

# Connected Stocks Evidence From Iran

Presentation:  
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- Connected Stocks-JF-2014-Anton Polk

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- Controlls

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- Pseudo Pairs
  - Random Pairs
  - Random Pairs from Same Business Group
  - Random Pairs from Same Size

## 6 Identification Method

## **Can institutional ownership cause excess return comovement ?**

- ▶ We connect stocks through common ownership by block holder (ownership  $> 1\%$ )
- ▶ We focus on excess return comovement for a pair of stocks
- ▶ We use common ownership to forecast cross-sectional variation in the realized correlation of four-factor + industry residuals

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## 6 Identification Method

# Connected Stocks-JF-2014-Anton Polk

- Common active mutual fund owners
- Measuring Common Ownership
  - ▶  $FCAP_{ij,t} = \frac{\sum_{f=1}^F (S_{i,t}^f P_{i,t} + S_{j,t}^f P_{j,t})}{S_{i,t} P_{i,t} + S_{j,t} P_{j,t}}$
  - ▶ 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 and MacBeth

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# Measuring Common Ownership

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

# Measuring Common Ownership

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

SQRT

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

Quadratic

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



# Measuring Common Ownership

$$\text{if } \boxed{S_{i,t}^f P_{i,t} = \alpha/n}$$

SQRT

$$\left[ \frac{\sum_{f=1}^n \sqrt{\alpha/n} + \sum_{f=1}^n \sqrt{\alpha/n}}{\sqrt{\alpha} + \sqrt{\alpha}} \right]^2$$

$$= \left[ \frac{2n\sqrt{\alpha/n}}{2\sqrt{\alpha}} \right]^2 = n$$

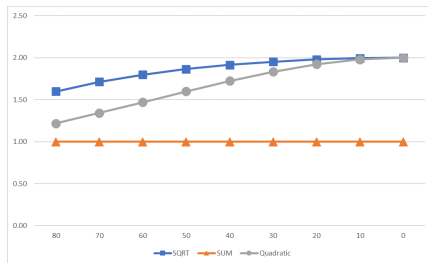
Quadratic

$$\left[ \frac{\sum_{f=1}^n (\alpha/n)^2 + \sum_{f=1}^n (\alpha/n)^2}{\alpha^2 + \alpha^2} \right]^{-1}$$

$$= \left[ \frac{2n(\alpha/n)^2}{2\alpha^2} \right]^{-1} = n$$

# Measuring Common Ownership

One common holder for two stocks with sum of 100 percent



# Measuring Common Ownership

## Advantage

	Owenership	Owenership	Owenership
x1	33.33	10	20
y1	33.33	10	10
x2	33.33	80	10
y2	33.33	80	20
x3	33.33	10	70
y3	33.33	10	70
SQRT	3	2.33	2.56
SUM	1	1	1
Quadratic	3	1.51	1.85

# Measuring Common Ownership

## Comparison

	Owenership	Owenership	Owenership	Owenership
x1	5	10	20	1
y1	5	10	20	1
x2	5	10	20	1
y2	5	10	20	1
x3	5	10	20	1
y3	5	10	20	1
SQRT	0.45	0.9	1.8	0.09
SUM	0.15	0.3	0.6	0.03
Quadratic	133.33	33.33	8.33	3333.33

# Data

- Data from 1394/01/06 to 1399/08/14

Number of Pairs	count	mean	std	min	25%	50%	75%	max
Daily	1354	9960.26	318.41	8934.59	9731.99	9927.60	10184.46	11037.98
Fortnightly	213	9996.86	285.63	9320.73	9791.10	9967.35	10178.58	10637.96
Monthly	69	10021.47	258.04	9475.31	9817.09	10008.80	10215.17	10596.13

FCA	count	mean	std	min	25%	50%	75%	max
Daily	7970465	0.15	0.24	0.00	0.02	0.06	0.16	4.23
Fortnightly	1454898	0.15	0.24	0.00	0.02	0.06	0.15	3.97
Monthly	511866	0.15	0.24	0.00	0.02	0.06	0.15	3.97

# Correlation Calculation

## 4 Factor + Industry

- 4 Factor + Industry :

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

$\rho_{ij,t}$	count	mean	std	min	25%	50%	75%	max
Fortnightly	1405850	0.01	0.46	-1	-0.32	0.01	0.34	1
Monthly	486676	0.01	0.33	-1	-0.20	0.01	0.22	1

# Controls

- $\rho_t$  : Current period correlation
- **ActiveHolder** : Dummy variable for whether at least one holder is Active. (the active holder is the one whose average percentage change is greater than median)
- **SameHolderType** : Dummy variable for whether at least two holders have a similar type.
- **SameGroup** : Dummy variable for whether the two stocks belong to same business group.
- **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

# Regression Summary

- **Main** : We use the percentile rank of a particular characteristic for each stock in regression.
- **Interaction** : We use the interaction between percentile rankings for a particular characteristic across a pair in regression.

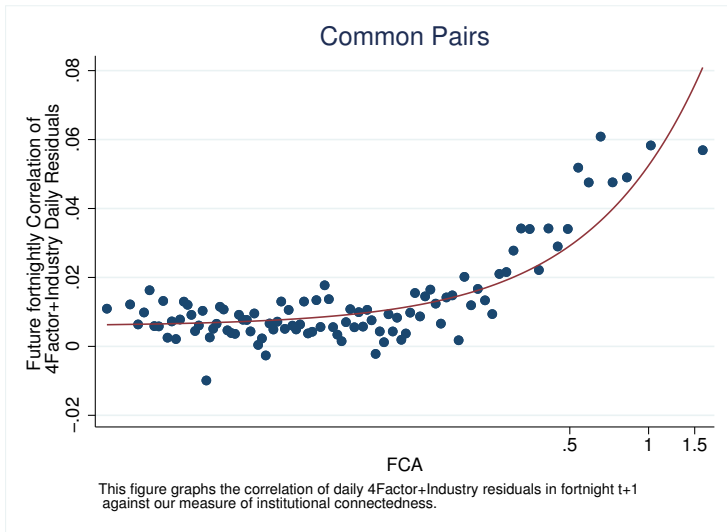


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# Future Correlation via *FCA*

## 4 Factor + Industry



# Fama MacBeth Estimation

## Fortnightly variables

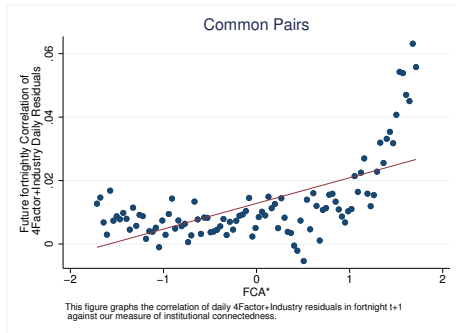
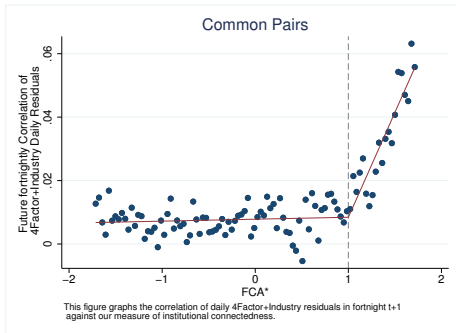
	Dependent Variable: Fortnightly Correlation of 4F+Industry Residuals					
	(1)	(2)	(3)	(4)	(5)	(6)
FCA	0.0469*** (10.93)	0.0306*** (11.38)	0.0200*** (9.82)	0.0198*** (9.78)	0.0201*** (9.80)	0.0207*** (9.56)
$\rho_t$		0.304*** (16.19)	0.303*** (16.21)	0.303*** (16.21)	0.303*** (16.20)	0.304*** (16.17)
ActiveHolder		0.00431*** (4.49)	0.00379*** (3.95)	0.00381*** (3.99)	0.00349*** (3.64)	0.00307** (3.12)
SameHolderType		-0.00148 (-0.27)	-0.00613 (-1.00)	-0.00596 (-0.99)	-0.00566 (-0.94)	-0.00490 (-0.87)
SameGroup			0.0169*** (7.50)	0.0167*** (7.30)	0.0164*** (7.14)	0.0180*** (7.40)
Samesize					0.0293*** (4.83)	0.0161*** (5.57)
SameBookToMarket					0.00582** (2.75)	0.00756*** (4.44)
Constant	0.00602*** (4.55)	0.00514 (0.91)	0.0317** (3.04)	0.0385** (3.30)	0.0274** (3.13)	0.0148* (2.41)
Main	No	No	Yes	Yes	No	No
Interaction	No	No	No	Yes	Yes	No
N	1405659	1380316	1380316	1380316	1380316	1380316
r2	0.000973	0.247	0.250	0.250	0.250	0.248

t statistics in parentheses

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

# 4 Factor + Industry Future Correlation via $FCA^*$

Normalized Rank Transformed for each cross section



# Fama MacBeth Estimation

## Fortnightly variables

	Dependent Variable: Fortnightly Correlation of 4F+Industry Residuals						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.00834*** (7.94)	-0.00525*** (-4.97)	-0.00360*** (-4.34)	-0.00468*** (-5.44)	-0.00467*** (-5.45)	-0.00451*** (-5.28)	-0.00351*** (-4.25)
(FCA* > Median[FCA*]) × FCA*		0.0272*** (10.97)	0.0178*** (10.91)	0.0153*** (9.57)	0.0152*** (9.58)	0.0151*** (9.48)	0.0138*** (8.89)
$\rho_{-t}$			0.304*** (16.19)	0.303*** (16.20)	0.303*** (16.20)	0.303*** (16.20)	0.304*** (16.17)
ActiveHolder			0.00471*** (5.01)	0.00383*** (4.08)	0.00382*** (4.10)	0.00352*** (3.76)	0.00318** (3.31)
SameHolderType			-0.00153 (-0.28)	-0.00602 (-0.98)	-0.00585 (-0.96)	-0.00556 (-0.91)	-0.00486 (-0.86)
SameGroup				0.0173*** (7.67)	0.0171*** (7.45)	0.0167*** (7.30)	0.0184*** (7.70)
Samesize						0.0305*** (5.06)	0.0166*** (5.80)
SameBookToMarket						0.00597** (2.85)	0.00774*** (4.56)
Constant	0.0130*** (7.69)	0.00131 (0.89)	0.00196 (0.34)	0.0290** (2.78)	0.0354** (3.03)	0.0246** (2.79)	0.0121 (1.93)
Main	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	1405659	1405659	1380316	1380316	1380316	1380316	1380316
r <sup>2</sup>	0.000702	0.00113	0.248	0.250	0.250	0.250	0.249

t statistics in parentheses

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

# Fama MacBeth Estimation

## Fortnightly variables

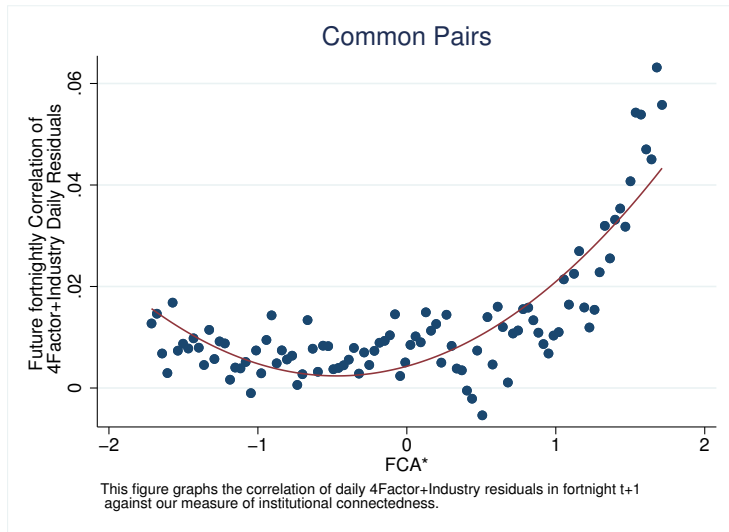
	Dependent Variable: Fortnightly Correlation of 4F+Industry Residuals						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.00834*** (7.94)	0.000488 (0.52)	0.000160 (0.24)	-0.00116* (-2.04)	-0.00121* (-2.14)	-0.00106 (-1.87)	-0.000609 (-1.03)
(FCA* > 1) × FCA*		0.0195*** (12.79)	0.0129*** (11.86)	0.0104*** (10.36)	0.0104*** (10.45)	0.0103*** (10.37)	0.01000*** (10.24)
$\rho_{-t}$			0.304*** (16.19)	0.303*** (16.20)	0.303*** (16.20)	0.303*** (16.20)	0.304*** (16.17)
ActiveHolder			0.00440*** (4.61)	0.00367*** (3.88)	0.00366*** (3.89)	0.00336*** (3.57)	0.00296** (3.04)
SameHolderType			-0.00110 (-0.20)	-0.00558 (-0.91)	-0.00540 (-0.89)	-0.00515 (-0.85)	-0.00448 (-0.79)
SameGroup				0.0170*** (7.72)	0.0168*** (7.48)	0.0164*** (7.32)	0.0180*** (7.65)
Samesize						0.0299*** (4.95)	0.0163*** (5.68)
SameBookToMarket						0.00584** (2.77)	0.00771*** (4.54)
Constant	0.0130*** (7.69)	0.00746*** (4.81)	0.00560 (0.97)	0.0315** (3.01)	0.0382** (3.26)	0.0272** (3.08)	0.0148* (2.36)
Main	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	1405659	1405659	1380316	1380316	1380316	1380316	1380316
r2	0.000702	0.00121	0.248	0.250	0.250	0.250	0.249

t statistics in parentheses

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

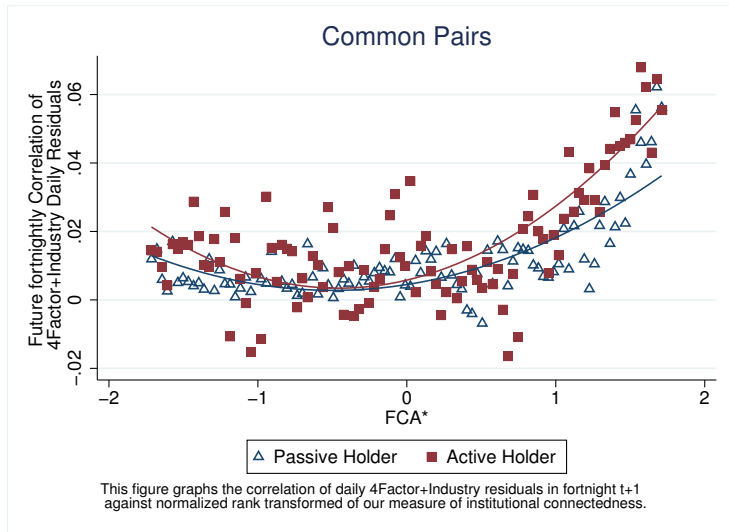
# 4 Factor + Industry Future Correlation via $FCA^*$

Normalized Rank Transformed for each cross section



# 4 Factor + Industry Future Correlation via $FCA^*$

Normalized Rank Transformed for each cross section





# Fama MacBeth Estimation

## Fortnightly variables

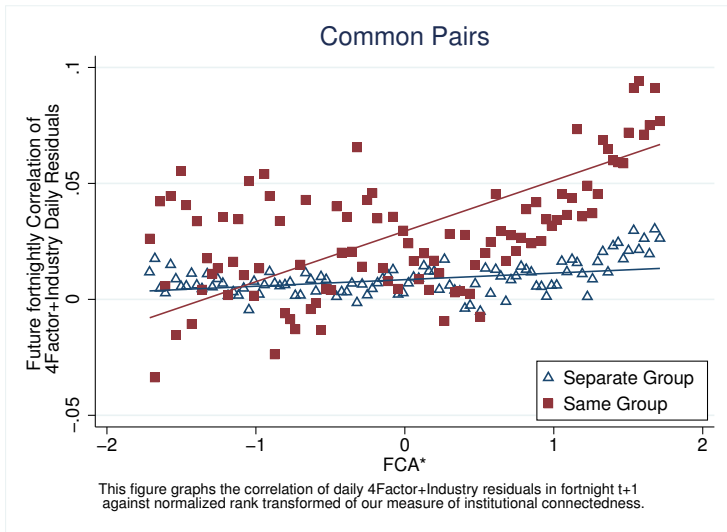
	Dependent Variable: Fortnightly Correlation of 4F+Industry Residuals						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.00834*** (7.94)	0.00834*** (7.90)	0.00533*** (8.00)	0.00302*** (6.61)	0.00297*** (6.49)	0.00310*** (6.74)	0.00341*** (6.47)
FCA* <sup>2</sup>		0.00868*** (12.33)	0.00577*** (12.25)	0.00484*** (10.69)	0.00481*** (10.70)	0.00478*** (10.62)	0.00449*** (10.16)
$\rho_t$			0.304*** (16.19)	0.303*** (16.20)	0.303*** (16.20)	0.303*** (16.20)	0.304*** (16.17)
ActiveHolder			0.00430*** (4.50)	0.00355*** (3.74)	0.00355*** (3.77)	0.00325*** (3.44)	0.00289** (2.96)
SameType			-0.00143 (-0.26)	-0.00586 (-0.96)	-0.00569 (-0.93)	-0.00540 (-0.89)	-0.00471 (-0.83)
SameGroup				0.0168*** (7.49)	0.0166*** (7.28)	0.0162*** (7.12)	0.0179*** (7.51)
Samesize						0.0304*** (5.05)	0.0165*** (5.79)
SameBookToMarket						0.00587** (2.81)	0.00765*** (4.52)
Constant	0.0130*** (7.69)	0.00441** (2.98)	0.00390 (0.68)	0.0307** (2.93)	0.0371** (3.17)	0.0262** (2.97)	0.0135* (2.16)
Main	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	1405659	1405659	1380316	1380316	1380316	1380316	1380316
r2	0.000702	0.00121	0.248	0.250	0.250	0.250	0.249

t statistics in parentheses

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

# Future Correlation via $FCA^*$

## 4 Factor + Industry

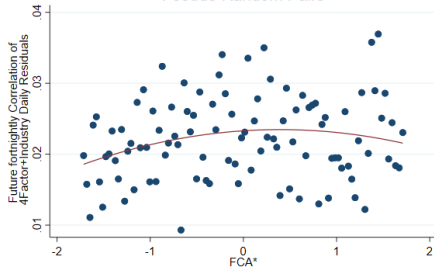


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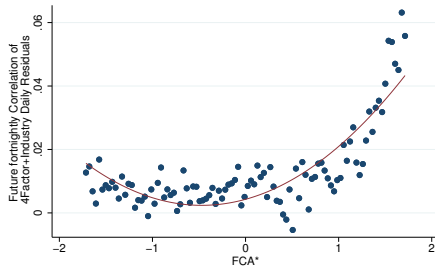
# Random Pairs

Pseudo Random Pairs



This figure graphs the correlation of daily 4Factor+Industry residuals in fortnight t+1 against normalized rank transformed of our measure of institutional connectedness.

Common Pairs



This figure graphs the correlation of daily 4Factor+Industry residuals in fortnight t+1 against our measure of institutional connectedness.

# Fama MacBeth Estimation for pseudo pairs

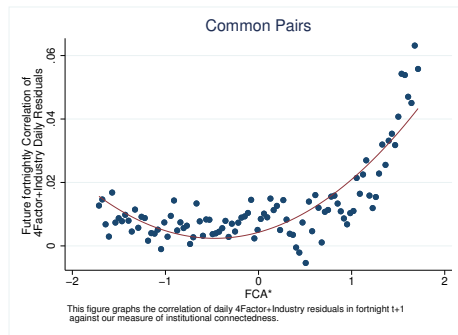
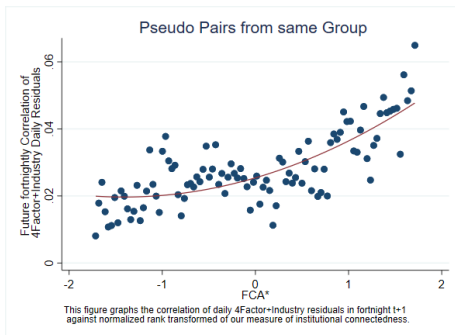
## Fortnightly variables for Random group

	Dependent Variable: Fortnightly Correlation of 4F+Industry Residuals						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.000606 (0.99)	0.000539 (0.87)	0.000444 (0.89)	0.000448 (0.90)	0.000519 (1.04)	0.000419 (0.83)	0.000492 (0.97)
FCA* <sup>2</sup>		-0.00148* (-2.49)	-0.00116* (-2.47)	-0.000849 (-1.75)	-0.000990* (-2.04)	-0.000832 (-1.72)	-0.000728 (-1.54)
$\rho_t$			0.265*** (15.12)	0.262*** (15.06)	0.261*** (15.02)	0.262*** (15.08)	0.263*** (15.05)
ActiveHolder			0.0000343 (0.03)	-0.000305 (-0.27)	-0.000363 (-0.32)	-0.000371 (-0.33)	-0.0000336 (-0.03)
SameHolderType			0.0199* (1.99)	0.0216* (2.10)	0.0216* (2.10)	0.0220* (2.14)	0.0228* (2.23)
SameGroup				0.0594*** (19.63)	0.0531*** (18.26)	0.0599*** (19.74)	0.0601*** (19.58)
SameSize						0.0398*** (8.15)	0.0312*** (8.56)
SameBookToMarket						0.0225*** (8.86)	0.0182*** (7.60)
Constant	0.0219*** (5.66)	0.0233*** (6.01)	-0.00318 (-0.32)	0.0446*** (4.07)	0.0987*** (8.71)	0.0283** (2.62)	0.00670 (0.63)
Main	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	1105543	1105543	1067554	1067554	1067554	1067554	1067554
r <sup>2</sup>	0.000237	0.000442	0.223	0.227	0.228	0.226	0.225

t statistics in parentheses

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

# Random Pairs from Same Business Group



# Fama MacBeth Estimation for pseudo pairs

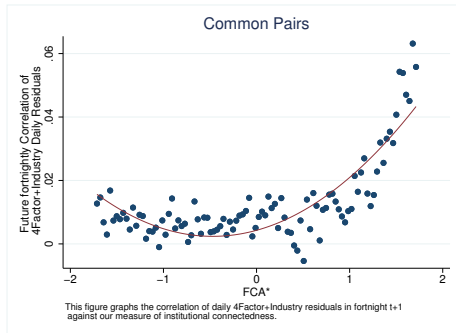
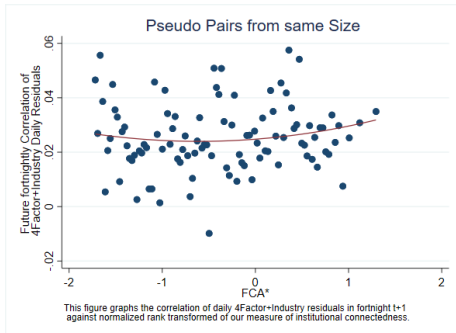
Fortnightly variables for Random group from Same Business Group

	Dependent Variable: Fortnightly Correlation of 4F+Industry Residuals						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.00808*** (10.67)	0.00830*** (11.02)	0.00574*** (10.54)	-0.0000109 (-0.02)	-0.000228 (-0.42)	-0.000342 (-0.64)	-0.000747 (-1.37)
FCA <sup>2</sup>		0.00335*** (4.45)	0.00240*** (4.17)	-0.000482 (-0.96)	-0.000735 (-1.45)	-0.000789 (-1.60)	-0.00168*** (-3.37)
$\rho_t$			0.287*** (16.77)	0.279*** (16.36)	0.274*** (16.01)	0.280*** (16.43)	0.283*** (16.47)
ActiveHolder			0.00576*** (4.54)	0.00226 (1.87)	0.000171 (0.14)	0.00296* (2.55)	0.00362** (3.11)
SameHolderType			0.00283 (0.37)	0.00130 (0.16)	-0.00293 (-0.35)	-0.00229 (-0.28)	-0.00627 (-0.79)
SameGroup				0.0637*** (16.19)	0.0550*** (15.29)	0.0651*** (16.32)	0.0711*** (18.05)
Samesize						0.0674*** (11.28)	0.0518*** (12.37)
SameBookToMarket						0.0530*** (12.97)	0.0417*** (12.81)
Constant	0.0288*** (8.68)	0.0256*** (7.39)	0.0139 (1.73)	0.114*** (9.95)	0.236*** (18.75)	0.0850*** (8.17)	0.0485*** (5.43)
Main	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	1111129	1111129	1073214	1073214	1073214	1073214	1073214
r2	0.000515	0.000787	0.226	0.235	0.240	0.234	0.231

t statistics in parentheses

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

# Random Pairs from Same Size





# Fama MacBeth Estimation for pseudo pairs

Fortnightly variables for Pseudo group from Same Size

	Dependent Variable: Fortnightly Correlation of 4F+Industry Residuals						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.000675 (0.39)	0.00375 (1.88)	0.00247 (1.51)	0.00274 (1.65)	0.00247 (1.40)	0.00234 (1.41)	0.000745 (0.44)
FCA* <sup>2</sup>		0.00458* (2.28)	0.00261 (1.74)	0.00560*** (3.87)	0.00324* (2.19)	0.00491*** (3.43)	0.00149 (1.02)
$\rho_t$			0.282*** (16.60)	0.271*** (15.82)	0.267*** (15.49)	0.272*** (15.91)	0.275*** (15.99)
ActiveHolder			-0.00374 (-1.04)	-0.00132 (-0.37)	0.00142 (0.40)	-0.00305 (-0.85)	-0.00438 (-1.18)
SameHolderType			0.00843 (0.88)	0.00765 (0.75)	0.000854 (0.09)	0.00825 (0.82)	0.00556 (0.57)
SameGroup				0.128*** (12.28)	0.0916*** (10.75)	0.136*** (12.27)	0.145*** (11.71)
SameSize						0.0684*** (9.57)	0.0419*** (6.66)
SameBookToMarket						0.0388*** (6.32)	0.0319*** (7.07)
Constant	0.0243*** (8.37)	0.0219*** (6.93)	0.00934 (0.96)	0.111*** (9.54)	0.263*** (18.30)	0.0718*** (6.38)	0.0287** (2.84)
Main	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	347137	347137	334482	334482	334482	334482	334482
r2	0.000813	0.00161	0.227	0.242	0.248	0.241	0.236

t statistics in parentheses

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

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# Identification

- Possible Events

- ▶ The Sepah bank Merge
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- ▶ Mutual funds Limit extension
- ▶ Dara 1 and Palayeshi 1
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