Common Ownership, Competition, and Top Management Incentives

Miguel Antón[†] Florian Ederer[‡] Mireia Giné[†] Martin Schmalz[§]

[†]IESE [‡]Yale University [§]University of Oxford

Cornell
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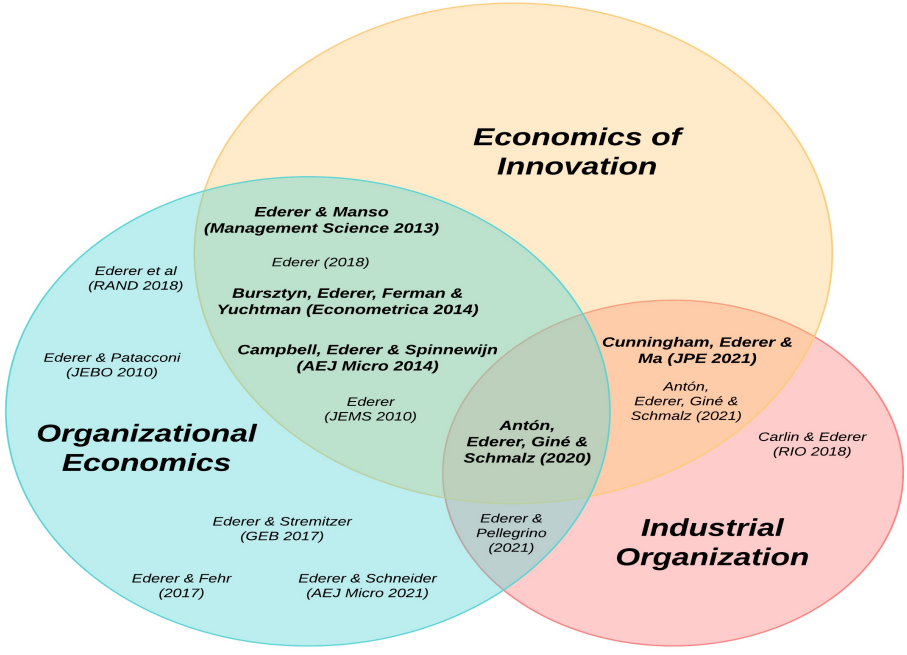
Economics of Innovation
Ederer & Manso (Management Science 2013)
Ederer et al (RAND 2018)
Ederer (2018)
Bursztyn, Ederer, Ferman & Yuchtman (Econometrica 2014)
Ederer & Patacconi (JEBO 2010)
Campbell, Ederer & Spinnewijn (AEJ Micro 2014)
Cunningham, Ederer & Ma (JPE 2021)
Antón, Ederer, Giné & Schmalz (2021)
Ederer (JEMS 2010)
Organizational Economics
Antón, Ederer, Giné & Schmalz (2020)
Carlin & Ederer (RIO 2018)
Ederer & Stremitzer (GEB 2017)
Ederer & Pellegrino (2021)
Industrial Organization
Ederer & Fehr (2017)
Ederer & Schneider (AEJ Micro 2021)

Delta Air Lines	[%]
Berkshire Hathaway	8.25
BlackRock	6.84
Vanguard	6.31
State Street Global Advisors	4.28
J.P. Morgan Asset Mgt.	3.79
Lansdowne Partners Limited	3.60
PRIMECAP	2.85
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Fidelity	1.54
PAR Capital Mgt.	1.52

Southwest Airlines Co.	[%]
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American Airlines	[%]
T. Rowe Price	13.99
PRIMECAP	8.97
Berkshire Hathaway	7.75
Vanguard	6.02
BlackRock	5.82
State Street Global Advisors	3.71
Fidelity	3.30
Putnam	1.18
Morgan Stanley	1.17
Northern Trust Global Inv	1.02

United Continental Holdings	[%]
Berkshire Hathaway	9.20
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PAR Capital Mgt.	5.18
State Street Global Advisors	3.45
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Altimeter Capital Mgt.	3.26
T. Rowe Price	2.25
AQR Capital Management	2.15

Alaska Air	[%]
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Renaissance Techn.	1.93

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The Rise of Common Ownership

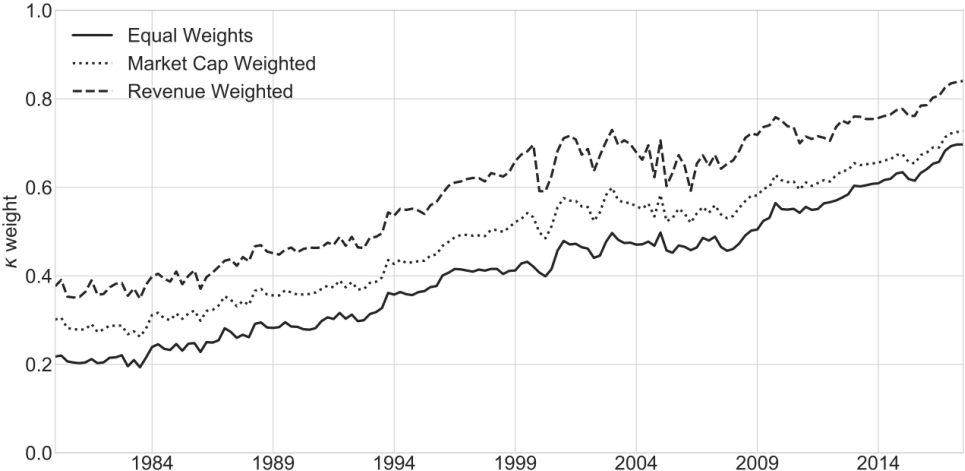

Figure: Common ownership profit weights κ over time (Backus et al., 2021b)

The Common Ownership Hypothesis

- "When large investors own shares in many firms within the same industry, those firms may have reduced incentives to compete."
  - Firms produce fewer units, raise prices, reduce investment, innovate less, limit entry, ...
  - Long intellectual history starting with theoretical contribution by Rotemberg (1984)
- Common ownership is one of the hottest topics in antitrust
  - Academic and policy interest driven by new empirical market-, industry-, and macro-level evidence (Azar, 2012; Azar et al., 2018; Boller and Scott Morton, 2020; Backus et al., 2021a)
  - FTC hearings, DOJ, EU Competition Commission, Uber-Grab Softbank enforcement, ...
- **But what is the (or, at least, a plausible) mechanism?**
  - Investors do not run firms, managers do.
  - BlackRock's CEO Larry Fink does not phone up managers to dictate market-level prices.
  - Collusion is illegal.

Why do we need a (plausible) mechanism?

"... areas of research that I, as an antitrust enforcer, would like to see developed before shifting policy on common ownership [are]: Whether a clear mechanism can be identified ..."

—FTC Commissioner Noah J. Phillips
FTC Hearing on Common Ownership, December 6, 2018

"The organizational complexity of today's largest public companies makes it far from clear how—even if top managers receive an anticompetitive signal from their pay packages—those incentives affect those making pricing decisions throughout the organization. [...] For these reasons, I worry that the evidence we have today may not carry the heavy burden that, as a Commissioner sworn to protect investors, I would require to impose costly limitations."

—SEC Commissioner Robert J. Jackson Jr.
FTC Hearing on Common Ownership, December 6, 2018

A Direct Mechanism

Investors

Directly set p_i to maximize

$$\phi_i = \pi_i + \sum_j \kappa_{ij} \pi_j$$

Product Prices

A Direct Mechanism ... not this paper

Investors

$$\psi_i = \pi_i + \sum_j \kappa_{ij} \pi_j$$

Product Prices

An Indirect Mechanism

Investors

Set w_i to maximize ϕ_i

Top Management

Invest e_i in cost reduction to maximize w_i

Pricing Specialists

Set p_i to maximize π_i

Product Prices

What this paper does — Theoretical Framework

- 3 ingredients from 3 different fields
  - Organizational Economics: incentive design (managers) with delegation in multiproduct firms
  - Industrial Organization: strategic product market competition (pricing specialists)
  - Corporate Finance: common ownership (investors)

- More common ownership at the firm level leads to
  - **lower managerial incentives at the top of the firm** and lower productivity, and
  - higher prices and lower quantities at the industry and market level, and
  - price and quantity cross-market variation even within the same firm,
  - ... but does **not** lead to higher markups.

- A plausible mechanism that reconciles the (seemingly conflicting) empirical evidence

What this paper does — Empirical Analysis

- Evidence on the central part of mechanism (common ownership $\uparrow \implies$ CEO incentives $\downarrow$)
  - Profit weight measures of common ownership ("kappas") (Backus et al., 2021b)
  - Comprehensive measure of CEO incentives ("WPS") (Edmans et al., 2009)
- Negative empirical relationship between common ownership and managerial incentives
  - 25^{th} to 75^{th} percentile increase in common ownership reduces managerial WPS by 6.6%
  - Comparable in magnitude to the effect of firm volatility on managerial incentives
- Difference-in-differences design based on competitor index additions confirms result
  - Index addition of a competitor increases common ownership (Boller and Scott Morton, 2020)
  - Competitor index addition reduces WPS of CEOs of index incumbents by 13.4%

Organizational Economics and Industrial Organization

- Realistic features of firm organization
  - n multiproduct firms each with an organizational hierarchy (Tirole, 1986)
    - ⋆ In each firm 1 top manager who makes high-level decisions (Bandiera et al., 2020) ...
    - ⋆ ... but product-specific pricing (or quantity) decisions are delegated to m middle managers (e.g., divisional/regional managers) (Alonso et al., 2008; Rantakari, 2008; Bloom et al., 2012b; Alonso et al., 2015)
  - Owners do not use product-level incentives for middle managers.
  - Top & middle managers do not know their owners' portfolio shareholdings in other firms.
- Top manager can improve firm productivity through investment
  - Large and persistent differences in productivity levels across businesses (Syverson, 2011)
  - Strongly influenced by management practices (Bloom et al., 2012a, 2019)
- No collusion or coordination between investors or managers

Model Setup

Equation	Description
$q_{i,l} = A - bp_{i,l} + a\sum_{j \neq i} p_{j,l}$	Product Demand for Firm i in Market l
$c_i = \bar{c} - e_i$	Productivity Improvement
$\pi_i = \sum_{l=1}^{m} \{[p_{i,l} - (\bar{c} - e_i)]q_{i,l}\} + \varepsilon_i$	Total Multiproduct Profits for Firm i
$w_i = s_i + \alpha_i \pi_i$	Top Manager Compensation
$\max_{p_{i,l}} \pi_{i,l} = [p_{i,l} - (\bar{c} - e_i)]q_{i,l} + \varepsilon_i$	Product Manager Objective Function
$\max_{e_i} CE_i = s_i + \alpha_i \pi_i - \frac{r}{2}\alpha_i^2 \sigma^2 - \frac{1}{2} q_i e_i^2$	Top Manager Utility
$\max_{s_i, \alpha_i} \phi_i = \pi_i - w_i + \sum_{j \neq i} \kappa_{ij}(\pi_j - w_j)$	Owner Objective Function

Key Intuition of the Model

- Stronger managerial incentives α_i encourage more productivity-improving investment e_i.
- Productivity-improving investment e_i by the manager has three effects:
  1. Margin effect increases price-cost margin: $p_i - (\bar{c} - e_i)$
  2. Price effect decreases price set by specialist: $p_i = \frac{1}{2b}A + b(\bar{c} - e_i) + a\sum_{j \neq i} p_j$
  3. Competition effect reduces competitor profits π_j through lower price p_i
- Different types of owners care differently about these three effects
  - Undiversified owner ($\kappa_{ij} = 0$) only cares about (1) and (2) which influence π_i.
  - Common owner ($\kappa_{ij} > 0$) cares about (1), (2), and (3) with concern for (3) increasing in κ_{ij}.

$$\frac{\partial \phi_i}{\partial \alpha_i} = \frac{\partial \pi_i^*}{\partial \alpha_i} - r\sigma^2\alpha_i^2 - q_i^*\alpha_i - \frac{\alpha_i^2}{2}\frac{\partial q_i^*}{\partial \alpha_i} + \sum_{j \neq i} \kappa_{ij}\left(\frac{\partial \pi_j^*}{\partial \alpha_i} - \frac{\alpha_j^2}{2}\frac{\partial q_j^*}{\partial \alpha_i}\right)$$

Common Ownership and Managerial Incentives

Proposition (Managerial Incentives)

The equilibrium incentives α_i^* given to managers decrease with the degree of common ownership κ_i, that is $\frac{\partial \alpha_i^*}{\partial \kappa_i} < 0$.

- Managers (optimally) face weaker incentives to improve firm efficiency as common ownership at the firm level increases.
- Strategic (product market) interaction is crucial to this result.
  - Without product market competition managerial actions would have no impact on the profits of other firms.
  - But any setting in which incentivizing managerial actions has negative repercussions on the profits of competitors would generate a similar result.

Corporate Governance and Common Ownership

- Common owners are "excessively deferential" toward managers or even "lazy owners"
  - At least when compared to the standard benchmark of undiversified owners
- Model does not assume but explains **why** common owners are passive (Proposition 5)
  - Common owners do not want to incur governance cost $g > 0$ to design incentive compensation for top managers ... but undiversified ("maverick") owners do and so they are more active.
  - Common owners do not have the same strong interest to **push** for high-powered incentive plans as undiversified ("maverick") owners.
  - Managers "enjoy the quiet life" (Bertrand and Mullainathan, 2003).

An Example of Firm-level Variation in Common Ownership

Virgin America	**[%]**
Richard Branson	30.77
Cyrus Capital Partners	23.52
Virgin Group Holdings Ltd.	15.34
Vanguard	2.89
BlackRock	2.25
Alpine Associates Advisors	2.11
Hutchin Hill Capital	2.09
Societe Generale	1.84
Apex Capital	1.74
Morgan Stanley	1.70

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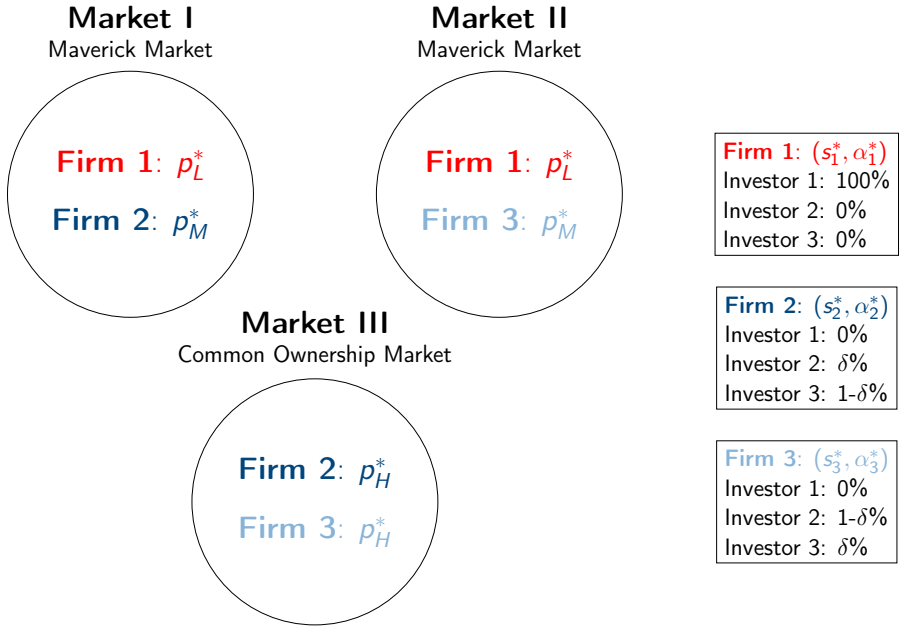

Market I
Maverick Market
Firm 1: p_L^*
Firm 2: p_M^*
Market II
Maverick Market
Firm 1: p_L^*
Firm 3: p_M^*
Market III
Common Ownership Market
Firm 2: p_H^*
Firm 3: p_H^*
Firm 1: (s_1^*, α_1^*)
Investor 1: 100%
Investor 2: 0%
Investor 3: 0%
Firm 2: (s_2^*, α_2^*)
Investor 1: 0%
Investor 2: δ%
Investor 3: 1-δ%
Firm 3: (s_3^*, α_3^*)
Investor 1: 0%
Investor 2: 1-δ%
Investor 3: δ%

Key Intuition for Price Effects

- Firm 1 sets lower prices than firm 2 and 3 in the maverick markets I and II:

$$p^*_{1,\mathrm{I}} = p^*_{1,\mathrm{II}} = p^*_L < p^*_M = p^*_{2,\mathrm{I}} = p^*_{3,\mathrm{II}}$$

- Firm 2 and 3 set even higher prices in common ownership market III:

$$p^*_{2,\mathrm{III}} = p^*_{3,\mathrm{III}} = p^*_H$$

- **Price effects are not driven by collusion, but by endogenously determined costs.**

Reconciling the Empirical Evidence

Theory	Prediction	Level	Empirical Evidence
Prop. 1 & 2	Incentives (−)	Firm	**This Paper**
	Costs (+)	Firm	Aslan (2019)
	Markups (±)	Firm & Market	Aslan (2019), Koch et al. (2020), Backus et al. (2021a)
Coro. 1	Profits (+)	Firm	Boller and Scott Morton (2020)
Coro. 2	Prices (+)	Firm & Market	Azar et al. (2018), Park and Seo (2019), Aslan (2019), Azar et al. (2019), Torshizi and Clapp (2019)
Coro. 3	Output (−)	Market	Azar et al. (2018)
	Concentration (−)	Market	Azar et al. (2018), Azar et al. (2019)
Prop. 5	Governance (−)	Firm	Bubb and Catan (2018), Heath et al. (2020)
	Entry (−)	Firm & Market	Newham et al. (2019), Ruiz-Pérez (2019), Xie and Gerakos (2020)
	Investment (−)	Industry	Gutiérrez and Philippon (2018)

Recognizing Agency Problems and Organizational Structure

- What would happen if ...
  - ... common owners could directly set prices $p_{i,l}$?
  - ... common owners could directly set optimal incentives for pricing specialists?
  - ... common owners could centralize pricing decisions with the top manager?

- All of these assumptions are arguably less realistic (no delegation and/or direct interventions by common owners), but they ...
  - ... provide useful benchmarks.
  - ... help rule out alternative.

- Common ownership would have **large markup effects** but would create **little (or even no) productive inefficiency** (Proposition 3 and 4).
  - Existing studies provide evidence of higher costs, but **not** of markup effects of common ownership ...
  - ... which, together with our theoretical analysis, casts doubt on such direct mechanisms.

Direct Mechanisms of Common Ownership $\longrightarrow$ Markup Effects

~~Productive Inefficiency~~

Investors

Directly set p_i to maximize

$$\phi_i = \pi_i + \sum_j \kappa_{ij} \pi_j$$

Product Prices

Markup Effects

Our Indirect Mechanism $\longrightarrow$ Productive Inefficiency

Investors

Set w_i to maximize ϕ_i

Top Management

Invest e_i in cost reduction to maximize w_i

Pricing Specialists

Set p_i to maximize π_i

Productive Inefficiency

Product Prices

Markup Effects

Implications for Industrial Organization and Antitrust

- Looking for common ownership effects in markups while taking costs, investments, entry, and product choices as given may miss a crucial channel of common ownership
  - (Common) Owners can only influence high-level decisions.
  - Neither investors nor top managers choose ready-to-eat breakfast cereal prices at the store and cereal brand level!

- Hybrid models may be more suited
  - Airlines choosing **entry for shareholder portfolio profits (**$\max \phi_i$**)**, but choosing **prices to maximize own firm profits (**$\max_{p_i} \pi_i$**)** fits data best (Ruiz-Pérez, 2019)
  - No effect of common ownership on prices **conditional** on entry choices
  - This is exactly what our model predicts if top managers make entry decisions and pricing decisions are delegated to route specialists.

- Common ownership may cause productive inefficiency rather than higher markups.
  - Negative welfare effects can be even higher.

Understanding the product market effects of common ownership

- Modeling the endogeneity of market shares is important
  - Only cause of market-level variation in prices, output, market shares, and concentration is the firm-level variation in common ownership.
  - Wrong to interpret only the common ownership coefficient as the price effect of common ownership (Azar et al., 2018, 2019)
  - Wrong to interpret a price effect of market shares variation without ownership variation as evidence against anti-competitive effects of common ownership (Dennis et al., 2019)
- Recognizing the principal-agent problem is important
  - Owner interests do not perfectly translate into owners' desired product market behavior
  - Common ownership effects more muted than implied by exact κ_{ij} (Backus et al., 2021a)
  - Hybrid model where airlines choose entry in shareholder interests (i.e., $\max \phi_i$), but choose prices to maximize just own firm profits (i.e., $\max_{p_i} \pi_i$) fits data best (Ruiz-Pérez, 2019)

Linking theory and empirics

- Theory considers totality of managerial incentives ... and so does the empirical analysis
  - **Wealth-performance sensitivity** rather than pay-performance sensitivity (Edmans et al., 2017)
  - Relevant WPS measure depends on whether CEO productivity is additive, linear or **multiplicative** for firm profits (Baker and Hall, 2004; Edmans et al., 2009)
  - Robustness checks using other WPS measures
- Theory uses profit weight model ... and so does the empirical analysis
  - Theory uses "**kappas**" given by $\phi_i = \pi_i - w_i + \sum_{j \neq i} \kappa_{ij}(\pi_j - w_j)$ as in Backus et al. (2021b)
  - Empirics use $\overline{\kappa}_i = \sum_{j \neq i} \kappa_{ij} \frac{\omega_j}{\sum_{j \neq i} \omega_j}$ where ω_j is the stock market value weighting
  - Robustness checks using other common ownership measures

Data

- Executives
  - ExecuComp covers all companies that are (or were once) part of the S&P 1500 index
  - Wealth-performance sensitivities from Alex Edmans (2019 update)
- Firms
  - Accounting and financial data (volatility, leverage, ...) are from Compustat
- Ownership
  - Thomson Reuters 13Fs augmented by scraping SEC 13F filings
  - Cleaning and aggregation following Ben-David et al. (2020)
- Unless otherwise stated all data are from 1992 to 2019

Empirical specification for panel regressions

- Our baseline analysis uses the following specification

$$WPS_{ijzt} = \beta \cdot CO_{it} + \gamma \cdot X_{ijzt} + \eta_{zt} + \mu_i + \varepsilon_{ijzt},$$

  where i indexes firms, j indexes managers, z denotes industries at the four-digit level.
  - Specification closely follows Edmans et al. (2009) but uses variation in common ownership

- Fixed effects to difference out potentially confounding variation
  - η_{zt} to take out unobserved industry trends in common ownership that are correlated with trends in managerial incentive slopes
  - μ_i to take out unobserved omitted firm characteristics that are correlated with common ownership and incentive slopes
  - Avoid spurious inferences from industry-wide trends or time-invariant firm compensation policies and base inferences only on within-firm and within-year variation

- Battery of robustness checks: WPS, common ownership, industry definitions, ...

Negative relationship between common ownership and managerial WPS

Dependent Variable	ln(Wealth-performance Sensitivity EGL)					
Industry Definition	SIC CRSP		SIC COMP		HOBERG-PHILLIPS	
	(1)	(2)	(3)	(4)	(5)	(6)
Common Ownership (Kappa EW)	-0.133***		-0.114***		-0.101**	
	(-2.953)		(-2.973)		(-2.428)	
Common Ownership (Kappa VW)		-0.128***		-0.114**		-0.0771*
		(-3.045)		(-2.669)		(-1.828)
Volatility	1.363***	1.370***	1.023***	1.022***	1.050***	1.051***
	(4.898)	(4.914)	(3.533)	(3.525)	(3.855)	(3.846)
ln(Market Equity)	0.346***	0.348***	0.343***	0.345***	0.368***	0.369***
	(17.91)	(18.06)	(18.21)	(18.23)	(15.68)	(15.61)
Leverage	0.0377	0.0384	0.0141	0.0153	0.0332	0.0348
	(0.581)	(0.591)	(0.231)	(0.250)	(0.456)	(0.479)
HHI	-0.113	-0.116	-0.0158	-0.0162	0.0116	0.0150
	(-1.528)	(-1.569)	(-0.172)	(-0.177)	(0.203)	(0.262)
ln(Tenure)	0.487***	0.486***	0.479***	0.479***	0.493***	0.492***
	(16.43)	(16.47)	(16.60)	(16.65)	(13.99)	(13.97)
Observations	42,788	42,788	45,670	45,670	34,161	34,161
R-squared	0.682	0.682	0.687	0.687	0.698	0.698
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Alternative common ownership measures

Dependent Variable	ln(Wealth-performance Sensitivity EGL)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CO (Kappa)	-0.133***						
	(-2.953)						
CO (Cosine Similarity)		-0.280***					
		(-5.868)					
CO (Top 5 Overlap)			-0.177***				
			(-4.404)				
CO (Anton and Polk)				-0.423***			
				(-5.813)			
CO (Harford, Jenter and Li)					-0.410***		
					(-5.811)		
CO (MHHID)						-0.338***	
						(-5.638)	
CO (MHHID 1/N)							-0.260***
							(-5.162)
Observations	42,788	42,788	42,030	42,788	42,788	42,794	42,794
R-squared	0.682	0.683	0.681	0.683	0.683	0.682	0.682
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Alternative wealth-performance sensitivity measures

Dependent Variable	ln(WPS JM)			ln(WPS HL)		
	(1)	(2)	(3)	(4)	(5)	(6)
CO (Kappa)	-0.164***			-0.120**		
	(-3.872)			(-2.616)		
CO (Cosine Similarity)		-0.258***			-0.192***	
		(-5.964)			(-4.265)	
CO (Top 5 Overlap)			-0.196***			-0.131***
			(-5.630)			(-3.706)
Observations	42,788	42,788	42,030	42,788	42,788	42,030
R-squared	0.791	0.792	0.792	0.792	0.792	0.792
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes

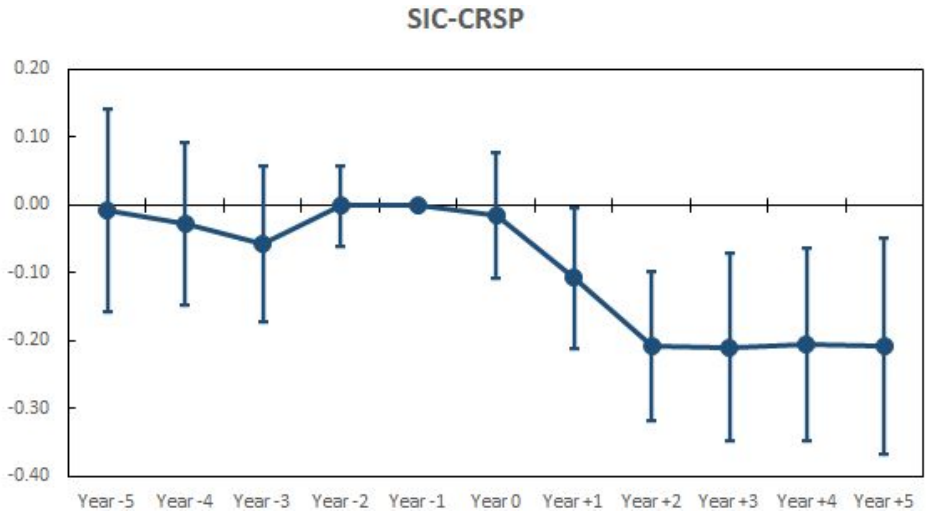
Difference-in-differences estimation using competitor index additions

- But can we give these panel regression results a causal interpretation?
  - Theory assumes exogenous ownership, but that's not realistic
  - For example, unobserved changes in firms' product market strategies could drive both changes in common ownership and changes in the structure of executive compensation

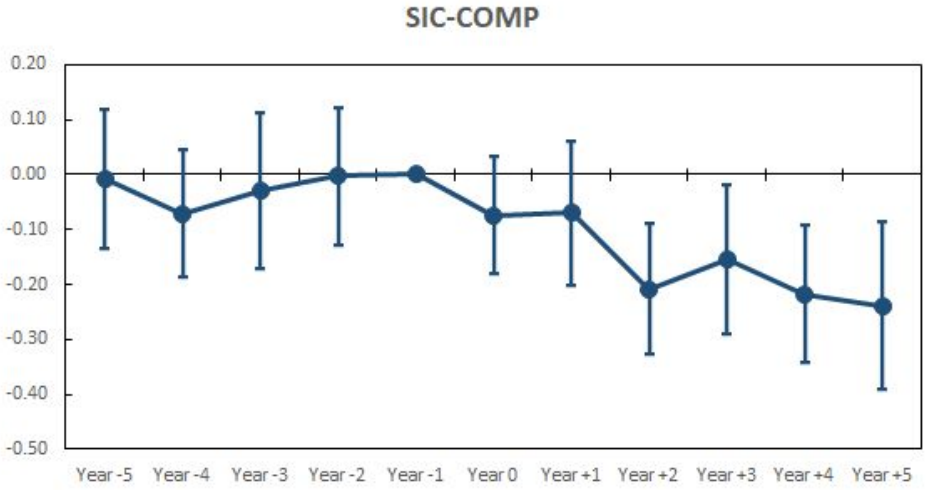
- Use addition of industry competitors as an exogenous shock to common ownership (Boller and Scott Morton, 2020)
  - Industry with 3 firms (A, B, and C), 2 of which (A and B) are already in the S&P500.
  - When C is added to the index, index funds that already own shares in A and B will be forced to buy shares in C as well.
  - Both A and B will experience an increase in common ownership.

- This is **not** a problematic shock like index additions, mergers of institutional investors, index reconstitutions, ...
  - Ownership of treated companies (i.e., index incumbents) remains **completely the same**
  - Common ownership weights κ_{ij} change due to ownership changes at **other firms**

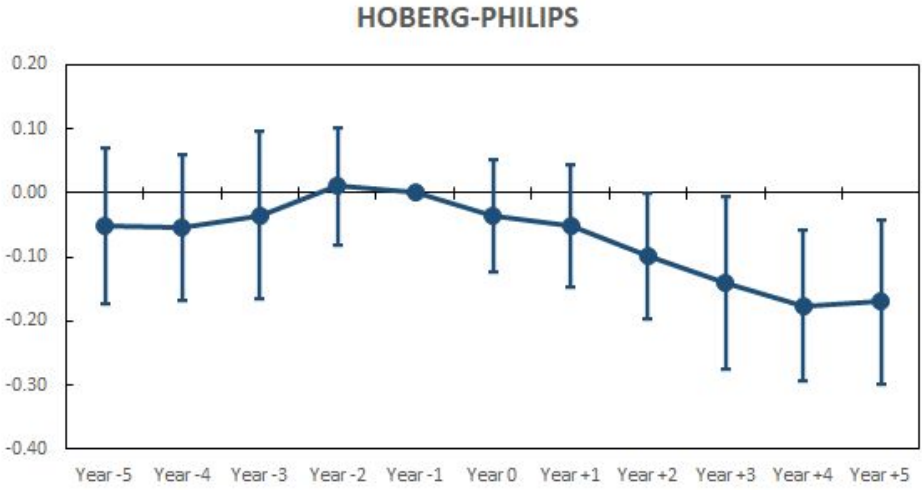
Event study graphs



Event study graphs



Event study graphs



Summary of difference-in-differences results

- Negative relationship between common ownership and managerial incentives persists
  - Allays empirical concern that endogenous ownership confounds the interpretation of the negative correlation in the panel regressions
- Index addition of competitor leads to a reduction of CEO WPS at index incumbents between $\mathbf{-10.2\%}$ and $\mathbf{-16.1\%}$ depending on industry definitions
- Negative effect of competitor index inclusion on index incumbent CEO WPS is not present before inclusion event and increases in magnitude afterwards

Conclusion

- What this paper says
  - Managerial compensation is a simple mechanism through which common ownership can affect product market outcomes including *intra-industry cross-market* variation in prices
  - Mechanism does not rely on implausible assumptions about what investors or managers do
  - Theoretical predictions can explain existing empirical evidence on product market outcomes
  - Empirical evidence confirms $-$ve link between common ownership and managerial incentives
- What this paper does **not** say
  - Managerial incentives are the only (or even the primary) mechanism of common ownership
  - Common ownership is necessarily welfare-reducing (let alone, "index funds are evil")
- Results have implications for
  - Evaluation of existing empirical evidence on common ownership
  - Future work at the intersection of organizational economics, IO, and corporate finance
  - Antitrust policy and financial regulation

Thank You!

Paper available at https://florianederer.github.io/common_ownership.pdf

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