

Discussion of **Innovation:** **The Bright Side of Common Ownership?**

(Antón, Ederer, Giné, Schmalz)

Johan Sulaeman
SGFIN @ NUS



PAPER SUMMARY

Interesting work –

- Part of an important debate regarding the rising “cross-ownership”

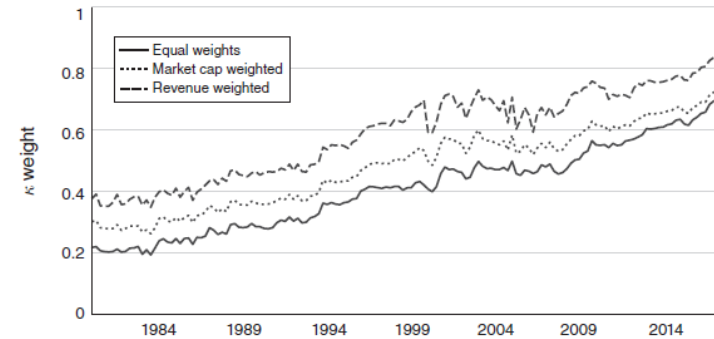


FIGURE 1. COMMON OWNERSHIP PROFIT WEIGHTS OVER TIME

Notes: This figure depicts the mean implied profit weight across all pairs of firms in the S&P 500 index by year, denoted by κ , excluding own profit weights, which are normalized to 1. The profit weights are defined as $\kappa_{jg} = (\sum_s \gamma_{fs} \beta_{gs}) / (\sum_s \gamma_{fs} \beta_{fs})$, where β_{fs} denotes the fraction of firm f held by shareholder s , and γ_{fs} is the control weight firm f places on shareholder s . See Section I for an explicit formula for common ownership weights and the full derivation.

- Positive vs. negative externalities for the society: customers, innovation, environment?

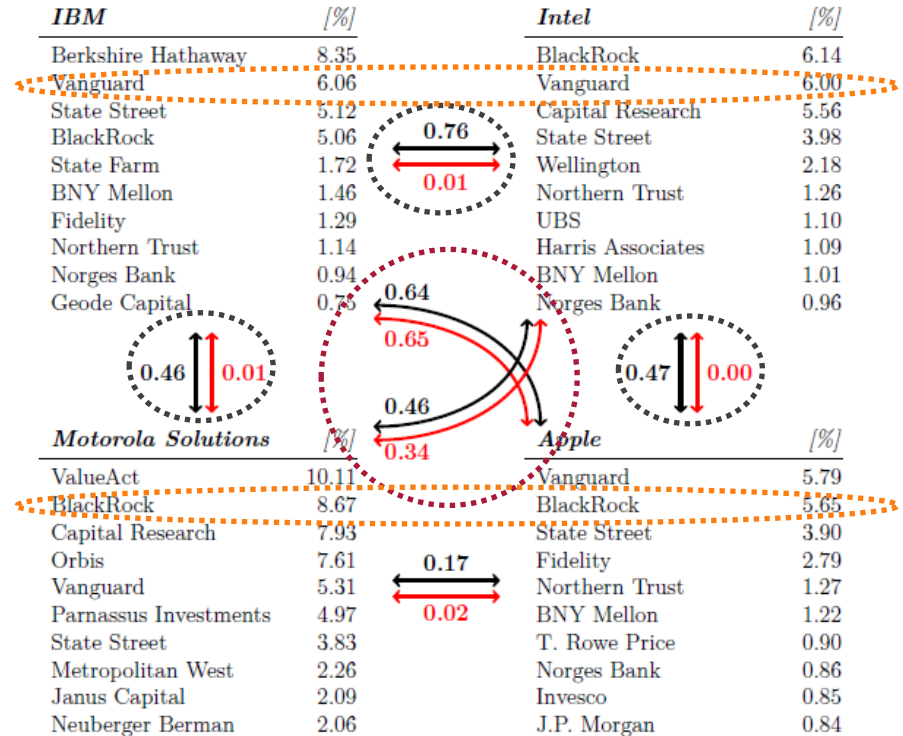
Technology vs. product market correlations

PAPER IN A SLIDE

Common ownership and innovation:

(+)~ when technological spillovers are higher

(-)~ when product market spillovers are greater



MOTIVATION



- In the presence of **technological spillovers**, **innovation in one firm** not only generates **benefits** in the firm that produced the innovation but also in **technologically related firms**
 - “Free riding” of innovation → less innovation
 - **Common ownership** of technologically related firms mitigates this problem to the extent that firms act in the interest of these common owners → **more innovation**



- **Innovations** naturally lead to the innovator **stealing market share** and profits from firms competing in the same or **related product markets**
 - .. when **the same shareholders** own both the innovator and its product market competitors, such **business stealing is less desirable** → **less innovation**



- Common ownership** increases innovation when:
- The **technological spillover** effect is **strong**
 - The **business stealing** effect is **weak**

EMPIRICAL RESULTS

Common ownership increases innovation when:

- The **technological spillover** effect is **strong**
- The **business stealing** effect is **weak**
- When **technology spillovers** are relatively large, the same increase in common ownership is associated with an **increase** of +12.5% in citation-weighted patents
- When **product market spillovers** are relatively large, an increase from the 25th to the 75th percentile of common ownership is associated with a **decrease** of -8.4% in citation-weighted patents.

DISCUSSANT SUMMARY



- **Not an expert** –
 - Main research focus: institutional investors, geographic factors, sustainability
 - But not innovation or product market competition
- Supervising a PhD student
 - George Ye; currently visiting at UIUC
 - (More precisely, learning from the student)
 - JMP: Positive vs. negative externalities of common ownership for the society: environment

COMMON OWNERSHIP MEASURE

$$CO_{it} = \text{Kappa}_{it}$$

- measures to what extent the largest and most powerful shareholders of firm i are also beneficial owners of other firms that are connected to firm i (page 21)

$CO_i =$ Average pair-wise Kappa of firm i

- Pairwise Kappa: (notation from Backus et al 2021)

$$\kappa_{fg}(\gamma_f, \beta) = \left(\frac{\sum_{\forall s} \gamma_{fs} \beta_{gs}}{\sum_{\forall s} \gamma_{fs} \beta_{fs}} \right)$$

- Assuming CF rights of shareholder $s =$ its control rights:

$$\gamma_{fs} = \beta_{fs}$$

$$\kappa_{fg}(\gamma_f, \beta) = \left(\frac{\sum_{\forall s} \beta_{fs} \beta_{gs}}{\sum_{\forall s} \beta_{fs} \beta_{fs}} \right)$$

COMMON OWNERSHIP MEASURE

$$\kappa_{fg}(\gamma_f, \beta) = \frac{\left(\sum_{\forall s} \beta_{fs} \beta_{gs} \right)}{\left(\sum_{\forall s} \beta_{fs} \beta_{fs} \right)}$$

$$\kappa_{fg}(\beta) = \underbrace{\cos(\beta_f, \beta_g)}_{\text{overlapping ownership}} \cdot \sqrt{\frac{\text{IHHI}_g}{\text{IHHI}_f}}_{\text{relative IHHI}}$$

IHHI_f = Herfindahl-Hirschman Index (HHI) for the investors in firm f

TABLE 3—DECOMPOSITION OF VARIANCE OF $\log \kappa$

	Overlapping ownership	Relative IHHI
Raw	68.67%	31.33%
Cross section	54.89%	45.11%
Time series	67.96%	32.04%
Panel	61.69%	38.31%

- Consider testing the robustness of the results by **removing the denominator**
 - Essentially the C-index used by Lewellen and Lowry (2021)

COMMON OWNERSHIP MEASURE

$$\kappa_{fg}(\gamma_f, \beta) = \frac{\left(\sum_{\forall s} \beta_{fs} \beta_{gs} \right)}{\left(\sum_{\forall s} \beta_{fs} \beta_{fs} \right)}$$

“A limitation implied by this data source is that we do not observe the holdings of **individual owners** unless they are employed as officers of the company or serve on its board, in which case we complement these data with Execucomp.”

- Missing large family/individual ownership
 - Not problematic for numerator
 - Underestimation of the denominator (i.e., ownership concentration of firm f)
- Consider adding ownership of individual blockholders from 13-D/G filings
 - Martin has done this for S&P500 firms in another paper (Amel-Zadeh, Kasperk, Schmalz, 2022)
- Alternatively, consider a cross ownership **dummy** variable (He and Huang 2017)
 - Also facilitate the interpretation of the economic magnitude of the effect

RESEARCH DESIGN



In the presence of **technological spillovers**, **innovation in one firm** not only generates **benefits** in the firm that produced the innovation but also in **technologically related firms**

- “Free riding” of innovation → less innovation
- **Common ownership** of technologically related firms mitigates this problem to the extent that firms act in the interest of these common owners → **more innovation**



Current test:

- **Common ownership** increases innovation when:
 - The **technological spillover** effect is **strong**
 - **Each variable calculated at the firm level**

$$CO \times \ln(SPILLTECH)$$

TECHNOLOGY SPILLOVER MEASURE

Can we measure the technological spillover among firms in the same ownership network instead?

- $$TECH_{ij} = \frac{T_i T_j'}{(T_i T_i')^{1/2} (T_j T_j')^{1/2}}$$

Denote the vector of the share of patents of firm i in any given technology class by T_i .

- $TECH_{ij}$ is high if firms i and j have **high share of patents in similar tech classes**

- $$SPILLTECH_{it} = \sum_{j \neq i} TECH_{ij} G_{jt}$$

where G_{jt} is the stock of R&D and $TECH_{ij}$ is the uncentered correlation between all firm i, j pairings and closely corresponds to the β_{ij} parameter in our model.

- $SPILLTECH$ of firm i is high if it has **high $TECH$ with firms that have a lot of R&D stock**

RESEARCH DESIGN -- TECH SPILLOVER



$$SPILLTECH_{it} = \sum_{j \neq i} TECH_{ij} G_{jt} \kappa_{ij}$$

In the presence of technological spillovers, **innovation in one firm** not only generates benefits in the firm that produced the innovation but also in technologically related firms

- “Free riding” of innovation → less innovation
- **Common ownership** of technologically related firms mitigates this problem to the extent that firms act in the interest of these common owners → more innovation

Proposed test:

- Common ownership increases innovation when:
 - The **technological spillover effect among firms in the same ownership network** is strong

RESEARCH DESIGN

-- RELATING TO THE MODEL

$$\mathbf{a} = \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ a_{21} & 1 & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & 1 \end{bmatrix}, \quad \mathbf{B} = \begin{bmatrix} 1 & \beta_{12} & \cdots & \beta_{1n} \\ \beta_{21} & 1 & \cdots & \beta_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \beta_{n1} & \beta_{n2} & \cdots & 1 \end{bmatrix}, \quad \mathbf{K} = \begin{bmatrix} 1 & \kappa_{12} & \cdots & \kappa_{1n} \\ \kappa_{21} & 1 & \cdots & \kappa_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \kappa_{n1} & \kappa_{n2} & \cdots & 1 \end{bmatrix}$$

Defining $\mathbf{K}_a = \mathbf{a} + \mathbf{K} \circ \mathbf{a}'$ and $\mathbf{K}_\beta = \mathbf{K} \circ \mathbf{B}'$ and plugging the second system of first-order conditions into the first yields the vector of equilibrium innovation \mathbf{x}^* given by

$$\mathbf{x}^* = \begin{bmatrix} x_1^* \\ x_2^* \\ \vdots \\ x_n^* \end{bmatrix} = (A - \bar{c}) [\gamma \mathbf{K}_a \mathbf{K}_\beta^{-1} - \mathbf{B}]^{-1} \cdot \mathbf{1}. \quad (17)$$

where \circ is the Hadamard (element-by-element) product

e.g., $\beta_{12} \kappa_{12}$

$$SPILLTECH_{it} = \sum_{j \neq i} TECH_{ij} G_{jt} \kappa_{ij}$$

RESEARCH DESIGN -- TECH SPILLOVER



$$SPILLTECH_{it} = \sum_{j \neq i} TECH_{ij} G_{jt} \kappa_{ij}$$

$$SPILLTECH_{it} = \sum_{j \neq i} TECH_{ij} G_{jt}$$

In the presence of **technological spillovers**, **innovation in one firm** not only generates **benefits** in the firm that produced the innovation but also in **technologically related firms**

- “Free riding” of innovation → less innovation
- **Common ownership** of technologically related firms mitigates this problem to the extent that firms act in the interest of these common owners → **more innovation**

Proposed test:

- **Common ownership** increases innovation when:
 - The **technological spillover effect among firms in the same ownership network** is strong
 - Control for the currently used tech spillover variable (~ industry characteristic?)

RESEARCH DESIGN -- PRODUCT MARKET SPILLOVER



$$SPILLSIC_{it} = \sum_{j \neq i} SIC_{ij} G_{jt} K_{ij}$$

Innovations naturally lead to the innovator **stealing market share** and profits from firms competing in the same or **related product markets**

- .. when **the same shareholders** own both the innovator and its product market competitors, such **business stealing is less desirable** → **less innovation**

Proposed test:

- **Common ownership** increases innovation when:
 - The **business stealing** effect **among firms in the same ownership network** is **weak**
 - Control for the currently used business stealing variable (~ industry characteristics?)

$$SPILLTECH_{it} = \sum_{j \neq i} TECH_{ij} G_{jt}$$

MORE COMMENTS ON SPILLOVER MEASURES

$$SPILLSIC_{it} = \sum_{j \neq i} SIC_{ij} G_{jt}$$

- **Technology spillover** is measured by weighting the R&D (G_{jt})
 - Consider weighting using innovation output, e.g., patenting and citations?
- More concerned about the measure of **product market similarity**
 - SIC_{ij} captures similarity of market share between firms
 - G_{jt} is R&D expenditure
 - Neither seems to relate directly to **product differentiation**
- Consider using the weighted average of product similarity scores from Hoberg-Phillips TNIC data.

RESEARCH DESIGN -- CONTROL VARIABLES

Analyses focus on interaction terms:

$$CO \times \ln(SPILLTECH)$$

- Need to have control variables as **interaction terms** as well?
 - E.g., $CO \times \ln(SALES)$
- Need **more** control variables in general?

3.4 Other Variables

Throughout our analysis we also use an additional set of control variables. First, $\ln(SALES_{it})$ is the natural logarithm of sales of the company where we adjust for inflation as in [Brav et al. \(2018\)](#). Second, $\ln(K_{it}/L_{it})$ is the capital-labor ratio, computed as the natural logarithm of the ratio of plant property equipment K_{it} and the number of employees L_{it} as in [Aghion et al. \(2013\)](#), [Hall et al. \(2001\)](#), and [Gompers and Metrick \(2001\)](#). Finally, we control for a firm's share of all of its institutional ownership as in [Aghion et al. \(2013\)](#) as this could also influence corporate innovation independent of the overlapping shareholdings of institutional investors.

4 Empirical Analysis

FIRM PAIR ANALYSIS

(From George Ye)



- The current analysis is conducted at the firm level (i) after aggregating profit weight across all firm pairs (i,j)
- More informative tests can be done at the **firm pair (i,j)** level
 - Whether firms are citing patents of other firms with which they share common shareholders
 - Number of **cross citations (i,j)** on the interaction between pairwise common ownership (i,j) and technology similarity (i,j)
 - Firm-pair regression of partnership formation (e.g., joint venture)

SUMMARY

- **Interesting work –**
 - Part of important topic
 - Would like to see more direct channels between cross-ownership (between firm i and firm j), tech/product spillover between firm i and firm j , and any evidence of joint decisions between firm i and firm j
- E.g., how is firm i innovating in the specific tech/industries in which it has a lot of tech/product spillover with firms with which it has high cross-ownership vs. its innovation activities in other tech/sectors.

SUMMARY

- **Interesting work –**
 - Part of important topic
 - Would like to see more direct channels between cross-ownership (between firm i and firm j), tech/product spillover between firm i and firm j , and any evidence of joint decisions between firm i and firm j

Common ownership and innovation efficiency

How does common ownership affect innovation? We study this question using project-level data on pharmaceutical startups and their venture capital (VC) investors. We find that common ownership leads VCs to hold back projects, withhold funding, and redirect innovation at lagging startups. Effects are stronger where R&D costs are larger, consistent with common owners aiming to cut duplicate costs. Effects are also stronger where technological similarity is greater and preexisting competition is lower, consistent with common owners seeking market power for their surviving projects. Overall, common VC ownership appears to generate social benefits, via improved innovation efficiency, but also social costs.

“Common ownership and innovation efficiency”
(Xuelin Li, Tong Liu, Lucian A. Taylor)
Journal of Financial Economics 147 (2023) 475–497

SUMMARY



- **Interesting work –**
 - Part of important topic
 - Would like to see more direct channels between cross-ownership (between firm i and firm j), tech/product spillover between firm i and firm j , and any evidence of joint decisions between firm i and firm j
- George's JMP: How is firm i polluting in the region in which there are more firms with which it has high cross-ownership, vs. its own pollutions in other regions?

THANK YOU