Connected Stocks via Business Groups:

Evidence from an Emerging Market

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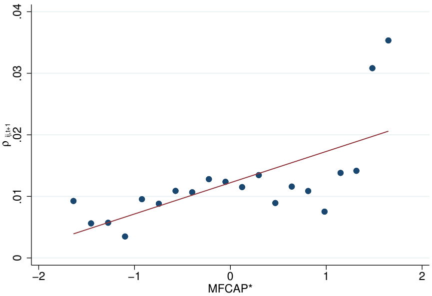
Table of Contents

Motivation

- **Does common ownership raise stock return co-movement?**
- **Would business groups be able to raise the co-movement of stock returns?**
- **What is the mechanism?**



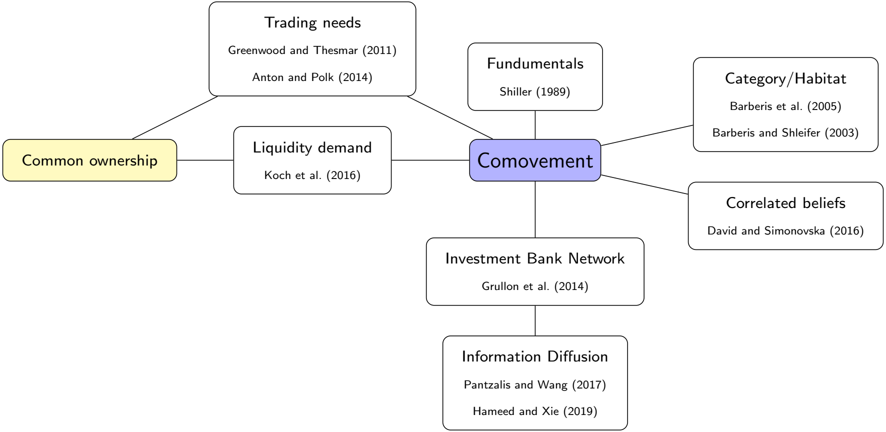
This figure shows the stock return comovement and common ownership.

Why does it matter?

- Covariance
  - Covariance is a key component of risk in many financial applications.
    - Portfolio selection
    - Hedging
    - Asset pricing
  - Covariance is a significant input in risk measurement models
    - Such as Value-at-Risk
- Return predictability
  - If it's valid, we can build a profitable buy-sell strategy

Table of Contents

Related Literature



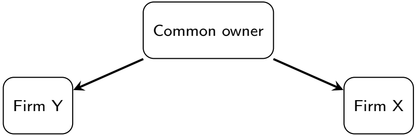
Our work

- We use daily records of block-holder ownership for firms (not restricted to mutual funds ownership)
- We connect stocks through the common ownership by blockholders (ownership $> 1\%$) for direct common ownership
- We connect stocks through the ultimate owner for indirect common ownership
- Common ownership or business group (indirect common ownership) ?

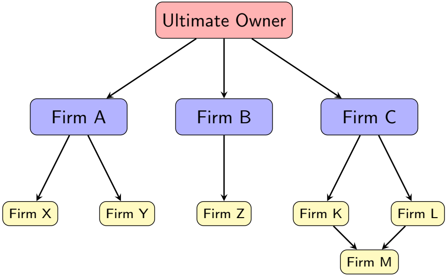
Table of Contents

Pair composition

- Firms with at least one common owner:

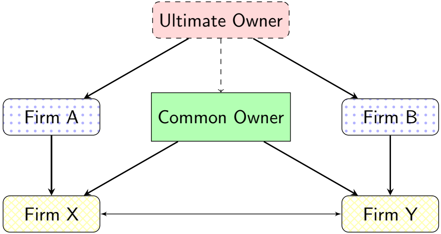


- Pair in the Business Group:



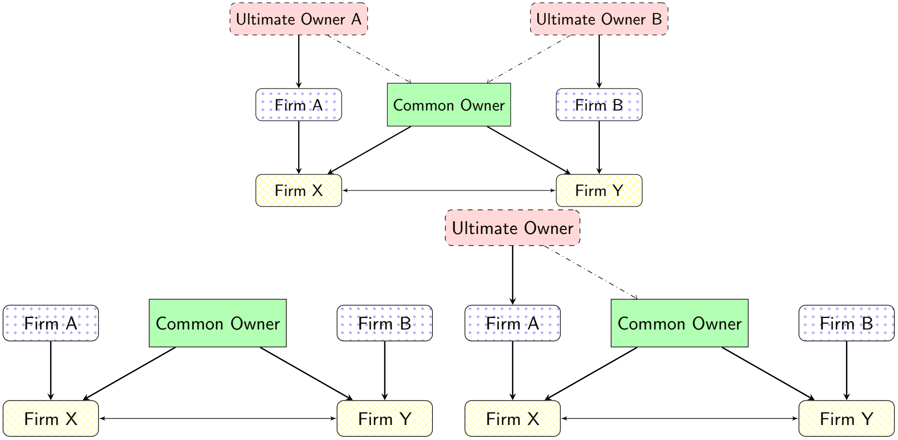
Pair Composition and Business Group

Pair in the Same Business Group



Pair Composition and Business Group

Pair in the Separate Business Group



Data Summary

- Data: 2014/03/25 (1393/01/06) - 2020/03/18 (1398/12/28)
  - 72 Months
  - 618 firm including 562 firms with common owners

Year	2015	2016	2017	2018	2019	2020	Average
No. of Firms	337	356	392	479	499	560	437
No. of Blockholders	1563	1656	1893	2510	2701	2991	2219
No. of Groups	37	40	42	43	39	42	40
No. of Firms in Groups	233	254	278	311	323	357	292
Ave. Number of group Members	6	6	7	7	8	8	7
Ave. ownership of each Blockholders (%)	17	18	18	17	18	19	17
Med. ownership of each Blockholders (%)	5	4	4	4	4	5	4
Ave. Number of Owners	7	7	7	7	7	6	6
Med. Number of Owners	5	5	5	6	5	5	5
Ave. Block. Ownership (%)	77	77	76	76	75	72	75

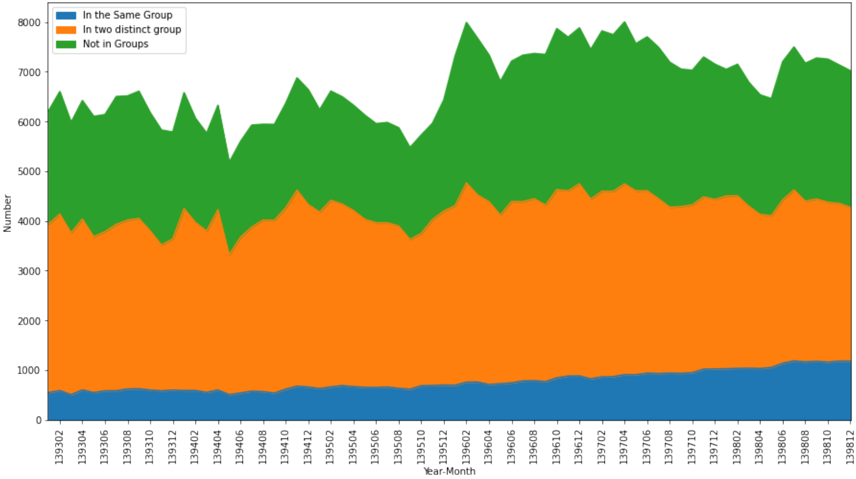
Pair Composition

- Pairs consist of two firms with at least one common owner
  - 17522 unique pairs which is 11% of possible pairs ($\frac{554*553}{2} = 153181$)

	mean	min	Median	max
Number of unique paris	6738	5176	6625	8002

Year	2015	2016	2017	2018	2019	2020	Average
No. of Pairs	9051	8980	9288	11147	11199	12171	10306
No. of Pairs not in Groups	3293	2979	3058	4427	4168	4571	3749
No. of Pairs not in the same Group	4727	4993	5129	5400	5464	5770	5247
No. of Pairs in the same Group	850	857	949	1126	1316	1556	1109
Ave. Number of Common owner	1.18	1.18	1.17	1.17	1.17	1.15	1.17

Number of Pairs



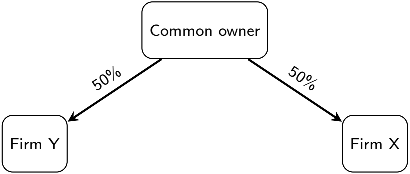
Measuring Common-ownership

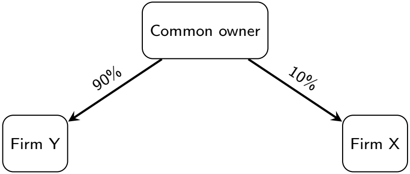
Anton and Polk (2014)

$$\boxed{FCAP_{ij,t} = \frac{\sum_{f=1}^{F}(S_{i,t}^{f}P_{i,t} + S_{j,t}^{f}P_{j,t})}{S_{i,t}Pi,t + S_{j,t}Pj,t}}$$

SQRT

$$\boxed{MFCAP_{ij,t} = [\frac{\sum_{f=1}^{F}(\sqrt{S_{i,t}^{f}P_{i,t}} + \sqrt{S_{j,t}^{f}P_{j,t}})}{\sqrt{S_{i,t}Pi,t} + \sqrt{S_{j,t}Pj,t}}]^2}$$





$$\text{FCAP} = \frac{50\%+50\%}{100\%+100\%} = 0.5$$

$$\text{MFCAP} = \frac{\sqrt{50\%}+\sqrt{50\%}}{\sqrt{100\%}+\sqrt{100\%}} = 0.71$$

$$\text{FCAP} = \frac{90\%+10\%}{100\%+100\%} = 0.5$$

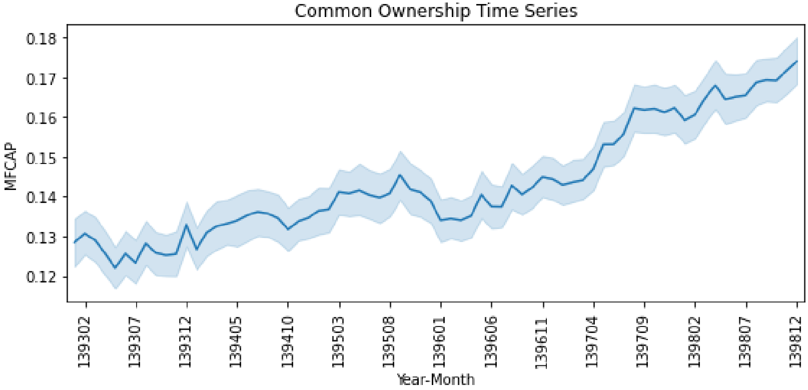
$$\text{MFCAP} = \frac{\sqrt{90\%}+\sqrt{10\%}}{\sqrt{100\%}+\sqrt{100\%}} = 0.63$$

More example

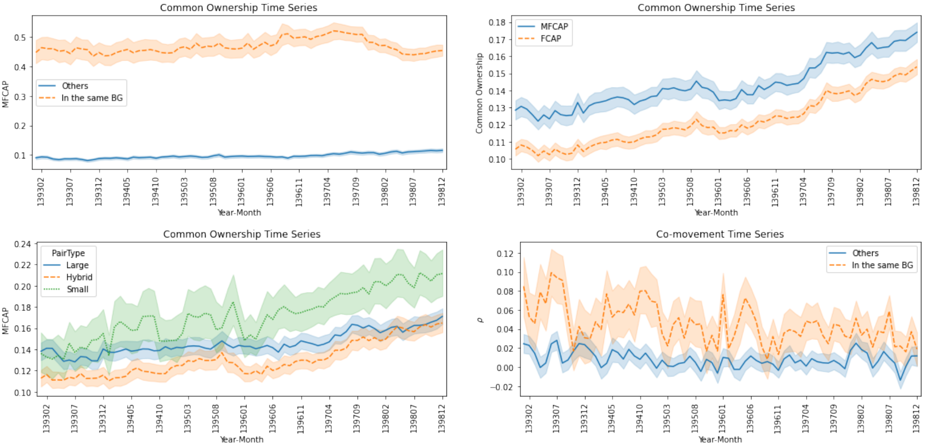
Measuring Common-ownership

	MFCAP					FCAP				
	mean	std	min	median	max	mean	std	min	median	max
All	0.15	0.24	0.00	0.06	4.62	0.12	0.16	0.0	0.05	0.97
Same Group	0.47	0.41	0.00	0.41	4.04	0.38	0.25	0.0	0.37	0.97
Different Group	0.10	0.16	0.00	0.04	2.90	0.08	0.11	0.0	0.04	0.97
Same Industry	0.34	0.41	0.01	0.18	4.04	0.25	0.24	0.0	0.16	0.96
Different Industry	0.12	0.19	0.00	0.05	4.62	0.10	0.14	0.0	0.05	0.97

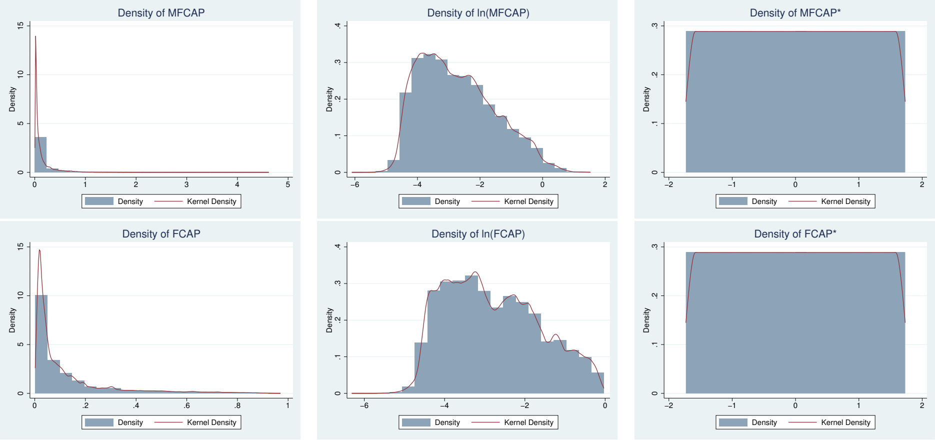
FCA's time series



FCA’s time series



MFCAP vs. FCAP Distributions



Correlation Calculation

4 Factor + Industry

1. Frist Step:
   - 4 Factor + Industry :

$$R_{i,t} = \alpha_i + \beta_{mkt,i} R_{M,t} + \beta_{Ind,i} R_{Ind,t} + \beta_{HML,i} HML_t + \beta_{SMB,i} SMB_t + \beta_{UMD,i} UMD_t + \boxed{\varepsilon_{i,t}}$$

2. Second Step:
   Calculate monthly correlation of each stock pair's daily abnormal returns (residuals)

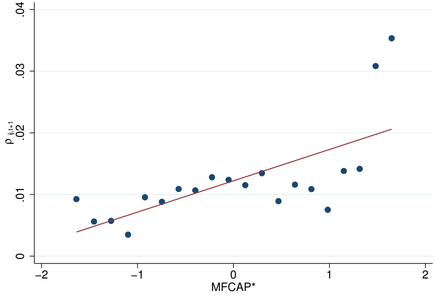
	mean	std	min	median	max
CAPM + Industry	0.019	0.127	-0.925	0.015	0.902
4 Factor	0.032	0.136	-0.877	0.023	0.837
4 Factor + Industry	0.015	0.125	-0.903	0.012	0.755

Controls

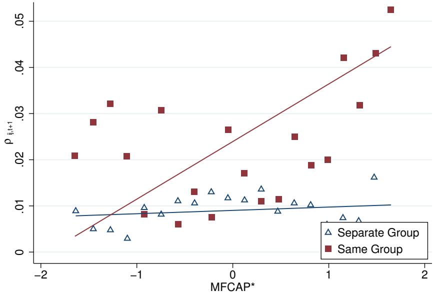
- **SameIndustry** : Dummy variable for whether the two stocks belong to the same Industry.
- **SameSize** : The negative of absolute difference in percentile ranking of size across a pair
- **SameBookToMarket** :The negative of absolute difference in percentile ranking of the book to market ratio across a pair
- **CrossOwnership**: The maximum percent of cross-ownership between two firms

Table of Contents

Co-movement and Common-ownership



This figure shows the stock return comovement and common ownership.



This figure shows the stock return comovement and common ownership.

Estimation model

- Estimation Model:

$$\begin{aligned}\rho_{ij,t+1} = \beta_0 + \beta_1 * \text{MFCAP}^*_{ij,t} + \beta_2 * \text{SameGroup}_{ij} \\ + \beta_3 * \text{MFCAP}^*_{ij,t} \times \text{SameGroup}_{ij} \\ + \sum_{k=1}^{n} \alpha_k * \text{Control}_{ij,t} + \varepsilon_{ij,t+1}\end{aligned} \tag{1}$$

- We use Fama-MacBeth method (As Anton and Polk (2014))
- Adjust standard errors by Newey and West adjustment with 4 lags $(4(70/100)^{\frac{2}{9}} = 3.69 \sim 4)$ (As Anton and Polk (2014))

Methodology

Model Estimation

	Dependent Variable: Future Pairs's Comovement					
	(1)	(2)	(3)	(4)	(5)	(6)
MFCAP*	0.00600***	0.00328***			0.00104	0.000929
	(8.10)	(4.87)			(1.68)	(1.53)
SameGroup			0.0358***	0.0254***	0.0242***	0.0219***
			(9.99)	(8.45)	(8.21)	(7.02)
SameIndustry		0.0267***		0.0216***	0.0212***	0.0215***
		(7.39)		(6.81)	(6.72)	(6.80)
SameBM		0.0224***		0.0213***	0.0214***	0.0199***
		(6.41)		(6.09)	(6.16)	(5.77)
SameSize		0.0123**		0.0143***	0.0138***	0.0254***
		(3.24)		(3.85)	(3.71)	(5.56)
CrossOwnership		0.0600***		0.0300*	0.0316*	0.0377**
		(5.50)		(2.36)	(2.48)	(2.93)
Constant	0.0142***	0.0204***	0.0103***	0.0187***	0.0188***	0.0280***
	(12.80)	(8.91)	(9.42)	(7.99)	(8.04)	(9.43)
Size Control	No	No	No	No	No	Yes
Observations	389591	389591	389591	389591	389591	389591

Model Estimation

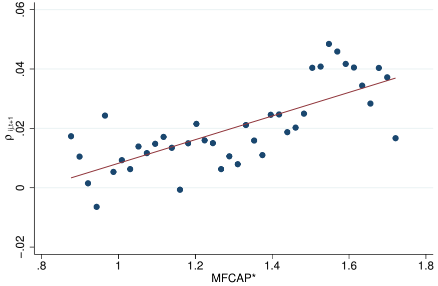
	Dependent Variable: Future Pairs's Comovement			
	(1)	(2)	(3)	(4)
MFCAP*	0.00915***	-0.000114	-0.000161	0.000309
	(6.64)	(-0.18)	(-0.26)	(0.63)
SameGroup			0.0100**	0.00749
			(2.97)	(1.99)
MFCAP* $\times$ SameGroup			0.0123***	0.0118***
			(10.04)	(9.69)
Sub-sample	SameGroup	Others	All	All
Business Group FE	No	No	No	Yes
Observations	47076	342515	389591	389591

t statistics in parentheses

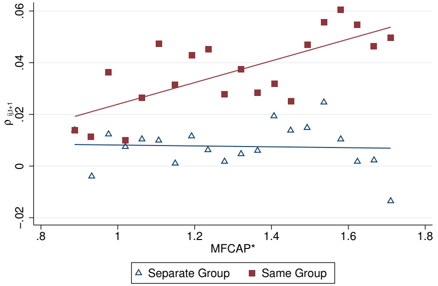
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Co-movement and Common-ownership

High level of common ownership



This figure shows the stock return comovement and common ownership for the pairs in the fourth quarter.



This figure shows the stock return comovement and common ownership for the pairs in the fourth quarter.

Model Estimation

High level of common ownership

	Dependent Variable: Future Pairs's Comovement						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SameGroup	0.0254***		0.0249***			0.00477	0.00252
	(8.45)		(8.21)			(1.32)	(0.66)
(MFCAP $>$ 75th Percentile)		0.00660***	0.000777	0.0230***	-0.00258*	-0.00157	-0.000513
		(5.48)	(0.73)	(7.09)	(-2.00)	(-1.29)	(-0.46)
(MFCAP $>$ 75th Percentile) $\times$ SameGroup						0.0248***	0.0237***
						(7.24)	(7.34)
Sub-sample	All	All	All	SameGroup	Others	All	All
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Business Group FE	No	No	No	No	No	No	Yes
Observations	389591	389591	389591	47076	342515	389591	389591

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model Estimation

All pairs

	Dependent Variable: Future Pairs' co-movement						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SameGroup	0.0184***		0.0185***			0.0154***	0.0138***
	(8.46)		(9.00)			(6.00)	(5.26)
MFCAP*		0.000404	-0.0000630	0.00191	-0.000289	-0.000832**	-0.000314
		(1.56)	(-0.26)	(1.97)	(-1.19)	(-3.36)	(-1.27)
MFCAP* × SameGroup						0.00281**	0.00261**
						(3.43)	(3.12)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sub-Sample	Total	Total	Total	SameGroups	Others	Total	Total
Business Group FE	No	No	No	No	No	No	Yes
Observations	4566594	4566594	4566594	94035	4472559	4566594	4566594

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table of Contents

Turnover

Koch et al. (2016)

$$\Delta \text{Turnover} = \ln\left(\frac{\text{Turnover}_{i,t}}{\text{Turnover}_{i,t-1}}\right) = \ln\left(\frac{\text{volume}_{i,t}}{\text{MarketCap}_{i,t}}\right) - \ln\left(\frac{\text{volume}_{i,t-1}}{\text{MarketCap}_{i,t-1}}\right)$$

	Dependent Variable: $\Delta\text{Turnover}_i$			
	(1)	(2)	(3)	(4)
$\Delta\text{Turnover}_{\text{Market}}$	0.416***	0.326***	0.252***	0.228***
	(12.25)	(5.35)	(6.41)	(4.24)
$\Delta\text{Turnover}_{\text{Industry-i}}$	0.142***	0.213***	0.0335	0.167**
	(3.79)	(6.29)	(1.34)	(2.87)
$\Delta\text{Turnover}_{\text{Group-i}}$			0.330***	0.218***
			(12.74)	(3.80)
Control	No	Yes	No	Yes
Observations	854662	851772	333789	331263
R^2	0.285	0.543	0.433	0.712

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

BG and correlation in Turnover

	Dependent Variable: Monthly Correlation of Delta turnover						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SameGroup	0.0177***		0.0176***			0.0144***	0.0167***
	(5.56)		(5.24)			(4.39)	(5.26)
MFCAP*		0.00168	0.0000714	0.00110	-0.000141	-0.000201	-0.00108
		(1.99)	(0.09)	(0.57)	(-0.15)	(-0.21)	(-0.92)
MFCAP* $\times$ SameGroup						0.00347	0.00395
						(1.42)	(1.63)
Sub-sample	All	All	All	SameGroup	Others	All	All
Business Group FE	No	No	No	No	No	No	Yes
Observations	327447	327447	327447	40605	286842	327447	327447

Correlation in Turnover and Co-movement

	Dependent Variable: Future Pairs's Comovement				
	(1)	(2)	(3)	(4)	(5)
$\rho(\Delta\text{Turnover})_{t+1}$	0.0516***	0.0486***	0.0849***	0.0423***	0.0492***
	(10.50)	(10.29)	(14.01)	(9.00)	(10.41)
ρ_t	0.0412***	0.0387***	0.113***	0.0262***	0.0375***
	(11.74)	(11.35)	(16.37)	(7.47)	(11.95)
Control	No	Yes	Yes	Yes	Yes
Sub-sample	Total	Total	SameGroup	Others	Total
Business Group FE	No	No	No	No	Yes
Observations	338895	338895	41955	296940	338895

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Abnormal Monthly Turnover

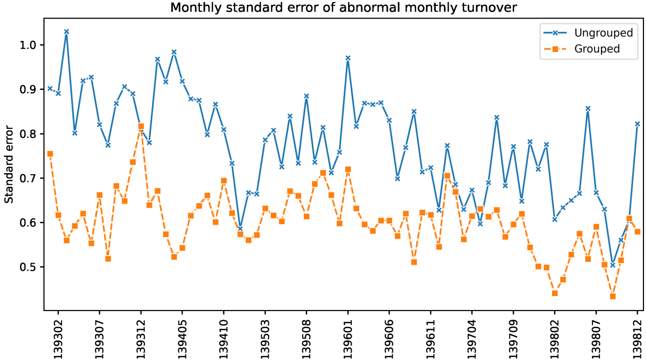
- $\text{Turnover}_{i,t} = \alpha_0 + \alpha_1 \times \text{Turnover}_{i,avg} + \alpha_2 \times \text{Turnover}_{m,t} + \alpha_3 \times \text{Turnover}_{ind,t} + \boxed{\varepsilon_{i,t}}$
  - $\text{Turnover}_{i,t}$: Monthly Turnover (Average of daily turnovers in each month)
  - $\text{Turnover}_{i,avg}$: Annual average of monthly turnover
  - $\text{Turnover}_{m,t}$: Market turnover
  - $\text{Turnover}_{ind,t}$: Industry turnover
- Assign Abnormal Turnover to the business groups

	Firm × Month	mean	std	min	25%	50%	75%	max
Ungrouped	8206	-0.004	0.783	-4.702	-0.471	-0.013	0.466	5.061
Grouped	18022	0.002	0.712	-5.997	-0.416	-0.009	0.424	3.392

Abnormal Monthly Turnover

Standard error

	Group × Month	mean	std	min	25%	50%	75%	max
Ungrouped	72	0.776	0.113	0.504	0.685	0.781	0.867	1.030
Grouped	2441	0.601	0.313	0.001	0.403	0.567	0.763	3.274



Low abnormal monthly turnover standard error

	Dependent Variable: Future Pairs's Comovement					
	(1)	(2)	(3)	(4)	(5)	(6)
SameGroup	0.0229***	0.0241***			0.0141***	0.0114**
	(7.20)	(8.00)			(3.60)	(2.93)
LowTurnoverStd		0.00233**	0.0296***	-0.000636	-0.000473	0.00284
		(2.65)	(5.72)	(-0.60)	(-0.45)	(1.88)
LowTurnoverStd $\times$ SameGroup					0.0279***	0.0260***
					(4.78)	(4.77)
Sub-sample	Total	Total	SameGroup	Others	Total	Total
Business Group FE	No	No	No	No	No	Yes
Observations	389591	389591	47076	342515	389591	389591

Institutional Imbalance

- Seasholes and Wu (2007)

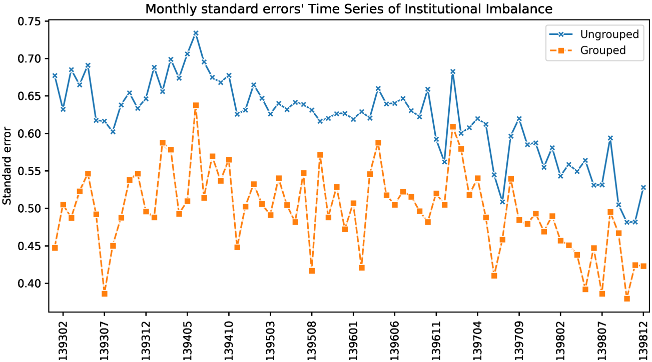
$$Imbalance_{ins} = \frac{Buy_{ins} - Sell_{ins}}{Buy_{ins} + Sell_{ins}}$$

	Group × Month	mean	std	min	25%	50%	75%	max
Ungrouped	20896	0.004	0.626	-1.0	-0.478	0.013	0.462	1.0
Grouped	12177	-0.043	0.574	-1.0	-0.453	-0.011	0.330	1.0

Institutional Imbalance std

Standard error

	Group × Month	mean	std	min	25%	50%	75%	max
Ungrouped	72	0.619	0.054	0.481	0.594	0.627	0.655	0.734
Grouped	2062	0.497	0.247	0.000	0.334	0.495	0.636	1.414



Low Institutional Imbalance Group

	Dependent Variable: Future Pairs's Comovement					
	(1)	(2)	(3)	(4)	(5)	(6)
SameGroup	0.0229***	0.0228***			0.00974**	0.00969*
	(7.20)	(7.14)			(2.70)	(2.53)
LowImbalanceStd		-0.00163	0.0263***	-0.00683***	-0.00577***	-0.00114
		(-1.51)	(4.72)	(-6.17)	(-5.26)	(-0.64)
LowImbalanceStd × SameGroup					0.0330***	0.0290***
					(5.91)	(5.15)
Sub-sample	Total	Total	SameGroup	Others	Total	Total
Business Group FE	No	No	No	No	No	Yes
Observations	389591	389591	47076	342515	389591	389591

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table of Contents

Conclusion

- Business group affiliation is positively associated with higher stock return comovement.
- Among firm pairs that belong to the same business. groups, those with higher direct common ownership experience higher levels of return comovement.
- Simultaneous trades in the same direction among firms affiliated with the same business groups explains higher return comovements among those stocks.

References I

Anton, M. and Polk, C. (2014). Connected stocks. *The Journal of Finance*, 69(3):1099–1127.

Azar, J., Schmalz, M. C., and Tecu, I. (2018). Anticompetitive effects of common ownership. *The Journal of Finance*, 73(4):1513–1565.

Barberis, N. and Shleifer, A. (2003). Style investing. *Journal of financial Economics*, 68(2):161–199.

Barberis, N., Shleifer, A., and Wurgler, J. (2005). Comovement. *Journal of financial economics*, 75(2):283–317.

Boubaker, S., Mansali, H., and Rjiba, H. (2014). Large controlling shareholders and stock price synchronicity. *Journal of Banking & Finance*, 40:80–96.

David, J. M. and Simonovska, I. (2016). Correlated beliefs, returns, and stock market volatility. *Journal of International Economics*, 99:S58–S77.

Freeman, K. (2019). The effects of common ownership on customer-supplier relationships. *Kelley School of Business Research Paper*, (16-84).

Gilje, E. P., Gormley, T. A., and Levit, D. (2020). Who's paying attention? measuring common ownership and its impact on managerial incentives. *Journal of Financial Economics*, 137(1):152–178.

Greenwood, R. and Thesmar, D. (2011). Stock price fragility. *Journal of Financial Economics*, 102(3):471–490.

Grullon, G., Underwood, S., and Weston, J. P. (2014). Comovement and investment banking networks. *Journal of Financial Economics*, 113(1):73–89.

Hameed, A. and Xie, J. (2019). Preference for dividends and return comovement. *Journal of Financial Economics*, 132(1):103–125.

Hansen, R. G. and Lott Jr, J. R. (1996). Externalities and corporate objectives in a world with diversified shareholder/consumers. *Journal of Financial and Quantitative Analysis*, pages 43–68.

Harford, J., Jenter, D., and Li, K. (2011). Institutional cross-holdings and their effect on acquisition decisions. *Journal of Financial Economics*, 99(1):27–39.

He, J. and Huang, J. (2017). Product market competition in a world of cross-ownership: Evidence from institutional blockholdings. *The Review of Financial Studies*, 30(8):2674–2718.

References II

He, J., Huang, J., and Zhao, S. (2019). Internalizing governance externalities: The role of institutional cross-ownership. *Journal of Financial Economics*, 134(2):400–418.

Khanna, T. and Thomas, C. (2009). Synchronicity and firm interlocks in an emerging market. *Journal of Financial Economics*, 92(2):182–204.

Koch, A., Ruenzi, S., and Starks, L. (2016). Commonality in Liquidity: A Demand-Side Explanation. *The Review of Financial Studies*, 29(8):1943–1974.

Newham, M., Seldeslachts, J., and Banal-Estanol, A. (2018). Common ownership and market entry: Evidence from pharmaceutical industry.

Pantzalis, C. and Wang, B. (2017). Shareholder coordination, information diffusion and stock returns. *Financial Review*, 52(4):563–595.

Seasholes, M. S. and Wu, G. (2007). Predictable behavior, profits, and attention. *Journal of Empirical Finance*, 14(5):590–610.

Shiller, R. J. (1989). Comovements in stock prices and comovements in dividends. *The Journal of Finance*, 44(3):719–729.

Table of Contents

- If two stocks in pair have n mutual owner, which total market cap divides them equally, the mentioned indexes equal n.
  - Each holder owns $1/n$ of each firm.
  - Firm's market cap is α_1 and α_2:
  - So for each holder of firms we have $S^f_{i,t}P_{i,t} = \alpha_i$
  - SQRT

$$[\frac{\sum_{f=1}^{n} \sqrt{\alpha_1/n} + \sum_{f=1}^{n} \sqrt{\alpha_2/n}}{\sqrt{\alpha_1} + \sqrt{\alpha_2}}]^2 = [\frac{\sqrt{n}(\sqrt{\alpha_1} + \sqrt{\alpha_2})}{\sqrt{\alpha_1} + \sqrt{\alpha_2}}]^2 = n$$

  - Quadratic

$$[\frac{\sum_{f=1}^{n} (\alpha_1/n)^2 + \sum_{f=1}^{n} (\alpha_2/n)^2}{\alpha_1^2 + {\alpha_2}^2}]^{-1} = [\frac{\alpha_1^2 + \alpha_2^2}{n(\alpha_1^2 + \alpha_2^2)}]^{-1} = n$$

Back

Measuring Common-ownership

Anton and Polk (2014)

$$\boxed{FCAP_{ij,t} = \frac{\sum_{f=1}^{F}(S_{i,t}^{f}P_{i,t} + S_{j,t}^{f}P_{j,t})}{S_{i,t}Pi,t + S_{j,t}Pj,t}}$$

SQRT

$$\boxed{[\frac{\sum_{f=1}^{F}(\sqrt{S_{i,t}^{f}P_{i,t}} + \sqrt{S_{j,t}^{f}P_{j,t}})}{\sqrt{S_{i,t}Pi,t} + \sqrt{S_{j,t}Pj,t}}]^2}$$

Quadratic

$$\boxed{[\frac{\sum_{f=1}^{F}[(S_{i,t}^{f}P_{i,t})^2 + (S_{j,t}^{f}P_{j,t})^2]}{(S_{i,t}Pi,t)^2 + (S_{j,t}Pj,t)^2}]^{-1}}$$

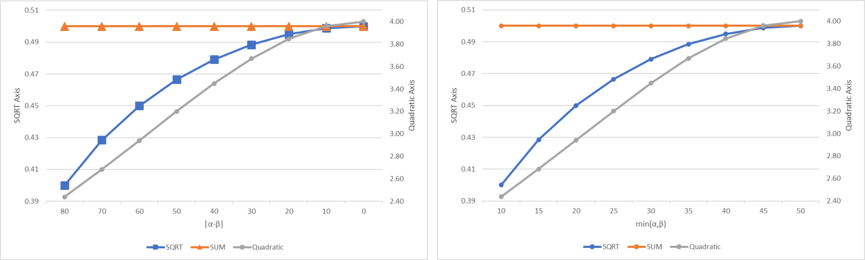
Intuition

If for a pair of stocks with n mutual owners, all owners have even shares of each firm's market cap, then the proposed indexes will be equal to n. Proof

$$\text{Firm Y} \xleftarrow{\beta} \text{Common owner} \xrightarrow{\alpha} \text{Firm X}$$

For better observation, assume that

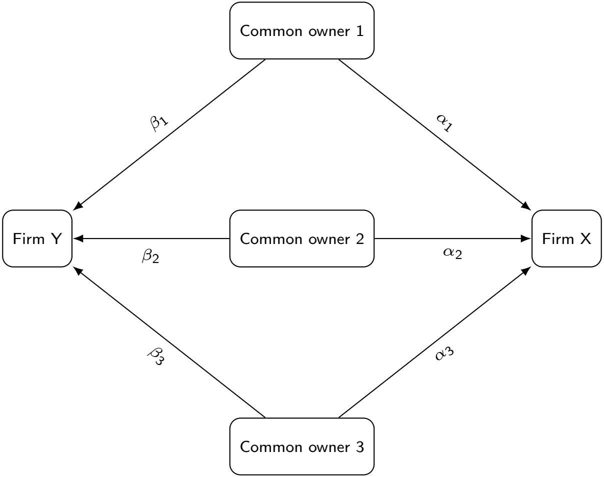
- $\alpha + \beta = 100$
- both firm have equal market cap



Comparison of three methods for calculating common ownership

Measuring Common Ownership

Example of three common owner



Measuring Common Ownership

Example of three common owner

Ownership	Type I	Type II	Type III	Type IV	Type V	Type VI	Type VII
α_1	1/3	20	10	20	10	5	1
β_1	1/3	10	10	20	10	5	1
α_2	1/3	10	80	20	10	5	1
β_2	1/3	20	80	20	10	5	1
α_3	1/3	70	10	20	10	5	1
β_3	1/3	70	10	20	10	5	1
SQRT	3	2.56	2.33	1.8	0.9	0.45	0.09
SUM	1	1	1	0.6	0.3	0.15	0.03
Quadratic	3	1.85	1.52	8.33	33.33	133.33	3333.33

Back

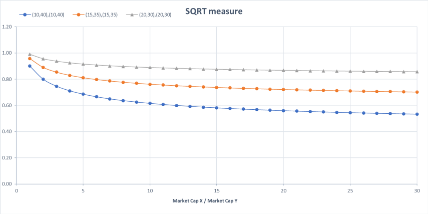
Measuring Common Ownership

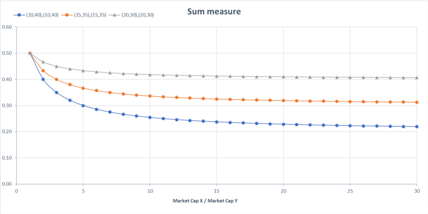
Comparison

- For better comparison we relax previous assumptions:
  - Two Firms with different market caps.

	$(\alpha_1,\beta_1),(\alpha_2,\beta_2)$					
	(10,40),(10,40)		(15,35),(15,35)		(20,30),(20,30)	
$\frac{\text{MarketCap}_x}{\text{MarketCap}_y}$	SQRT	SUM	SQRT	SUM	SQRT	SUM
1	0.90	0.50	0.96	0.50	0.99	0.50
2	0.80	0.40	0.89	0.43	0.96	0.47
3	0.75	0.35	0.85	0.40	0.94	0.45
4	0.71	0.32	0.83	0.38	0.92	0.44
5	0.69	0.30	0.81	0.37	0.91	0.43
6	0.67	0.29	0.80	0.36	0.91	0.43
7	0.65	0.28	0.79	0.35	0.90	0.43
8	0.64	0.27	0.78	0.34	0.90	0.42
9	0.63	0.26	0.77	0.34	0.89	0.42
10	0.62	0.25	0.76	0.34	0.89	0.42

Measuring Common Ownership
Comparison





Comparison of two methods for calculating common ownership

Conclusion

We use the SQRT measure because it has an acceptable variation and has fair values at a lower level of aggregate common ownership.

Common Ownership measure

	Dependent Variable: Future Monthly Correlation of 4F+Industry Residuals							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Common Ownership Measure	0.00370***	0.00325***	0.00155*	0.00109	0.000333	-0.000105	0.000550	0.000283
	(5.58)	(4.97)	(2.61)	(1.84)	(0.54)	(-0.17)	(1.07)	(0.58)
SameGroup			0.0229***	0.0234***	0.0100**	0.0103**	0.00626	0.00668
			(7.89)	(7.93)	(3.26)	(3.17)	(1.79)	(1.79)
Common Ownership Measure × SameGroup					0.0134***	0.0135***	0.0127***	0.0126***
					(9.47)	(10.65)	(9.23)	(9.71)
Observations	398818	398818	398818	398818	398818	398818	398818	398818
Group FE	No	No	No	No	No	No	Yes	Yes
Measurement	Sum	Sum	Sum	Sum	Sum	SQRT	Sum	SQRT
R^2	0.00433	0.00427	0.00518	0.00515	0.00554	0.00551	0.0182	0.0182

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table of Contents

Main Effect

- Common-ownership and comovement effect
  [Anton and Polk (2014)]
  Stocks sharing many common investors tend to comove more strongly with each other in the future than otherwise similar stocks.
- Common-ownership and liquidity demand
  [Koch et al. (2016), Pastor and Stambaugh (2003), Acharya and Pedersen (2005)]
  Commonality in stock liquidity is likely driven by correlated trading among a given stock's investors. Commonality in liquidity is important because it can influence expected returns
- Trading needs and comovement
  [Greenwood and Thesmar (2011)]
  If the investors of mutual funds have correlated trading needs, the stocks that are held by mutual funds can comove even without any portfolio overlap of the funds themselves
- Stock price synchronicity and poor corporate governance
  [Boubaker et al. (2014), Khanna and Thomas (2009), Morck et al. (2000)]
  Stock price synchronicity has been attributed to poor corporate governance and a lack of firm-level transparency. On the other hand, better law protection encourages informed trading, which facilitates the incorporation of firm-specific information into stock prices, leading to lower synchronicity

Grapgh

- Three types of network
  1. Equity network
  2. Director network
  3. Owner network
- Dependent variables

  Using deterended weekly return for calculation

  1. Pairwise returns synchronicity $= \frac{\sum_t (n^{up}_{i,j,t} n^{down}_{i,j,t})}{T_{i,j}}$
  2. Correlation $= \frac{Cov(i,j)}{\sqrt{Var(i).Var(j)}}$
- Tobit estimation of

$$f^d_{i,j} = \alpha I_{i,j} + \beta(1 * N_{i,j}) + \gamma Ind_{i,j} + \varepsilon_{i,j}$$

being in the same director network has a significant effect

- Stock price synchronicity:

$$SYNCH = \log(\frac{R^2_{i,t}}{1 - R^2_{i,t}})$$

where $R^2_{i,t}$ is the R-squared value from

$$RET_{i,w} = \alpha + \beta_1 MKRET_{w-1} + \beta_2 MKRET_w + \beta_3 INDRET_{i,w-1} + \beta_4 INDRET_{i,w} + \varepsilon_{i,w}$$

- OLS estimation of

$$\begin{aligned} SYNCH_{i,t} = \beta_0 + \beta_1 Excess_{i,t} + \beta_2 UCF_{i,t} + \sum_k \beta_k Control^k_{i,t} \\ + IndustryDummies + YearDummies + \varepsilon_{i,t} \end{aligned}$$

- Stock price synchronicity increases with excess control
- Firms with substantial excess control are more likely to experience stock price crashes

- Common active mutual fund owners
- Measuring Common Ownership
  - $FCAP_{ij,t} = \frac{\sum_{f=1}^{F}(S^f_{i,t}P_{i,t}+S^f_{j,t}P_{j,t})}{S_{i,t}Pi,t+S_{j,t}Pj,t}$
  - Using normalized rank-transformed as $FCAP^*_{ij,t}$
- $\rho_{ij,t}$: within-month realized correlation of each stock pair's daily four-factor returns
-
$$\rho_{ij,t+1} = a + b_f \times FCAPF^*_{ij,t} + \sum_{k=1}^{n} CONTROL_{ij,t,k} + \varepsilon_{ij,t+1}$$

  Estimate these regressions monthly and report the time-series average as in Fama-MacBeth

Commonownership measurements

Model-based measures

- $\text{HJL}_I^A(A,B) = \sum_{i \in I^{A,B}} \frac{\alpha_{i,B}}{\alpha_{i,A}+\alpha_{i,B}}$ Harford et al. (2011)
    - Bi-directional
    - Pair-level measure of common ownership
    - Its potential impact on managerial incentives
    - Measure not necessarily increases when the relative ownership increases
    - Accounts only for an investor's relative holdings
- $\text{MHHI} = \sum_j \sum_k s_j s_k \frac{\sum_i \mu_{ij}\nu_{ik}}{\sum_i \mu_{ij}\nu_{ij}}$ Azar et al. (2018)
    - Capture a specific type of externality
    - Measured at the industry level
    - Assumes that investors are fully informed about the externalities
- $\text{GGL}^A(A,B) = \sum_{i=1}^{I} \alpha_{i,A} g(\beta_{i,A}) \alpha_{i,B}$ Gilje et al. (2020)
    - Bi-directional
    - Less information
    - Not sensitive to the scope
    - Measure increases when the relative ownership of firm A increases

Commonownership measurements

Ad hoc common ownership measures

- $Overlap_{Count}(A, B) = \sum_{i \in I^{A,B}} 1$
  He and Huang (2017),He et al. (2019)
- $Overlap_{Min}(A, B) = \sum_{i \in I^{A,B}} min\{\alpha_{i,A}, \alpha_{i,B}\}$
  Newham et al. (2018)
- $Overlap_{AP}(A, B) = \sum_{i \in I^{A,B}} \alpha_{i,A} \frac{\bar{\nu}_A}{\bar{\nu}_A + \bar{\nu}_B} + \alpha_{i,B} \frac{\bar{\nu}_B}{\bar{\nu}_A + \bar{\nu}_B}$
  Anton and Polk (2014)
- $Overlap_{HL}(A, B) = \sum_{i \in I^{A,B}} \alpha_{i,A} \times \sum_{i \in I^{A,B}} \alpha_{i,B}$
  Hansen and Lott Jr (1996) , Freeman (2019)
- Unappealing properties
  - Unclear is whether any of these measures represents an economically meaningful measure of common ownership's impact on managerial incentives.
  - Both Overlap$_{Count}$ and Overlap$_{AP}$ are invariant to the decomposition of ownership between the two firms, which leads to some unappealing properties.

Back

Table of Contents

Fama-MacBeth Estimation

- Fama-MacBeth regression analysis is implemented using a two-step procedure.
  - The first step is to run periodic cross-sectional regression for dependent variables using data of each period.
  - The second step is to analyze the time series of each regression coefficient to determine whether the average coefficient differs from zero.

Fama-MacBeth (1973)

- Two Step Regression
  - First Step

$$\begin{aligned} Y_{i1} &= \delta_{0,1} + \delta^1_{1,1}X^1_{i,1} + \cdots + \delta^k_{k,1}X^k_{i,1} + \varepsilon_{i,1} \\ &\vdots \\ Y_{iT} &= \delta_{0,1} + \delta^1_{1,T}X^1_{i,T} + \cdots + \delta^k_{k,T}X^k_{i,T} + \varepsilon_{i,T} \end{aligned}$$

  - Second Step

$$\begin{bmatrix} \bar{Y}_1 \\ \vdots \\ \bar{Y}_T \end{bmatrix}_{T\times 1} = \begin{bmatrix} 1 & \delta^0_1 & \delta^1_1 & \dots & \delta^k_1 \\ \vdots & \vdots & \vdots & \dots & \vdots \\ 1 & \delta^0_T & \delta^1_T & \dots & \delta^k_T \end{bmatrix}_{T\times(k+2)} \times \begin{bmatrix} \lambda \\ \lambda_0 \\ \lambda_1 \\ \vdots \\ \lambda_k \end{bmatrix}_{(k+2)\times 1}$$

- Fama-MacBeth technique was developed to account for correlation between observations on different firms in the same period

Calculating standard errors

- In most cases, the standard errors are adjusted following Newey and West (1987).
  - Newey and West (1987) adjustment to the results of the regression produces a new standard error for the estimated mean that is adjusted for autocorrelation and heteroscedasticity.
  - Only input is the number of lags to use when performing the adjustment

    $$Lag = 4(T/100)^{\frac{2}{9}}$$

    where T is the number of periods in the time series

Back