Innovation: The Bright Side of Common Ownership?

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Research question: between two macro trends re competitiveness debate

1. Increasing product market concentration - hand in hand with less business dynamism, and decline in corporate innovation
2. Increasing common ownership (CO): the extent to which the most influential shareholders of one firm have financial interests in other firms

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- Theory says: Potentially!
  - Common ownership of competitors can reduce incentives to innovate.
  - But technological spillovers can also incentivize more innovation (López and Vives, 2019).
- Open empirical question: Are **both** effects present in the data? Which one prevails?

The Rise of Common Ownership

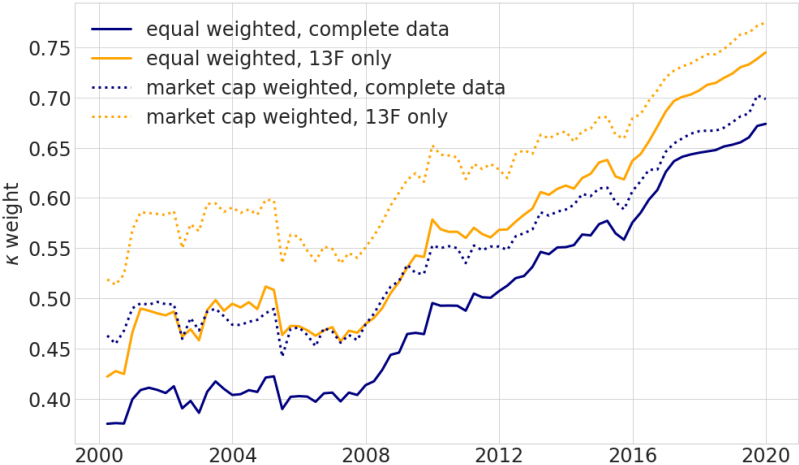


Figure: Common ownership profit weights κ over time (Amel-Zadeh et al., 2022)

Common ownership across industries

Common ownership across industries

R&D Exp
$2.4bn
(2% of sales)

Patents
452

R&D Exp
$5.7bn
(6% of sales)

Patents
5,052

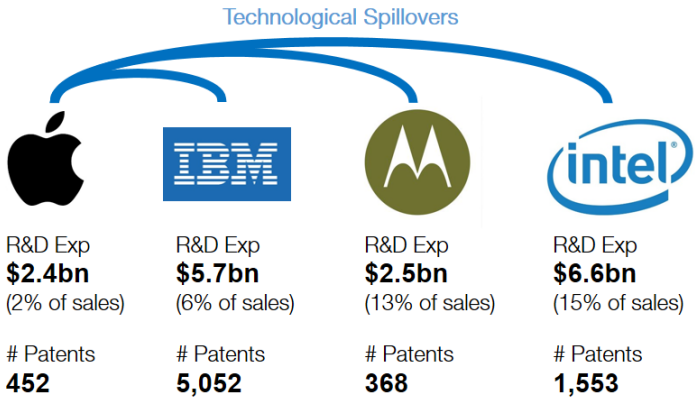
R&D Exp
$2.5bn
(13% of sales)

Patents
368

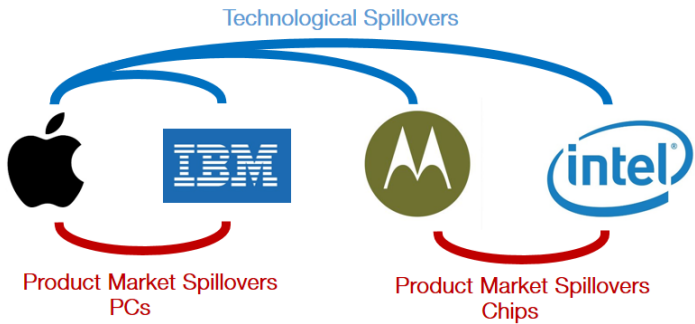
R&D Exp
$6.6bn
(15% of sales)

Patents
1,553

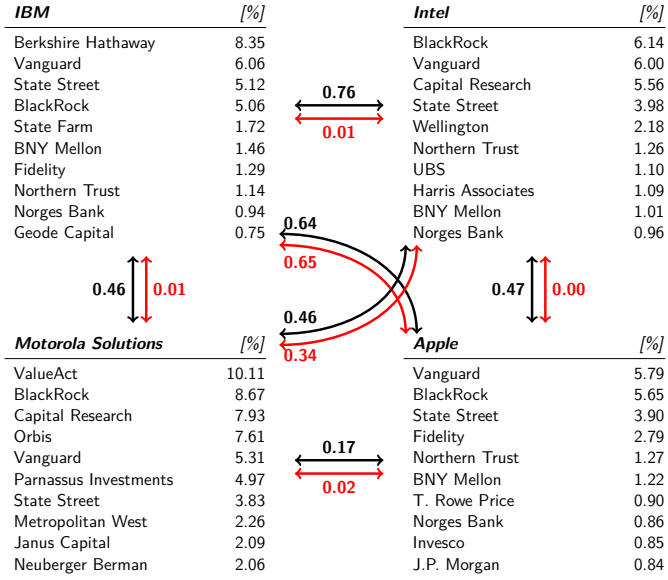
Common ownership across industries



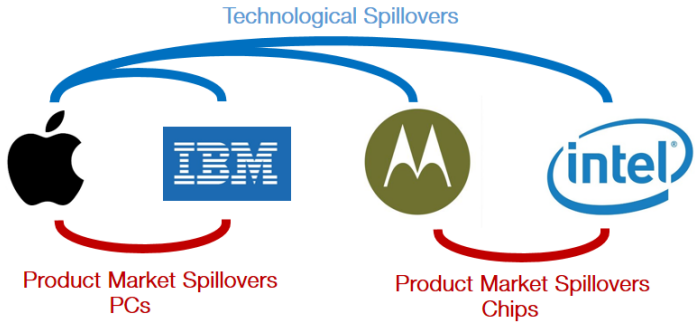
Motivation


Technological Spillovers
IBM
intel
Product Market Spillovers
PCs
Product Market Spillovers
Chips

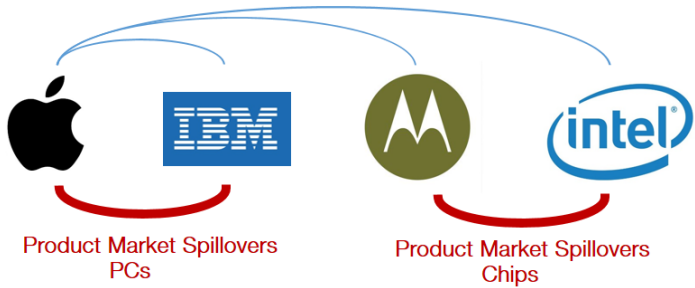
Technology & product market spillovers as per Bloom et al. (2013)



How does Common ownership interact with Spillovers?



Motivation: Internalizing the externalities



- Common ownership helps overcome free-rider problem; spurs innovation amid high technology spillovers.

Motivation: Internalizing the externalities

- Common ownership helps overcome free-rider problem; spurs innovation amid high technology spillovers.
- Common ownership reduces incentives to steal market share from competitors; can discourage innovation.

This Paper

- We know $\exists$ anti-competitive effects
  - Firms internalize competitive externalities on other firms $\Rightarrow$ choose lower q, higher p $\Rightarrow$ deadweight loss

In this framework:

- Competitive concerns also gives reduced incentives to compete: why pay for innovation to steal market share from commonly-owned rival?
- Technological spillovers, by contrast, give increased incentives to innovate: multiple portfolio firms benefit from costly innovation.

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- Which effect prevails? Theory...

Theory

Overview of the Model

1. Oligopolistic competition with heterogeneously differentiated products between n firms
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4. Owners are diversified - each owner has a stake in firm i as well as shares in other firms denoted by j
   - Firm i maximizes $\phi_i = \pi_i + \sum_{j \neq i}^{n} \kappa_{ij} \pi_j$
   - Greater weight attached to profits of firm j when κ_{ij} is higher

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Model Setup

- n firms set quantity q_i (or price p_i) and choose innovation x_i
  - Inverse demand: $p_i = A - bq_i - \sum_{j \neq i}^{n} a_{ij} q_j$ where $b > a > 0$
  - Marginal cost: $c_i = \bar{c} - x_i - \sum_{j \neq i}^{n} \beta_{ij} x_j$

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- Potentially diversified shareholders
  - Firm i's profit: $\pi_i = (p_i - c_i) q_i - \frac{\gamma}{2} x_i^2$
  - Firm i's objective function: $\phi_i = \pi_i + \sum_{j \neq i}^{n} \kappa_{ij} \pi_j$ (Rotemberg, 1984)
  - Common ownership measured by κ_{ij} the weight that firm i places on j's net profits

$$\kappa_{ij} = \frac{\sum_o \gamma_{io} \beta_{jo}}{\sum_o \gamma_{io} \beta_{io}}$$

where β_{io} is the ownership share of firm i accruing to shareholder o and γ_{io} is the control share of firm i exercised by shareholder o.

  - Captures overlapping ownership between firms **within** and **across** industries

First order conditions: Two distinct effects

$$q_i = \frac{1}{2}\left[A - \left(\bar{c} - x_i - \sum_{j \neq i}^{n} \beta_{ij} x_j\right) - \sum_{j \neq i}^{n} a_{ij} q_j - \underbrace{\sum_{j \neq i}^{n} \kappa_{ij} a_{ji} q_j}_{\text{CO} \times \text{product market spillovers}}\right]$$

$$x_i = \frac{1}{\gamma}\left(q_i + \underbrace{\sum_{j \neq i}^{n} \kappa_{ij} \beta_{ji} q_j}_{\text{CO} \times \text{technology spillovers}}\right)$$

Intuition

- Product market spillovers (a_{ij})
  - Innovation reduces own marginal cost, increases own profit, but reduces other firms' profits because of business stealing
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  - Innovation reduces own marginal cost, increases own profit, but reduces other firms' profits because of business stealing
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- Technology spillovers (β_{ij})
  - Innovation reduces other firms' cost and increases their profit
  - **Encourage** innovation when common ownership κ_{ij} increases

When does CO increase or decrease innovation?

Proposition (Common Ownership and Innovation)

Common ownership κ_{ij} increases equilibrium innovation x_i^* if and only if technological spillovers β_{ij} are sufficiently large relative to product market spillovers a_{ij}.

The effect of κ_{ij} on x_i^* is decreasing in a_{ij}, $\frac{\partial^2 x_i^*}{\partial \kappa_{ij} \partial a_{ij}} < 0$, and increasing in β_{ij}, $\frac{\partial^2 x_i^*}{\partial \kappa_{ij} \partial \beta_{ij}} > 0$.

Empirics

Data and specifications

- **Innovation data:**
  - Input: R&D expenditures and R&D/Sales from Compustat
  - Output: number of patents, citation-weighted value of patents TCW, and market value of patents TSM. From Kogan, Papanikolau, Seru, and Stoffman (QJE 2017). Data 1985-2015.

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- **Spillover measures:** Bloom, Schankerman & Van Reenen (2013), Lucking et al. (2018)
  - Product market spillovers (a): $SPILLSIC_{it} = \sum_{j \neq i} SIC_{ij} G_{jt}$,

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    where $TECH_{ij}$ correlation between firm i and j share of patents in each of the 426 tech classes.

Data and specifications

- TR13F augmented by scraping SEC 13F following Ben-David et al.(2020): correct stale, omitted institutions, missing holdings since 2000. (In progress: add blockholders.)
- Execucomp for individual owners that are employed as officers or board.

- **Common Ownership measure:** from Backus et al. (2020) "kappa"

  - κ_{ij} between any firm pair i and j across the entire economy. Equal- or value-weighted average of the weights that the owners of firm i place in year t on the profits of the $n-1$ other firms in the economy as $\overline{\kappa}_{it}$.

$$\overline{\kappa}_{it} = \frac{1}{n-1}\sum_{j\neq i}\kappa_{ij,t} \quad \text{or} \quad \overline{\kappa}_{it} = \frac{1}{\sum_{j\neq i}\omega_{jt}}\sum_{j\neq i}\kappa_{ij,t}\omega_{jt} \tag{1}$$

Methodology

- We extend a classic innovation model to also capture common ownership and its interactions with product market & technology spillovers

$$
\begin{aligned}
Innovation_{it} \quad &= \alpha_1 \cdot CO_{it} + \alpha_2 \cdot SPILLSIC_{it} + \alpha_3 \cdot SPILLTECH_{it} \\
&+ \alpha_4 \cdot CO_{it} \cdot SPILLSIC_{it} + \alpha_5 \cdot CO_{it} \cdot SPILLTECH_{it} \\
&+ \alpha_6 \cdot X_{it} + \textstyle\sum_x \xi_x \cdot \eta_x + \varepsilon_{ijt}
\end{aligned}
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- Controls include the logs of market value, K/L, firm age, HHI, industry sales, and institutional ownership.
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- Proposition 1 tests: $H_0 : \alpha_4 < 0$ and $\alpha_5 > 0$

Input Innovation: R&D Expenditures

R&D expenditure $\ln(1+R_{it}/S_{it})$	(1) Jaf.	(2) Jaf.	(3) Jaf.	(4) Jaf.	(5) Mah.	(6) Mah.
CO		-0.00151**	-0.0347**	-0.0347**	-0.00124*	-0.0697***
		(0.000736)	(0.0162)	(0.0164)	(0.000726)	(0.0215)
$CO \times \ln(SPILLTECH)$			0.00247**	0.00246**		0.00486***
			(0.00108)	(0.00109)		(0.00143)
$CO \times \ln(SPILLSIC)$			-0.00111**	-0.00103**		-0.00224**
			(0.000507)	(0.000513)		(0.000878)
$\ln(SPILLTECH)$	-0.0204***	-0.0216***	-0.0223***	-0.0215***	-0.0164*	-0.0176**
	(0.00642)	(0.00651)	(0.00654)	(0.00668)	(0.00838)	(0.00841)
$\ln(SPILLSIC)$	0.00468***	0.00442***	0.00470***	0.00489***	0.00215	0.00266
	(0.00134)	(0.00135)	(0.00135)	(0.00137)	(0.00219)	(0.00220)
Institutional Ownership				0.00426	0.00486	0.00471
				(0.00349)	(0.00350)	(0.00349)
Observations	25,985	25,276	25,276	25,009	25,009	25,009
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

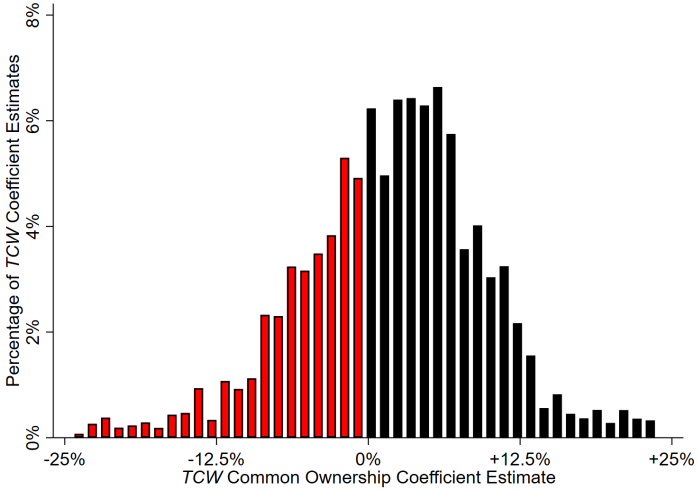
Output Innovation: Citation-weighted Patents

Citation-weighted patents TCW_{it}	(1) Jaf.	(2) Jaf.	(3) Jaf.	(4) Jaf.	(5) Mah.	(6) Mah.
CO		0.0476	-6.085***	-6.045***	0.125	-6.520**
		(0.138)	(2.162)	(2.189)	(0.147)	(2.675)
$CO \times \ln(SPILLTECH)$			0.465***	0.466***		0.519***
			(0.154)	(0.156)		(0.185)
$CO \times \ln(SPILLSIC)$			-0.237***	-0.233**		-0.346***
			(0.0919)	(0.0928)		(0.134)
$\ln(SPILLTECH)$	0.133***	0.133***	0.0400	0.0397	0.174***	0.0676
	(0.0475)	(0.0475)	(0.0566)	(0.0567)	(0.0614)	(0.0707)
$\ln(SPILLSIC)$	-0.0130	-0.0127	0.0367	0.0372	-0.0237	0.0521
	(0.0257)	(0.0256)	(0.0317)	(0.0319)	(0.0371)	(0.0459)
Institutional Ownership				0.137	0.128	0.137
				(0.0952)	(0.0936)	(0.0953)
Observations	24,683	24,683	24,683	24,487	24,487	24,487
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Patent Stock Market Value

Patent stock market value $\ln(1 + TSM_{it})$	(1) Jaf.	(2) Jaf.	(3) Jaf.	(4) Jaf.	(5) Mah.	(6) Mah.
CO		0.581***	-2.779***	-2.883***	0.692***	-3.868***
		(0.0680)	(0.964)	(1.002)	(0.0797)	(1.318)
$CO \times \ln(SPILLTECH)$			0.206***	0.219***		0.263***
			(0.0701)	(0.0729)		(0.0921)
$CO \times \ln(SPILLSIC)$			0.0418	0.0446		0.0463
			(0.0523)	(0.0532)		(0.0809)
$\ln(SPILLTECH)$	0.0785	0.0625	-0.0122	0.0327	-0.0530	-0.136
	(0.0907)	(0.0902)	(0.0929)	(0.0936)	(0.117)	(0.120)
$\ln(SPILLSIC)$	0.0508*	0.0541**	0.0443	0.0413	0.0775*	0.0652
	(0.0268)	(0.0268)	(0.0272)	(0.0274)	(0.0421)	(0.0419)
Institutional Ownership				0.367**	0.350**	0.357**
				(0.147)	(0.143)	(0.146)
Observations	24,694	24,694	24,694	24,495	24,495	24,495
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Heterogeneity of the relationship CO and Citation-weighted Patents



Passive mechanism for negative product market effect

These results neither assume nor imply active interventions by common owners.

- Suppose innovation requires managerial effort.
  - Absent incentives (and shareholder pressure) to innovate, firms will innovate less.
  - Common owners of product market competitors optimally provide less such pressure *in equilibrium*, because cost reductions would hurt product market competitors in the same portfolio. (Antón et al. JPE 2023)

- Hence, there can be negative effects of common ownership of product market competitors on innovation, without active intervention by common owners.

Passive mechanism for positive tech spillovers

- Protecting innovation from spilling over to peers may take effort as well.
  - E.g., the inventor of the automobile assembly line – Eli Olds – patented the technology in 1901, allowing Henry Ford to only use & expand on it in 1913.
  - Non-common owner Olds took the effort to patent the technology, having strong incentives to do so.
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  - A less incentivized owner/manager may not have patented the technology, allowing for a decade faster spillover to rival Ford.
- Hence, particularly low effort – and less pressure from common owners – to protect inventions allows more free spillover over process innovation to other firms.

Conclusions

- Common ownership encourages innovation in *some* firms
  - Specifically, in high-spillover industries
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- However, the effect is not different from zero on average. (preliminary!)
  - The two opposing effects cancel each other out on average.
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- Common ownership encourages innovation in *some* firms
  - Specifically, in high-spillover industries
  - Consistent with (and necessary for!) pro-competitive effects
- However, the effect is not different from zero on average. (preliminary!)
  - The two opposing effects cancel each other out on average.
  - More doubtful whether theoretically thinkable welfare-increasing effects of horizontal common ownership (as per Lopez & Vives 2019) exist
- Potential message to policy makers
  - To be sure, focus on more likely socially wasteful forms of common ownership?
  - E.g. tech likely high tech spillovers – focus enforcement on airlines, banking, ...?

Future work

- Address endogeneity of parameters modeled as exogenous?
  - Of common ownership κ (omitted industry trends)

    Exogenous shock to ownership (mutual fund scandal 2003, index inclusion of competitors, or BLK-BGI merger?).
  - Of the level of spillovers a, β (type of innovation; strategic positioning of the firm)
- Ownership data: blockholders?

Active mechanism are thinkable, too

- See Shekita (2020) for 30 examples.
- E.g. common owners could just tell portfolio firms to (i) not enforce patents / let technology spill over, and (ii) put qualms about competition aside.

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Drugmakers urged to collaborate on coronavirus vaccine

Investors say competition needs to be put aside for the greater good

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BlackRock has held talks with pharma companies about ways of developing medicines, including working with competitors © REUTERS

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