Connected Stocks via Business Groups:
Evidence from an Emerging Market

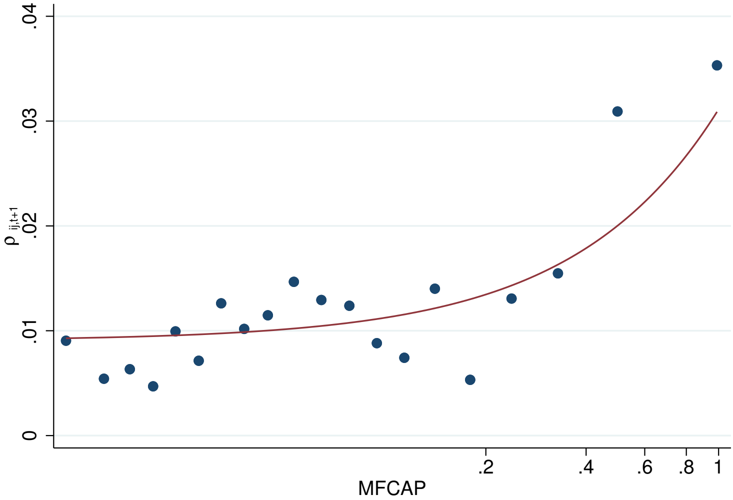
S.M. Aghajanzadeh M. Heidari M. Mohseni

Tehran Institute for Advanced Studies

January, 2022

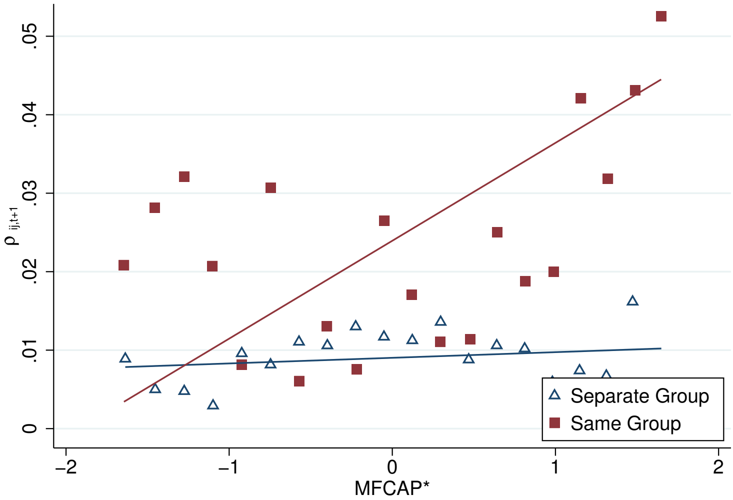
Table of Contents

Co-movement and common ownership



This figure shows the stock return comovement and common ownership.

Co-movement and common ownership



This figure shows the stock return comovement and common ownership.

Motivation

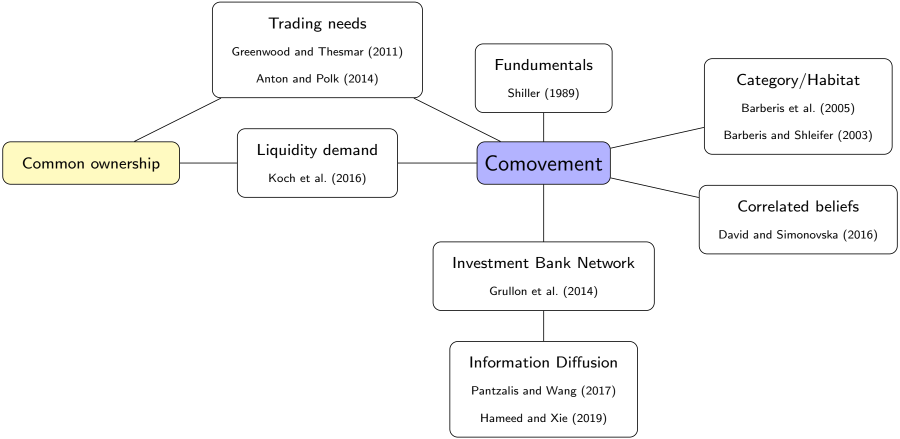
- **Does direct or indirect common ownership cause stock return co-movement?**
    - common ownership:
        - We connect stocks through the common ownership by blockholders (ownership $> 1\%$) for direct common ownership
        - We connect stocks through the ultimate owner for indirect common ownership
    - We focus on excess return co-movement for a pair of the stocks
    - We use common ownership (direct or indirect) to forecast cross-sectional variation in the realized correlation of four-factor + industry residuals
    - We demonstrate that correlated trading can be a channel of co-movement

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

Main effect


Trading needs
Greenwood and Thesmar (2011)
Anton and Polk (2014)
Fundumentals
Shiller (1989)
Category/Habitat
Barberis et al. (2005)
Barberis and Shleifer (2003)
Common ownership
Liquidity demand
Koch et al. (2016)
Comovement
Correlated beliefs
David and Simonovska (2016)
Investment Bank Network
Grullon et al. (2014)
Information Diffusion
Pantzalis and Wang (2017)
Hameed and Xie (2019)

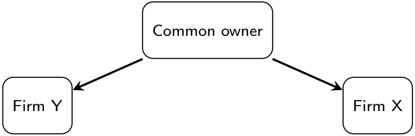
Our work

- We use daily records of block-holder ownership for firms
- We are not restricted to mutual funds ownership
- 85% of market belongs to the business groups
  - Would business groups be able to raise the co-movement of stock returns?
    - Cho and Mooney (2015):
      The strong co-movement between group returns and firm returns is explained by correlated fundamentals.
    - Kim et al. (2015):
      The increase in correlation appears to be driven more by non-fundamental factors such as correlated trading, rather than fundamental factors such as related-party transactions
  - Common ownership or business group (indirect common ownership) ?
  - Channel?

Table of Contents

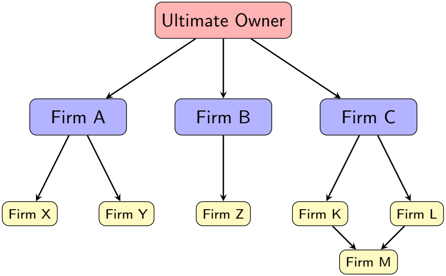
Pair composition

- Firms with at least one common owner



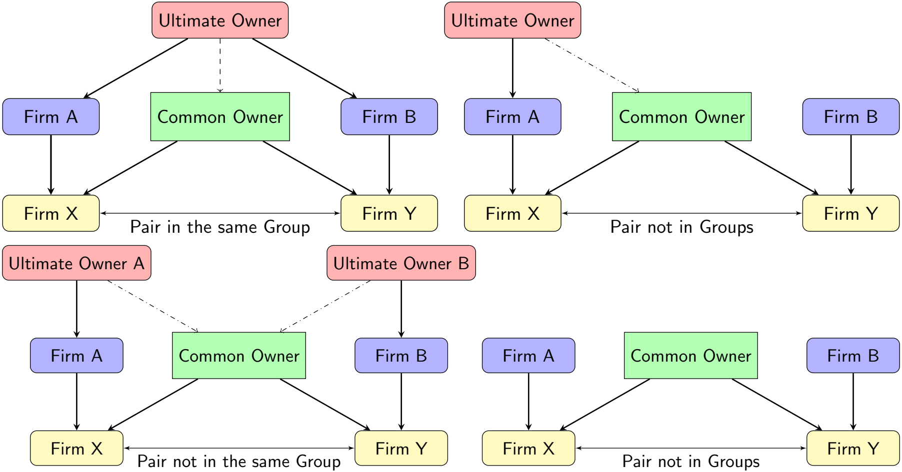
- In a business group, how can one pair be defined?

- Business group



Pair Composition and Business Group

Pair in the 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	2014	2015	2016	2017	2018	2019
No. of Firms	337	356	392	479	499	560
No. of Blockholders	1563	1656	1893	2510	2701	2991
No. of Groups	37	40	42	43	39	42
No. of Firms in Groups	233	254	278	311	323	357
Ave. Number of group Members	6	6	7	7	8	8
Ave. ownership of each Blockholders (%)	17	18	18	17	18	19
Med. ownership of each Blockholders (%)	5	4	4	4	4	5
Ave. Number of Owners	7	7	7	7	7	6
Med. Number of Owners	5	5	5	6	5	5
Ave. Block. Ownership (%)	77	77	76	76	75	72

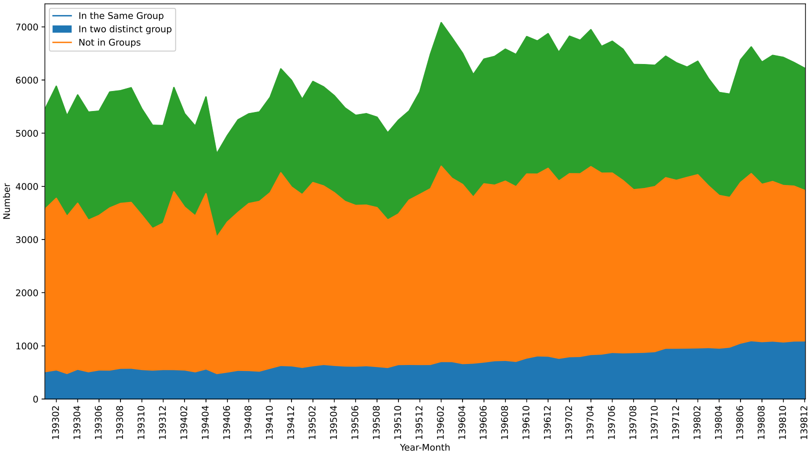
Pair Composition

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

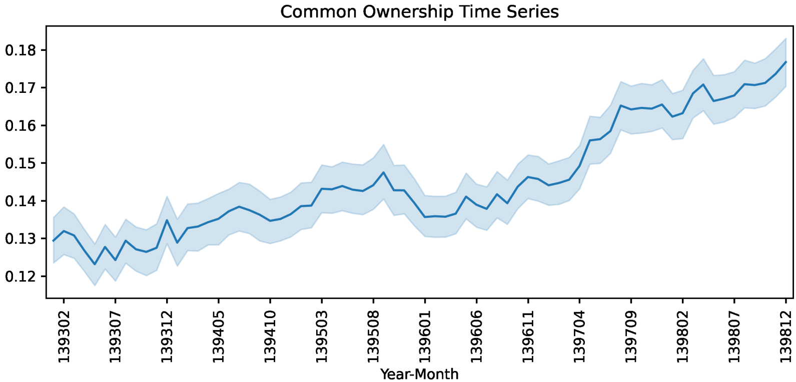
	mean	min	Median	max
Number of unique paris	5983	4610	5983	7079

Year	2014	2015	2016	2017	2018	2019
No. of Pairs	8092	8017	8316	9732	9843	10776
No. of Pairs not in Groups	2807	2515	2616	3593	3380	3822
No. of Pairs not in the same Group	4357	4594	4709	4981	5069	5322
No. of Pairs in the same Group	771	773	857	1015	1209	1408
Ave. Number of Common owner	1	1	1	1	1	1

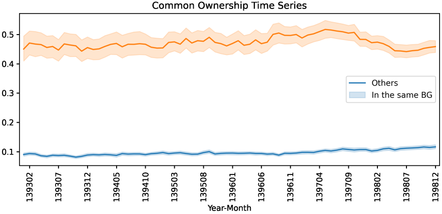
Number of Pairs

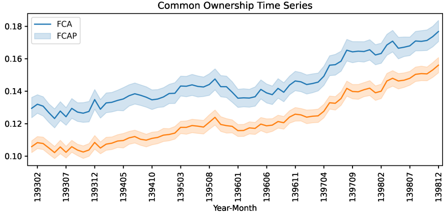


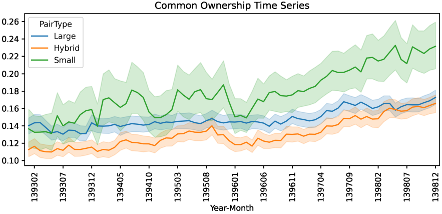
FCA's time series

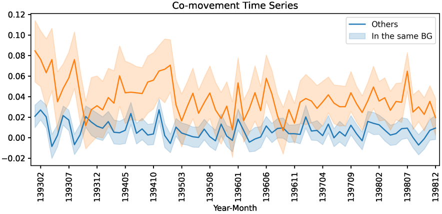


FCA's time series





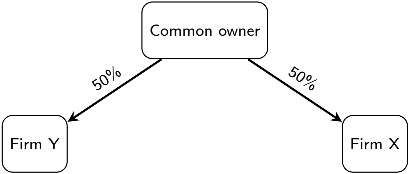




Measuring Common-ownership

Anton and Polk (2014)

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

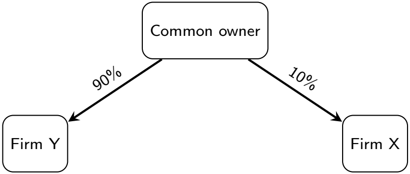


$$\text{FCAP} = \frac{50\%+50\%}{100\%+100\%} = 0.5$$

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

SQRT

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



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

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

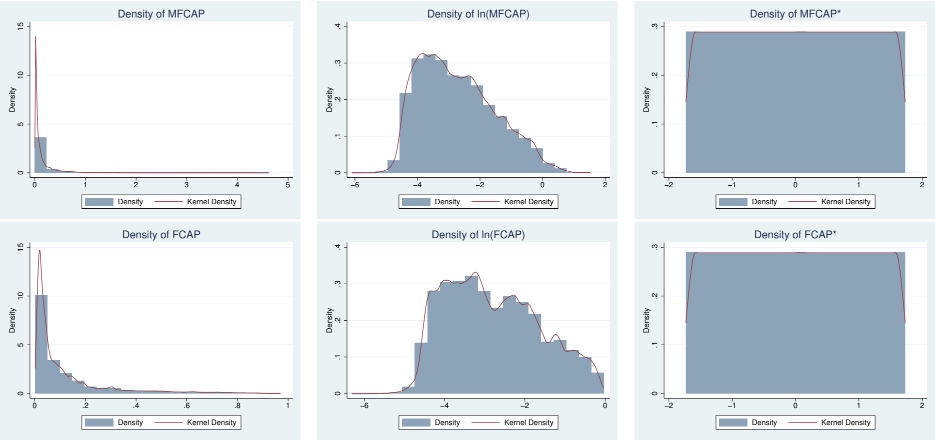
More example

Measuring Common-ownership

Subset	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
Not Same 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
Not Same Industry	0.12	0.19	0.00	0.05	4.62	0.10	0.14	0.0	0.05	0.97

MFCAP vs. FCAP Distributions

Monthly



1. Frist Step:
   Estimate this model on periods of three month (From two months earlier):
   - 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)

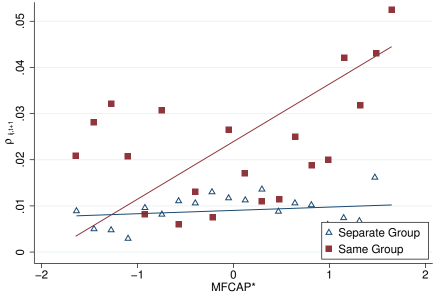
	mean	std	min	median	max
CAPM + Industry	0.016	0.127	-0.950	0.014	0.818
4 Factor	0.033	0.136	-0.875	0.024	0.869
4 Factor + Industry	0.013	0.124	-0.875	0.010	0.779
Benchmark	0.008	0.145	-0.933	0.006	0.860

Controls

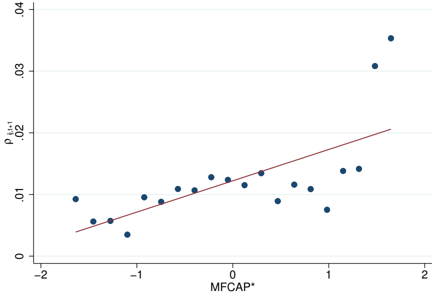
- **SameGroup** : Dummy variable for whether the two stocks belong to the same business group.
- **SameIndustry** : Dummy variable for whether the two stocks belong to the same Industry.
- **SameSize** : The negative of absolute difference in percentile ranking of size across a pair
- **SameBookToMarket** :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

- Use Fama-MacBeth to estimate this model

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

- Estimate the model on a monthly frequency
- Adjust standard errors by Newey and West adjustment with 4 lags $(4(70/100)^{\frac{2}{9}} = 3.69 \sim 4)$

Methodology

Model Estimation

Normalized Rank-Transformed

	Dependent Variable: Future Pairs's Comovement					
	(1)	(2)	(3)	(4)	(5)	(6)
MFCAP*	0.00590***	0.00325***			0.00109	0.000981
	(8.15)	(4.97)			(1.84)	(1.67)
SameGroup			0.0348***	0.0246***	0.0234***	0.0212***
			(9.83)	(8.20)	(7.93)	(6.76)
SameIndustry		0.0258***		0.0208***	0.0204***	0.0207***
		(7.27)		(6.68)	(6.57)	(6.67)
SameBM		0.0224***		0.0214***	0.0215***	0.0200***
		(6.57)		(6.28)	(6.34)	(5.96)
SameSize		0.0129***		0.0149***	0.0143***	0.0259***
		(3.53)		(4.14)	(4.00)	(5.90)
CrossOwnership		0.0569***		0.0278*	0.0294*	0.0354**
		(5.20)		(2.18)	(2.30)	(2.75)
Constant	0.0139***	0.0204***	0.0102***	0.0188***	0.0189***	0.0281***
	(12.32)	(9.13)	(9.09)	(8.22)	(8.29)	(9.50)
PairType Control	No	No	No	No	No	Yes
Observations	398818	398818	398818	398818	398818	398818

Model Estimation

Normalized Rank-Transformed

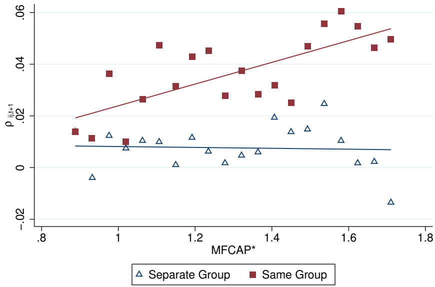
	Dependent Variable: Future Pairs's Comovement			
	(1)	(2)	(3)	(4)
MFCAP*	0.00920***	-0.0000508	-0.000111	0.000283
	(7.05)	(-0.08)	(-0.18)	(0.60)
SameGroup			0.00925**	0.00684
			(2.73)	(1.82)
$\text{MFCAP}^{*} \times \text{SameGroup}$			0.0123***	0.0119***
			(10.11)	(9.41)
Sub-sample	SameGroup	Others	All	All
Business Group FE	No	No	No	Yes
Observations	47941	350877	398818	398818

t statistics in parentheses

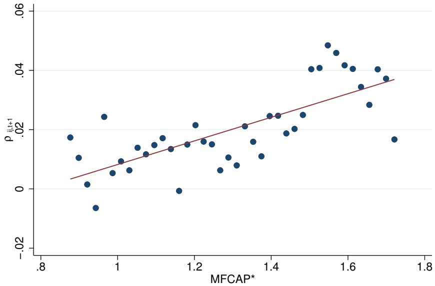
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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.

Fama-MacBeth Estimation

High level of common ownership (sub-sample)

	Dependent Variable: Future Pairs's Comovement						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SameGroup	0.0297***		0.0253***			-0.0440*	-0.0406*
	(7.88)		(7.19)			(-2.24)	(-2.00)
MFCAP*		0.0392***	0.0200***	0.0509***	0.0109	0.0113	0.00885
		(7.37)	(4.01)	(4.65)	(1.75)	(1.81)	(1.34)
MFCAP* × SameGroup						0.0444**	0.0408**
						(3.11)	(2.72)
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	103396	103396	103396	36297	67099	103396	103396

All pairs

	Dependent Variable: Future Pairs' co-movement						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SameGroup	0.0178***		0.0180***			0.0148***	0.0131***
	(9.01)		(9.69)			(6.42)	(5.58)
MFCAP*		0.000393	-0.0000580	0.00195*	-0.000282	-0.000828**	-0.000301
		(1.48)	(-0.23)	(2.01)	(-1.13)	(-3.21)	(-1.17)
MFCAP* × SameGroup						0.00284***	0.00264**
						(3.55)	(3.26)
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	4656286	4656286	4656286	95686	4560600	4656286	4656286

t statistics in parentheses

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

Table of Contents

TrunOver

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

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

Business group and correlation in Turnover

	Dependent Variable: Monthly Correlation of Delta turnover						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SameGroup	0.0174***		0.0173***			0.0145***	0.0167***
	(5.62)		(5.31)			(4.43)	(5.35)
MFCAP*		0.00161	0.00000580	0.000589	-0.000155	-0.000234	-0.00110
		(1.88)	(0.01)	(0.30)	(-0.16)	(-0.24)	(-0.94)
MFCAP* $\times$ SameGroup						0.00310	0.00362
						(1.30)	(1.53)
Sub-sample	All	All	All	SameGroup	Others	All	All
Business Group FE	No	No	No	No	No	No	Yes
Observations	331439	331439	331439	40979	290460	331439	331439

Correlation in Turnover and Co-movement

	Dependent Variable: Future Pairs's Comovement				
	(1)	(2)	(3)	(4)	(5)
$\rho(\Delta \text{TurnOver})_{t+1}$	0.0514***	0.0484***	0.0830***	0.0424***	0.0490***
	(10.45)	(10.26)	(13.20)	(9.08)	(10.41)
ρ_t	0.0405***	0.0381***	0.111***	0.0258***	0.0369***
	(11.36)	(10.99)	(17.12)	(7.17)	(11.41)
Control	No	Yes	Yes	Yes	Yes
Sub-sample	Total	Total	SameGroup	Others	Total
Business Group FE	No	No	No	No	Yes
Observations	343173	343173	42354	300819	343173

t statistics in parentheses

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

Residual of Monthly Turnover

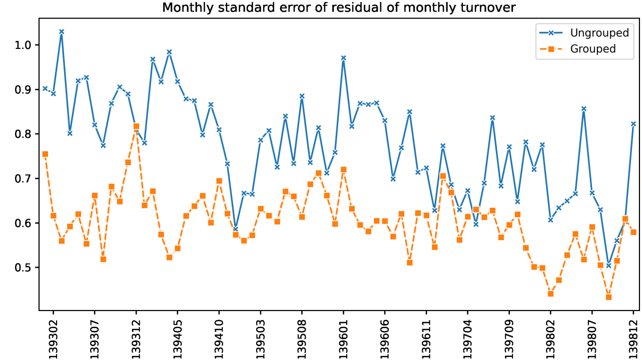
- $\text{Turnover}_{i,t} = \alpha_0 + \alpha_1 \times \text{Turnover}_{i,avg} + \alpha_2 \times \text{Turnover}_{m,t} + \alpha_3 \times \text{Turnover}_{ind,t} + \boxed{\varepsilon_{i,t}}$
  - $\text{Turnover}_{i,t}$: Monthly Turnover (Average of daily turnovers in each month)
  - $\text{Turnover}_{i,avg}$: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

Residual of 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 residual standard error

	Dependent Variable: Future Pairs's Comovement					
	(1)	(2)	(3)	(4)	(5)	(6)
SameGroup	0.0223***	0.0234***			0.0133**	0.0106**
	(6.98)	(7.75)			(3.39)	(2.73)
LowTurnoverStd		0.00239**	0.0305***	-0.000697	-0.000469	0.00215
		(2.92)	(5.96)	(-0.69)	(-0.48)	(1.52)
LowTurnoverStd × SameGroup					0.0287***	0.0269***
					(4.86)	(4.93)
Sub-sample	Total	Total	SameGroup	Others	Total	Total
Business Group FE	No	No	No	No	No	Yes
Observations	398818	398818	47941	350877	398818	398818

Institutional Imbalance

- Seasholes and Wu (2007)

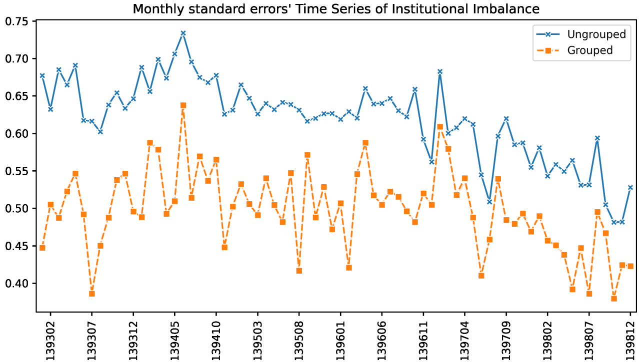
$$Imbalance_{ins} = \frac{Buy_{ins} - Sell_{ins}}{Buy_{ins} + Sell_{ins}}$$

	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

Ins 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 Ins Imbalance Group

	Dependent Variable: Future Pairs's Comovement					
	(1)	(2)	(3)	(4)	(5)	(6)
SameGroup	0.0223***	0.0221***			0.00908*	0.00908*
	(6.98)	(6.91)			(2.55)	(2.44)
LowImbalanceStd		-0.00184	0.0260***	-0.00704***	-0.00597***	-0.00169
		(-1.49)	(4.56)	(-5.85)	(-4.97)	(-0.87)
LowImbalanceStd × SameGroup					0.0330***	0.0289***
					(5.96)	(5.24)
Sub-sample	Total	Total	SameGroup	Others	Total	Total
Business Group FE	No	No	No	No	No	Yes
Observations	398818	398818	47941	350877	398818	398818

t statistics in parentheses

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

Table of Contents

Conclusion

- Direct common ownership affects firms' co-movement.
- Firms in the business groups co-move more than other pairs
- Direct common ownership only matters for firms in the business groups.
- In the Business groups, firms are traded in the same time and also in the same direction.

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.

Cho, C. H. and Mooney, T. (2015). Stock return comovement and korean business groups. *Review of Development Finance*, 5(2):71–81.

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.

References II

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.

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.

Kim, M.-S., Kim, W., and Lee, D. W. (2015). Stock return commonality within business groups: Fundamentals or sentiment? *Pacific-Basin Finance Journal*, 35:198–224.

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 $S_{i,t}^{f} P_{i,t} = \alpha_i$
  - 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)

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

SQRT

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

Quadratic

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

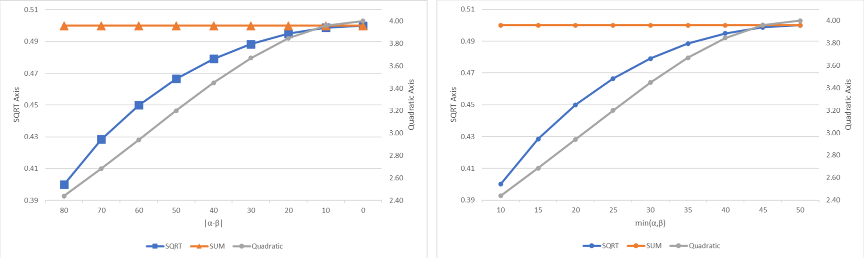
Intuition

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

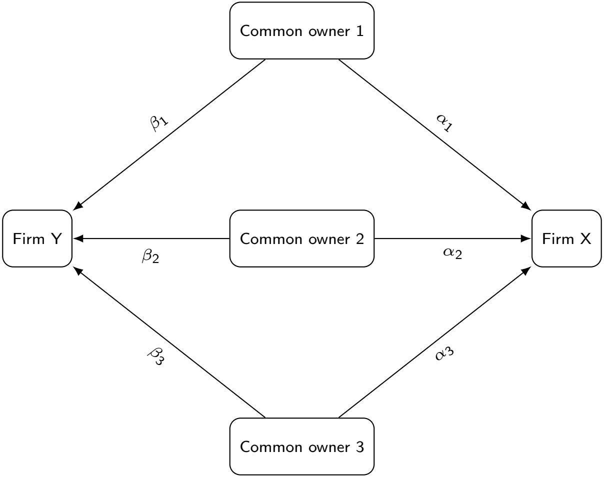
- $\alpha + \beta = 100$
- both firm have equal market cap



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

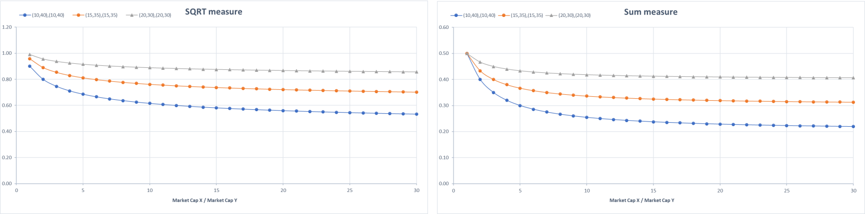
Measuring Common Ownership
Comparison

- 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

Synchronicity and firm interlocks

JFE-2009-Khanna

- 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

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

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

- $\mathrm{HJL}_I^A(A,B) = \sum_{i \in I^{A,B}} \frac{\alpha_{i,B}}{\alpha_{i,A}+\alpha_{i,B}}$ 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
- $\mathrm{MHHI} = \sum_j \sum_k s_j s_k \frac{\sum_i \mu_{ij}\nu_{ik}}{\sum_i \mu_{ij}\nu_{ij}}$ Azar et al. (2018)
  - Capture a specific type of externality
  - Measured at the industry level
  - Assumes that investors are fully informed about the externalities
- $\mathrm{GGL}^A(A,B) = \sum_{i=1}^{I} \alpha_{i,A} g(\beta_{i,A}) \alpha_{i,B}$ 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

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

  - 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