Connected Stocks: Evidence from Tehran Stock Exchange

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Motivation

Research Question

- **Can common ownership cause stock return comovement** ?
  - We connect stocks through common ownership by blockholde 
  - 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

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Main

- 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))

Papers' Detail

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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

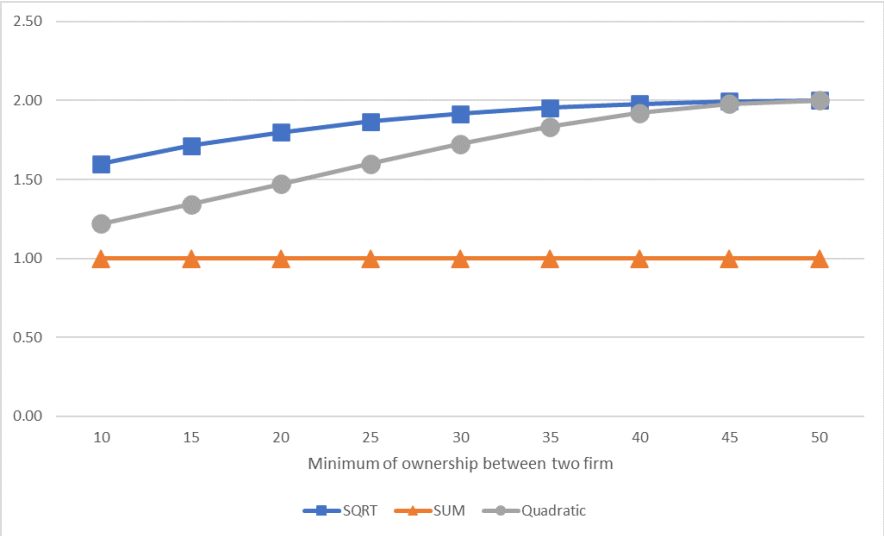
$$[\frac{\sum_{f=1}^{n}\sqrt{\alpha/n}+\sum_{f=1}^{n}\sqrt{\alpha/n}}{\sqrt{\alpha}+\sqrt{\alpha}}]^2 = [\frac{2n\sqrt{\alpha/n}}{2\sqrt{\alpha}}]^2 = n$$

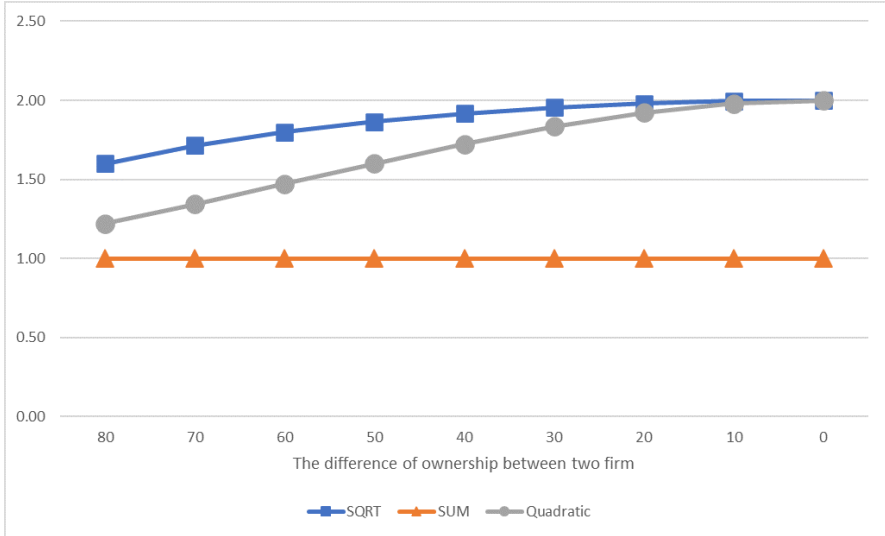
  - Quadratic

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

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	median	max
Daily	1362	3561	1447	3519	4872
Fortnightly	153	4161	2626	4101	5397
Monthly	69	4397	3010	4247	5485

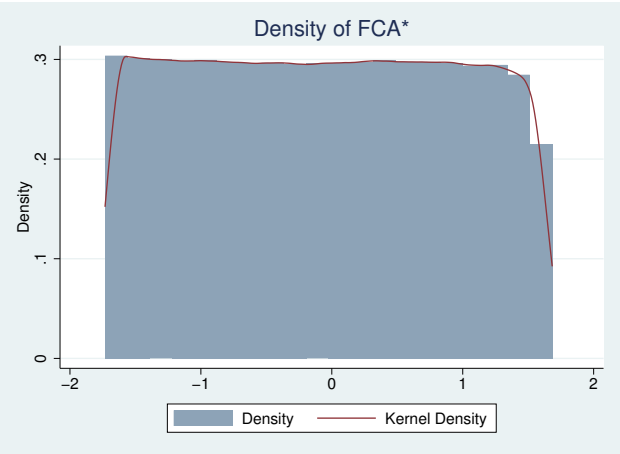
Year	2015	2016	2017	2018	2019	2020	Mean
Pairs	4259	5295	6258	6766	6780	4873	5605
Stocks	234	256	311	333	335	335	301

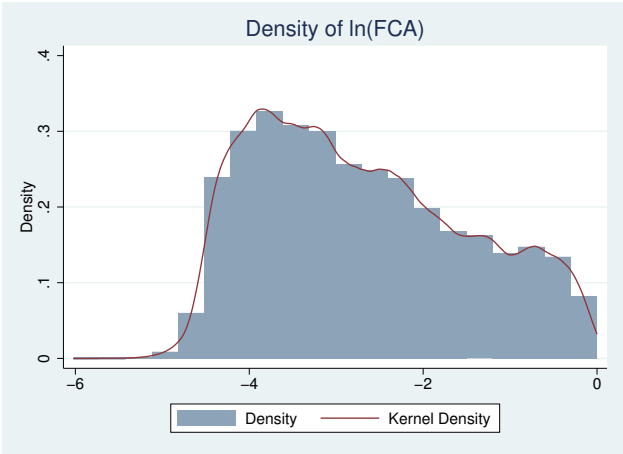
Frequency	variable	count	mean	std	min	median	max
Monthly	FCA	303419	0.168	0.269	0.002	0.059	4.342
	FCAP	303419	0.142	0.190	0.002	0.054	0.999
	FCA*	303419	-0.021	0.993	-1.732	-0.023	1.732
	FCAP*	303419	-0.020	0.993	-1.732	-0.021	1.732

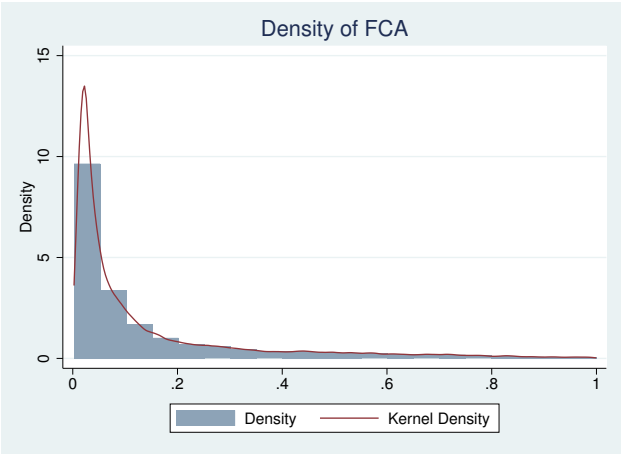
Variables which we denote with * are rank-transformed and normalized to have unit standard deviation

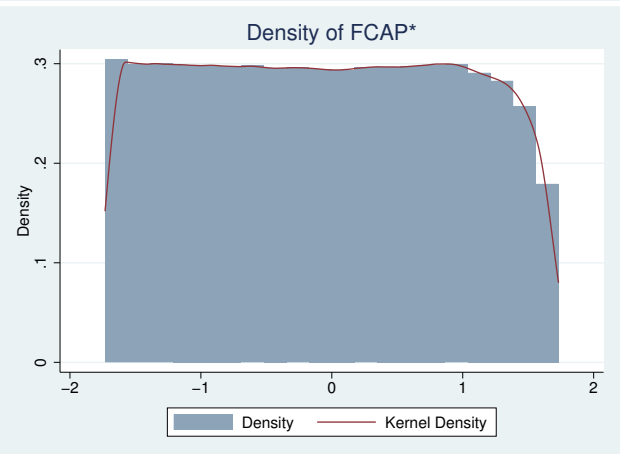
FCA vs. FCAP Distributions

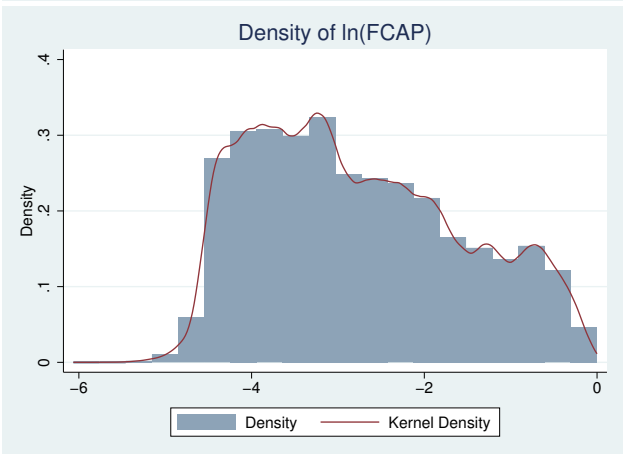
Monthly

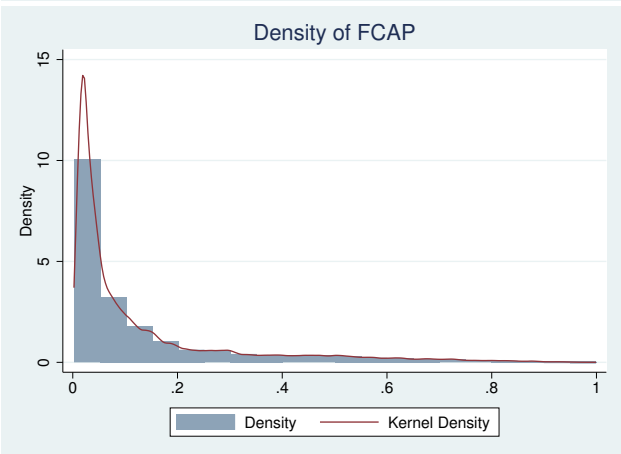












Fortnightly

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
Monthly2	292895	0.016	0.327	-1	-0.19	0.01	0.22	1
Monthly4	292895	0.057	0.345	-1	-0.17	0.05	0.28	1
Monthly5	292895	0.015	0.326	-1	-0.19	0.01	0.22	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)
- **SameIndustry** : Dummy variable for whether the two stocks belong to same Industry.
- **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

Monthly

Type of Pairs	Yes	No
SameIndustry	1142	9125
	(11.1%)	(88.9%)
SameGroup	1173	9094
	(11.4%)	(88.6%)
ActiveHolder	2819	7448
	(27.5%)	(72.5%)

Variable	count	mean	std	min	25%	50%	75%	max
Size1	303419	0.75	0.22	0.01	0.60	0.81	0.93	1
Size2	303419	0.47	0.26	0.00	0.26	0.44	0.66	1.00
SameSize	303419	-0.28	0.22	-0.99	-0.42	-0.24	-0.10	0.00
BookToMarket1	303419	0.52	0.27	0.00	0.31	0.54	0.74	1.00
BookToMarket2	303419	0.50	0.25	0.00	0.29	0.49	0.70	1.00
SameBookToMarket	303419	-0.30	0.21	-1.00	-0.43	-0.25	-0.12	0.00

Fortnightly

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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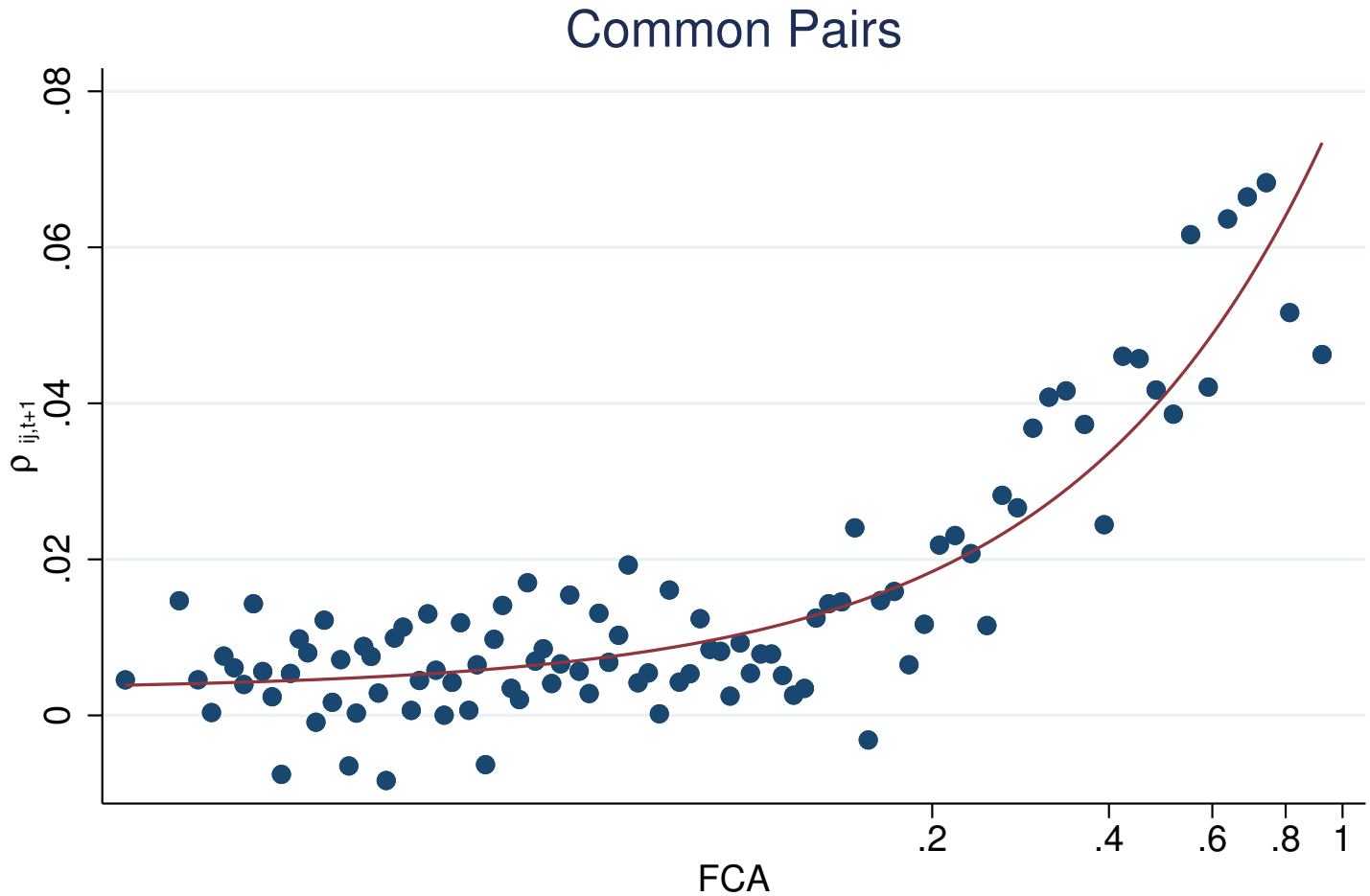
Future Correlation via *FCA*

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)	(10)
ln(*FCA*)	0.0107***	0.00890***	0.00892***	0.00510***	0.00490***	0.00388***	0.00301***	0.00301***	0.00312***	0.00334***
	(7.17)	(9.13)	(8.94)	(5.07)	(4.98)	(4.75)	(4.49)	(4.47)	(4.52)	(4.40)
ρ_t		0.145***	0.145***	0.144***	0.144***	0.143***	0.141***	0.141***	0.141***	0.143***
		(6.36)	(6.36)	(6.30)	(6.30)	(6.35)	(6.51)	(6.50)	(6.48)	(6.37)
ActiveHolder			0.00606***			0.00405*	0.00239	0.00245	0.00191	0.00262
			(3.63)			(2.46)	(1.31)	(1.36)	(1.05)	(1.53)
SameGroup				0.0273***	0.0268***	0.0210***	0.0186***	0.0185***	0.0189***	0.0222***
				(9.78)	(9.76)	(6.86)	(5.36)	(5.35)	(5.49)	(7.67)
SamePosition					0.00624**	0.00631**	0.00625**	0.00629**	0.00665**	0.00619**
					(3.03)	(3.02)	(3.08)	(3.25)	(3.07)	(2.91)
SameIndustry						0.0210***	0.0173***	0.0170***	0.0165***	0.0191***
						(4.42)	(4.76)	(4.53)	(4.36)	(4.14)
Samesize									0.0417**	0.0232***
									(3.20)	(3.98)
SameBookToMarket									0.00779*	0.00866**
									(2.50)	(2.97)
Constant	0.0456***	0.0362***	0.0347***	0.0217***	0.0207***	0.0147***	0.0458**	0.0539***	0.0403***	0.0228***
	(5.63)	(8.51)	(8.34)	(5.27)	(5.24)	(4.90)	(3.21)	(3.46)	(3.79)	(6.16)
Value	No	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	Yes	Yes	No
N	287509	286678	286678	286678	286678	286678	286678	286678	286678	286678
r2	0.00211	0.0380	0.0383	0.0391	0.0394	0.0410	0.0444	0.0453	0.0442	0.0421

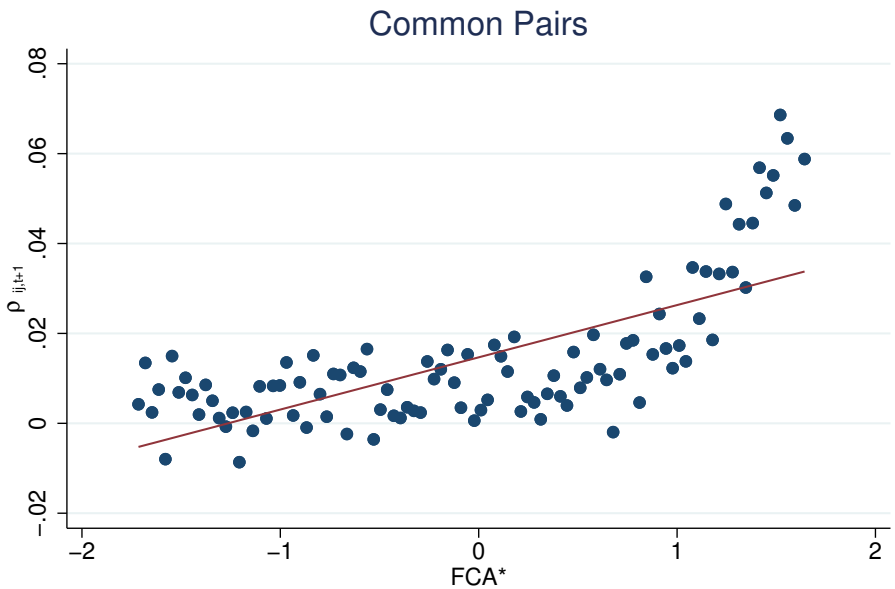
t statistics in parentheses

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

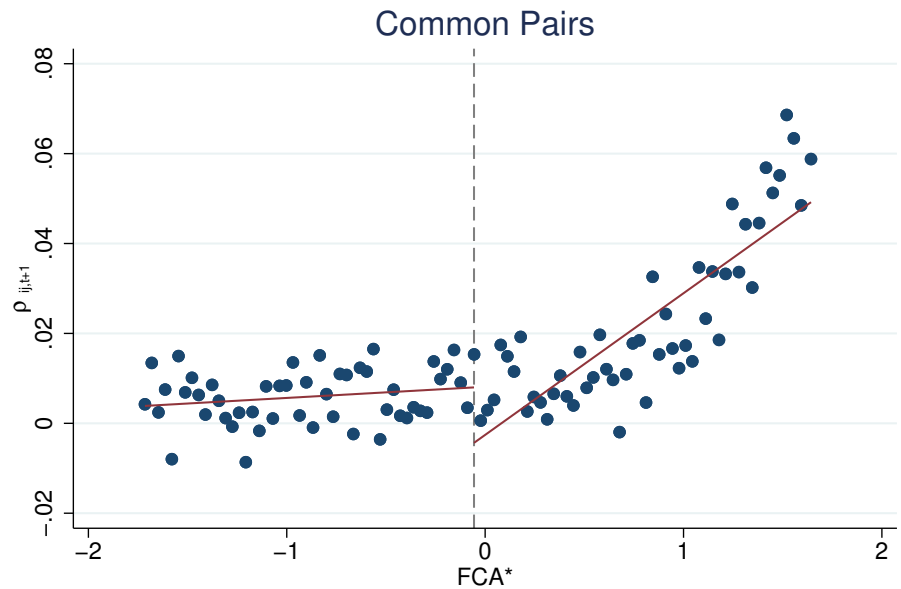
Fortnightly

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

Fortnightly

Fama MacBeth Estimation

Monthly variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FCA*	0.0122***	-0.00227	-0.00208	-0.00171	-0.000828	-0.000728	-0.000365	-0.00196	-0.00201	-0.00192	-0.00108
	(6.13)	(-1.51)	(-1.53)	(-1.32)	(-0.67)	(-0.60)	(-0.32)	(-1.79)	(-1.84)	(-1.75)	(-1.02)
(FCA* > *Median*[FCA*]) × FCA*		0.0302***	0.0253***	0.0246***	0.0145***	0.0138***	0.0131***	0.0115***	0.0117***	0.0118***	0.0105***
		(7.27)	(7.68)	(7.79)	(4.50)	(4.50)	(4.45)	(4.82)	(4.81)	(4.73)	(4.11)
ρ_t			0.145***	0.145***	0.144***	0.144***	0.144***	0.141***	0.141***	0.141***	0.143***
			(6.36)	(6.36)	(6.31)	(6.31)	(6.31)	(6.51)	(6.51)	(6.49)	(6.38)
ActiveHolder				0.00496**			0.00490**	0.00187	0.00189	0.00137	0.00216
				(3.01)			(2.94)	(1.02)	(1.05)	(0.75)	(1.26)
SameGroup					0.0255***	0.0251***	0.0252***	0.0172***	0.0170***	0.0174***	0.0211***
					(9.22)	(9.15)	(9.18)	(4.77)	(4.75)	(4.86)	(7.16)
SamePosition						0.00561**	0.00568**	0.00566**	0.00572**	0.00607**	0.00571**
						(2.89)	(2.89)	(2.89)	(3.07)	(2.92)	(2.81)
SameIndustry								0.0170***	0.0166***	0.0162***	0.0189***
								(4.72)	(4.48)	(4.33)	(4.15)
Samesize										0.0422**	0.0233***
										(3.25)	(3.99)
SameBookToMarket										0.00768*	0.00853**
										(2.46)	(2.92)
Constant	0.0178***	0.00513	0.00224	0.00127	0.00267	0.00249	0.00153	0.0343*	0.0419**	0.0281**	0.0100***
	(3.80)	(1.44)	(1.52)	(0.86)	(1.95)	(1.87)	(1.14)	(2.54)	(2.78)	(2.90)	(4.39)
Value	No	No	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	No	Yes	Yes	No
N	287509	287509	286678	286678	286678	286678	286678	286678	286678	286678	286678
r2	0.00184	0.00268	0.0384	0.0387	0.0394	0.0397	0.0400	0.0447	0.0456	0.0445	0.0423

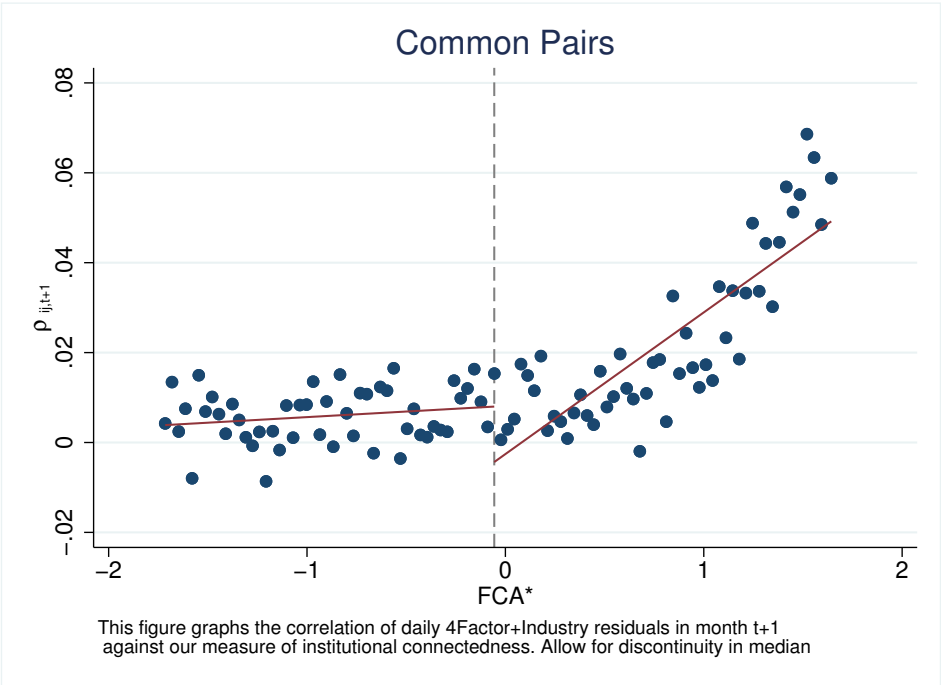
t statistics in parentheses

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

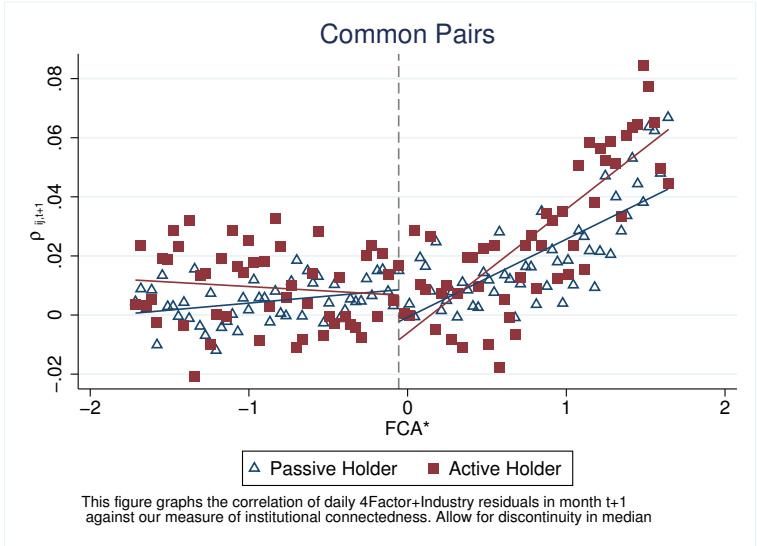
Fortnightly

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. Allow for discontinuity in median



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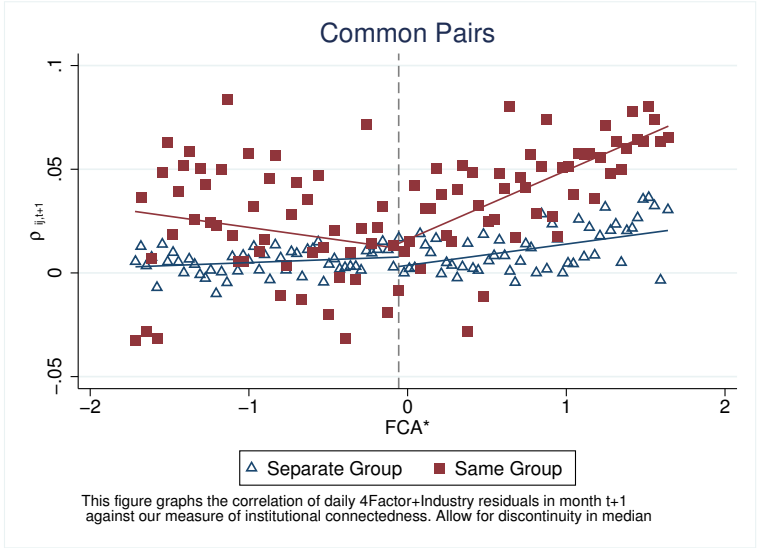


This figure graphs the correlation of daily 4Factor+Industry residuals in month t+1 against our measure of institutional connectedness. Allow for discontinuity in median

Fama MacBeth Estimation

Monthly variables

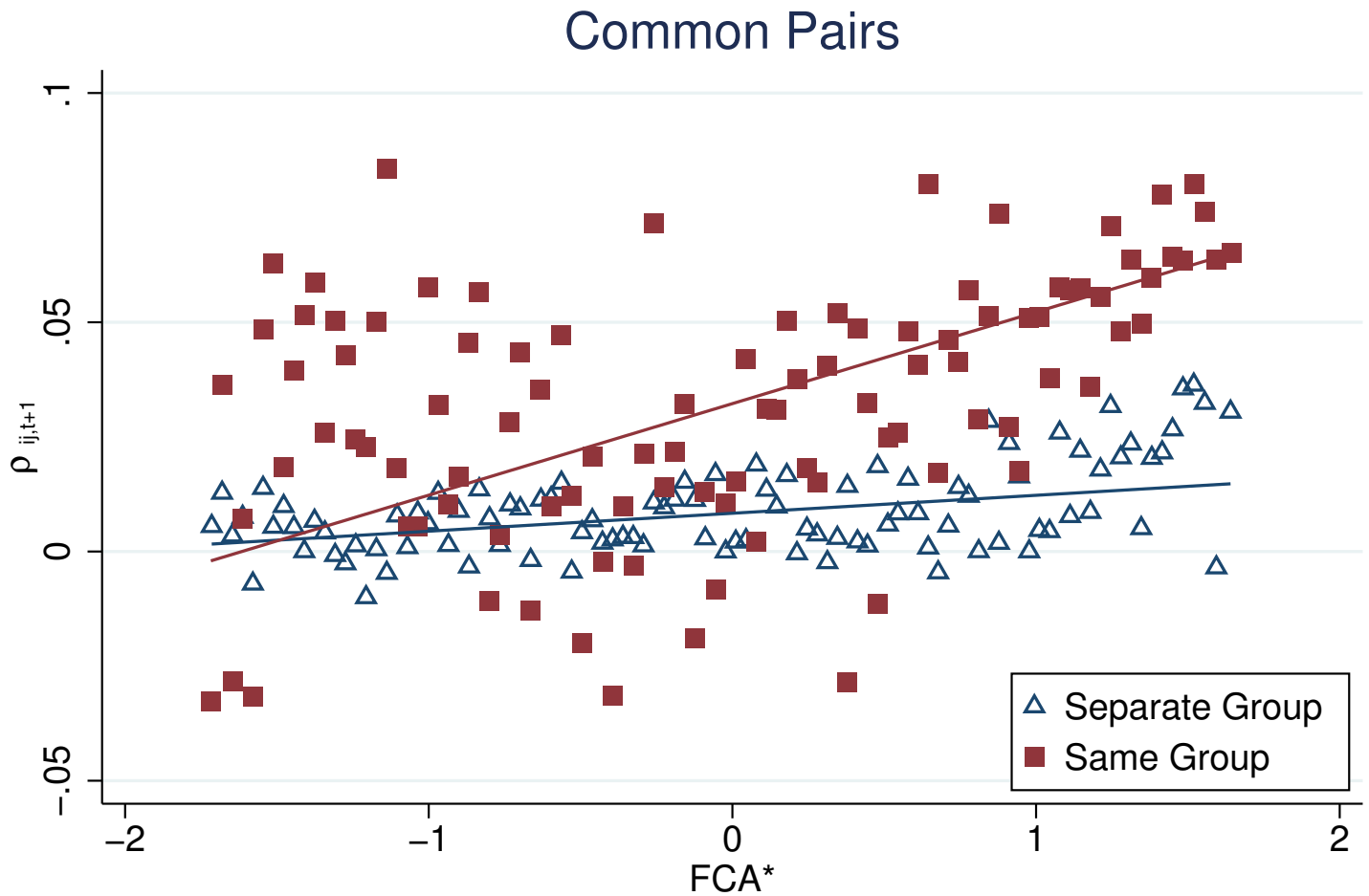
	(1)	(2)
FCA*	-0.000905	-0.00225
	(-0.74)	(-1.79)
$(FCA^* > Median[FCA^*]) \times FCA^*$	0.00784***	0.0102***
	(3.68)	(4.53)
ActiveHolder	0.00133	0.000252
	(0.84)	(0.15)
$(FCA^* > Median[FCA^*]) \times$ Same Position	0.00129	0.00295
	(0.47)	(1.08)
SameGroup	0.00834	0.00423
	(1.78)	(1.01)
$(FCA^* > Median[FCA^*]) \times$ SameGroup	0.0151***	0.0132**
	(3.88)	(3.29)
SameGroup × SamePosition	0.0130*	0.0116*
	(2.54)	(2.34)
SameGroup × PositionDifference	-0.00115	0.00219
	(-0.22)	(0.49)
ρ_t	0.143***	0.141***
	(6.39)	(6.51)
Constant	0.0111***	0.0424**
	(4.60)	(2.77)
Value	No	Yes
Interaction	No	Yes
N	286678	286678
r2	0.0433	0.0465

t statistics in parentheses

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

Future Correlation via *FCA**

4 Factor + Industry (by Business Group)



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

Fama MacBeth Estimation

Monthly variables for subset of Same Business Group

	(1)	(2)	(3)	(4)	(5)	(6)
FCA*	0.0115	-0.0154	0.0105***	0.00120	0.00899***	-0.000541
	(1.69)	(-1.31)	(4.45)	(0.22)	(4.63)	(-0.10)
$(FCA^* > Median[FCA^*]) \times FCA^*$		0.0407***		0.0147		0.0151
		(3.59)		(1.60)		(1.85)
ActiveHolder			0.0191*	0.0184*	0.0208**	0.0200**
			(2.61)	(2.47)	(2.88)	(2.75)
SamePosition			0.00880*	0.00741	0.00573	0.00433
			(2.05)	(1.79)	(1.47)	(1.12)
SameIndustry			0.0255***	0.0254***	0.0251***	0.0250***
			(5.39)	(5.38)	(4.95)	(4.94)
Samesize			0.0353**	0.0337**		
			(3.01)	(2.94)		
SameBookToMarket			0.0494***	0.0490***		
			(5.31)	(5.17)		
Constant	0.0360***	0.0186**	0.0343***	0.0274***	0.0870***	0.0798***
	(5.68)	(3.31)	(6.74)	(4.45)	(4.55)	(4.28)
Value	No	No	No	No	Yes	Yes
Interaction	No	No	No	No	Yes	Yes
N	45005	45005	44876	44876	44876	44876
r2	0.00927	0.0117	0.0814	0.0832	0.0920	0.0937

t statistics in parentheses

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

Fama MacBeth Estimation

Monthly variables for subset of Different Business Group

	(1)	(2)	(3)	(4)	(5)	(6)
FCA*	0.00696*	-0.000943	0.00246**	0.000319	0.00222**	-0.000844
	(2.04)	(-0.50)	(2.77)	(0.28)	(2.74)	(-0.75)
$(FCA^* > Median[FCA^*]) \times FCA^*$		0.0203		0.00530*		0.00772**
		(1.61)		(2.40)		(2.99)
ActiveHolder			-0.00115	-0.00133	-0.00224	-0.00252
			(-0.98)	(-1.15)	(-1.75)	(-1.98)
SamePosition			0.00119	0.00101	0.00316	0.00298
			(0.53)	(0.45)	(1.37)	(1.28)
SameIndustry			0.0141*	0.0138*	0.0115*	0.0110*
			(2.57)	(2.53)	(2.43)	(2.33)
Samesize			0.0215***	0.0215***		
			(4.12)	(4.12)		
SameBookToMarket			0.000514	0.000506		
			(0.18)	(0.18)		
Constant	0.0123*	0.00584**	0.0125***	0.0106***	0.0322*	0.0296*
	(2.54)	(3.02)	(5.69)	(4.61)	(2.22)	(2.05)
Value	No	No	No	No	Yes	Yes
Interaction	No	No	No	No	Yes	Yes
N	242504	242504	241802	241802	241802	241802
r2	0.00123	0.00227	0.0349	0.0351	0.0380	0.0383

t statistics in parentheses

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

Fortnightly

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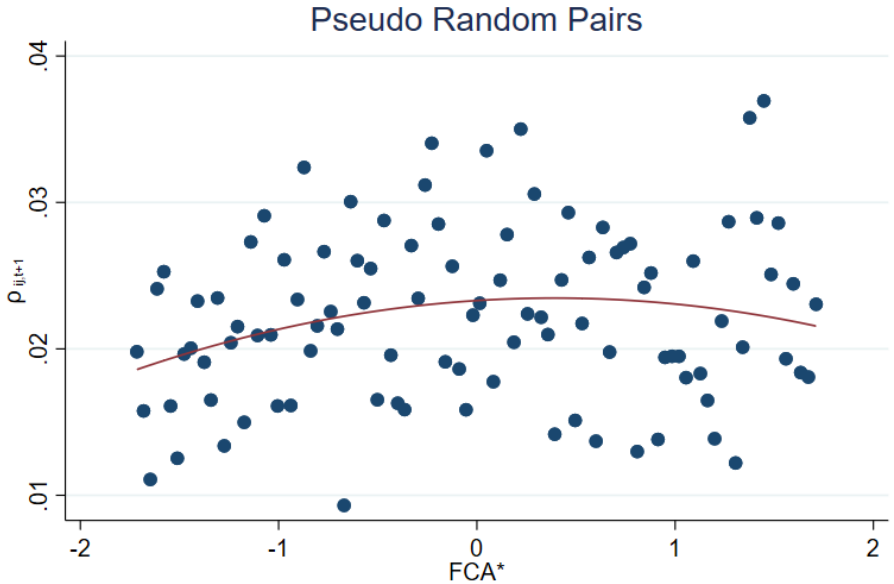
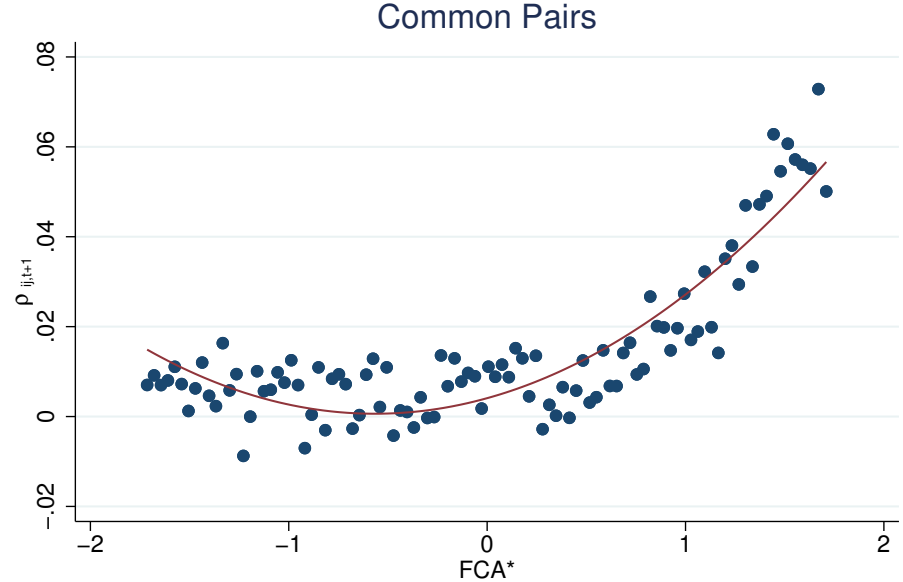
Random Pairs



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

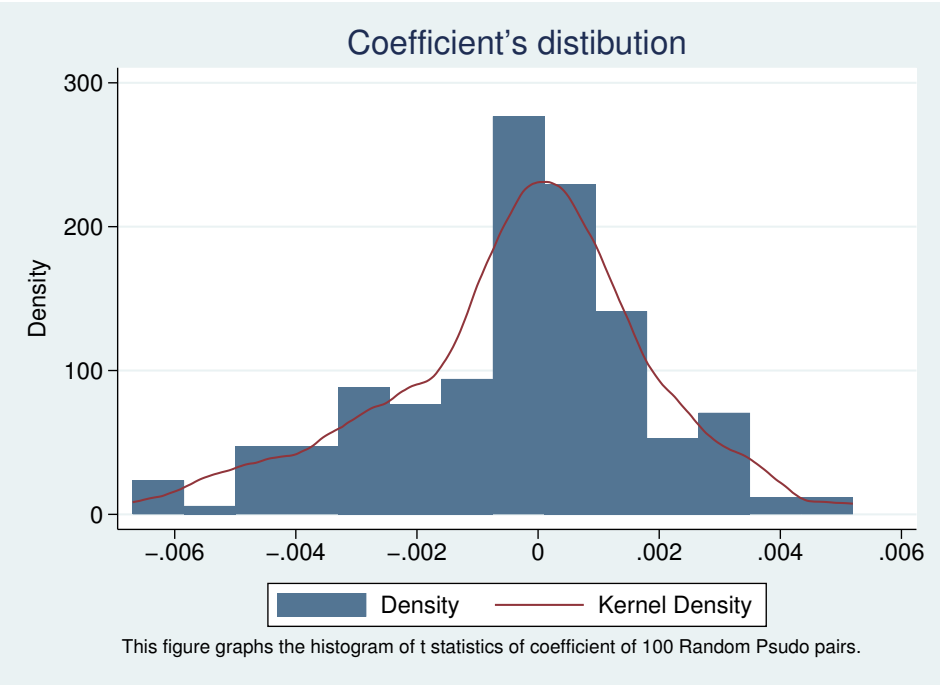
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.000606	0.00333**	0.00261**	0.00206*	0.00244*	0.00202*	0.00190
	(0.99)	(2.60)	(2.71)	(2.11)	(2.49)	(2.04)	(1.94)
(FCA* > *Median*[FCA*]) × FCA*		-0.00559*	-0.00427*	-0.00316	-0.00377*	-0.00314	-0.00274
		(-2.57)	(-2.56)	(-1.84)	(-2.19)	(-1.82)	(-1.63)
ActiveHolder			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

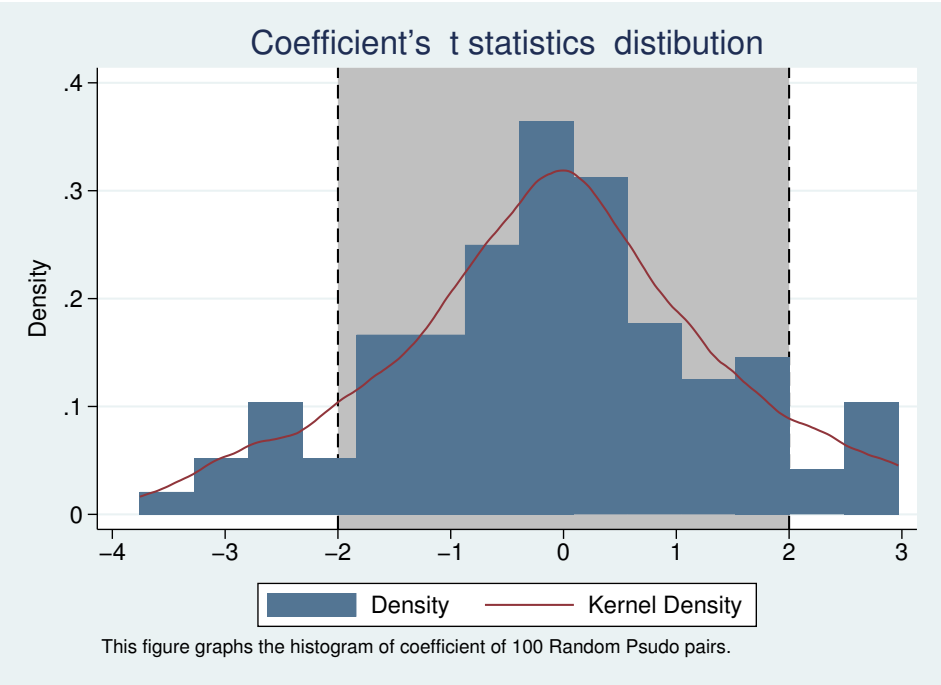
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Random Pairs

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

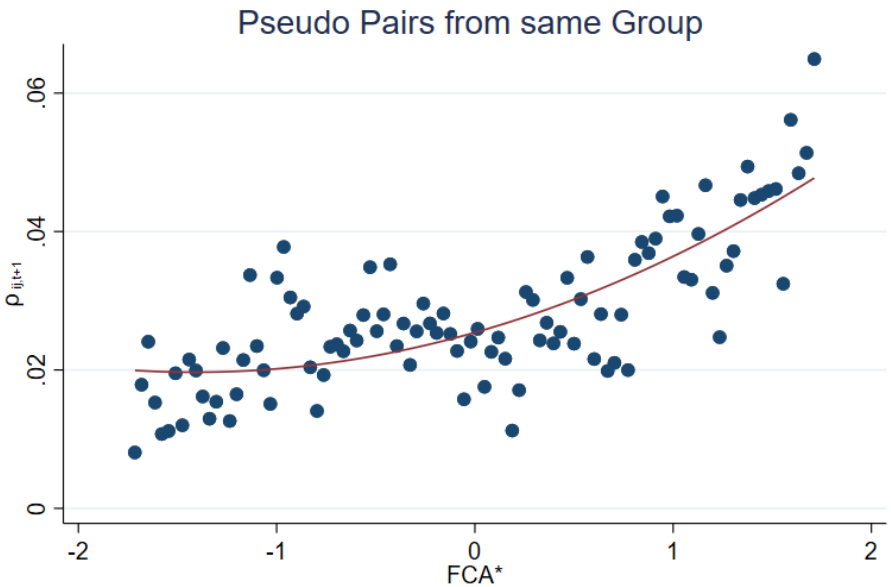


This figure graphs the histogram of t statistics of coefficient of 100 Random Psudo pairs.

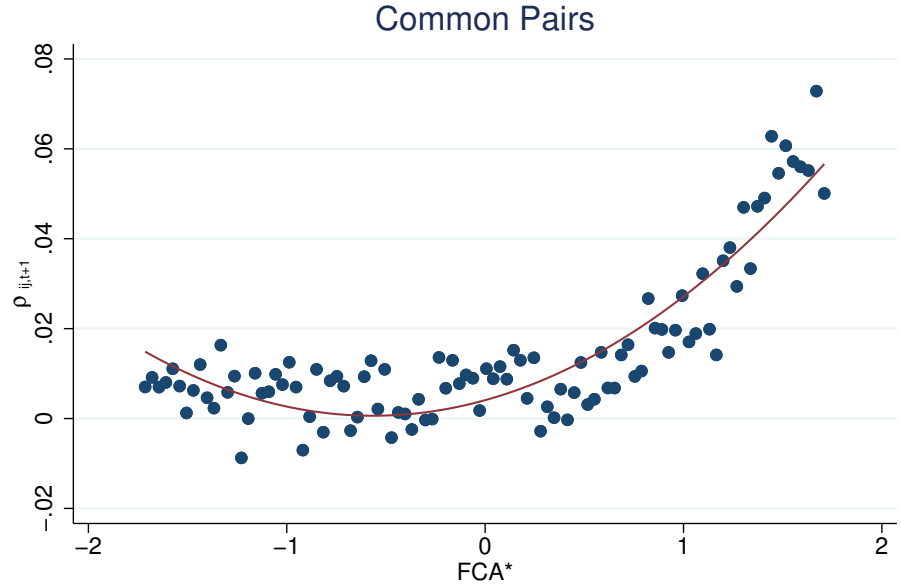


This figure graphs the histogram of coefficient of 100 Random Psudo pairs.

Random Pairs from Same Business Group



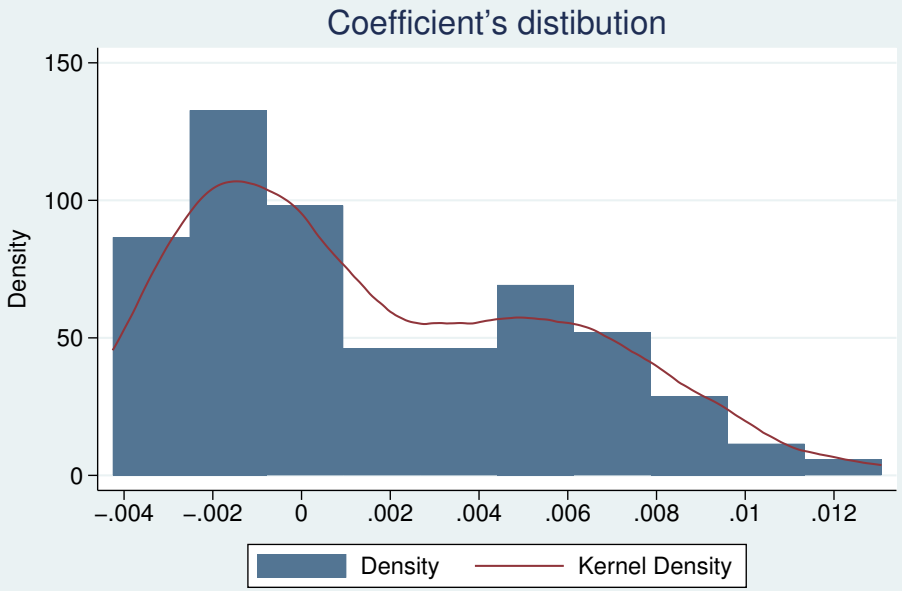
This figure graphs the correlation of daily 4Factor+Industry residuals in fortnight t+1 against normalized rank transformed of our measure of institutional connectedness.



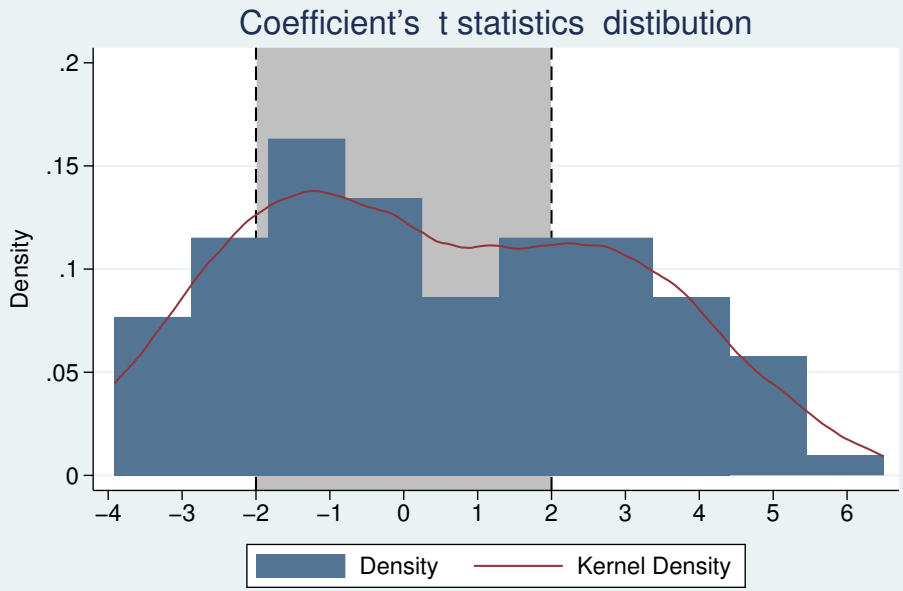
This figure graphs the correlation of daily 4Factor+Industry residuals in fortnight t+1 against our measure of institutional connectedness.

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

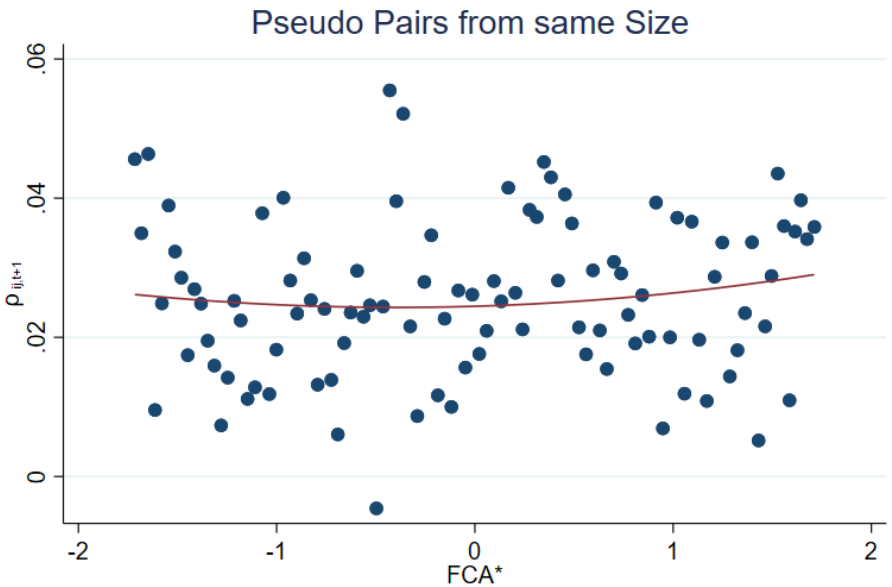
Fortnightly variables for Random group from Same Business Group

	(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

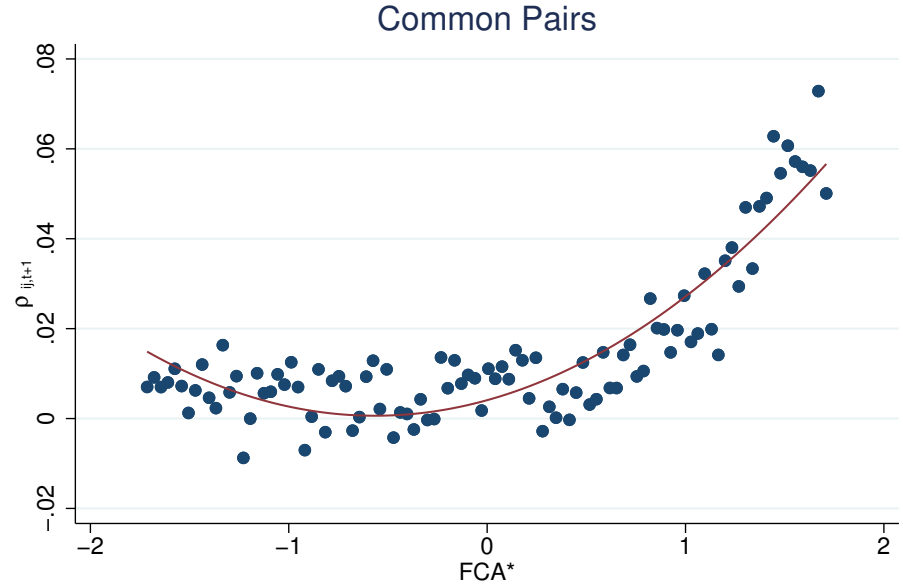
t statistics in parentheses

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

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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Identification

- Possible Events
  - The Sepah bank Merge
  - Fixed Income Rule change
  - Mutual funds Limit extension
  - Dara 1 and Palayeshi 1
  - Goverment Transfer to Banks

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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

Connected Stocks

JF-2014-Anton Polk

- Common active mutual fund owners
- Measuring Common Ownership
  - $FCAP_{ij,t} = \frac{\sum_{f=1}^{F}(S_{i,t}^{f} P_{i,t} + S_{j,t}^{f} P_{j,t})}{S_{i,t} Pi,t + S_{j,t} Pj,t}$
  - 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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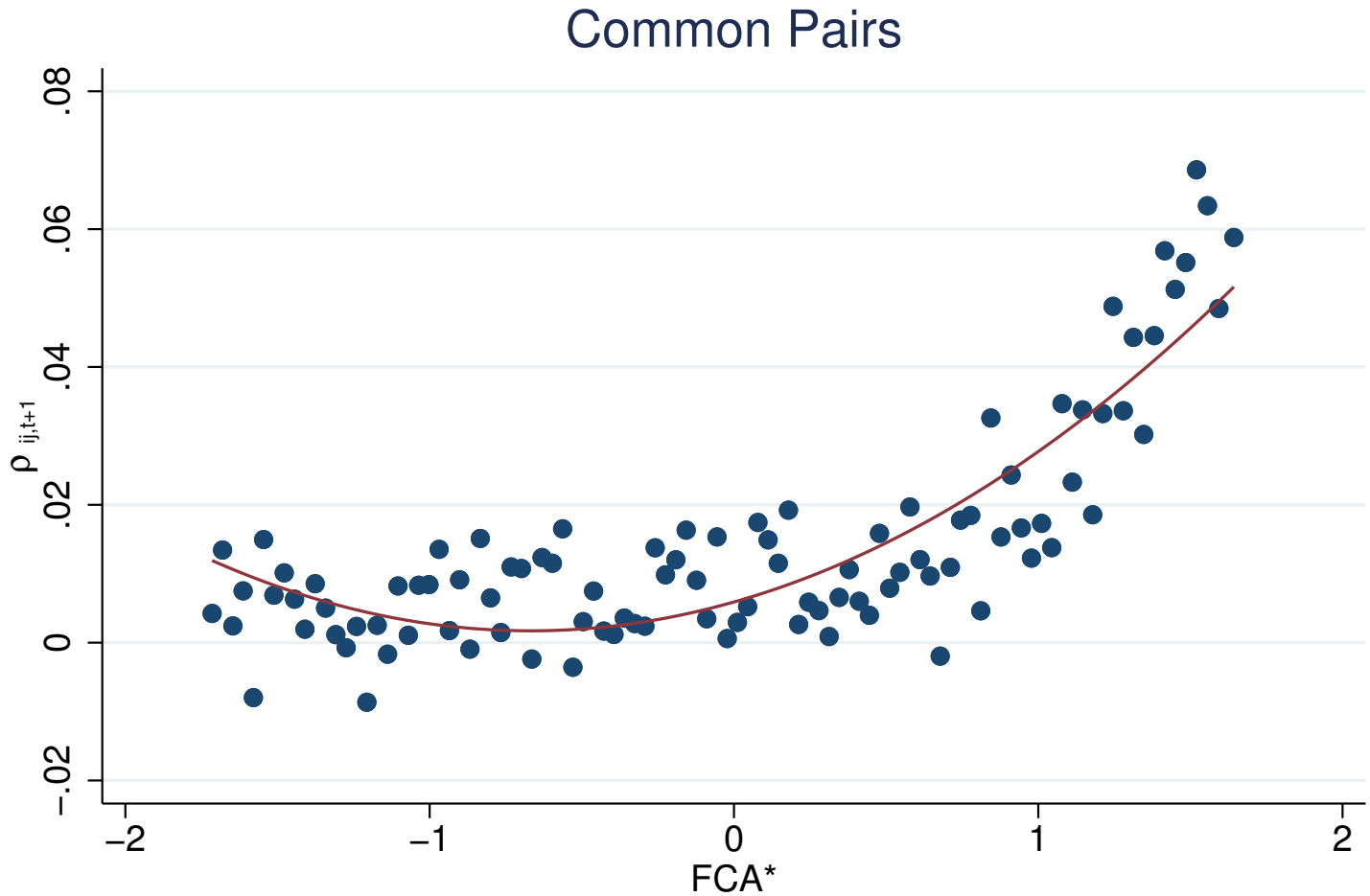
4 Factor + Industry Future Correlation via *FCA**

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*	0.0122***	0.0131***	0.0108***	0.00418***	0.00418***	0.00433***	0.00569***
	(6.17)	(6.26)	(7.77)	(4.75)	(4.75)	(4.75)	(4.35)
FCA^{*2}		0.00948***	0.00793***	0.00392***	0.00397***	0.00399***	0.00429***
		(7.49)	(7.91)	(5.15)	(5.20)	(5.02)	(4.42)
ρ_t			0.145***	0.141***	0.141***	0.141***	0.144***
			(6.35)	(6.51)	(6.50)	(6.48)	(6.33)
ActiveHolder				0.000958	0.000952	0.000375	0.00252
				(0.52)	(0.53)	(0.20)	(1.53)
SameGroup				0.0170***	0.0169***	0.0173***	0.0257***
				(4.78)	(4.75)	(4.89)	(9.78)
SameIndustry				0.0171***	0.0167***	0.0163***	
				(4.63)	(4.41)	(4.26)	
Samesize						0.0433**	0.0265***
						(3.22)	(4.00)
SameBookToMarket						0.00811*	0.0114***
						(2.64)	(4.27)
Constant	0.0177***	0.00875*	0.00534**	0.0369*	0.0442**	0.0308**	0.0146***
	(3.84)	(2.33)	(3.42)	(2.63)	(2.82)	(2.98)	(4.73)
Value	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	Yes	Yes	No
N	287000	287000	286155	286155	286155	286155	286155
r2	0.00188	0.00281	0.0386	0.0446	0.0455	0.0444	0.0410

t statistics in parentheses

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

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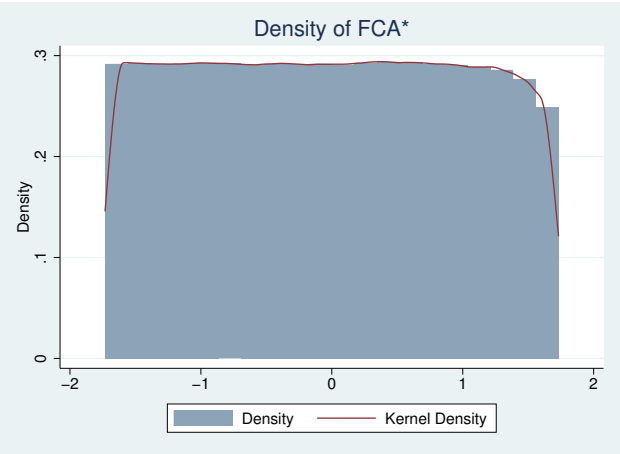
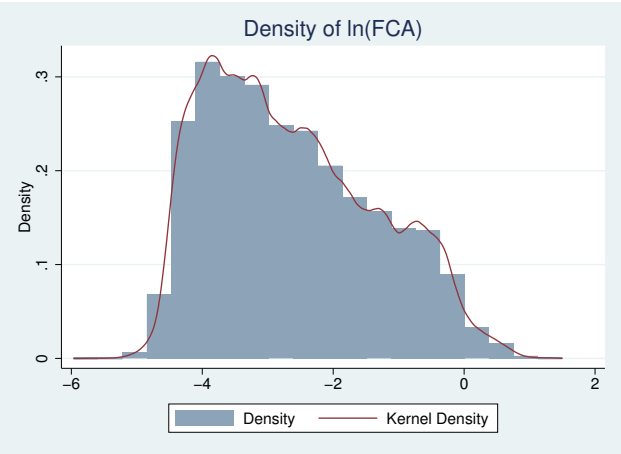
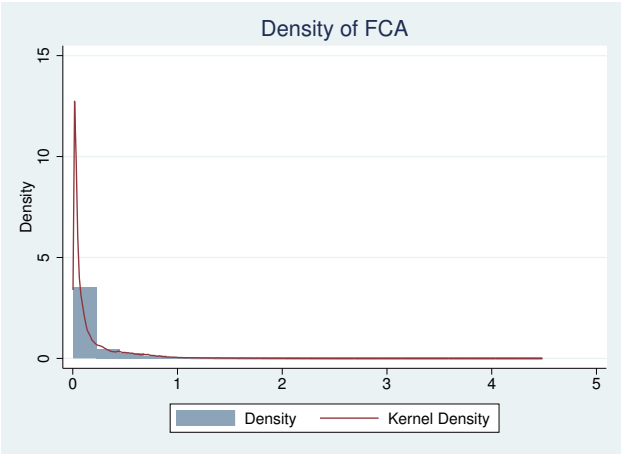
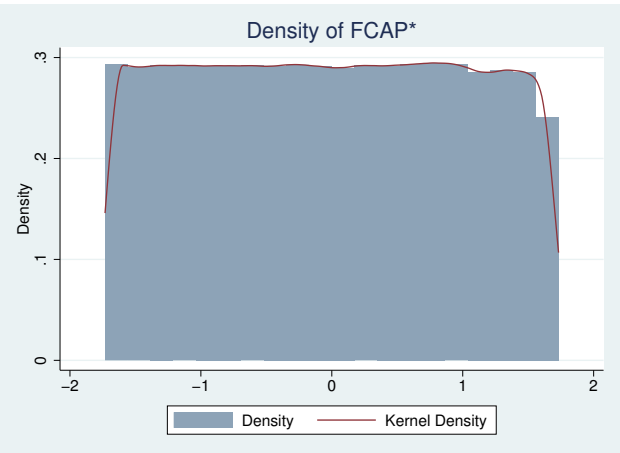
FCA vs. FCAP Distributions

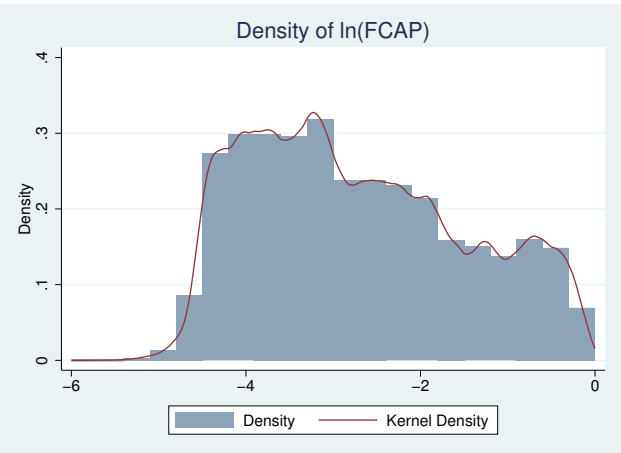
Fortnightly

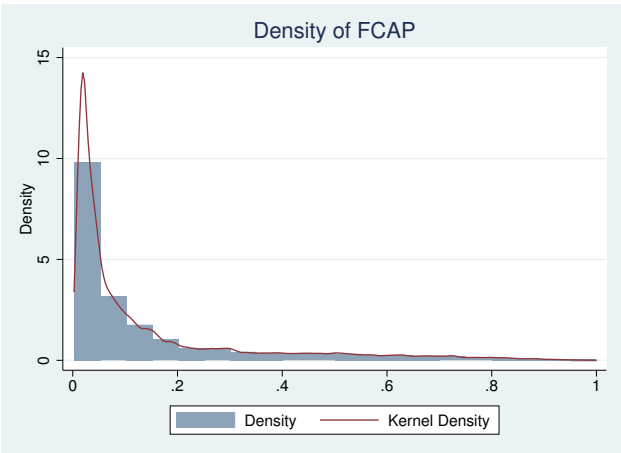












Monthly

Summary of Controls

Fortnightly

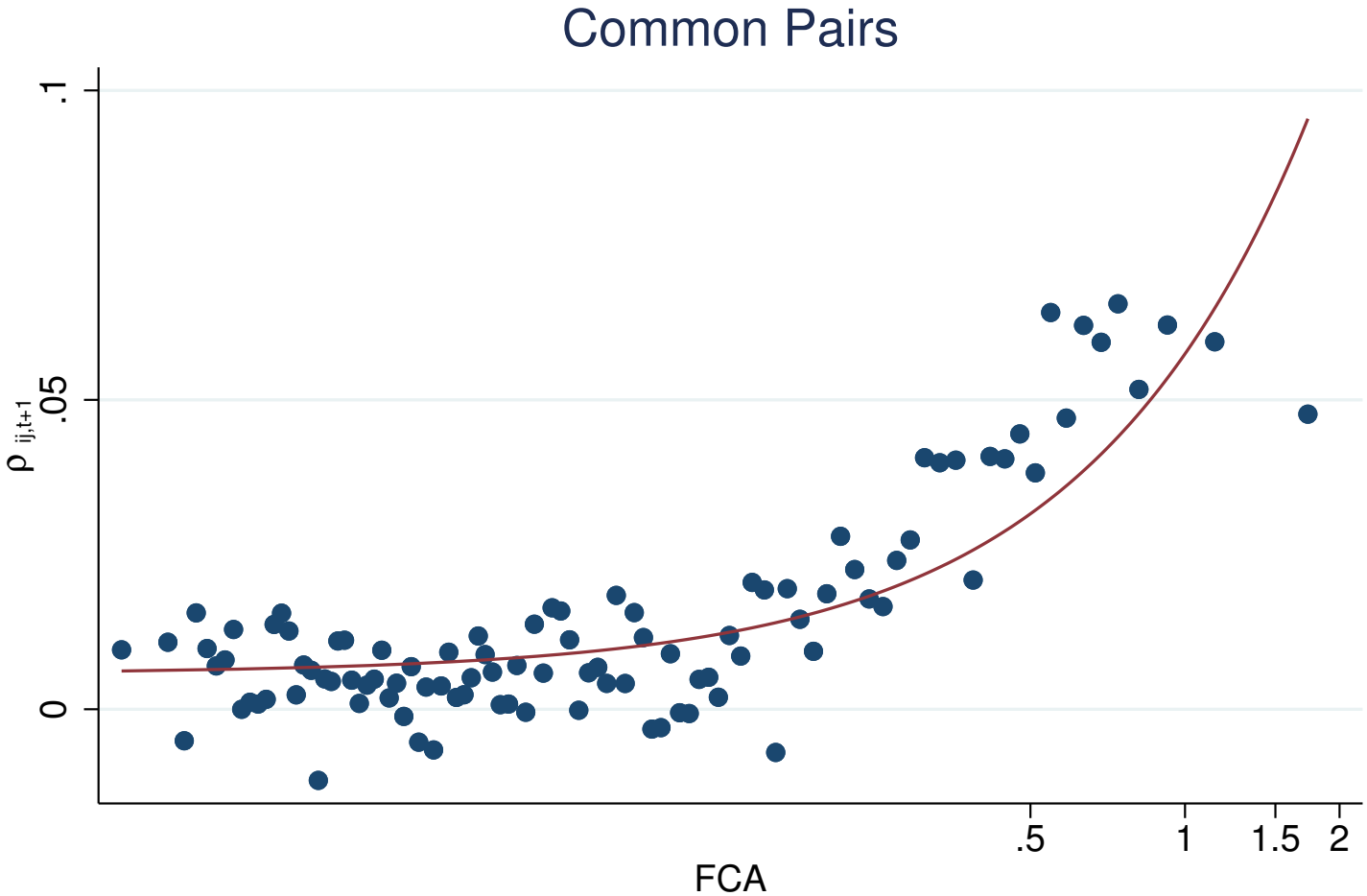
Type of Pairs	Yes	No
SameIndustry	1142	9125
	(11.1%)	(88.9%)
SameGroup	1173	9094
	(11.4%)	(88.6%)
ActiveHolder	2819	7448
	(27.5%)	(72.5%)

Variable	count	mean	std	min	25%	50%	75%	max
Size1	636641	0.75	0.21	0.01	0.61	0.81	0.93	1
Size2	636641	0.47	0.26	0.00	0.26	0.45	0.67	1.00
SameSize	636641	-0.28	0.22	-0.99	-0.42	-0.24	-0.10	0.00
BookToMarket1	636641	0.52	0.27	0.00	0.31	0.54	0.74	1.00
BookToMarket2	636641	0.50	0.25	0.00	0.29	0.49	0.70	1.00
SameBookToMarket	636641	-0.29	0.21	-1.00	-0.43	-0.25	-0.12	0.00

Monthly

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

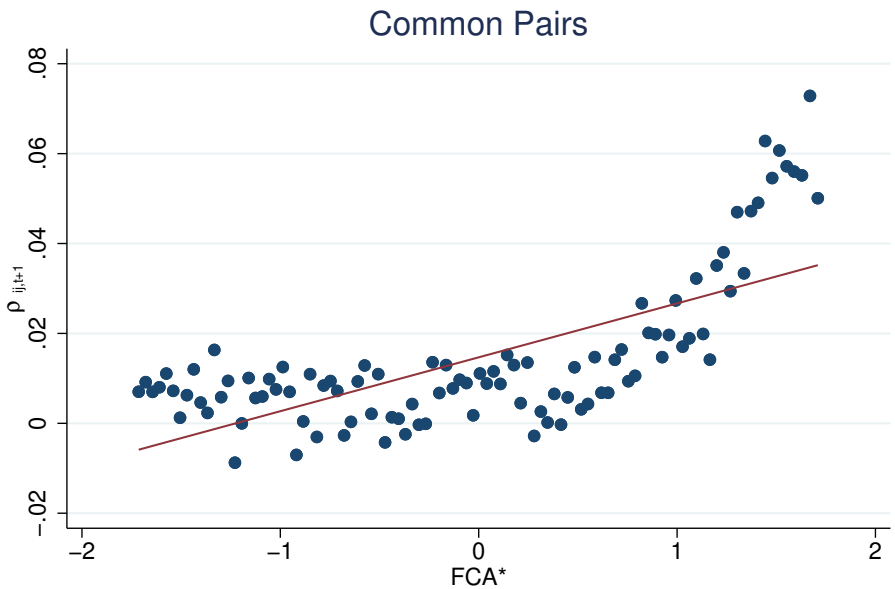
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(FCA)	0.0108***	0.00989***	0.00964***	0.00511***	0.00499***	0.00271***	0.00276***	0.00281***	0.00297***
	(8.48)	(9.12)	(8.81)	(5.15)	(4.95)	(4.12)	(4.07)	(4.16)	(3.78)
ρ_t		0.0740***	0.0739***	0.0734***	0.0733***	0.0710***	0.0708***	0.0711***	0.0723***
		(5.50)	(5.49)	(5.44)	(5.44)	(5.36)	(5.34)	(5.36)	(5.39)
ActiveHolder			0.00970***		0.00810***	0.00425*	0.00416*	0.00356	0.00410*
			(6.05)		(5.06)	(2.35)	(2.40)	(1.94)	(2.41)
SameGroup				0.0329***	0.0322***	0.0216***	0.0214***	0.0218***	0.0247***
				(10.98)	(10.80)	(7.32)	(7.29)	(7.47)	(9.32)
SameIndustry						0.0275***	0.0267***	0.0264***	0.0288***
						(7.00)	(6.73)	(6.55)	(6.45)
Samesize								0.0403***	0.0235***
								(3.53)	(4.35)
SameBookToMarket								0.0127**	0.0146***
								(3.22)	(4.34)
Constant	0.0432***	0.0395***	0.0363***	0.0214***	0.0191***	0.0396**	0.0504**	0.0372***	0.0225***
	(8.14)	(8.73)	(8.10)	(5.32)	(4.71)	(3.13)	(3.20)	(4.04)	(5.91)
Value	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	Yes	Yes	No
N	613875	613875	613875	613875	613875	613875	613875	613875	613875
r2	0.00152	0.0127	0.0131	0.0137	0.0141	0.0184	0.0193	0.0183	0.0164

t statistics in parentheses

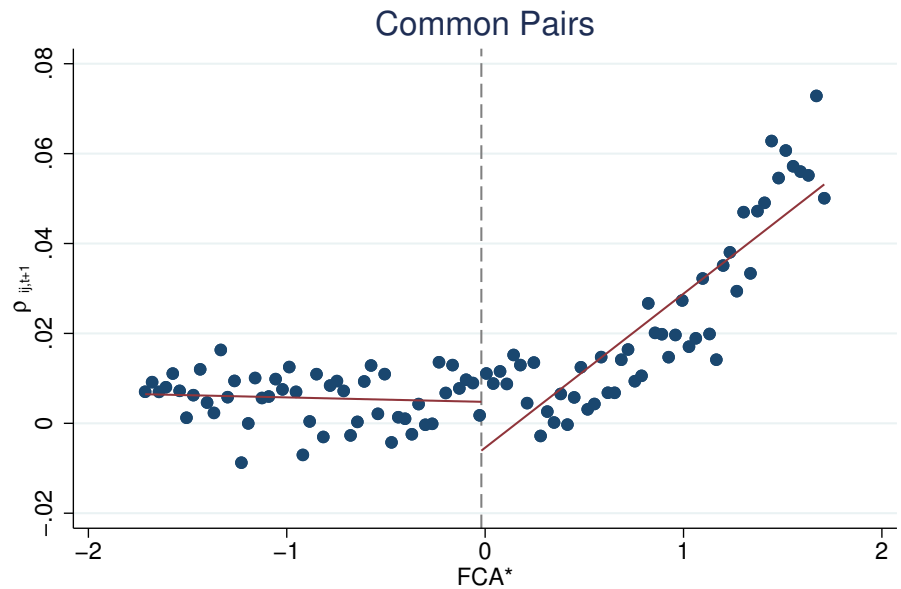
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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

Monthly

Fama MacBeth Estimation

Fortnightly variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FCA*	0.0124***	-0.00545***	-0.00518***	-0.00450***	-0.00440***	-0.00408**	-0.00537***	-0.00420**	-0.00526***	-0.00448***
	(7.43)	(-3.99)	(-3.90)	(-3.44)	(-3.40)	(-3.19)	(-4.06)	(-3.22)	(-3.98)	(-3.49)
(FCA* > *Median*[FCA*]) × FCA*		0.0360***	0.0332***	0.0314***	0.0240***	0.0232***	0.0228***	0.0156***	0.0231***	0.0231***
		(9.80)	(10.20)	(9.78)	(8.68)	(8.29)	(9.37)	(5.83)	(9.14)	(8.17)
ρ_t			0.0738***	0.0737***	0.0727***	0.0727***	0.0711***	0.0708***	0.0712***	0.0724***
			(5.50)	(5.49)	(5.42)	(5.41)	(5.38)	(5.34)	(5.38)	(5.41)
ActiveHolder				0.00792***		0.00494**	0.00362	0.00322	0.00284	0.00354*
				(4.85)		(2.98)	(1.94)	(1.81)	(1.49)	(2.02)
SameIndustry					0.0363***	0.0357***	0.0315***	0.0261***	0.0303***	0.0339***
					(8.06)	(7.91)	(7.93)	(6.60)	(7.47)	(7.54)
SameGroup								0.0191***		
								(6.14)		
Samesize									0.0416***	0.0213***
									(3.67)	(3.91)
SameBookToMarket									0.0128**	0.0147***
									(3.24)	(4.36)
Constant	0.0150***	-0.000422	-0.000591	-0.00187	-0.00234	-0.00312*	0.0300*	0.0375*	0.0258**	0.00782***
	(6.31)	(-0.25)	(-0.38)	(-1.19)	(-1.70)	(-2.19)	(2.59)	(2.50)	(3.22)	(3.56)
Value	No	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	Yes	Yes	No
N	613875	613875	613875	613875	613875	613875	613875	613875	613875	613875
r2	0.00132	0.00208	0.0132	0.0136	0.0149	0.0151	0.0182	0.0196	0.0181	0.0162

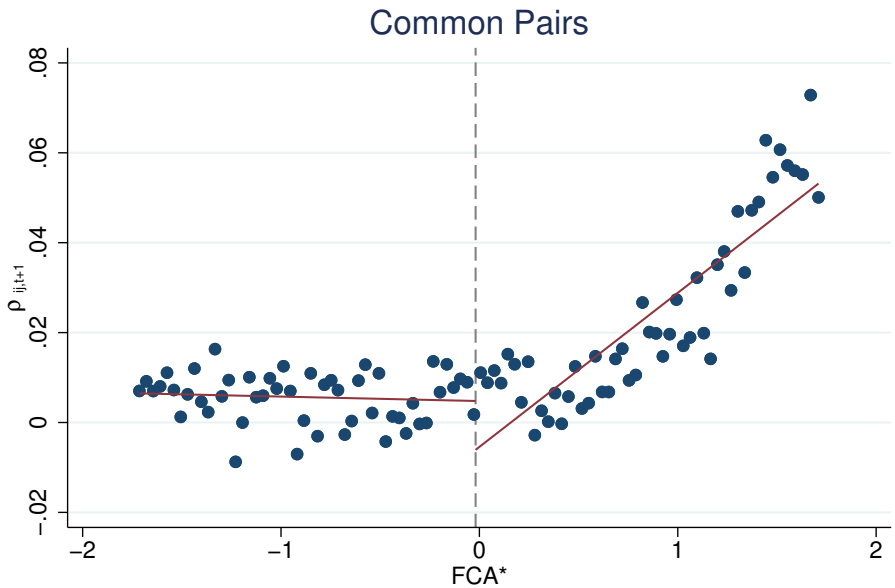
t statistics in parentheses

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

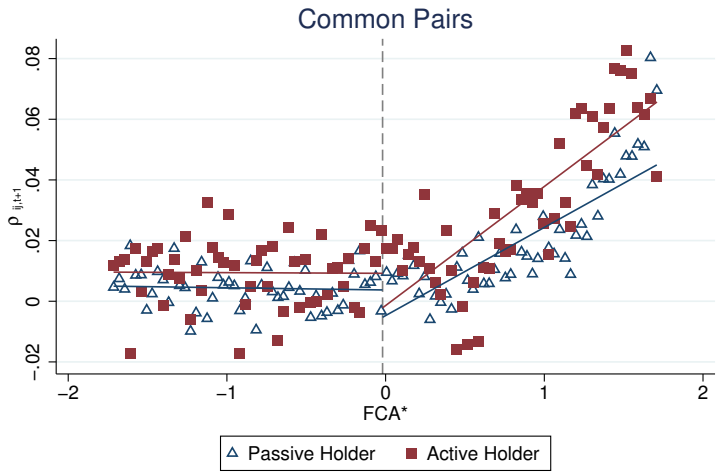
Monthly

4 Factor + Industry Future Correlation via *FCA**

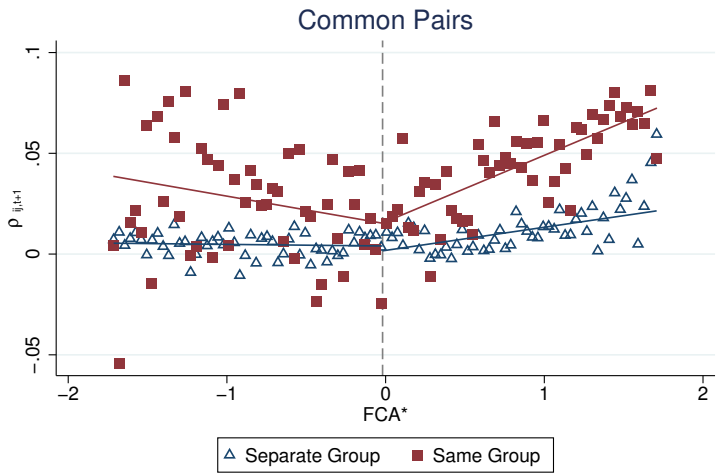
Normalized Rank Transformed for each cross section (Fortnightly)



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



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

Monthly

Fama MacBeth Estimation

Monthly variables

	(1)	(2)
FCA*	-0.00370**	-0.00472***
	(-2.79)	(-3.39)
(FCA* > *Median*[FCA*]) × FCA*	0.0128***	0.0141***
	(4.34)	(5.15)
ρ_t	0.0722***	0.0708***
	(5.39)	(5.35)
ActiveHolder	0.00140	0.000470
	(0.73)	(0.22)
(FCA* > *Median*[FCA*]) × ActiveHolder	0.00338	0.00522
	(1.17)	(1.75)
SameGroup	0.0117**	0.0106**
	(3.29)	(2.87)
(FCA* > *Median*[FCA*]) × SameGroup	0.0139***	0.0109**
	(4.05)	(3.14)
Constant	0.00973***	0.0380*
	(4.57)	(2.51)
Value	No	Yes
Interaction	No	Yes
N	613875	613875
r2	0.0173	0.0202

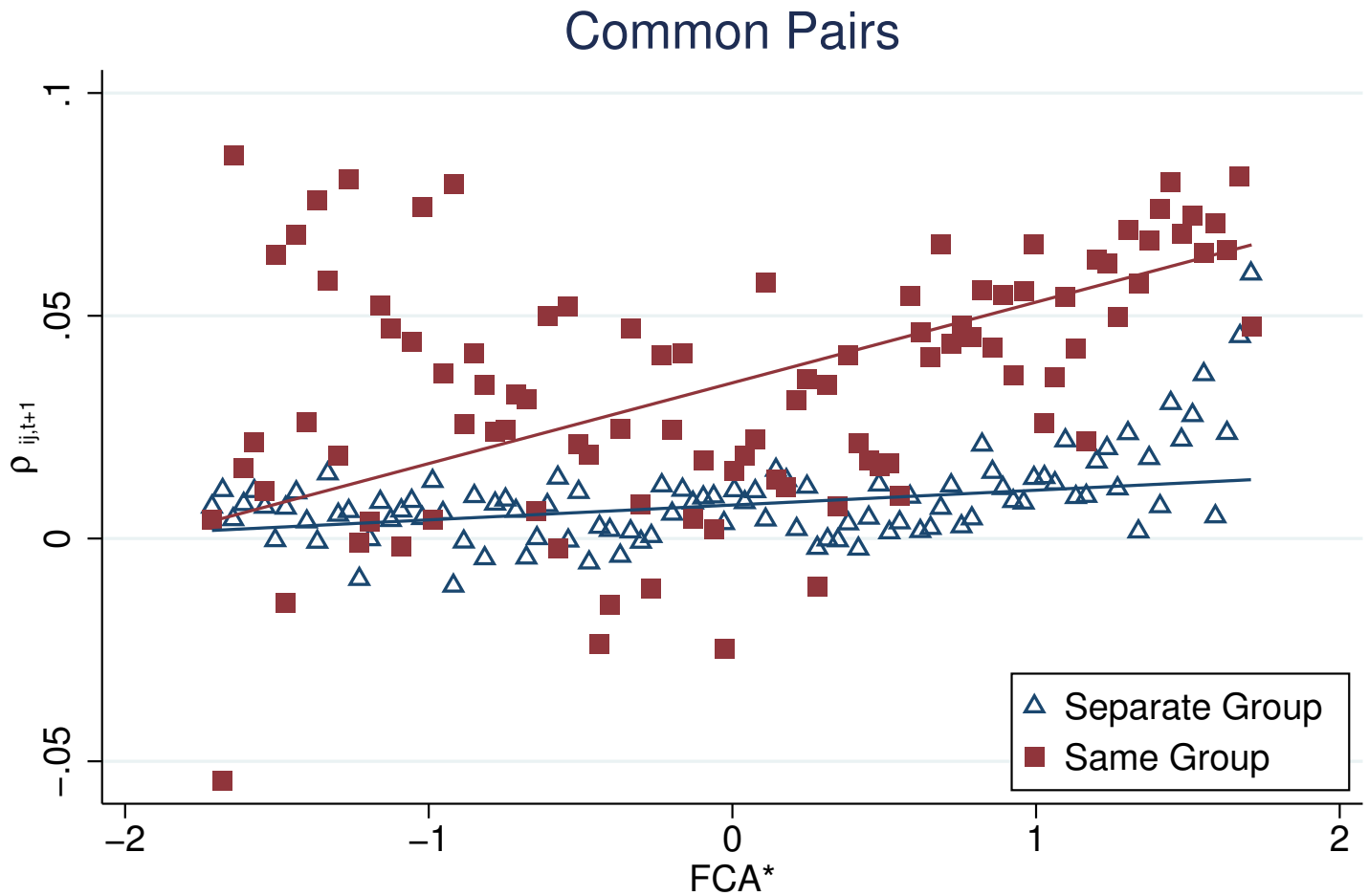
t statistics in parentheses

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

Monthly

Future Correlation via FCA^*

4 Factor + Industry (by 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.

Fama MacBeth Estimation

Fortnightly variables for subset of Same Business Group

	(1)	(2)	(3)	(4)	(5)	(6)
FCA*	0.0183***	-0.0127*	0.0100***	-0.00219	0.00842***	-0.00535
	(7.04)	(-2.13)	(5.21)	(-0.39)	(5.37)	(-0.98)
(FCA* > *Median*[FCA*]) × FCA*		0.0460***		0.0186*		0.0210*
		(4.63)		(2.08)		(2.53)
ActiveHolder			0.0162***	0.0149**	0.0188***	0.0174***
			(3.41)	(3.07)	(4.00)	(3.61)
SameIndustry			0.0336***	0.0333***	0.0330***	0.0327***
			(7.85)	(7.78)	(7.95)	(7.83)
Samesize			0.0340**	0.0318**		
			(3.17)	(3.03)		
SameBookToMarket			0.0609***	0.0605***		
			(5.97)	(5.90)		
Constant	0.0344***	0.0149**	0.0399***	0.0314***	0.104***	0.0941***
	(9.76)	(3.01)	(8.38)	(5.53)	(5.71)	(5.16)
Value	No	No	No	No	Yes	Yes
Interaction	No	No	No	No	Yes	Yes
N	103914	103914	103914	103914	103914	103914
r2	0.00281	0.00488	0.0390	0.0407	0.0494	0.0511

t statistics in parentheses

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

Monthly

Fama MacBeth Estimation

Fortnightly variables for subset of Different Business Group

	(1)	(2)	(3)	(4)	(5)	(6)
FCA*	0.00422**	-0.00178	0.00194*	-0.00210	0.00172	-0.00290*
	(3.11)	(-1.37)	(1.98)	(-1.75)	(1.93)	(-2.26)
(FCA* > *Median*[FCA*]) × FCA*		0.0146***		0.00996***		0.0115***
		(4.22)		(3.48)		(3.82)
ActiveHolder			0.000676	0.000186	-0.000437	-0.00102
			(0.48)	(0.13)	(-0.30)	(-0.70)
SameIndustry			0.0238***	0.0231***	0.0211***	0.0202***
			(4.34)	(4.23)	(4.23)	(4.05)
Samesize			0.0217***	0.0217***		
			(3.94)	(3.94)		
SameBookToMarket			0.00482	0.00477		
			(1.49)	(1.48)		
Constant	0.00831***	0.00285	0.0124***	0.00886***	0.0240	0.0202
	(4.07)	(1.67)	(5.03)	(4.03)	(1.53)	(1.32)
Value	No	No	No	No	Yes	Yes
Interaction	No	No	No	No	Yes	Yes
N	509961	509961	509961	509961	509961	509961
r2	0.000490	0.000899	0.0120	0.0124	0.0148	0.0152

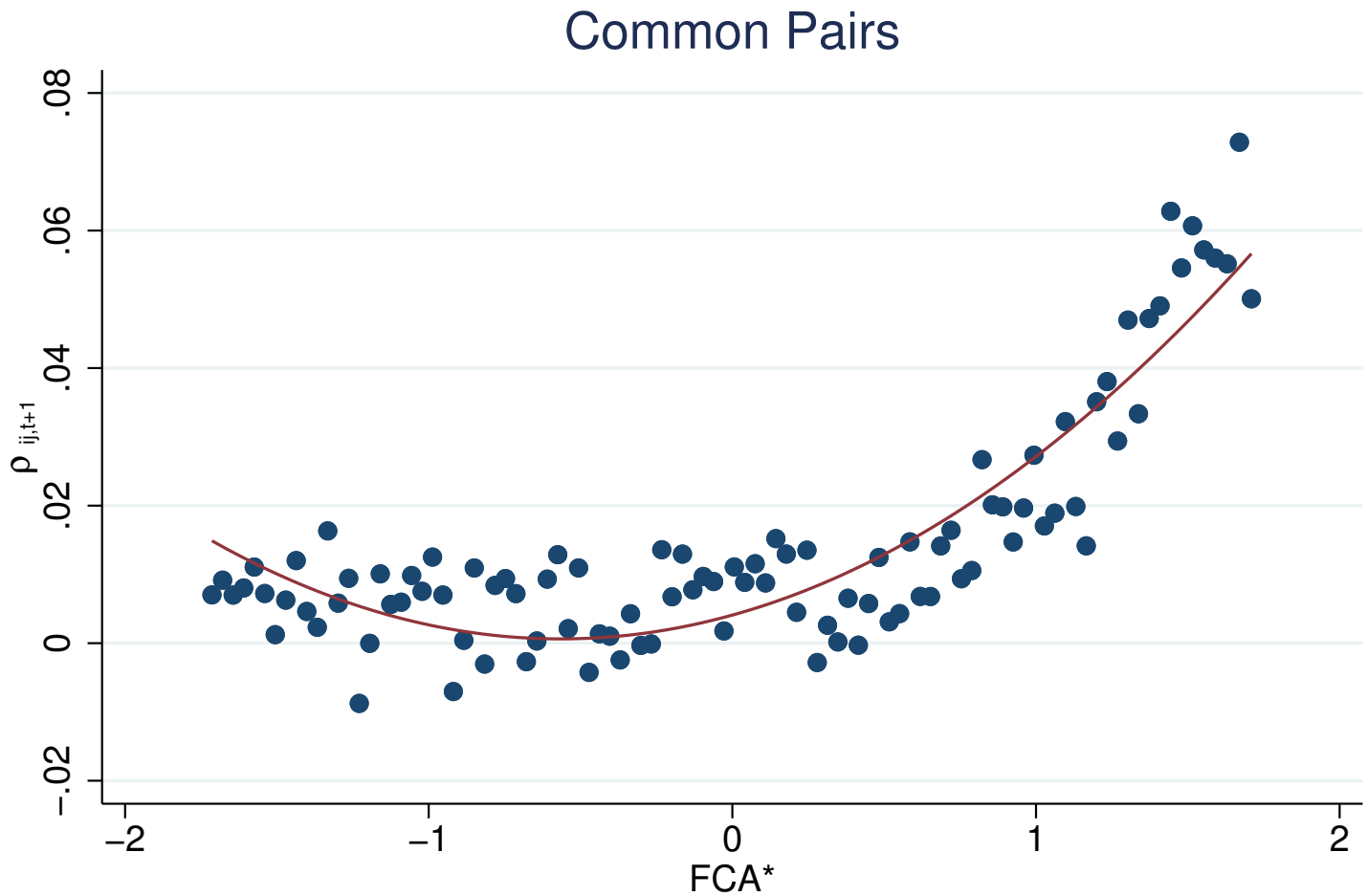
t statistics in parentheses

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

Monthly

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)	(8)
FCA*	0.0124***	0.0126***	0.0114***	0.0112***	0.00613***	0.00618***	0.00634***	0.00717***
	(7.43)	(7.54)	(8.09)	(7.90)	(8.02)	(7.89)	(8.12)	(7.01)
FCA*^{2}		0.0109***	0.0101***	0.00959***	0.00697***	0.00700***	0.00701***	0.00710***
		(10.30)	(10.52)	(10.08)	(9.59)	(9.97)	(9.37)	(8.49)
ρ_t			0.0737***	0.0736***	0.0711***	0.0709***	0.0712***	0.0724***
			(5.49)	(5.48)	(5.37)	(5.36)	(5.38)	(5.41)
ActiveHolder				0.00761***	0.00345	0.00331	0.00267	0.00336
				(4.62)	(1.84)	(1.84)	(1.40)	(1.90)
SameIndustry					0.0310***	0.0301***	0.0299***	0.0334***
					(7.85)	(7.57)	(7.40)	(7.46)
Samesize							0.0416***	0.0214***
							(3.66)	(3.91)
SameBookToMarket							0.0126**	0.0146***
							(3.19)	(4.29)
Constant	0.0150***	0.00429*	0.00372*	0.00224	0.0330**	0.0428**	0.0288***	0.0108***
	(6.31)	(2.35)	(2.24)	(1.35)	(2.82)	(2.85)	(3.52)	(4.76)
Value	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	Yes	Yes	No
N	613875	613875	613875	613875	613875	613875	613875	613875
r2	0.00132	0.00215	0.0133	0.0136	0.0183	0.0191	0.0182	0.0162

t statistics in parentheses

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

Monthly