Results of Empirical Analyses

Baseline Regression
- Vertical common ownership is positively associated with suppliers' investment in innovation, quantity and quality of innovation output.

Identification
- Mergers and acquisitions (M&As) of institutional investors as plausibly exogenous positive shocks:
  - Institution 1: acquires Institution 2 → Institution 1 = hold
  - Institution 2: acquired by Institution 1 → Institution 2 = hold
- Exclusion Restriction: M&As of institutional investors are not mainly driven by the purpose to affect corporate innovation.
- I collect 31 events from year 1980 to 2010.

Channel Tests
- Hold-up Mitigation Channel
  - The impact of vertical common ownership on suppliers' investment in innovation is less pronounced when the intensity of hold-up issues for suppliers is weak in the first place, in particular when:
    - suppliers are more vertically integrated, i.e., have more operating segments in the downstream industries (inside customers);
    - suppliers have relatively stronger bargaining power than customers.
  - The input to customers has less asset specificity.
- Technological Spillover Channel
  - The impact of vertical common ownership on suppliers' innovation output is stronger when technological spaces of suppliers and customers are closer.

Other Tests
- The impact of vertical common ownership on innovation input and quality of innovation output is stronger and more robust than that of horizontal common ownership.
- Firm-level analyses suggest that vertical common ownership can increase suppliers' relation-specific innovation.

Conclusion
- Institutional common ownership enhances suppliers' innovation performance by improving the relationship between suppliers and their customers.
- Regulators may need to think about the potential anti-trust scrutiny on common ownership.

Measure of Vertical Common Ownership: VCO

Step 1: Firm-pair level VCO

\[ \beta_i\cdot (\text{Innovation}_1 + \text{Innovation}_2) + \sum_{j\neq i} \beta_j\cdot \text{Innovation}_j + \beta_v\cdot \text{Shareholders'} value \]

Step 2: Supplier level VCO

\[ \sum_{i=1}^{n} \sum_{j=1}^{m} \beta_i\cdot \text{Innovation}_i + \beta_v\cdot \text{Shareholders'} value \]

Measure of Innovation Activities

- Investment in innovation/innovation input: R&D intensity (R&D/sales)
- Quantity of innovation output: The number of patents at firm-year level
- Quality of innovation output: The average market value of patents at firm-year level

Data Source
- Compustat Segments Customer: suppliers and their principal customers
- Thomson Reuters 13F: institutional holdings;
- Kogan et al. (2017): patent application, patent market value, and patent citations;
- Capital IQ: mergers and acquisition of financial institutions;
- Bureau of Economic Analysis (BEA) IO Table: upstream and downstream industries.

Overview
- Suppliers' innovation performances are improved when financial institutions are holding both the suppliers and their customers.
- In particular, institutional common ownership increases suppliers' investment in innovation by mitigating hold-up issues between suppliers and customers, and enhances their innovation output by improving technological spillovers between suppliers and customers.
- I provide plausible evidence for causality using a difference-in-differences approach based on a quasi-natural experiment in the form of financial institution mergers and acquisitions.

Motivation
- Separate Ownership vs. Common Ownership
- A basic assumption in financial economics is that the ultimate goal of firm management is to maximize shareholders' value:
  - Separate Ownership: Shareholders i.e., lowering cost, developing new products, and acquiring higher market share.
  - Common Ownership: Maximize Shareholders' value

Horizontal Common Ownership vs. Vertical Common Ownership
- Horizontal Common Ownership: competitors are held in the same portfolio
  - Institutional Shareholders (e.g., BlackRock, Vanguard, Fidelity).
  - Horizontal common ownership in airline industry will lead to higher prices of the airline tickets.
  - More evidence for anti-competitive effect due to horizontal common ownership (e.g., He and Huang 2017, Azar et al. 2018).
  - Regulatory Implication: Potential anti-trust scrutiny on the institutional investors (e.g., Elbaasgi 2015, Bhattachar and Hiru 2019).
- Vertical Common Ownership: suppliers and their customers are held in the same portfolio
  - Vertical common ownership can improve the relationship between suppliers and their customers in the portfolio (Freeman 2019).
  - My paper is the first to examine the impact of vertical common ownership on innovation activities.

Hypotheses Development
- Hypothesis: Vertical common ownership could improve the suppliers' innovation through two potential channels:
  - 1) Hold-up Mitigation Channel
    - Hold-up problems happen when suppliers invest to produce relation-specific products to a customer:
      - It could weaken the bargaining power of the supplier.
      - The customer may act opportunistically to the supplier (e.g., push down the price, threaten to cancel the order).
      - Potential hold-up issues lead to underinvestment in relation-specific investment/innovation by the supplier (Klein et al. 1978).
    - Joint asset ownership attenuates hold-up problems under conditions of asset specificity and ex-ante incomplete contracting. (Grossman and Hart 1986, Hart and Moore 1990).
    - Hypothesis: Vertical common ownership reduces potential hold-up issues by mitigating conflicts of the firms in the same portfolio.
    - (1) Reduce the competitions between the firms.
    - (2) Enhance the collaborations between the firms.
    - Display: Vertical common ownership can improve the relationship between suppliers and their customers in the portfolio (Freeman 2019).
  - 2) Technological Spillover Channel
    - Innovation information exchange can improve corporate innovation performance:
      - Manso (2011)'s principal-agent model
      - Timely feedback from customers to suppliers is one of the potential channels that improve suppliers' innovation performance (Chu et al. 2019).
    - Common ownership of suppliers and customers can improve innovation information exchange between suppliers and customers.
    - Common ownership increases crosstab citations between the patents assigned to held firms (Kostovetsky and Manconi 2020, Freeman 2019).

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