common ownership, firm behavior, and market outcomes. I start, chronologically, with studies exploiting industry- and firm-level variation, before describing studies using more detailed market-level variation in CoOCo, prices, and quantities.

3.3.1. Industry- and firm-level evidence. The papers discussed in this section seek to address the question of whether CoOCo has the effect of changing firms' strategic behavior and equilibrium outcomes. To approach an answer to this question, Azar (2012) shows that an increase in a reduced-form measure of a within-industry common-ownership density predicts industry margins, but that industry margins do not, conversely, 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 to hold more profitable firms, whereas both the within- and the across-industry findings are consistent with an internalization of shareholder portfolio interests in corporate conduct as well as anticompetitive effects from common ownership within an industry. Further, 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 rather than anticompetitive effects. Semov (2016) finds that commonly owned firms move closer together in product space and hold lower cash, with is consistent with a response to reduced competition and greater incentives to coordinate or collaborate on product-market strategies.

These studies only consider the presence of institutional owners holding blocks of at least 5% in the affected firms, which may raise concerns discussed in Section 2.5. Perhaps more importantly, unobserved endogenous time trends at the industry level could potentially drive the documented correlations. Measuring common ownership at the industry as opposed to the market level further complicates the interpretation of the evidence, as illustrated in the comparison of market- versus

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national-level bank concentration in Section 2.5.[15] In sum, various concerns with industry-level analyses challenge a causal interpretation of a negative correlation between CoOCo and higher margins, as theory predicts.

Because of these concerns with broad studies based on variation in common ownership at the industry level or firm-pair level, testing the hypothesis reflected in Equation 3 that higher CoOCo causes higher product market margins can perhaps be more convincingly performed with an industry study that uses more granular market-level price and quantity data. The reason is that omitted time trends at the industry or even firm level can be differenced out with fixed effects, thus mitigating concerns about omitted variable bias. Even so, a convincing identification strategy also has to rule out reverse causality as an alternative explanation for a positive correlation between margins and CoOCo.

3.3.2. Market-level evidence. The first examination of the effects of CoOCo on market-level outcomes is a study on airlines by Azar, Schmalz & Tecu (2018a). A key advantage of focusing on variation across markets within a single industry is that many identification concerns present in the above industry-level studies can be differenced out with fixed effects. An advantage of the US airline industry is that price and volume data used in the study are publicly available. Moreover, each route can be regarded as a fairly well-defined market.[16] The baseline regressions of Azar, Schmalz & Tecu (2018a) estimate the coefficient β in a panel regression of ticket prices at the route-airline-quarter level on the level of CoOCo in route r in year-quarter t (as measured by MHHIdelta), whereas the effect of industry concentration (as measured by HHI) and various potential confounders X_{rjt}, such as time-varying route and airline (j) characteristics, are explicitly controlled for. In addition, many potential confounders such as macroeconomic conditions or market-specific peculiarities are differenced out with various combinations of firm, quarter-year, and route fixed effects (α_{jt} and ν_{rj}).

$$\log\left(p_{rjt}\right) = \beta \cdot \text{MHHIdelta}_{rt} + \gamma \cdot \text{HHI}_{rt} + \theta \cdot X_{rjt} + \alpha_{jt} + \nu_{rj} + \varepsilon_{rjt}. \quad 4.$$

The baseline findings are:

- The sensitivity of ticket prices to CoOCo, β, is robustly negative: Ticket prices are 3%–8% higher than in a counterfactual world without common ownership. This finding formally rejects the null hypothesis of no product market effects of CoOCo.
- Passenger volume is lower when CoOCo is higher, suggesting that unobserved demand shocks do not explain the price effects.
- The effect of CoOCo on prices is larger in routes with higher passenger volume, but insignificant for the smallest 16% of markets, indicating that the effects are driven by the economically most important markets. (For reference, 90% of passenger volume is produced in the largest 50% of airline markets.)
- The effects are qualitatively similar when alternative market definitions or measures of control shares (such as Banzhaf voting power indexes) are used to compute MHHIdelta.

[15] An omitted size control in He & Huang's (2017) 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).

[16] 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, 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.

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- The effects are attenuated or insignificant when the authors assume in the calculation of MHHIdelta that control is exercised by small or temporary shareholders, or when carriers go through bankruptcies. These findings are consistent with corporate governance realities, but also indicate that the endogeneity of market shares—a concern discussed in Section 2.4.2—is unlikely to drive the main results.[17]

In sum, these panel regressions address various concerns that are present in previous industry-level studies, chiefly due to the more granular nature of the data and the use of a large number of fixed effects. However, the endogeneity of market shares, perhaps due to reverse causality, remains a concern that limits especially the quantitative interpretation of these baseline results. To investigate the effect that the endogeneity of ownership may have on the estimated price effects, Azar, Schmalz & Tecu (2018a) use the acquisition of one very large asset management firm by another to obtain quasi-exogenous variation in ownership and from that construct a market-level instrument for CoOCo. They find the estimated price effects from the instrumental variable regressions to be larger than in the panel regressions: up to 12%. This finding suggests that the endogeneity of ownership biases panel estimates toward zero, which increases confidence in the internal validity of the estimate that CoOCo may reduce product market competition in this industry. These results are difficult to explain with theories other than that variation in CoOCo causes variation in product prices.

However, as in any empirical study, the interpretation of these findings is subject to numerous caveats and assumptions. For example, alternative measures of CoOCo are likely to yield different results, and which measure of CoOCo is most reflective of empirical realities is an open research question, as discussed above. Relatedly, the derivation of MHHIdeltas is based on a Cournot model of competition, which may be more appropriate for some applications than others. Moreover, the predicted relationship is between markups and MHHIdelta, which may be different from the empirically measured relationship with price, conditional on market fixed effects and other controls meant to absorb marginal costs. In other words, readers should keep in mind the reduced-form empirical specification in Equation 4 is not derived from a structural model. The statistically causal evidence also does not tell us which particular shareholders or governance mechanisms, if any, are primarily responsible for these outcomes; for a discussion, see Section 3.5. Another potential concern is that the US airline industry is special, for example in that regulation imposes high barriers to entry. Therefore, questions about the external validity of these results may arise.

3.3.3. External validity. Azar, Raina & Schmalz (2016) find a positive effect of CoOCo on the prices of retail deposit products and a negative effect on deposit interest rates. Aside from providing evidence of external validity, their study also contributes a qualitatively different measure of ownership concentration, GHHI. This is important because direct cross-holdings of shares in competitors significantly contribute to ultimate ownership concentration in the US banking sector. Azar, Raina & Schmalz (2016) also show 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).

[17] An alternative approach to avoiding the potential endogeneity of market shares would be to use the incentive terms λ_{jk} from Equation 2. Antón et al. (2018) and Gramlich & Grundl (2017) employ this approach.

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Market-level studies are attractive because they feature relatively well-defined markets, which, as 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 (see also Panayides & Thomas 2017; for causal evidence, see Gutiérrez & Philippon 2017). Saidi & Streitz (2018) find an effect of common debt ownership on product market competition as well: A higher proportion of firms sharing the same lender and higher credit concentration in an industry is associated with lower output. Given this breadth of results, 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 for the past decade (Krugman 2007, 2014; Summers 2016).

In sum, there are now many pieces of evidence that could suggest that more CoOCo leads to less competition, but many open questions remain. One open question for antitrust enforcement concerns a possible efficiency defense.

3.4. Evidence for Potentially Welfare-Increasing Effects of Common Ownership

The above papers document likely anticompetitive effects of horizontal common-ownership links. However, that does not mean that CoOCo is welfare-decreasing in all industries or on average. Instead, as discussed in Section 2, horizontal CoOCo can have welfare-enhancing effects, for example when technological spillovers are large. Moreover, vertical common-ownership links can presumably have welfare-reducing or -enhancing effects as well, similar to the effects of full vertical integration (see Levy, Spiegel & Gilo 2018). Note also that the existence of vertical common-ownership links does not obviously contradict horizontal effects of common ownership.

Indeed, there exists an emergent literature hinting at the empirical validity of this hypothesis. Lindsey's (2008) results suggest that common ownership can help overcome contracting frictions. Cici, Gibson & Rosenfeld (2015) and Freeman (2016) find a greater incidence and robustness of business relationships between vertically connected firms, mirroring the results of Fee, Hadlock & Thomas (2006), who show longer-lasting customer–supplier relationships when the customers directly own shares in the supplier. Ojeda (2017) documents that when a firm and a bank have common ownership, the firm obtains larger loans from the bank at a lower interest rate. Geng, Hau & Lai (2017) find that vertical common-ownership links mitigate hold-up problems arising from patent complementarities. Lastly, Antón et al. (2017) examine how CoOCo affects research and development investments and innovation output (see also Kostovetsky & Manconi 2016, Qiu 2017).

3.5. Governance Channels

The empirical link between changes in CoOCo and changes in product prices raises the question of which corporate governance mechanisms translate the shareholders' interests to corporate policy. Azar, Schmalz & Tecu (2018a) and Schmalz (2017) offer the most comprehensive discussion of what we know of the particular governance activities performed by common owners. I provide a short summary here and complement it with some more recent evidence.

First, whereas much common ownership is driven by asset management families with predominantly passive investment strategies, it is important to clarify that passive investment strategies do

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not 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; see **Table 2**) or primarily passive strategies (e.g., Vanguard). The active/passive distinction is further complicated by the fact that active and passive funds' shares within a fund family tend to be voted jointly by a centralized corporate governance office (see footnote 13), rendering moot the question of 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 (for a more comprehensive discussion, see Schmalz 2017).

Relatedly, some scholars have argued that passive funds' competitive pressures imply that 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 (for an informal discussion, see Bebchuk, Cohen & Hirst 2017). The premise of this argument is disputed and appears to conflict with empirical facts; see below. However, even if it were true, reduced incentives to engage would not imply that passive ownership does not affect governance outcomes and firm behavior. For example, Antón et al. (2018) show formally that common owners may indeed have reduced incentives to engage with the goal of enhancing efficiency or reducing cost, but not because of interfund competition; rather, it is because cost reductions in multiple firms of an industry do not necessarily lead to higher industry profits and portfolio values. Instead, engagement and steeper incentives not only encourage cost cutting, but also cause higher governance and compensation costs and lead to increased output, which can lead to 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.[18]

In other words, "doing nothing" is a mechanism by which common owners can induce portfolio firms to internalize shareholders' interests in other firms, including their anticompetitive incentives.

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 alleged in *The Economist* (2015)] and harm competition at the same time.

That said, large asset managers may in fact have incentives to increase portfolio values through governance because higher asset values imply higher revenue from management fees (which are typically a percentage of assets under management). Lewellen & Lewellen (2018) empirically assess whether additional fees arising from increases in portfolio values would justify engagement by asset managers and conclude that their estimates "suggest that institutional investors often have strong incentives to be active shareholders" (p. 1). Edmans, Levit & Reilly (2018) study theoretically the effect of common ownership on incentives and ability to engage in governance, concluding that common ownership can strengthen governance incentives.

If common owners engage with the explicit aim to reduce competition, they can use (*a*) voice, (*b*) incentives, and (*c*) their vote to do so; the only tool not available to those common owners that follow passive investment strategies is exit, that is, selling their shares.

[18] In a similar spirit, Ikeda, Inoue & Watanabe (2017) find that cross-ownership structures in Japan stifle risky investment but enable managers to live the "quiet life."

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Azar, Schmalz & Tecu (2018a) provide anecdotal evidence for the voice channel. In particular, for an example of engagement by a common shareholder of competitors, see Flaherty & Kerber (2016b); for an example of shareholders putting United Airlines' CEO "under pressure for slashing fares and for increasing the supply of flights and seats," see Waldmeir & Kwan (2017).[19]

This interaction is not an isolated incident or specific to the airline industry. *The Wall Street Journal* (Olson & Cook 2017) reports on a meeting between 12 shareholders for the purpose of finding strategies for "how to make frackers pump less and profit more" and "curb their dependency on growth." One participant "has asked several shale producers why they appear hellbent on giving away their product as fast as possible at low prices," hearing in response that "it's what The Street" wants. He continues, "we wanted to provide another voice that says, 'we've got skin in the game, and we don't want to see you do that.'"

Regarding the incentives channel, the same investor meeting "homed in on the role executive pay plays in driving a growth-at-all-costs mentality." Gilo (2000) provides detailed numerical examples on how compensation contracts can be used to align managerial incentives with those of shareholders holding stakes in competitors. Antón et al. (2018) provide evidence that these examples generalize: In the sample of Compustat firms, common ownership is associated with lower wealth-performance sensitivities at the industry level.[20]

Regarding the voting channel, Matvos & Ostrovsky (2008) show direct evidence that shareholders take portfolio considerations into account in voting decisions, as previously discussed in Section 3.2. Hshieh, Li & Tang (2018) find that passive funds are more likely to vote for the renewal of poison pills, perhaps suggesting insulation from pressures of investors with active investment strategies. However, these authors also provide evidence that passive funds influence which items get proposed in the first place. Not only voting patterns but also voting outcomes have been documented to depend on the extent of common ownership: Azar (2012) shows that firms that share common owners are more likely to share common directors, and Buhayar (2016) reports an example in which one firm's shareholders choose a representative of a competitor's largest shareholder as a director. Schmalz (2015) illustrates with a case study how voting can have the effect of preventing activist involvement that would likely lead to more aggressive industry competition.

All of the above mechanisms are premised on the assumption that managers unilaterally act in the interest of their shareholders and do not explicitly or tacitly coordinate with competitor firms. Evidence for an association between common ownership and pay-for-delay in the pharmaceutical industry provided by Gerakos & Xie (2018), however, suggests that explicit agreements between firms may also play a role in implementing anticompetitive effects of common ownership. These authors show that common ownership between brand and generic drug manufacturers is positively related to the likelihood of a settlement agreement in which the brand pays the generic to stay out of the market, with a delay in the sale of generics, and with the brand's daily abnormal returns

[19] 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 United's stock price (for a discussion, see Levine 2017).

[20] An earlier working paper version of Antón et al. (2018) also documented 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) reports a positive association based on alternative industry definitions, data sources, and ownership measures. As an alternative to measuring incentives in a regression framework, Kwon also checks for the presence of relative performance provisions in executive contracts as a function of common ownership. It is unclear how informative the existence of such provisions is for managerial incentives, however, because whether relative performance evaluation strengthens or weakens managers' incentives to compete depends on how performance is measured.

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around the settlement agreement. Aside from suggesting an explicit channel of anticompetitive conduct associated with common ownership, the paper also constitutes the first study of how entry depends on the industry's ownership structure.[21]

However, agreements need not be explicit; more subtle changes in firm behavior can also increase the ability of firms to coordinate implicitly. For example, firms can disclose more details about their product market strategy to investors. This information is also visible to competitors and may help soften competition. For evidence that communication in earnings calls softens competition in the US airline industry, see Aryal, Ciliberto & Leyden (2018). Pawliczek & Skinner (2018) document a positive correlation between CoOCo and voluntary disclosure of product market–related information in 10-K and 10-Q filings, and corroborate their evidence by using variation from the BlackRock–BGI acquisition as a plausibly exogenous shock to CoOCo.

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 because of the lack of incentives to do otherwise. To the extent that common owners actively engage in governance, any of the usual corporate governance channels can be used to induce firms to act in their shareholders' interest.

However, research to provide empirical support for most channels remains limited, and their relative importance is not well understood. Therefore, there is scope for numerous research projects to identify which governance channels are employed by various types of investors, and which of these channels are important in influencing firm behavior. The finding of various alternative governance channels would have policy implications because it would imply that shutting down particular channels would not be a promising policy response to concerns about anticompetitive effects of common ownership. In that case, a more promising route to prevent undesirable influence by common owners would be to reduce the anticompetitive incentives. The policy proposals discussed in the following section are primarily based on that premise.

4. LEGAL ASPECTS OF HORIZONTAL SHAREHOLDINGS AND POLICY RESPONSES

4.1. Legal Aspects

As reflected in the review thus far, perhaps the most consequential documented effects of CoOCo are anticompetitive product-market outcomes. Long before such empirical results were on the horizon, Roe's (1990) 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 $548 billion (about $1 trillion in 2017 dollars). Nowadays, a single mutual fund family, BlackRock, controls more than $6 trillion.

(Roe 1990, p. 12) 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

[21] Common ownership may also be related to the establishment of cross-ownership links, which may deter entry or encourage exit from product markets, as suggested by press coverage of Softbank's involvement in Uber's decision to sell its operations in China to commonly owned rival Didi in exchange for a cross-ownership stake in Didi, as well as in similar transactions in Southeast Asia.

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their normal channels of diversified investment to the abnormal avenues 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." President Franklin D. Roosevelt 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.[22] (Roe 1990, p. 18) 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."

A quarter-century later, the world's largest common owners nowadays regularly convene for "secret summits," in which they discuss how they can most effectively influence their portfolio firms (Foley & McLannahan 2016). Indeed, doing so may be the most effective way to have an influence in governance and overcome free-rider problems. These meetings occurred several years after the Securities and Exchange Commission 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), thus boxing institutional shareholder into a difficult position between satisfying security and competition regulators' potentially conflicting demands.

Roe (1990) also discusses the conflicting goals of diversification that mutual funds offer to ultimate investors, while at the same time avoiding antitrust problems that come with control, 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 (1990) appears to see less of a policy conflict, as he voices skepticism of large institutions' ability and incentives to effectively monitor firms to the benefit of social welfare, consistent with the theoretical considerations and empirical evidence of Antón et al. (2018): "The networks could siphon resources for banker profit and still fail to monitor managers effectively; they could become politically intolerable concentrations of economic power" (Roe 1990, p. 21).

Gilo (2000) provides the first legal analysis I know of that specifically focuses on the anti-competitive effects of common and cross-ownership. He discusses the potential for violations of Section 7 of the Clayton Act in the context of purely passive investments in competitors, emphasizing that 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 anticompetitive effects of passive investments in competitors is ("obviously") to divest.

Wilkinson & White (2006) and Norbäck, Persson & Tåg (2018) discuss antitrust concerns and enforcement actions related to partial common ownership acquisitions in private equity. In particular, Wilkinson & White (2006, p. 28) point to legal precedents that give competition authorities a "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.

[22] The 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 explicitly discussed by Roe (1990) is whether the resulting limitations imposed on funds also apply to fund families that exercise joint control over a large number of funds' shares.

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Elhauge (2016) offers the first assessment of the concrete legal implications of the empirical findings of anticompetitive effects of common ownership by Azar, Raina & Schmalz (2016) and Azar, Schmalz & Tecu (2018a). In short, he emphasizes that even if no evidence of collusion exists[23] and hence a clear violation of Section 1 of the Sherman Act, Section 7 of the Clayton Act still prohibits acquisitions of assets—explicitly also below a level that confers control—that lessen competition.[24] A key argument of Elhauge (2016) is that the so-called passive-investor exemption to the Clayton Act requires both 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, Elhauge (2016) concludes that existing patterns of common ownership do not satisfy the requirements for the passive-investor exemption. Elhauge (2016) also details the potential for large-scale violations of the Hart-Scott Rodino Act, a concern since reflected in the press (Flaherty & Kerber 2016a) and by regulators (Feinstein, Libby & Lee 2015), and discusses the potential role of CoOCo in explaining otherwise puzzling macroeconomic trends.

Baker (2016) offers a "qualified agreement" with Elhauge's (2016) 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 United States. Elhauge (2017a) offers an assessment of how anticompetitive effects of common ownership can be addressed within the confines of EU competition law. Elhauge (2017a) also updates his earlier *Harvard Law Review* paper with respect to the applicability of existing US antitrust law, and in particular Section 1 of the Sherman Act.

A vivid theoretical debate continues in the law literature (see, e.g., Patel 2017, Rock & Rubinfeld 2018, Enriques & Romano 2018, Ginsburg & Klovers 2018, Lambert & Sykuta 2018; for a review, see Elhauge 2017b). Most of the debate centers around the incentives of fund managers rather than fund families and on whether the relevant beneficial owners indeed have the incentives and ability to effectuate reduced competition. It thereby ignores the literature documenting family-level incentives and engagement, the question of why firms would act competitively absent incentives to do so, and other previously disproven claims the industry has brought forward (for an overview, see Schmalz 2017). The discussion also omits an answer to the question of which shareholders influence a firm if not the largest and most powerful ones. The literature agrees that large asset managers should ensure that they have robust antitrust compliance programs in place, and that an efficiency defense may exist, based on new economic theory.

4.2. Policy Proposals

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 these laws would improve economic welfare. With such welfare considerations in mind, a first policy proposal by Posner, Scott Morton & Weyl (2017) points out an apparent problem with suits according to

[23] The 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 (for recent models of collusion under partial common ownership and cross-ownership, see de Haas & Paha 2016; Brito, Ribeiro & Vasconcelos 2018).

[24] Indeed, O'Brien & Salop (2000, p. 565) 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."

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the Clayton Act as proposed by Elhauge (2016): If a concentrated owner sells shares to small individual investors and thus creates greater CoOCo (imagine Jeff Bezos liquidating his Amazon shares, thus making more diversified shareholders relatively more powerful), institutions with preexisting 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 evaluation of the loss of diversification benefits due to diversifying across industries alone. They conclude that such a loss would be negligible compared to the increase in economic efficiency from more competitive product markets.

An additional likely benefit of the proposal of Posner, Scott Morton & Weyl (2017) is that increased concentration of asset managers' shareholdings in one firm per industry would enhance the institutions' incentives to improve corporate governance. The alternative policy of restricting common owners' voting rights, proposed by Shapiro Lund (2018), would arguably lead to a greater divergence between cash flow and control rights, thus creating greater corporate governance frictions and perhaps preventing socially beneficial governance activities by large institutional investors. Adding to the theoretical appeal of the proposal of Posner, Scott Morton & Weyl (2017), increased concentration of an asset managers' holdings in vertically connected firms (as opposed to dispersed holdings across firms in an industry) could also have welfare-improving effects, to the extent the premise of the efficiency defense is correct—namely, that vertical common ownership has, on average, quantitatively important welfare-enhancing effects. These conjectures have not been evaluated by formal models; doing so constitutes an important task for future research.

The above proposals are perceived by many as far-reaching and therefore controversial. A hopefully less controversial proposal would be that policy makers demand, collect, and analyze accurate beneficial ownership information and details on the governance activities of institutional investors, including the level at which governance rights are de facto exercised. In particular, regulators should be aware of the aggregation problem discussed in Section 2.5, in which the extent of CoOCo can be understated due to some investors' split reporting of holdings. To the extent that asset managers have an interest in a transparent and fact-based debate, they could voluntarily make such data openly available to academic researchers as well.

Many other possible policy responses have not been discussed in detail, such as the use of taxes to discourage patterns of asset holdings that create anticompetitive incentives, the promotion of entry and entrepreneurship, the prevention of creation of common ownership links by active investors, the prevention of centralization or coordination of governance activities across funds and fund families, etc.

Antitrust authorities worldwide have begun to examine the competitive implications of common-ownership links.[25] As a result, the asset management industry has invested significant resources in discrediting the underlying research and discouraging policy responses. A detailed discussion of such nonacademic and industry-sponsored papers on the subject is beyond the scope of this review.

Popular misconceptions in the policy debate, including the claim that index funds are the only or key culprit in bringing about anticompetitive effects and the notion that addressing the

[25] See 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, Schmalz & Tecu (2017) discuss additional developments. See also press coverage of challenges to SoftBank's engagement to discourage ride hailing competition in Southeast Asia.

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competitive risks from common ownership would imply a prohibition of passive investing, 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 these findings are "likely to spawn a whole field of study" (Davidoff 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. New questions arise for theorists and empiricists alike.

5.1. Additional Industry Studies and Structural Estimates

One example of such an opportunity is to reexamine industry studies of product market competition, while allowing for the possibility that common ownership affects outcomes. Studies covering jurisdictions outside the United States might be particularly informative for policy makers.

Besides adding to the reduced-form evidence, researchers may find it useful to offer structural estimates as well, to help address challenges of interpretation inherent in existing reduced-form studies. Structural estimates also allow more reliable quantification of the pricing effects of common ownership and gauging of the likely welfare consequences of implementing policy proposals that aim to change CoOCo in an attempt to balance the partially conflicting goals of shareholder value maximization, competition in factor and product markets, innovation, and ultimate shareholder diversification. In ongoing work, Backus, Conlon & Sinkinson (2018) estimate a structural model of demand in the US ready-to-eat cereal industry, which allows them to test and quantify pricing effects of common ownership.

5.2. Quantifying Welfare Trade-Offs

Another open question regards a quantitative assessment of the utility benefits investors achieve by diversifying across versus within industries. Such estimates would help evaluate the likely welfare effect of some of the policy proposals discussed above. That said, restricting diversification at the asset-manager level does not necessarily restrict ultimate shareholder diversification, because households can diversify across intermediaries. The primary policy goal should arguably be to allow for cost-effective ultimate shareholder diversification, as opposed to full diversification of intermediaries.

In other words, the key to fixing the competition problem is to restore and maintain incentives to compete at the level at which corporate governance activities are effectively conducted, which can be different from the level at which diversification is achieved. Future theoretical work could evaluate the conjecture that informational frictions between ultimate investors and asset managers and ultimate investors' ability to select asset managers are sufficient to generate second-best contracts (as currently in place) that reward asset managers for maximizing assets under management (rather than the interests of shareholder-consumers) and thus break the premise of the problem studied by Farrell (1985). (Full internalization of ultimate investors' interests might otherwise imply that diversification by ultimate investors across asset managers can reduce firms' competitive incentives even if asset managers are not diversified within an industry.) The key policy trade-off would then be not between beneficial owner diversification, shareholder value maximization, and product market competition, but between transactions costs of diversification to ultimate shareholders, governance, and product market competition, as reflected in Rotemberg (1984).

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A likely important aspect that has received relatively little attention in the policy debate concerns the potential welfare benefits of governance activities by large, diversified institutional investors. Quantitative estimates of such benefits would be desirable to inform the policy debate. Estimating factor market effects of CoOCo (e.g., monopsony in the labor market) would likewise help to obtain a full picture of welfare effects.

5.3. Documenting Welfare-Enhancing Effects of Common Ownership

As discussed in Section 2.4.2, it is theoretically possible that vertical common ownership has welfare-enhancing effects. However, 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. Providing such guidance would therefore be a useful addition to the literature.

5.4. Governance Mechanisms

Which governance mechanisms are chiefly responsible for common-ownership effects appears to be of interest to corporate governance researchers, legal scholars, and policy makers. A related question is which (type of) shareholders are chiefly responsible for any anticompetitive or procompetitive effects of common ownership. Also, are the effects due to commission of anticompetitive actions or omission of procompetitive directions one would expect from noncommon concentrated owners? Either could cause the variation in CoOCo measured in extant empirical work. 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%, passive ownership is just the flip side of active ownership, and the presence of one shareholder type implies the absence of another. This consideration casts 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, as I discuss below.

5.5. Endogenizing Ownership and Market Structure in General Equilibrium

The literature on anticompetitive 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 dependencies may be a fruitful area for research for both theorists and empiricists; Gerakos & Xie (2018) and Newham, Seldeslachts & Banal-Estanol (2018) provide pioneering papers in that respect.

For example, evidence suggests that activist engagement depends on other investors' holdings and preferences (Kedia et al. 2016), 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 on common ownership, equilibrium asset prices should likewise be a function of ownership and market structure. More generally, understanding

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the endogeneity of ownership structures of competitors is a very interesting theoretical question for future research.[26]

More generally, all of the papers discussed in this review operate in partial equilibrium. Given the worldwide and systemic changes in the ownership structures of public firms across all public markets due to the rise and consolidation of intermediated asset management, however, general equilibrium effects of CoOCo (including those from vertical common ownership) may have to be considered to assess the overall efficiency effects of this development. Whether common ownership is pro- or anticompetitive in such a context is a very interesting question for future theoretical research.

5.6. Tackle the Question: What Is the Objective Function of the Firm?

Perhaps the most consequential question for future studies in both industrial organization and financial economics concerns what is the objective function of the firm. I have emphasized in Section 2 the decades-old literature observing 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 therefore be to continue the development and testing of voting models that take into account shareholders' varying portfolio interests (for related working papers, see Bubb & Catan 2018; Bolton et al. 2018; Bar-Isaac & Shapiro 2017; Cvijanovic, Groen-Xu & Zachariadis 2017).

6. CONCLUSIONS

The commonly made assumption that firms maximize their own value ceases to have a robust theoretical foundation when firms interact strategically and the shareholder bases of firms overlap. Both theory and empirical evidence indicate that a realistic model of corporate conduct should take into account shareholders' portfolio interests.

Yet no single correct model has been identified, which leaves opportunities for theoretical research. In addition, existing theories have made a large number of falsifiable predictions both about corporate behavior and about resulting equilibrium outcomes that have not yet been tested. New research in the area can have immediate policy implications. Therefore, both theoretical and empirical research on CoOCo and corporate conduct will likely remain an attractive area of study in the foreseeable future.

DISCLOSURE STATEMENT

I hold a portfolio of exchange-traded funds. Other than that, I am not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

[26] 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.

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