Connected Stocks: Evidence from Tehran Stock Exchange

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February, 2021

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Motivation

Research Question

- **Can common ownership cause stock 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

Why does it matter?

- Covariance
  - Covariance is a key component of risk in many financial applications. (Portfolio selection, Risk management, Hedging and 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
- Synchronicity
  - Poor corporate governance
  - Lack of firm-level transparency

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literature

- Commonality in stock liquidity is likely driven by correlated trading among a given stock's investors.(Koch et al (2016)) Commonality in liquidity is important because it can influence expected returns (Pastor and Stambaugh (2003) Acharya and Pedersen (2005))
- Stocks sharing many common investors tend to comove more strongly with each other in the future than otherwise similar stocks. (Antón and Polk (2014))
- 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 (Greenwood and Thesmar (2011))
- Better law protection encourages informed trading, which facilitates the incorporation of firm-specific information into stock prices, leading to lower synchronicity (Morck et al. (2000))
- Stock prices move together depends on the relative amounts of firm-specific and market-level information impounded into stock prices(Roll (1988))

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

Large controlling shareholder and stock price synchronicity

JBF-2014-Boubaker

- 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 and MacBeth

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Measuring Common Ownership

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

Measuring Common Ownership

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

SQRT

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

Quadratic

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

Measuring Common Ownership

Intuition

- The mentioned indexes equal n if we split all the two firms' market cap between n holders equally.
- Assume $S^f_{i,t}P_{i,t} = 100/n$ which for simplicity we show that by $S^f_{i,t}P_{i,t} = \alpha/n$:
  - SQRT

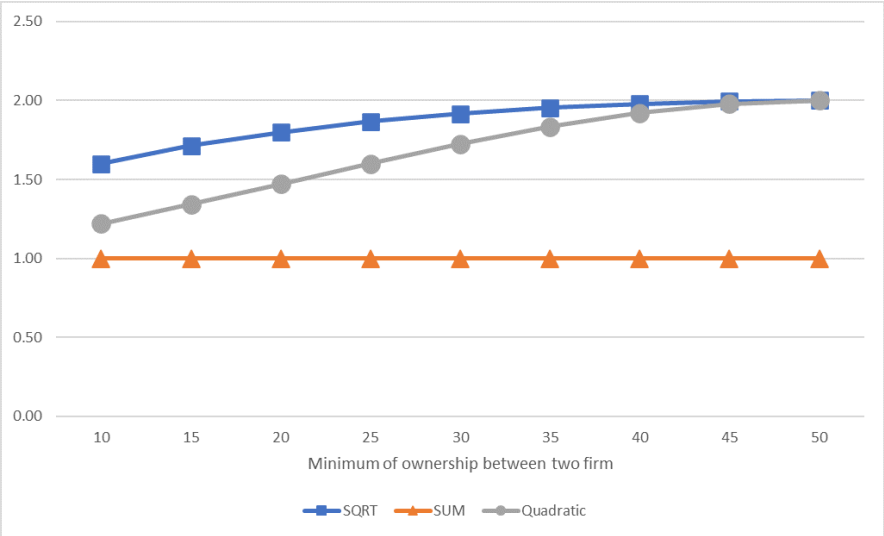
$$[\frac{\sum_{f=1}^{n}\sqrt{\alpha/n}+\sum_{f=1}^{n}\sqrt{\alpha/n}}{\sqrt{\alpha}+\sqrt{\alpha}}]^2 = [\frac{2n\sqrt{\alpha/n}}{2\sqrt{\alpha}}]^2 = n$$

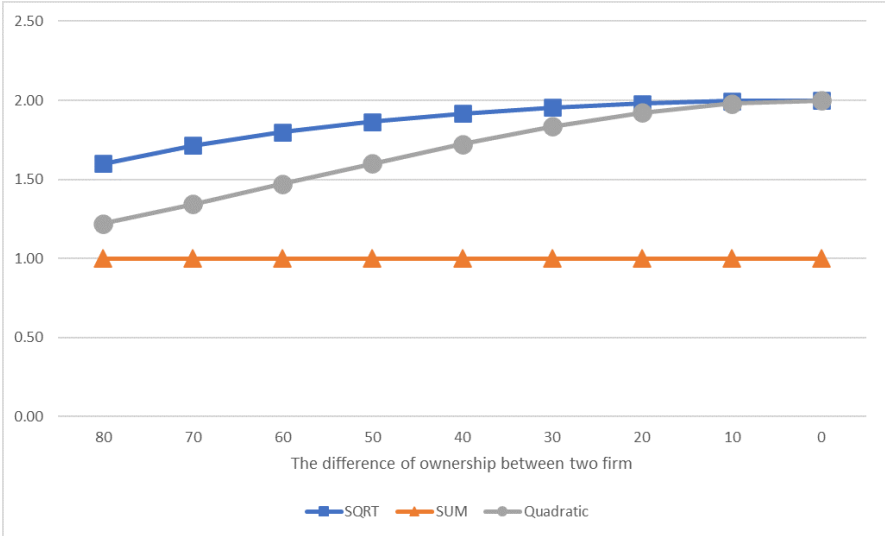
  - Quadratic

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

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 Summary

- We use blockholders' data from 1394/01/06 to 1399/08/14

Numer of Pairs	count	mean	min	max
Daily	1354	5887	2288	7829
Fortnightly	152	7153	5180	10158
Monthly	69	7418	4722	8932

Year	2015	2016	2017	2018	2019	2020	Mean
Pairs	7473	8701	10527	11167	11098	9428	9732
Stocks	328	350	456	481	514	539	445

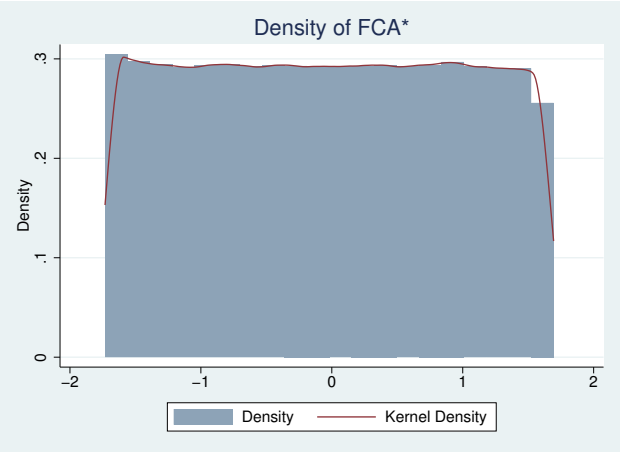
FCA vs. FCAP

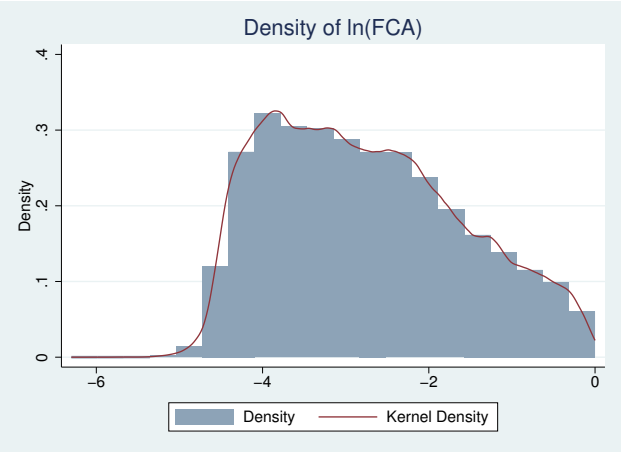
Frequence	variable	count	mean	std	min	25%	50%	75%	max
Fortnightly	FCA	1086268	0.148	0.239	0.002	0.025	0.058	0.155	3.967
	FCAP	1086268	0.125	0.167	0.001	0.023	0.055	0.146	1.000
	FCA*	1086268	-0.005	0.998	-1.732	-0.869	-0.005	0.859	1.732
	FCAP*	1086268	-0.003	0.999	-1.732	-0.868	-0.004	0.864	1.732
	LnFCA	1086268	-2.702	1.209	-6.289	-3.701	-2.846	-1.865	1.378
	LnFCAP	1086268	-2.773	1.171	-6.517	-3.753	-2.907	-1.922	0.000
Monthly	FCA	511396	0.147	0.238	0.002	0.025	0.058	0.154	3.967
	FCAP	511396	0.125	0.167	0.001	0.023	0.054	0.146	0.998
	FCA*	511396	-0.009	1.000	-1.732	-0.875	-0.009	0.856	1.732
	FCAP*	511396	-0.006	1.001	-1.732	-0.875	-0.007	0.863	1.732
	LnFCA	511396	-2.706	1.208	-6.300	-3.705	-2.851	-1.873	1.378
	LnFCAP	511396	-2.777	1.170	-6.535	-3.758	-2.911	-1.926	-0.002

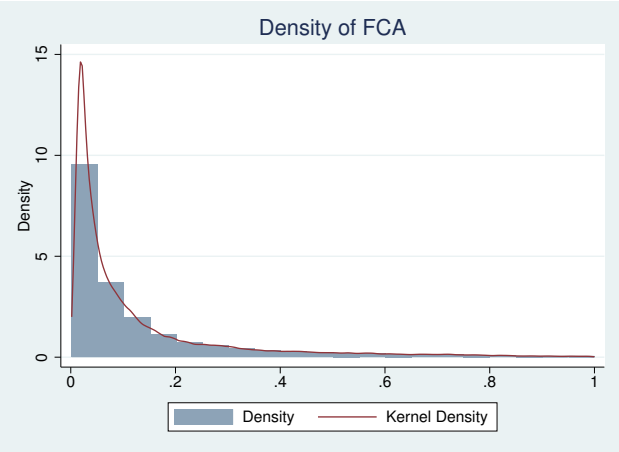
Variables which we denote with * are rank-transformed and normalized to have unit standard deviation

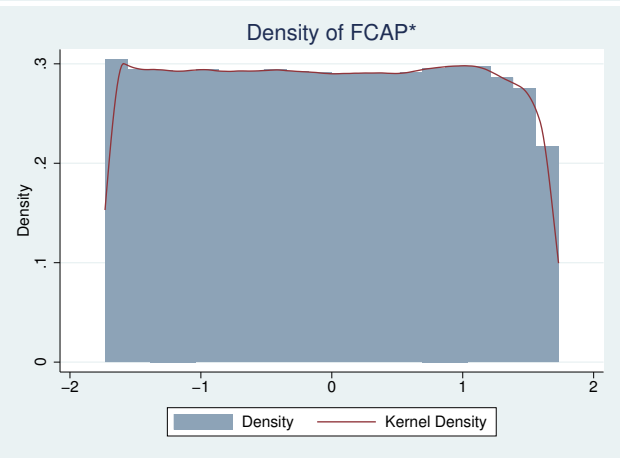
FCA vs. FCAP Distributions

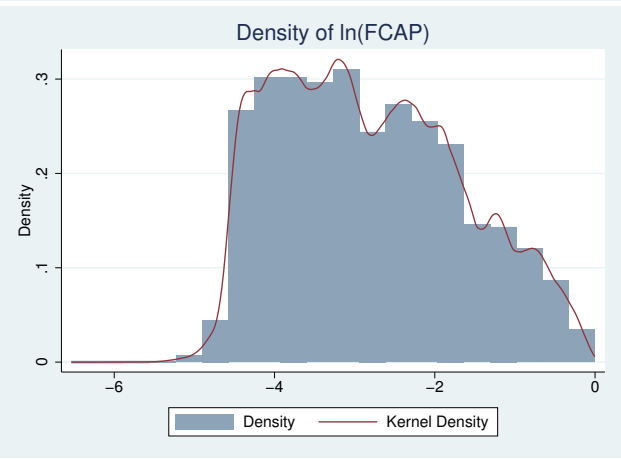
Monthly

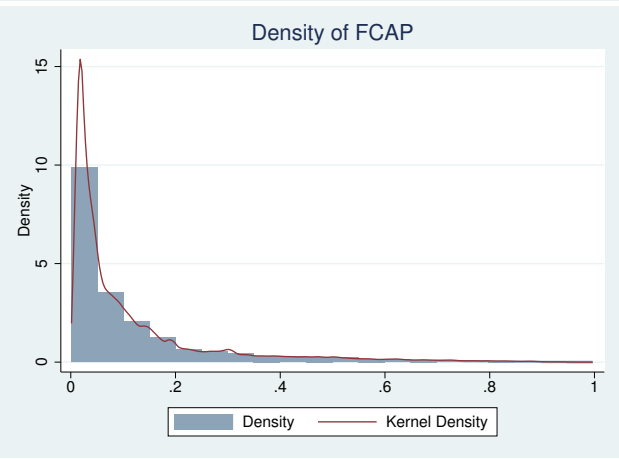






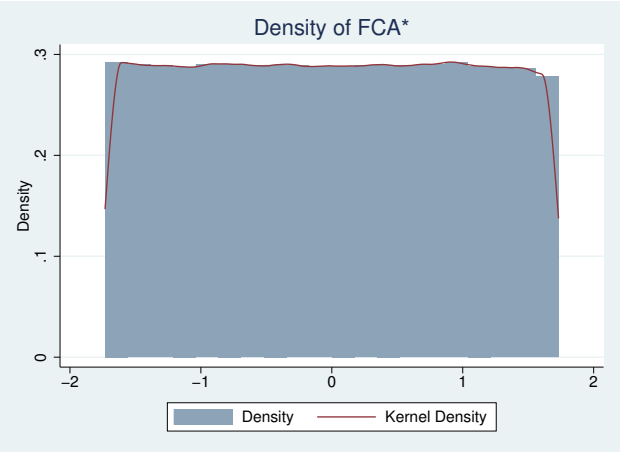


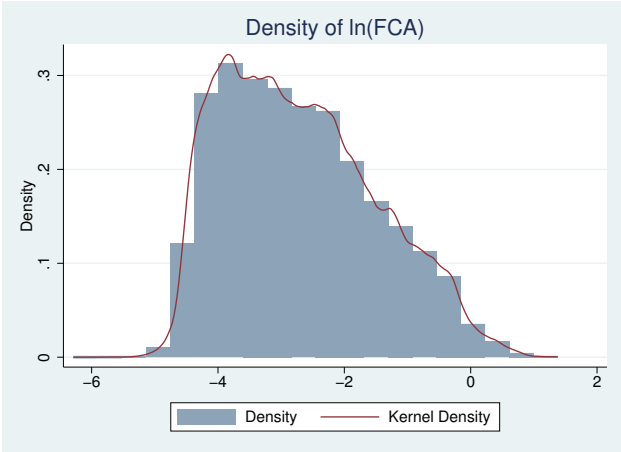


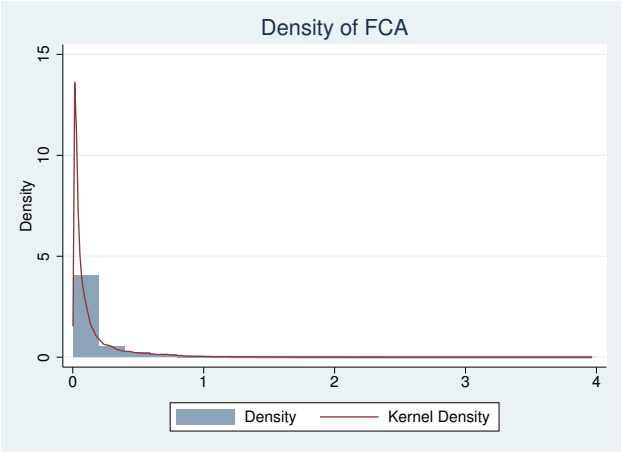


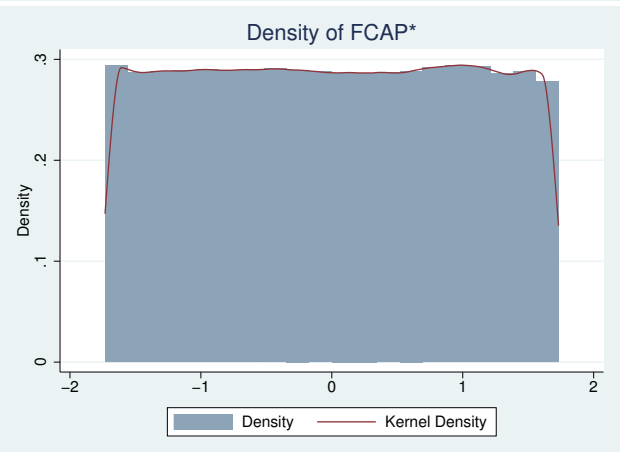
FCA vs. FCAP Distributions

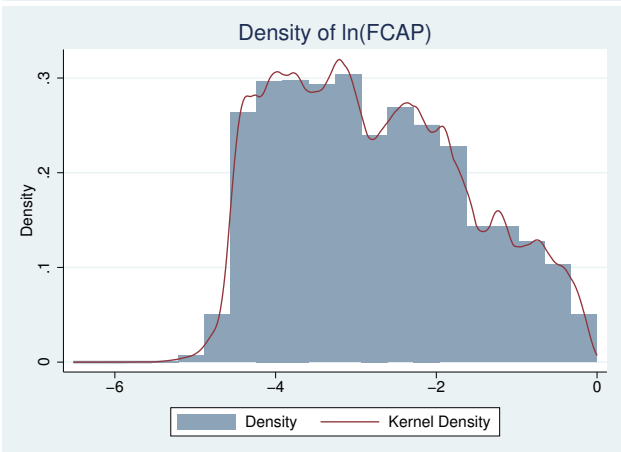
Fortnightly

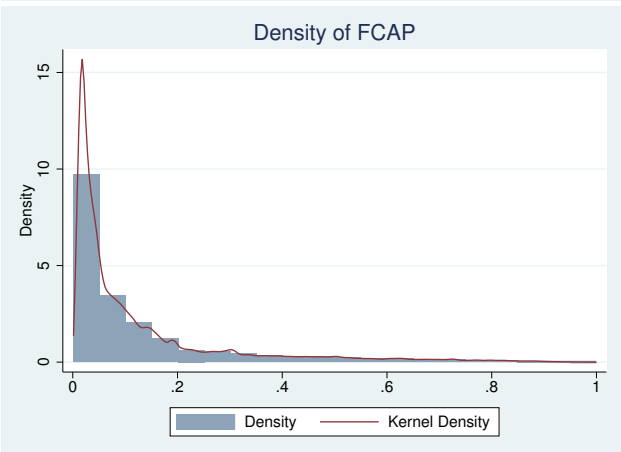












Correlation Calculation

4 Factor + Industry

- CAPM + Industry (2 Factor):

$$R_{i,t} - R_{F,t} = \alpha_i + \beta_{mkt,i}(R_{M,t} - R_{F,t}) + \beta_{Ind,i}(R_{Ind,t} - R_{F,t}) + \boxed{\varepsilon_{i,t}}$$

- 4 Factor :

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

- 4 Factor + Industry (5 Factor) :

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

Correlation Calculation Results

Factors	count	mean	std	min	max
SMB	1374	0.19	1.47	-5.64	19.52
HML	1374	-0.12	1.39	-4.90	23.20
Winner − Loser	1374	0.69	1.06	-2.61	8.58
Market	1374	0.24	1.23	-4.71	4.89

$\rho_{ij,t}$	count	mean	std	min	25%	50%	75%	max
Fortnightly2	1054673	0.014	0.477	-1	-0.325	0.014	0.355	1
Fortnightly4	1054673	0.054	0.488	-1	-0.296	0.062	0.416	1
Fortnightly5	1054673	0.013	0.476	-1	-0.325	0.013	0.353	1
Monthly2	487649	0.015	0.336	-1	-0.196	0.012	0.223	1
Monthly4	487649	0.053	0.351	-1	-0.171	0.050	0.278	1
Monthly5	487649	0.014	0.334	-1	-0.196	0.012	0.222	1

Controls

- ρ_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)
- **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

Summary of Controls

Fortnightly

Type of Pairs	Yes	No
SameGroup	1882	17728
	(9.6%)	(90.4%)
ActiveHolder	4766	14844
	(24.3%)	(75.7%)

Variable	count	mean	std	min	max
Size1	1087256	0.73	0.22	0.01	1.00
Size2	1087256	0.44	0.26	0.00	1.00
SameSize	1087256	-0.29	0.22	-0.99	0.00
BookToMarket1	1087256	0.53	0.28	0.00	1.00
BookToMarket2	1087256	0.51	0.27	0.00	1.00
SameBookToMarket	1087256	-0.31	0.22	-1.00	0.00

Regression Summary

- **Value** : 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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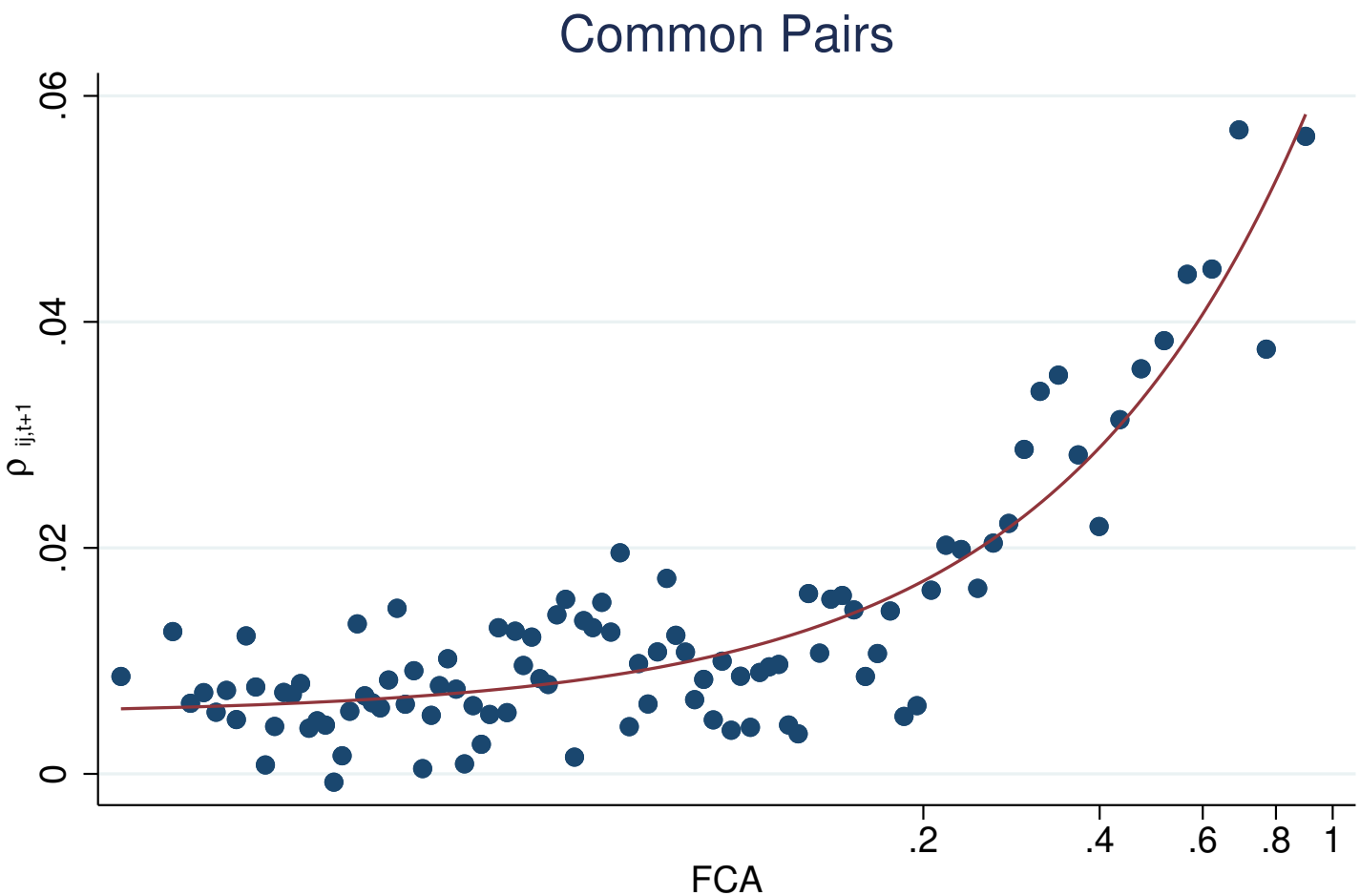
Future Correlation via *FCA*

4 Factor + Industry (Monthly)



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

Fama MacBeth Estimation

Monthly variables

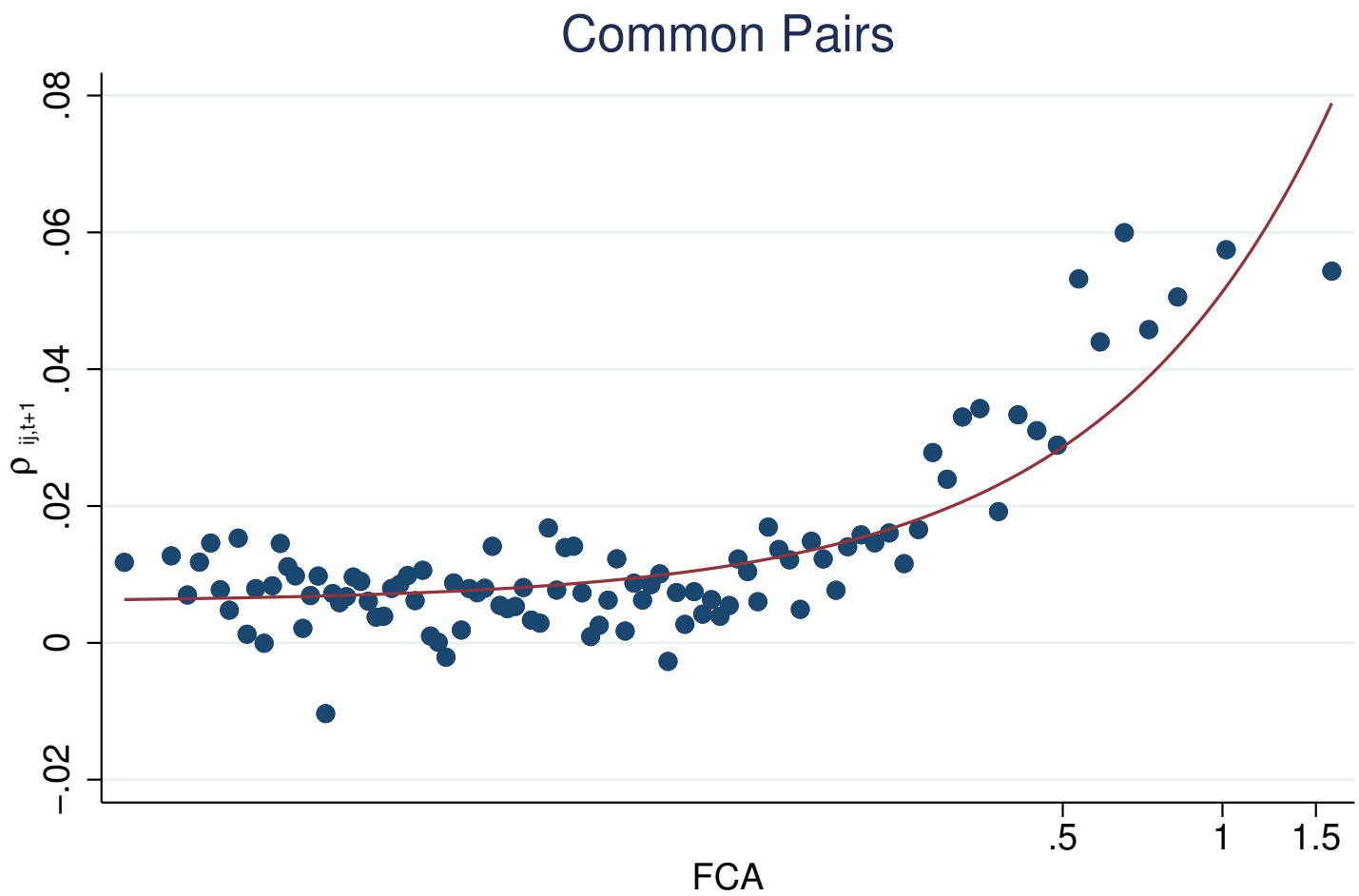
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(*FCA*)	0.00719***	0.00653***	0.00647***	0.00506***	0.00505***	0.00423***	0.00418***	0.00434***	0.00477***
	(7.18)	(7.70)	(7.61)	(8.42)	(8.32)	(9.36)	(9.16)	(9.37)	(8.42)
ρ_t		0.0849***	0.0849***	0.0843***	0.0843***	0.0820***	0.0820***	0.0821***	0.0840***
		(4.17)	(4.17)	(4.16)	(4.16)	(4.13)	(4.12)	(4.13)	(4.16)
ActiveHolder			0.00299**		0.00194*	0.00214*	0.00213*	0.00183*	0.00119
			(3.14)		(2.08)	(2.37)	(2.33)	(2.05)	(1.30)
SameGroup				0.0192***	0.0190***	0.0159***	0.0156***	0.0153***	0.0175***
				(4.90)	(4.86)	(5.27)	(5.13)	(4.82)	(4.58)
Samesize								0.0393**	0.0191***
								(2.97)	(3.74)
SameBookToMarket								0.00633*	0.00764**
								(2.20)	(2.81)
Constant	0.0328***	0.0298***	0.0290***	0.0233***	0.0229***	0.0555***	0.0621***	0.0482***	0.0304***
	(6.56)	(6.93)	(6.86)	(7.72)	(7.65)	(3.87)	(4.33)	(4.75)	(8.18)
Value	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	Yes	Yes	No
N	479796	475383	475383	475383	475383	475383	475383	475383	475383
r2	0.000981	0.0134	0.0136	0.0142	0.0143	0.0170	0.0175	0.0169	0.0150

t statistics in parentheses

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

Future Correlation via *FCA*

4 Factor + Industry (Fortnightly)



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

Fama MacBeth Estimation

Fortnightly variables

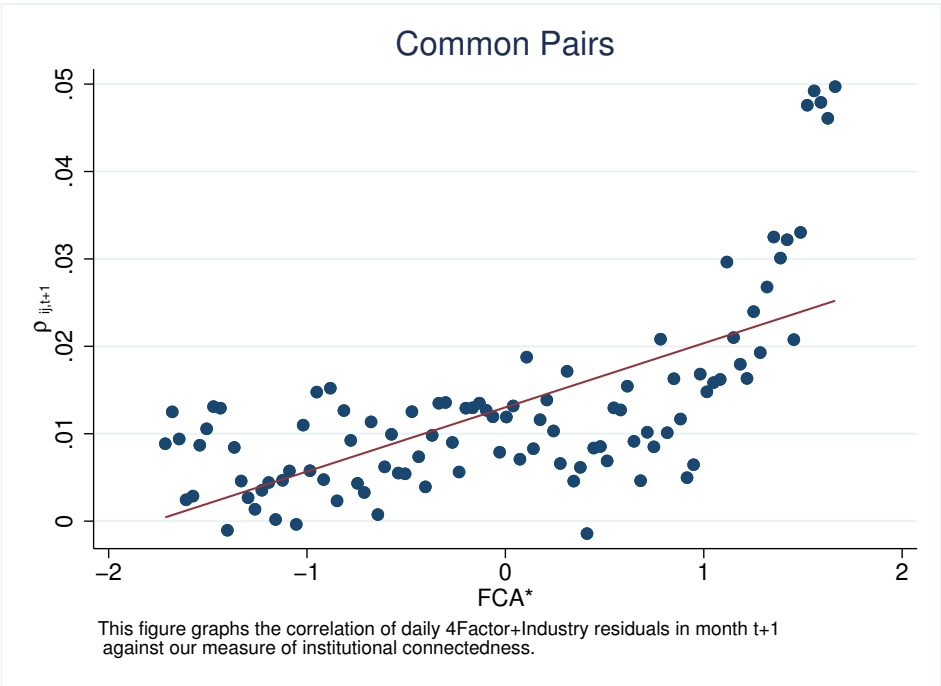
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(*FCA*)	0.00771***	0.00712***	0.00688***	0.00490***	0.00475***	0.00396***	0.00390***	0.00405***	0.00437***
	(8.61)	(9.08)	(8.65)	(7.98)	(7.56)	(8.09)	(7.98)	(8.14)	(7.31)
ρ_t		0.0743***	0.0743***	0.0738***	0.0738***	0.0725***	0.0725***	0.0725***	0.0736***
		(5.11)	(5.11)	(5.07)	(5.07)	(5.04)	(5.04)	(5.04)	(5.07)
ActiveHolder			0.00735***		0.00592***	0.00591***	0.00592***	0.00551***	0.00502***
			(5.80)		(4.61)	(4.58)	(4.65)	(4.31)	(3.86)
SameGroup				0.0281***	0.0276***	0.0245***	0.0242***	0.0237***	0.0257***
				(7.85)	(7.71)	(7.46)	(7.26)	(7.10)	(7.23)
Samesize								0.0404***	0.0224***
								(4.09)	(5.32)
SameBookToMarket								0.00767**	0.0100***
								(2.77)	(4.85)
Constant	0.0334***	0.0311***	0.0289***	0.0214***	0.0199***	0.0482***	0.0566***	0.0436***	0.0288***
	(8.19)	(8.81)	(8.16)	(7.73)	(7.03)	(4.61)	(4.64)	(5.83)	(8.66)
Value	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	Yes	Yes	No
N	1038309	1012967	1012967	1012967	1012967	1012967	1012967	1012967	1012967
r2	0.000727	0.0127	0.0130	0.0136	0.0138	0.0162	0.0167	0.0161	0.0145

t statistics in parentheses

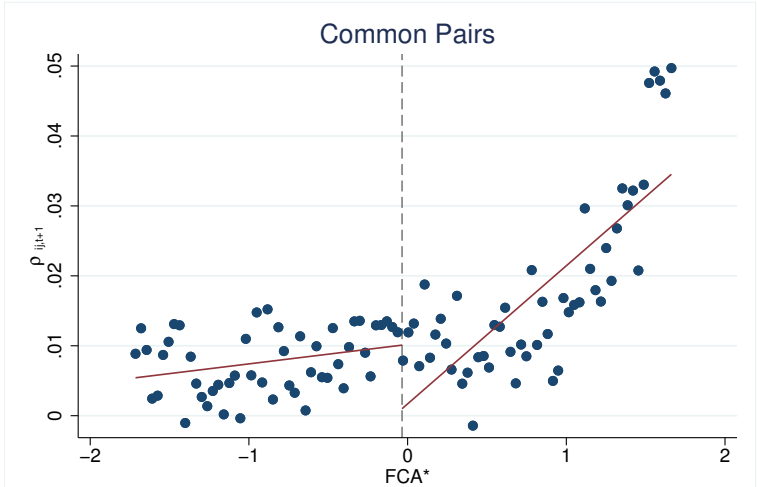
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4 Factor + Industry Future Correlation via *FCA**

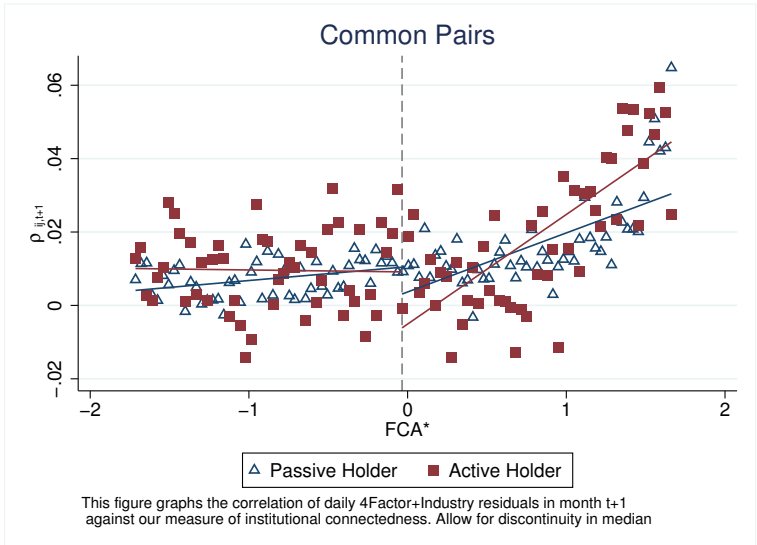
Normalized Rank Transformed for each cross section (Monthly)



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



This figure graphs the correlation of daily 4Factor+Industry residuals in month t+1 against our measure of institutional connectedness. Allow for discontinuity in median



This figure graphs the correlation of daily 4Factor+Industry residuals in month t+1 against our measure of institutional connectedness. Allow for discontinuity in median

Fama MacBeth Estimation

Monthly variables

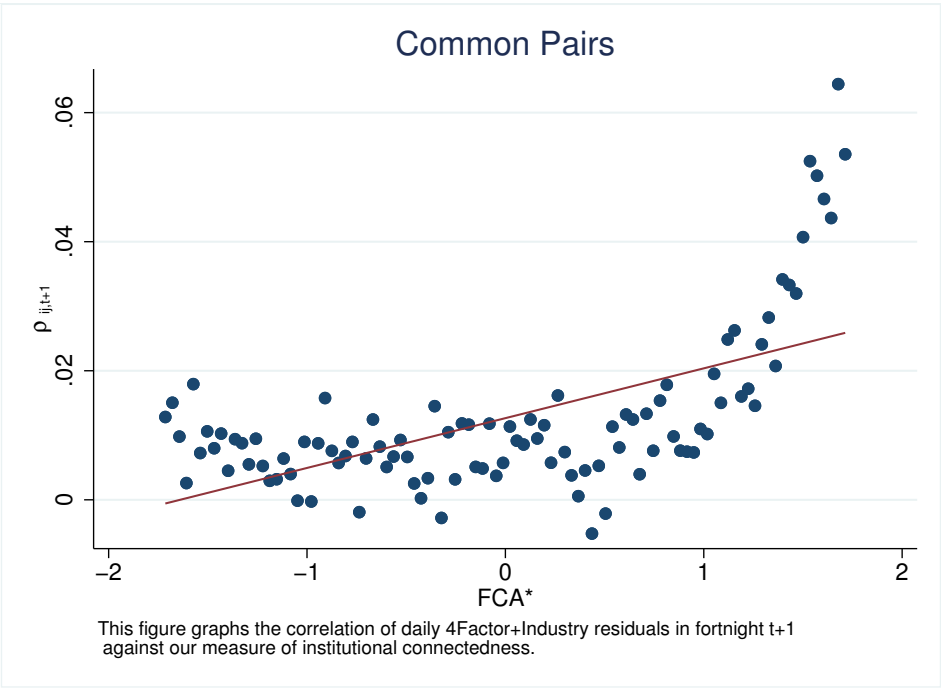
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FCA*	0.00764***	-0.000763	-0.000778	-0.000541	-0.000466	-0.000303	-0.00244*	-0.00245*	-0.00224	-0.000732
	(5.92)	(-0.61)	(-0.65)	(-0.45)	(-0.38)	(-0.25)	(-2.11)	(-2.13)	(-1.94)	(-0.63)
$(FCA^* > Median[FCA^*]) \times FCA^*$		0.0172***	0.0157***	0.0152***	0.0119***	0.0115***	0.0139***	0.0138***	0.0137***	0.0117***
		(7.29)	(7.38)	(7.34)	(5.92)	(5.89)	(6.80)	(6.82)	(6.75)	(6.05)
ρ_t			0.0848***	0.0848***	0.0843***	0.0843***	0.0820***	0.0820***	0.0821***	0.0840***
			(4.17)	(4.17)	(4.16)	(4.16)	(4.13)	(4.12)	(4.12)	(4.15)
ActiveHolder				0.00218*		0.00137	0.00142	0.00140	0.00112	0.000584
				(2.46)		(1.57)	(1.66)	(1.63)	(1.32)	(0.67)
SameGroup					0.0188***	0.0187***	0.0152***	0.0149***	0.0146***	0.0171***
					(4.82)	(4.79)	(5.06)	(4.92)	(4.62)	(4.51)
Samesize									0.0404**	0.0195***
									(3.07)	(3.84)
SameBookToMarket									0.00605*	0.00747**
									(2.11)	(2.74)
Constant	0.0135***	0.00621**	0.00555**	0.00528**	0.00472**	0.00454**	0.0395**	0.0458**	0.0316**	0.0128***
	(5.04)	(2.96)	(2.91)	(2.82)	(2.77)	(2.69)	(2.80)	(3.24)	(3.22)	(4.89)
Value	No	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	Yes	Yes	No
N	479796	479796	475383	475383	475383	475383	475383	475383	475383	475383
r2	0.000858	0.00118	0.0136	0.0137	0.0143	0.0144	0.0172	0.0177	0.0171	0.0151

t statistics in parentheses

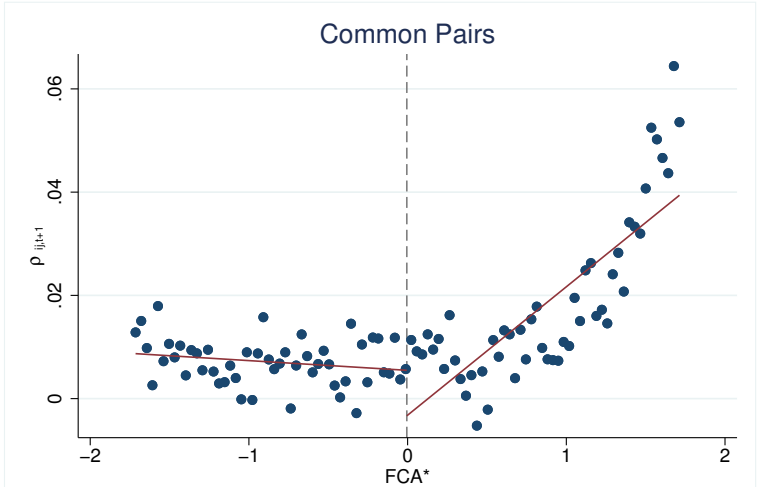
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4 Factor + Industry Future Correlation via *FCA**

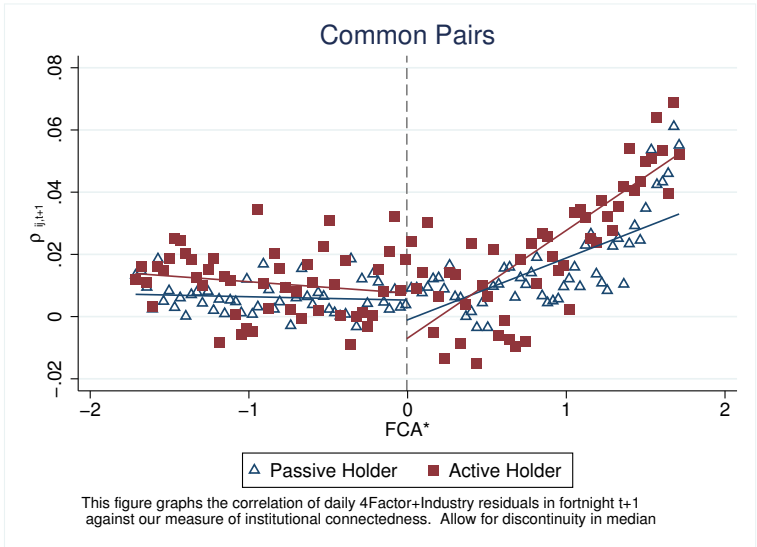
Normalized Rank Transformed for each cross section (Fortnightly)



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



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



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

Fama MacBeth Estimation

Fortnightly variables

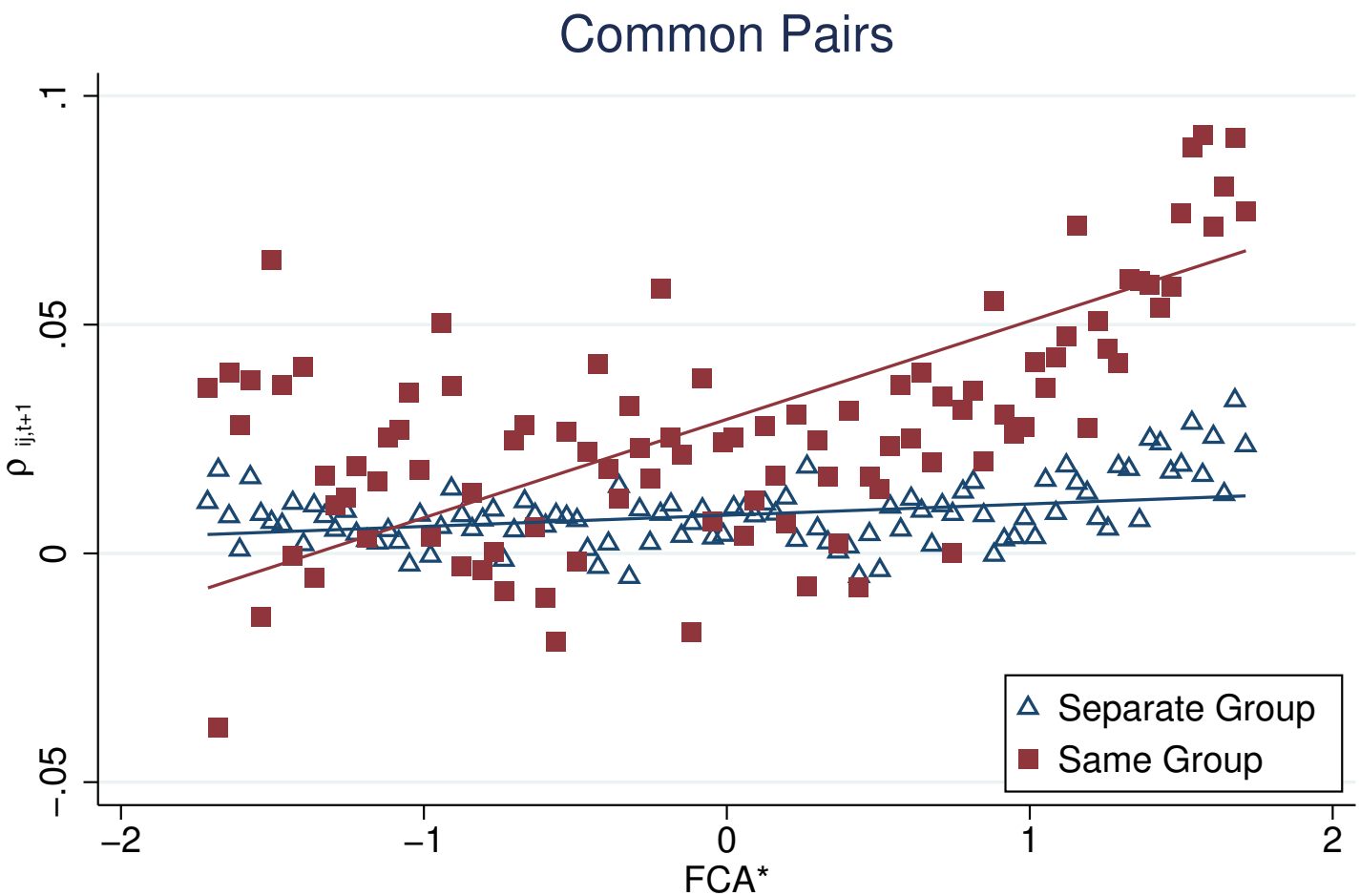
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FCA*	0.00801***	-0.00539***	-0.00523***	-0.00472***	-0.00456***	-0.00415***	-0.00619***	-0.00621***	-0.00596***	-0.00463***
	(7.07)	(-5.23)	(-5.14)	(-4.63)	(-4.46)	(-4.07)	(-5.99)	(-6.03)	(-5.85)	(-4.60)
(FCA* > *Median*[FCA*]) × FCA*		0.0268***	0.0251***	0.0238***	0.0193***	0.0182***	0.0203***	0.0202***	0.0201***	0.0183***
		(12.11)	(12.55)	(11.62)	(10.42)	(9.64)	(10.67)	(10.79)	(10.57)	(9.57)
ρ_t			0.0742***	0.0742***	0.0737***	0.0738***	0.0724***	0.0724***	0.0725***	0.0736***
			(5.11)	(5.11)	(5.07)	(5.07)	(5.03)	(5.03)	(5.04)	(5.07)
ActiveHolder				0.00589***		0.00481***	0.00469***	0.00468***	0.00430**	0.00385**
				(4.56)		(3.69)	(3.56)	(3.62)	(3.29)	(2.90)
SameGroup					0.0269***	0.0266***	0.0231***	0.0228***	0.0223***	0.0247***
					(7.47)	(7.39)	(6.96)	(6.77)	(6.63)	(6.89)
Samesize									0.0421***	0.0231***
									(4.27)	(5.48)
SameBookToMarket									0.00728**	0.00980***
									(2.68)	(4.75)
Constant	0.0128***	0.00122	0.00109	0.000509	0.000147	-0.000332	0.0309**	0.0390**	0.0256***	0.00972***
	(6.17)	(0.70)	(0.70)	(0.33)	(0.10)	(-0.23)	(3.10)	(3.30)	(3.69)	(4.41)
Value	No	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	Yes	Yes	No
N	1038309	1038309	1012967	1012967	1012967	1012967	1012967	1012967	1012967	1012967
r2	0.000614	0.00101	0.0130	0.0133	0.0139	0.0141	0.0164	0.0169	0.0163	0.0147

t statistics in parentheses

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

Future Correlation via *FCA**

4 Factor + Industry (by sgroup)



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

Fama MacBeth Estimation

Fortnightly variables for subset of Same Business Group

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.0214***	-0.0114*	-0.00976*	-0.0114**	-0.0113**	-0.0106*	-0.00768
	(10.83)	(-2.37)	(-2.33)	(-2.73)	(-2.71)	(-2.53)	(-1.76)
(FCA* > *Median*[FCA*]) × FCA*		0.0530***	0.0458***	0.0441***	0.0433***	0.0431***	0.0412***
		(6.55)	(6.59)	(6.19)	(6.06)	(6.03)	(5.69)
ActiveHolder			-0.00408	0.00549	0.00395	0.00221	-0.00665*
			(-1.23)	(1.64)	(1.16)	(0.64)	(-2.04)
Constant	0.0294***	0.00517	0.00577	0.0348	0.0723***	0.0411**	0.0283***
	(6.64)	(0.84)	(1.06)	(1.89)	(3.62)	(3.03)	(4.39)
Value	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	134932	134932	131364	131364	131364	131364	131364
r2	0.00321	0.00534	0.0399	0.0509	0.0550	0.0519	0.0442

t statistics in parentheses

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

Fama MacBeth Estimation

Fortnightly variables for subset of Different Business Group

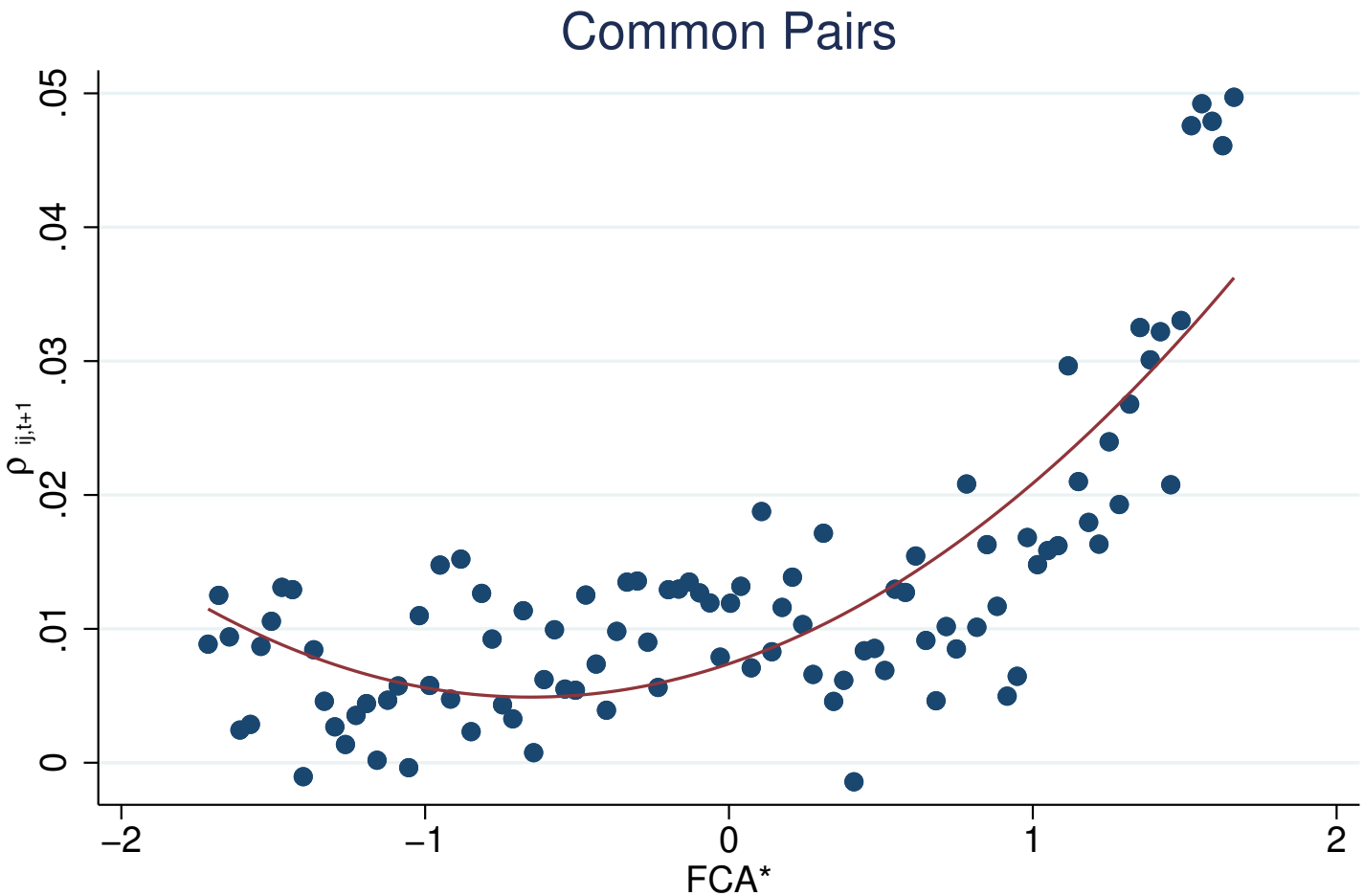
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.00276***	-0.00249*	-0.00202	-0.00427***	-0.00431***	-0.00404***	-0.00267*
	(3.37)	(-2.24)	(-1.85)	(-3.93)	(-4.00)	(-3.76)	(-2.51)
(FCA* > *Median*[FCA*]) × FCA*		0.0112***	0.00938***	0.0125***	0.0124***	0.0123***	0.00992***
		(5.99)	(5.23)	(6.44)	(6.54)	(6.33)	(5.45)
ActiveHolder			0.00683***	0.00581***	0.00596***	0.00547***	0.00595***
			(4.74)	(3.86)	(4.02)	(3.66)	(4.02)
Constant	0.00849***	0.00386*	0.00287	0.0328***	0.0399**	0.0255***	0.0105***
	(4.84)	(2.26)	(1.83)	(3.46)	(3.31)	(3.93)	(4.54)
Value	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	903377	903377	881603	881603	881603	881603	881603
r2	0.000270	0.000492	0.0105	0.0127	0.0133	0.0126	0.0111

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 (Monthly)



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

Fama MacBeth Estimation

Monthly variables

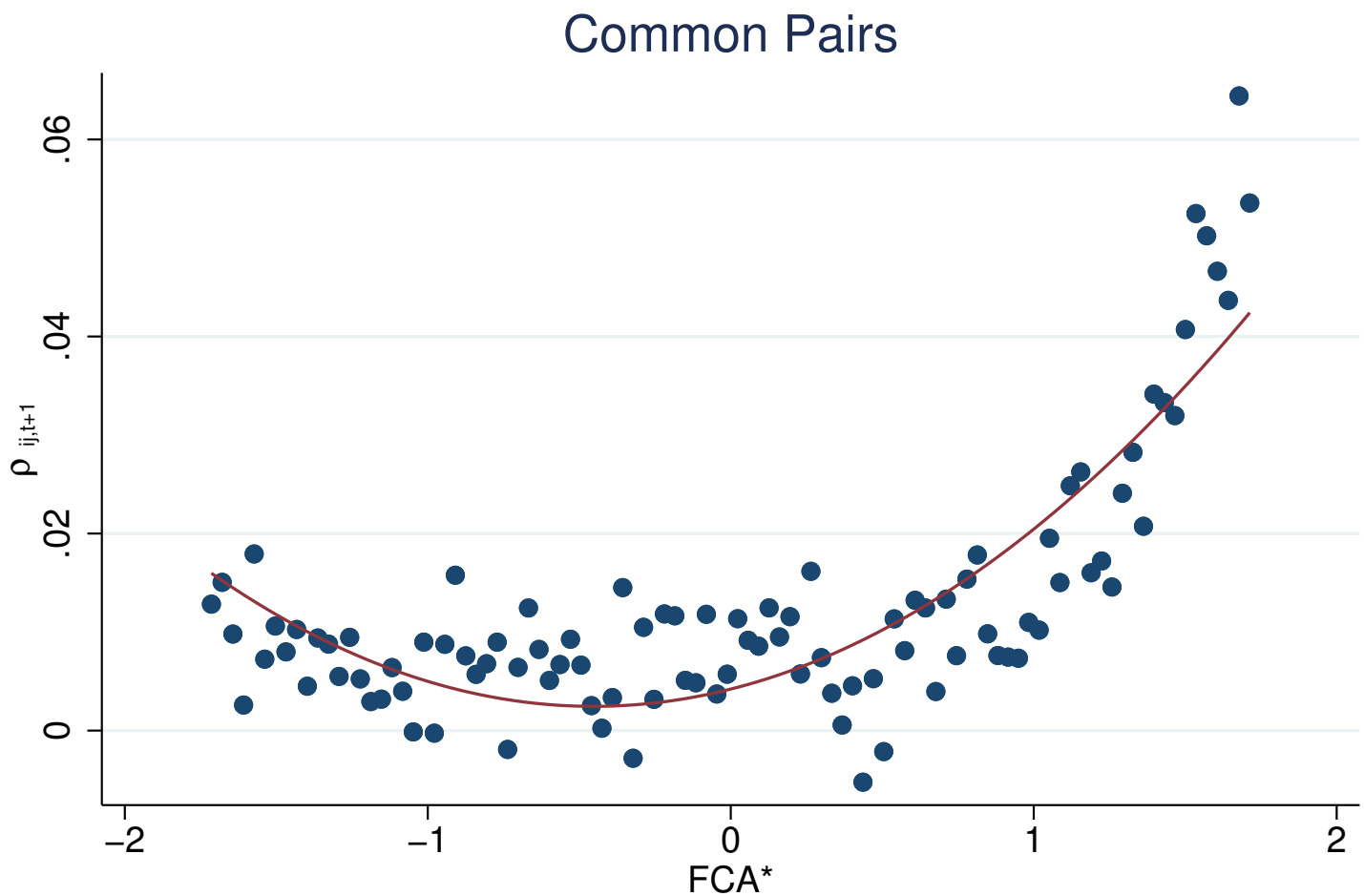
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.00764***	0.00796***	0.00718***	0.00462***	0.00457***	0.00476***	0.00526***
	(5.92)	(5.95)	(6.32)	(8.40)	(8.24)	(8.37)	(7.09)
FCA^{*2}		0.00583***	0.00536***	0.00463***	0.00460***	0.00458***	0.00415***
		(9.51)	(9.80)	(8.79)	(8.83)	(8.78)	(8.17)
ρ_t			0.0848***	0.0819***	0.0819***	0.0820***	0.0840***
			(4.17)	(4.12)	(4.12)	(4.12)	(4.15)
ActiveHolder				0.00115	0.00114	0.000856	0.000278
				(1.31)	(1.28)	(0.98)	(0.31)
SameGroup				0.0148***	0.0144***	0.0141***	0.0166***
				(4.86)	(4.73)	(4.44)	(4.36)
Samesize						0.0404**	0.0195***
						(3.07)	(3.83)
SameBookToMarket						0.00596*	0.00741**
						(2.08)	(2.72)
Constant	0.0135***	0.00791***	0.00706**	0.0411**	0.0473**	0.0331**	0.0139***
	(5.04)	(3.44)	(3.43)	(2.89)	(3.32)	(3.32)	(5.21)
Value	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	479796	479796	475383	475383	475383	475383	475383
r2	0.000858	0.00124	0.0137	0.0173	0.0177	0.0172	0.0152

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 (Fortnightly)



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

Fama MacBeth Estimation

Fortnightly variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.00801***	0.00802***	0.00719***	0.00404***	0.00398***	0.00415***	0.00458***
	(7.07)	(7.03)	(7.15)	(6.58)	(6.46)	(6.66)	(5.99)
FCA*^{2}		0.00852***	0.00766***	0.00640***	0.00637***	0.00633***	0.00594***
		(14.05)	(13.06)	(12.00)	(12.14)	(11.95)	(10.99)
ρ_t			0.0742***	0.0724***	0.0724***	0.0724***	0.0736***
			(5.10)	(5.03)	(5.03)	(5.03)	(5.06)
ActiveHolder			0.00535***	0.00433**	0.00433**	0.00395**	0.00347*
			(4.06)	(3.24)	(3.28)	(2.97)	(2.56)
SameGroup				0.0225***	0.0222***	0.0217***	0.0240***
				(6.80)	(6.62)	(6.47)	(6.73)
Samesize						0.0419***	0.0230***
						(4.26)	(5.46)
SameBookToMarket						0.00713**	0.00968***
						(2.63)	(4.72)
Constant	0.0128***	0.00432*	0.00326*	0.0334**	0.0415***	0.0280***	0.0118***
	(6.17)	(2.36)	(2.04)	(3.31)	(3.47)	(3.96)	(5.21)
Value	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	1038309	1038309	1012967	1012967	1012967	1012967	1012967
r2	0.000614	0.00107	0.0133	0.0164	0.0170	0.0164	0.0148

t statistics in parentheses

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

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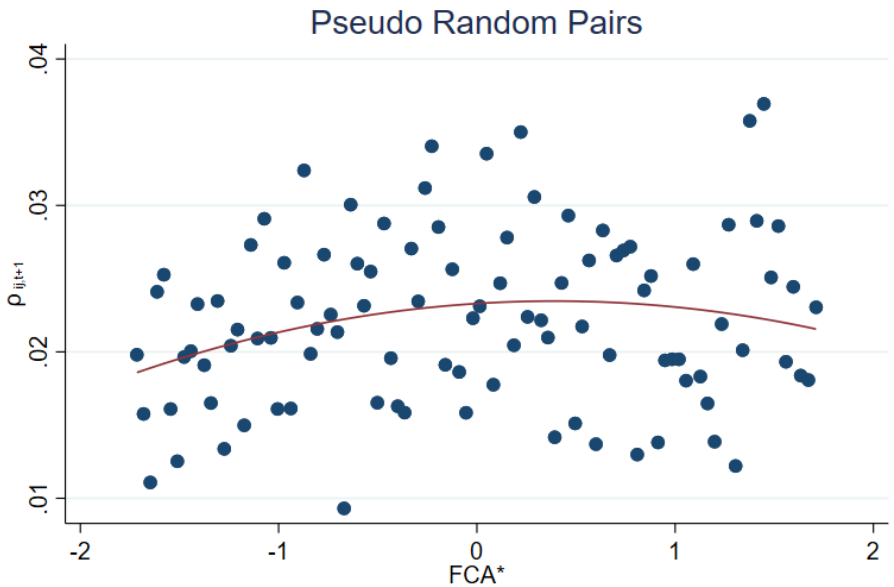
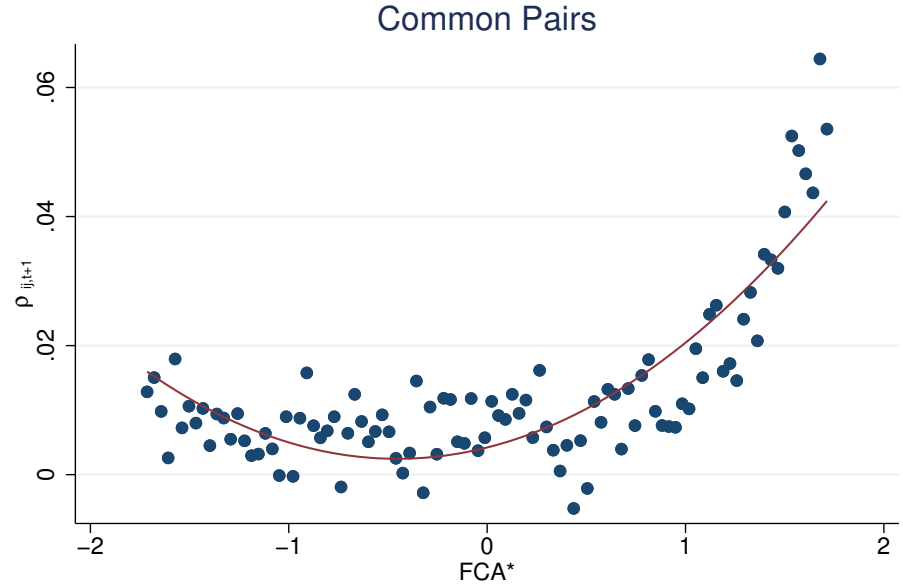
Random Pairs



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



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

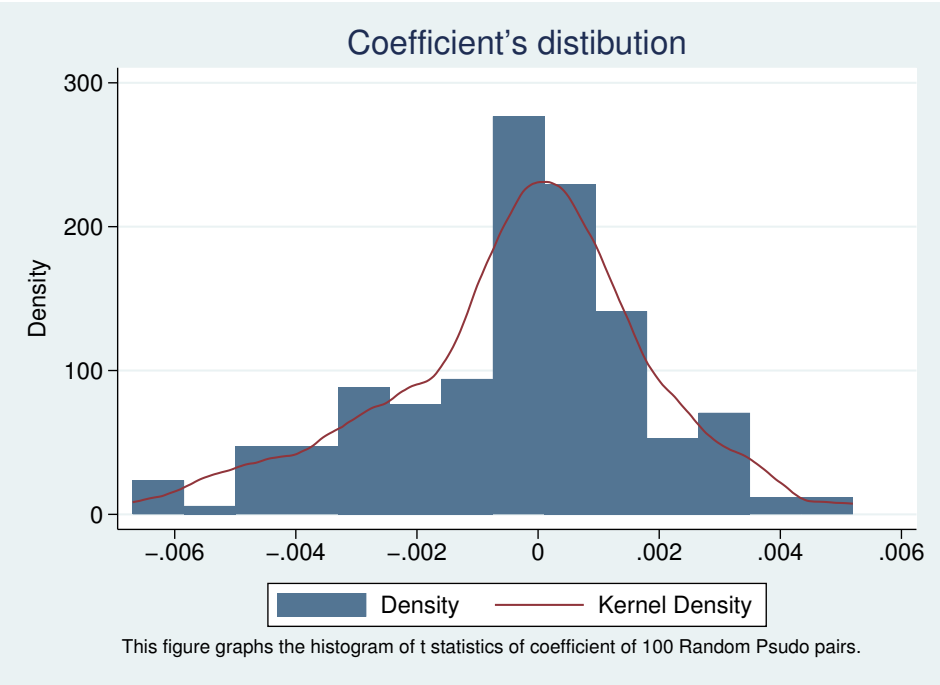
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.000606	0.00333**	0.00261**	0.00206*	0.00244*	0.00202*	0.00190
	(0.99)	(2.60)	(2.71)	(2.11)	(2.49)	(2.04)	(1.94)
(FCA* > *Median*[FCA*]) × FCA*		-0.00559*	-0.00427*	-0.00316	-0.00377*	-0.00314	-0.00274
		(-2.57)	(-2.56)	(-1.84)	(-2.19)	(-1.82)	(-1.63)
ActiveHolder			0.0000628	-0.000258	-0.000307	-0.000319	0.0000163
			(0.06)	(-0.23)	(-0.27)	(-0.28)	(0.01)
Constant	0.0219***	0.0243***	0.0173***	0.0666***	0.121***	0.0508***	0.0299***
	(5.27)	(5.75)	(6.82)	(11.33)	(18.46)	(10.35)	(8.12)
Main	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	1105543	1105543	1067554	1067554	1067554	1067554	1067554
r2	0.000237	0.000448	0.223	0.227	0.228	0.226	0.225

t statistics in parentheses

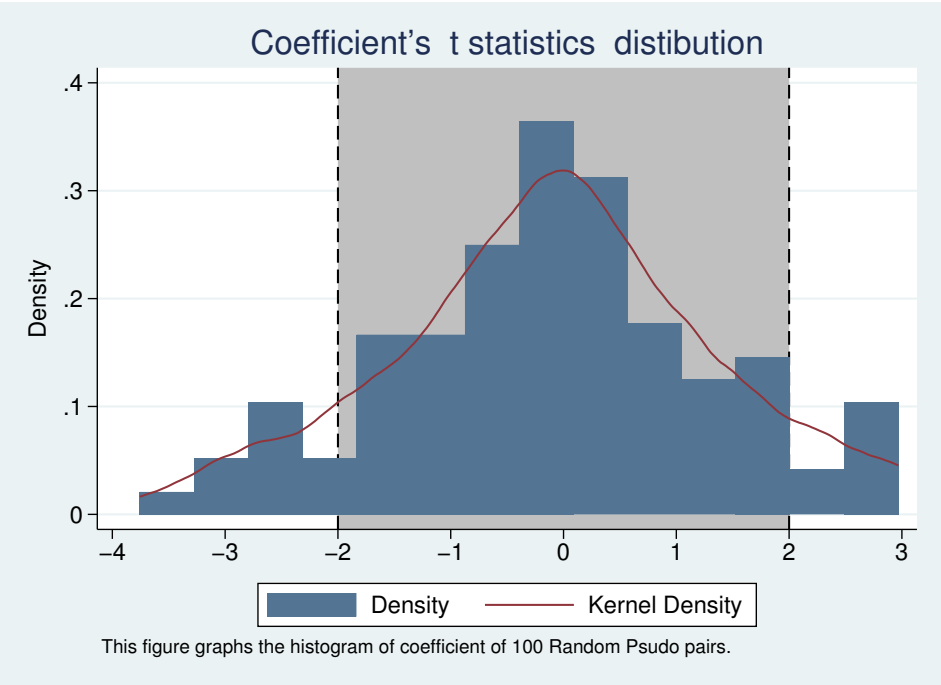
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Random Pairs

$$(\text{FCA}^* > \textit{Median}[\text{FCA}^*]) \times \text{FCA}^*$$

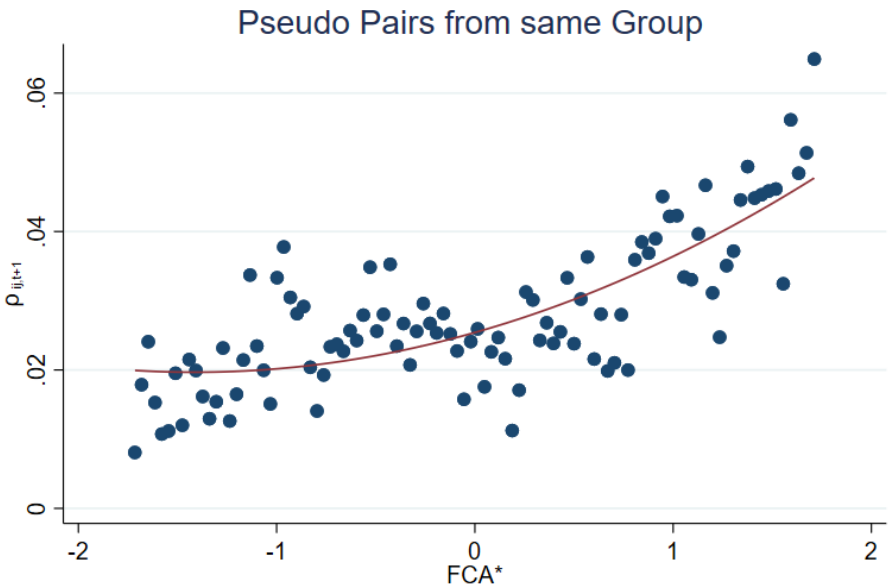


This figure graphs the histogram of t statistics of coefficient of 100 Random Psudo pairs.

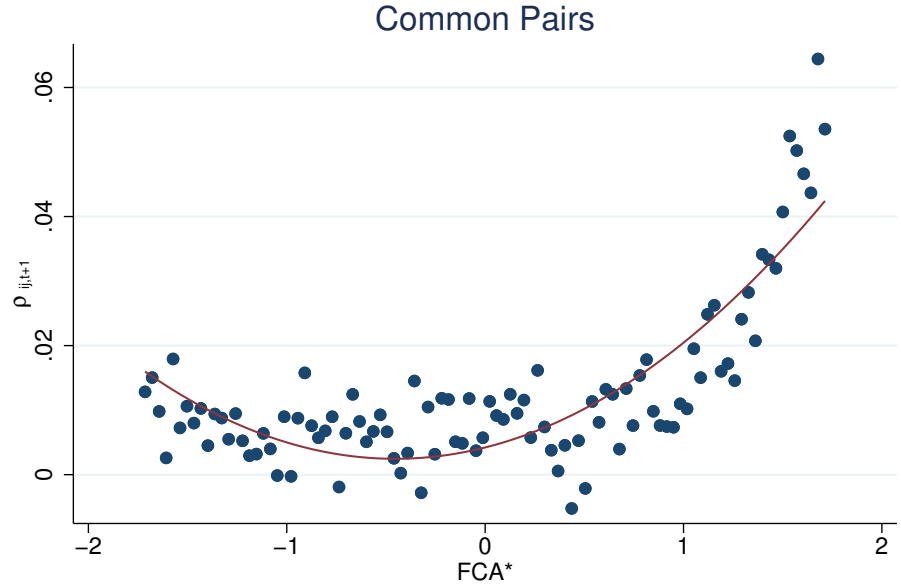


This figure graphs the histogram of coefficient of 100 Random Psudo pairs.

Random Pairs from Same Business Group



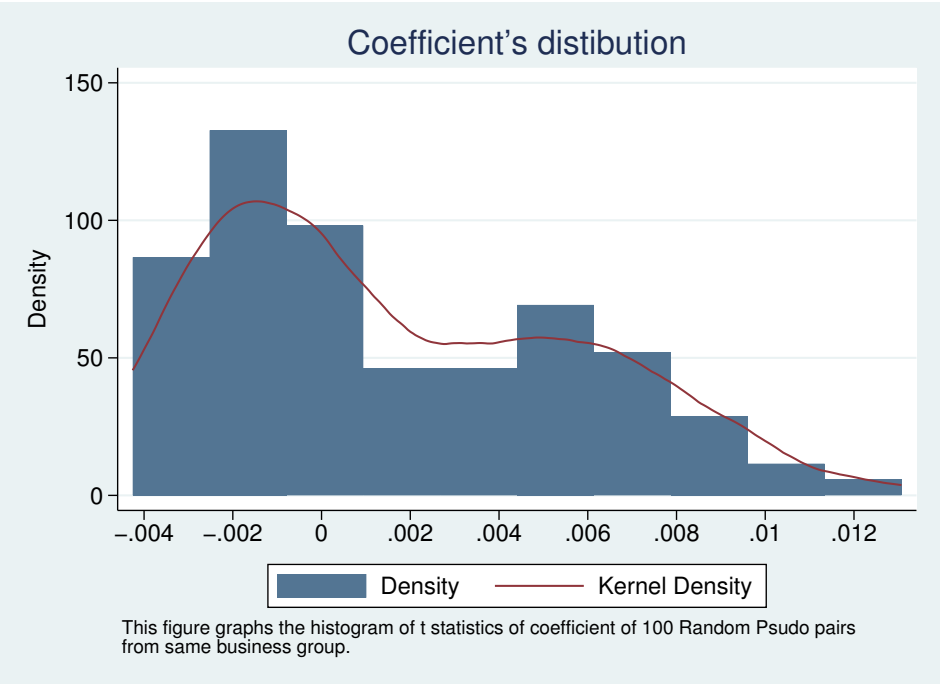
This figure graphs the correlation of daily 4Factor+Industry residuals in fortnight t+1 against normalized rank transformed of our measure of institutional connectedness.



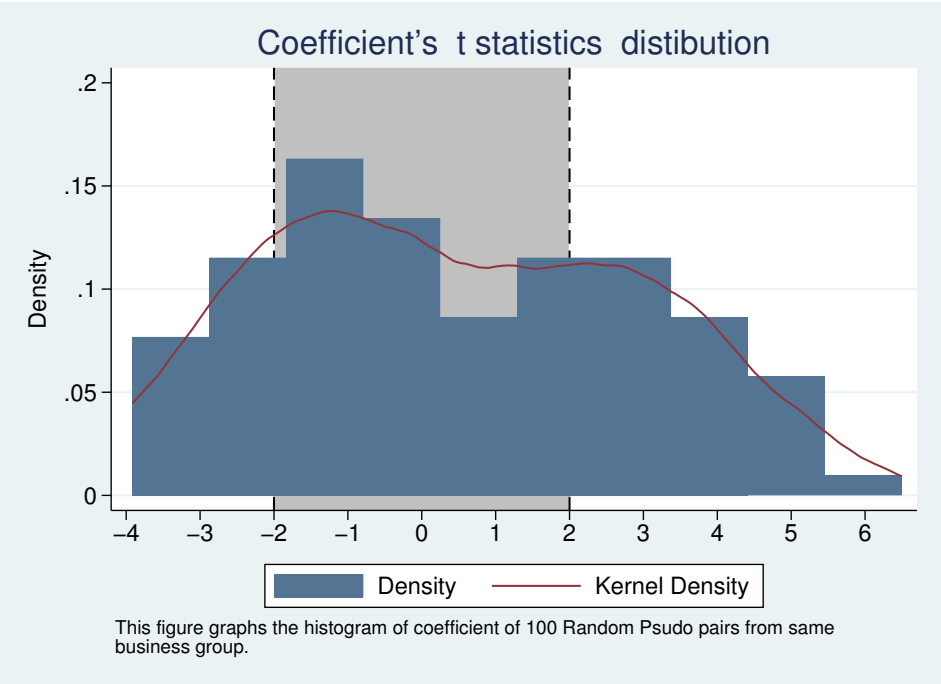
This figure graphs the correlation of daily 4Factor+Industry residuals in fortnight t+1 against our measure of institutional connectedness.

Random Pairs from Same Business Group

$$(\text{FCA}^* > \textit{Median}[\text{FCA}^*]) \times \text{FCA}^*$$



This figure graphs the histogram of t statistics of coefficient of 100 Random Psudo pairs from same business group.



This figure graphs the histogram of coefficient of 100 Random Psudo pairs from same business group.

Fama MacBeth Estimation for pseudo pairs

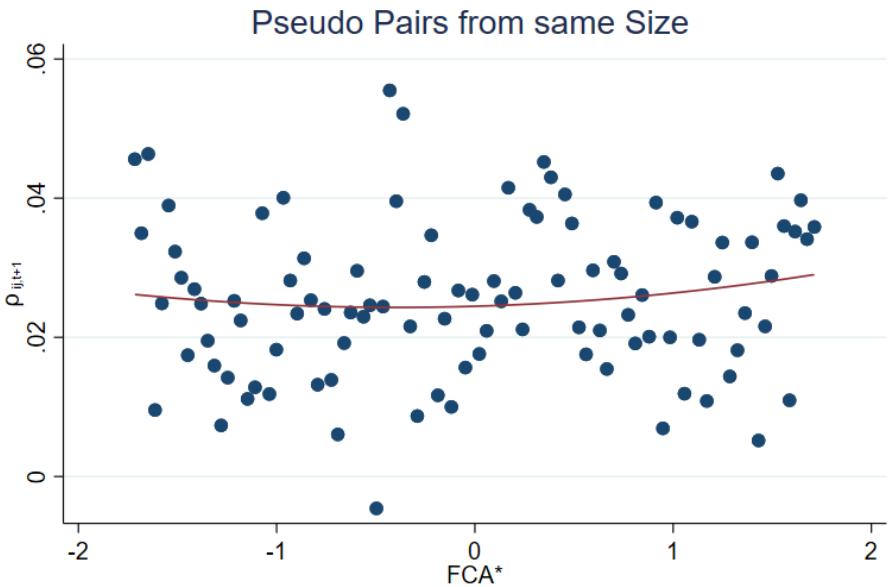
Fortnightly variables for Random group from Same Business Group

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.00808***	0.00365*	0.00230	-0.000386	-0.000628	-0.000128	0.000500
	(10.59)	(2.37)	(1.88)	(-0.31)	(-0.50)	(-0.11)	(0.42)
(FCA* > *Median*[FCA*]) × FCA*		0.00932**	0.00691**	0.000962	0.00104	-0.000242	-0.00233
		(3.24)	(3.18)	(0.46)	(0.49)	(-0.12)	(-1.18)
ActiveHolder			0.00648***	0.00223	0.0000493	0.00285*	0.00325**
			(5.09)	(1.87)	(0.04)	(2.52)	(2.86)
Constant	0.0288***	0.0248***	0.0160***	0.115***	0.232***	0.0821***	0.0418***
	(8.08)	(6.62)	(6.88)	(15.79)	(26.40)	(14.10)	(11.86)
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	0.000796	0.226	0.235	0.240	0.234	0.231

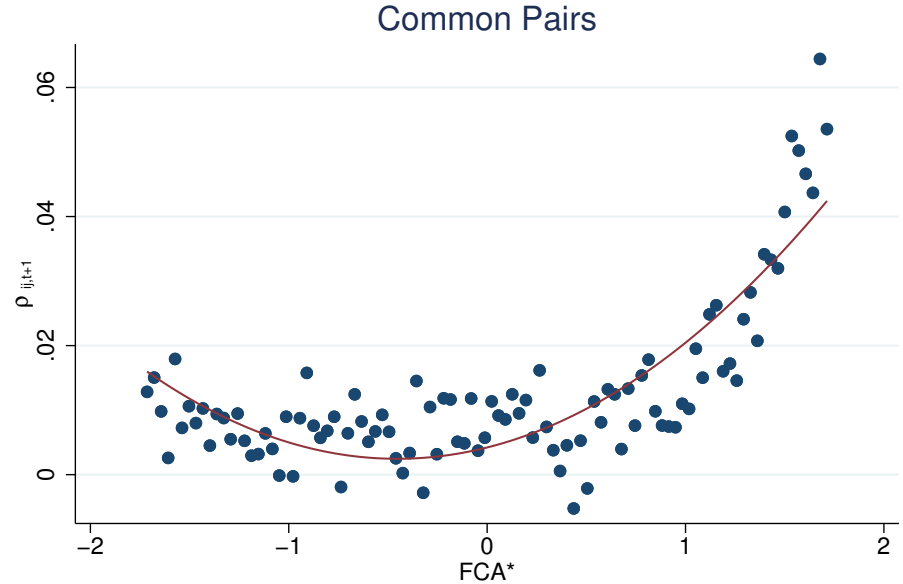
t statistics in parentheses

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

Random Pairs from Same Size



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



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 Pseudo group from Same Size

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.000524	-0.00205	-0.00126	-0.00335	-0.000312	-0.00314	-0.00114
	(0.47)	(-0.68)	(-0.61)	(-1.71)	(-0.17)	(-1.61)	(-0.55)
(FCA* > *Median*[FCA*]) × FCA*		0.00510	0.00375	0.000580	-0.00431	0.00113	0.000589
		(0.99)	(1.04)	(0.17)	(-1.26)	(0.33)	(0.17)
ActiveHolder			-0.00180	0.00129	0.00294	0.0000404	-0.00154
			(-0.69)	(0.53)	(1.18)	(0.02)	(-0.60)
Constant	0.0240***	0.0217***	0.0167***	0.116***	0.255***	0.0792***	0.0347***
	(8.56)	(5.65)	(6.25)	(14.36)	(19.32)	(11.49)	(9.81)
Main	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	442279	442279	426218	426218	426218	426218	426218
r2	0.000653	0.00125	0.224	0.238	0.243	0.236	0.232

t statistics in parentheses

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

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