Connected Stocks: Evidence from Tehran Stock Exchange

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Motivation

Research Question

- **Can the common ownership cause stock return comovement** ?
  - We connect stocks through the common ownership by blockholders (ownership $> 1\%$)
  - We focus on excess return comovement for a pair of the 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 Effect

- **Common-ownership and comovement efect**
  [Antón and Polk (2014)]
  Stocks sharing many common investors tend to comove more strongly with each other in the future than otherwise similar stocks.

- **Common-ownership and liquidity demand**
  [Koch et al (2016), Pastor and Stambaugh (2003), Acharya and Pedersen (2005)]
  Commonality in stock liquidity is likely driven by correlated trading among a given stock's investors. Commonality in liquidity is important because it can influence expected returns

- **Trading needs and comovement**
  [Greenwood and Thesmar (2011)]
  If the investors of mutual funds have correlated trading needs, the stocks that are held by mutual funds can comove even without any portfolio overlap of the funds themselves

- **Stock price synchronicity and poor corporate governance**
  [Boubaker et al. (2014), Khanna and Thomas (2009), Morck et al. (2000)]
  Stock price synchronicity has been attributed to poor corporate governance and a lack of firm-level transparency. On the other hand, better law protection encourages informed trading, which facilitates the incorporation of firm-specific information into stock prices, leading to lower synchronicity

Papers' Detail

Commonownership measurements

Model-based measures

- $HJL_I^A(A,B) = \sum_{i \in I^{A,B}} \frac{\alpha_{i,B}}{\alpha_{i,A}+\alpha_{i,B}}$ [Harford et al.-JFE-2011]
  - Bi-directional
  - Pair-level measure of common ownership
  - Its potential impact on managerial incentives
  - Measure not necessarily increases when the relative ownership increases
  - Accounts only for an investor's relative holdings
- $MHHI = \sum_j \sum_k s_j s_k \frac{\sum_i \mu_{ij}\nu_{ik}}{\sum_i \mu_{ij}\nu_{ij}}$ [Azar et al.-JF-2018]
  - Capture a specific type of externality
  - Measured at the industry level
  - Assumes that investors are fully informed about the externalities
- $GGL^A(A,B) = \sum_{i=1}^{I} \alpha_{i,A} g(\beta_{i,A}) \alpha_{i,B}$ [Erik et al.-JFE-2019]
  - Bi-directional
  - Less information
  - Not sensitive to the scope
  - Measure increases when the relative ownership of firm A increases

Commonownership measurements

Ad hoc common ownership measures

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

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Measuring Common Ownership

Sum

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

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

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

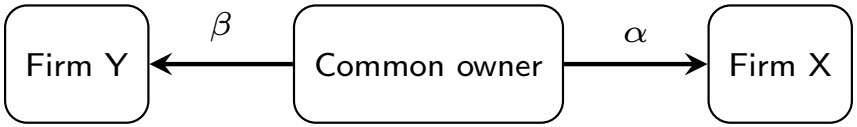
Intuition

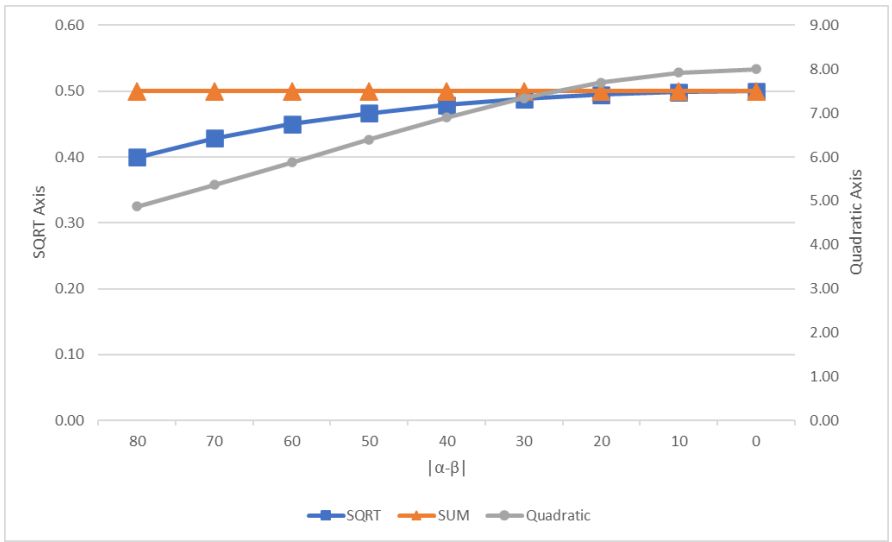
If for a pair of stocks with n mutual owners, all owners have even shares of each firm's market cap, then the proposed indexes will be equal to n. Proof

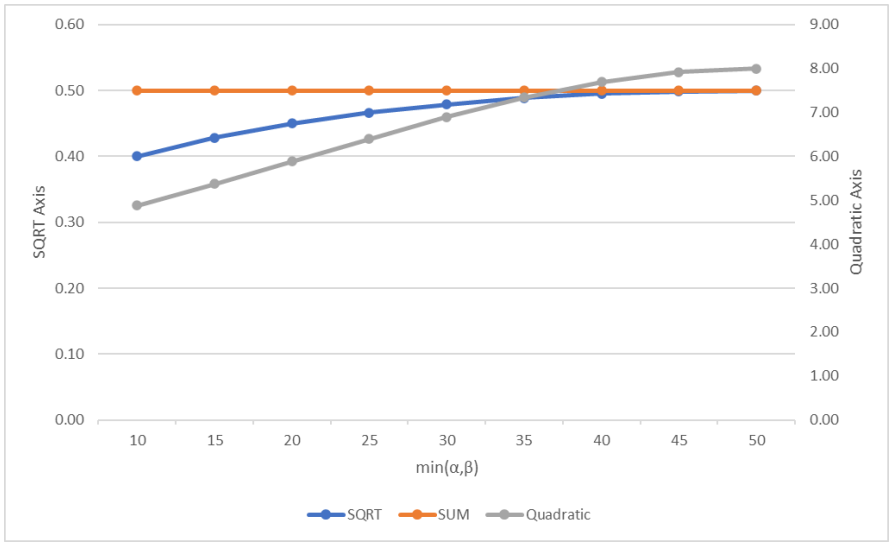
Measuring Common Ownership

Example

α and β are the percent of common owner's ownership from firms' market cap. For better observation, assume that $\alpha + \beta = 100$



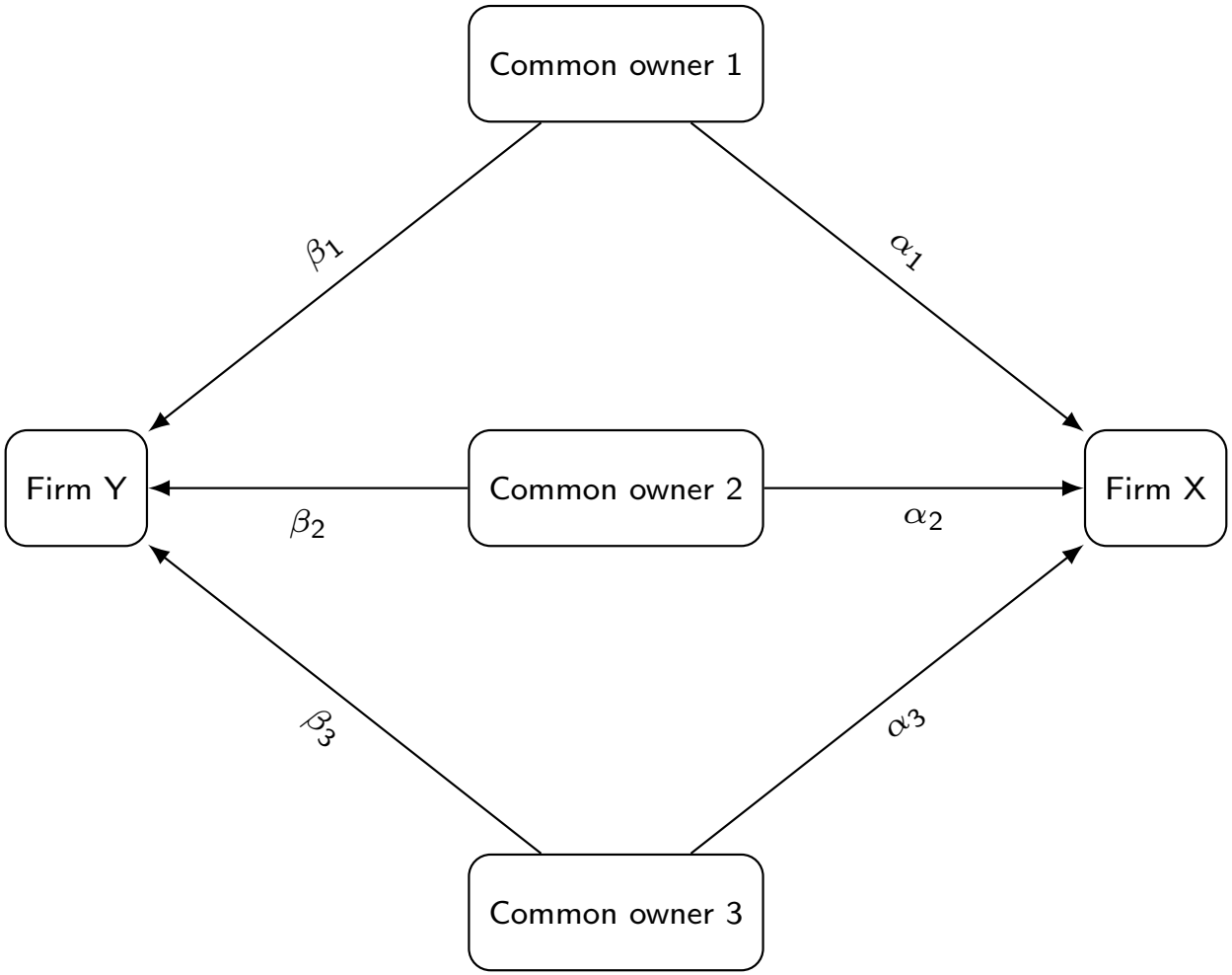




Comparison of three methods for calculating common ownership

Measuring Common Ownership

Example of three common owner



Measuring Common Ownership

Example of three common owner

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

Conclusion

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

Pair Composition

- Pairs consist of two firms with at least one common owner
  - 10310 unique pairs which is 18% of possible pairs ($\frac{340*399}{2} = 67830$)

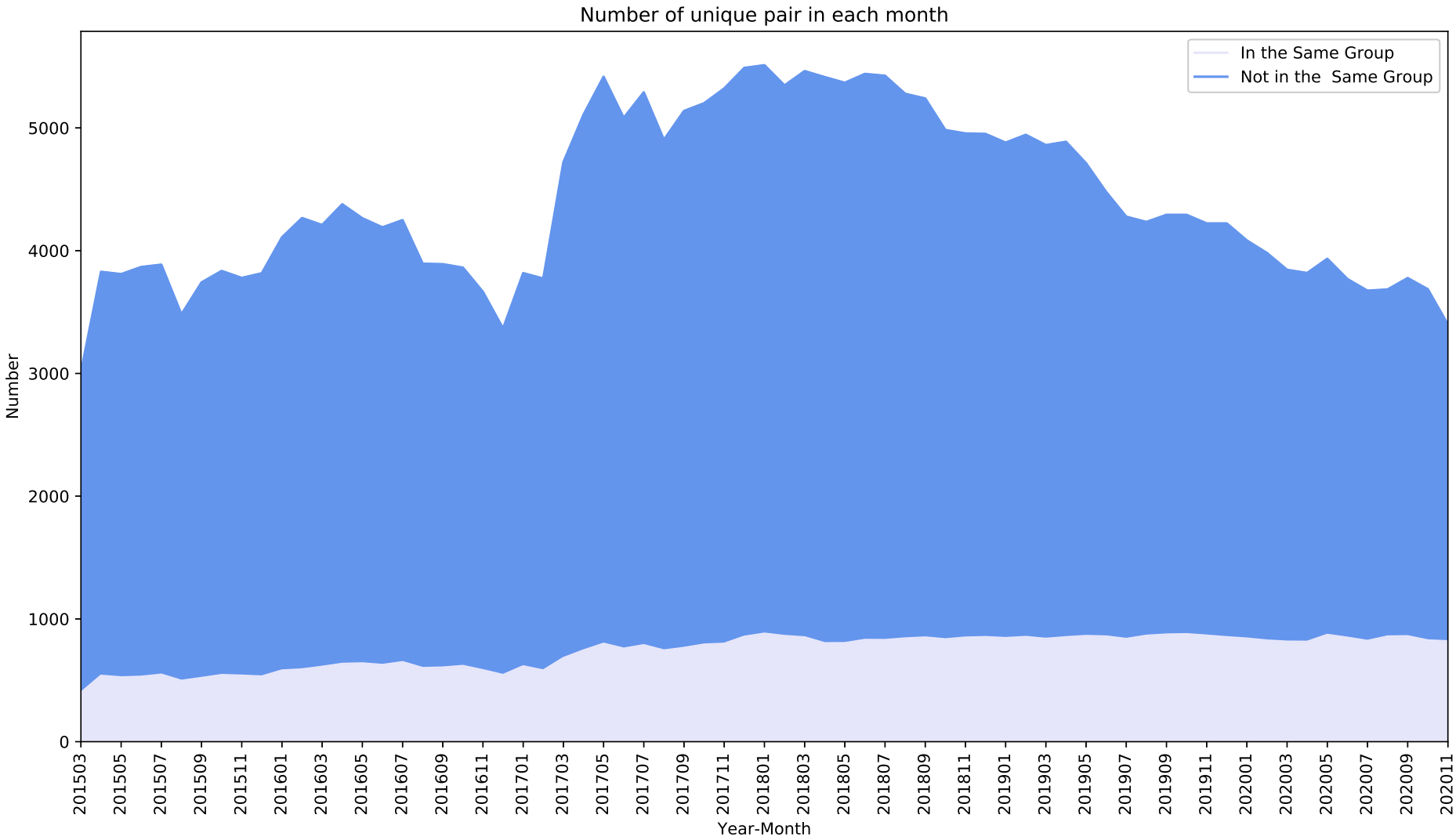
Number of unique paris	mean	min	median	max
Monthly	4397	3010	4247	5485

Year	2015	2016	2017	2018	2019	2020	Mean
No. of Pairs	4259	5307	6297	6800	6197	4877	5623
No. of Groups	42	43	46	47	47	48	46
No. of Pairs not in any Groups	0	0	0	0	0	0	0
No. of Pairs in one Group	591	697	930	999	977	946	857
No. of Pairs not in one Group	3668	4689	5524	5804	5220	3931	4806
Avg. Number of Pairs in one Group	21	21	23	23	23	23	22
Med. Number of Pairs in one Group	10	8	7	6	6	8	8
Av. of each Owners' ownership	18.8	19.3	19.4	19.4	19.1	19.1	19
Med. of each Owners' ownership	10.4	10.5	10.7	10.5	10.4	11.0	11
Av. Number of Owners	6.0	5.9	5.8	5.9	5.9	6.0	6
Med. Number of Owners	6.0	5.9	5.8	5.9	5.9	5.9	6
Av. Block. Ownership	81.0	81.9	82.4	83.3	83.7	83.6	83
Med. Block. Ownership	79.7	80.4	80.8	81.8	82.3	82.5	81

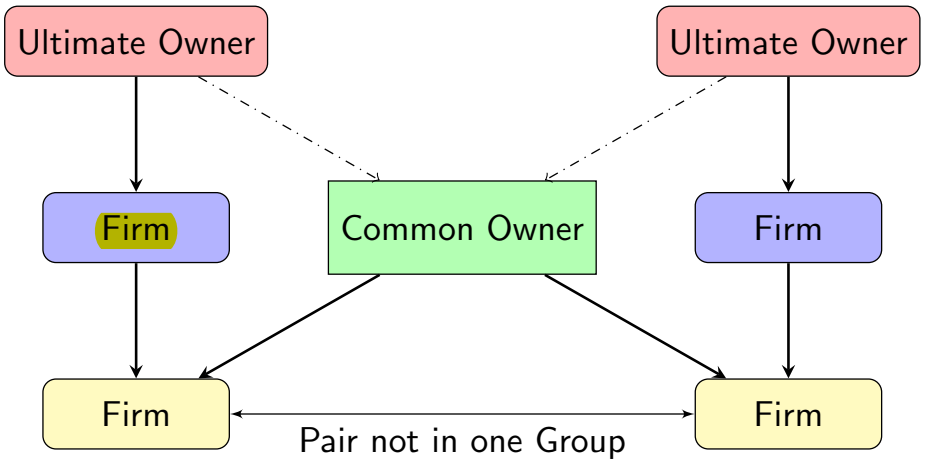
Data Summary

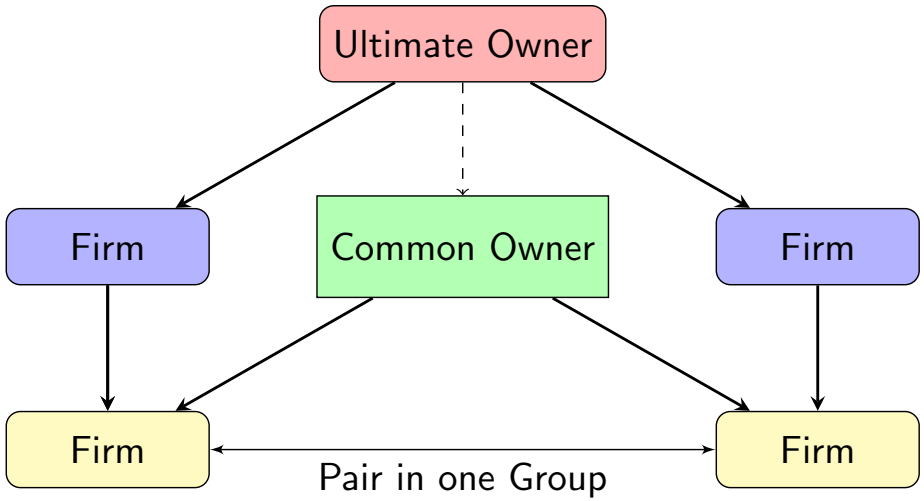
- We use blockholders' data from 2015/03/25 (1394/01/06) to 2020/11/16 (1399/08/26)
  - Includes of 1362 Days and 69 Months
  - Consists of 605 firm inculding 340 firm with common owners

Year	2015	2016	2017	2018	2019	2020	Mean
No. of Firms	351	378	504	530	567	590	487
No. of Holders	719	870	1222	1305	1354	1347	1136
No. of Groups	42	43	47	48	48	48	46
No. of Firms not in Groups	109	120	183	181	216	240	175
No. of Firms in Groups	242	265	329	349	351	350	314
Avg. Number of Members	32	39	41	45	44	41	40
Med. of Number of Members	22	26	29	32	32	29	28
Av. of each Owners' ownership	20.9	21.5	20.5	23.1	25.6	25.2	23
Med. of each Owners' ownership	7.7	7.0	6.9	7.2	9.3	9.5	8
Av. Number of Owners	5	5	5	5	5	4	5
Med. Number of Owners	4	4	4	4	4	3	4
Av. Block. Ownership	72	71.7	68.6	78.1	78.5	69.2	73
Med. Block. Ownership	80.6	80.2	77.7	83.8	81.8	75.1	80


Number of unique pair in each month
In the Same Group
Not in the Same Group
Number
0
1000
2000
3000
4000
5000
Year-Month
201503
201505
201507
201509
201511
201601
201603
201605
201607
201609
201611
201701
201703
201705
201707
201709
201711
201801
201803
201805
201807
201809
201811
201901
201903
201905
201907
201909
201911
202001
202003
202005
202007
202009
202011

Business Group





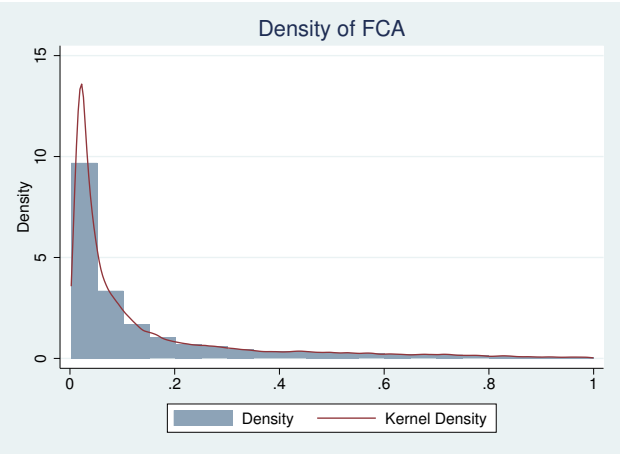
FCA vs. FCAP Summary

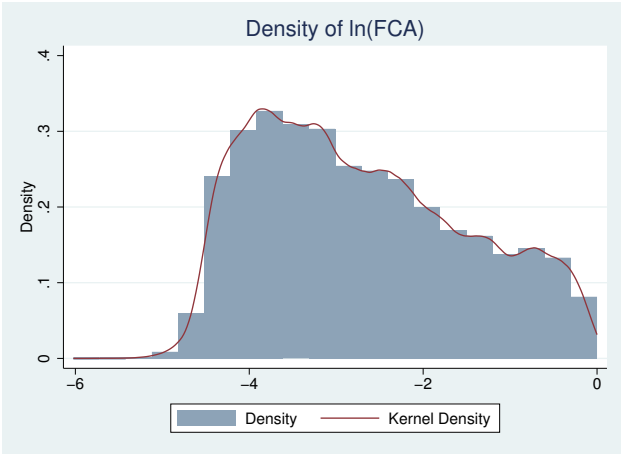
Monthly

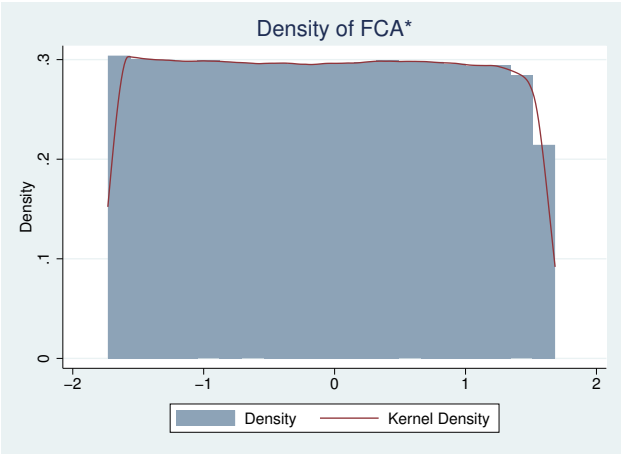
	variable	count	mean	std	min	median	max
Total	FCA	303419	0.168	0.269	0.002	0.059	4.342
	FCAP	303419	0.142	0.190	0.002	0.054	0.999
Same Group	FCA	50808	0.486	0.417	0.003	0.432	4.342
	FCAP	50808	0.391	0.259	0.004	0.400	0.999
Not Same Group	FCA	253163	0.104	0.165	0.002	0.045	2.813
	FCAP	253163	0.091	0.122	0.002	0.043	0.999
Same Industry	FCA	46797	0.379	0.419	0.007	0.243	4.342
	FCAP	46797	0.292	0.259	0.006	0.208	0.999
Not Same Industry	FCA	257174	0.129	0.210	0.002	0.049	2.869
	FCAP	257174	0.114	0.160	0.002	0.046	0.999

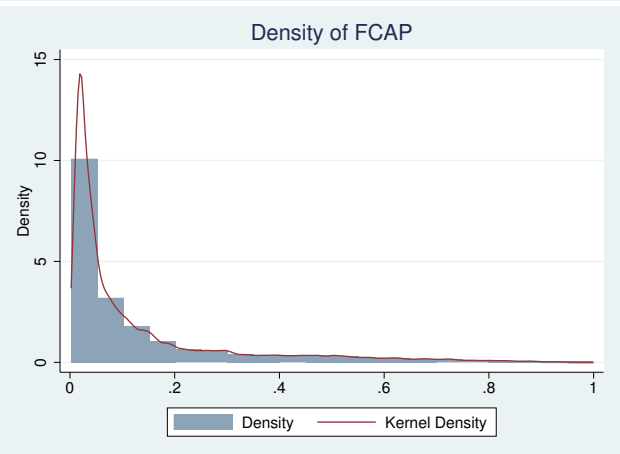
FCA vs. FCAP Distributions

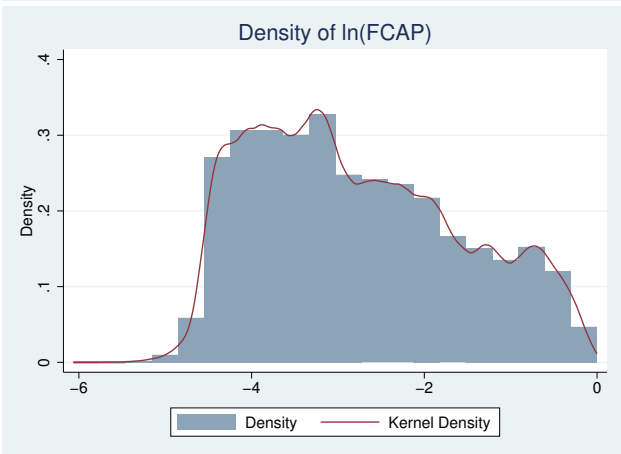
Monthly

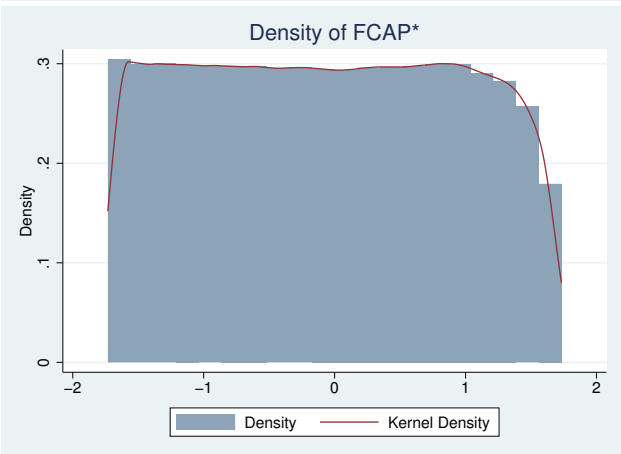












Fortnightly

Correlation Calculation

4 Factor + Industry

1. Frist Step:
   Estimate each of these models on periods of three month:
   - CAPM + Industry (2 Factor):

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

   - 4 Factor :

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

   - 4 Factor + Industry (5 Factor) :

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

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

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	311625	0.01	0.33	-1.00	-0.20	0.01	0.21	1
Monthly4	311793	0.04	0.36	-1.00	-0.20	0.03	0.27	1
Monthly5	311806	0.01	0.34	-1.00	-0.22	0.01	0.23	1

Conclusion

We use the 4 Factor + Industry model to control for exposure to systematic risk because it almost captures all correlations between two firms in each pair.

Controls

- ρ_t : Current period correlation
- **SameGroup** : Dummy variable for whether the two stocks belong to the same business group.
- **ActiveHolder** : Dummy variable for whether at least one of the holders 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 the same Industry.
- **SameSize** : The negative of absolute difference in percentile ranking of size across a pair
- **SameBookToMarket** :The negative of absolute difference in percentile ranking of the book to market ratio across a pair

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

- **Controls** : 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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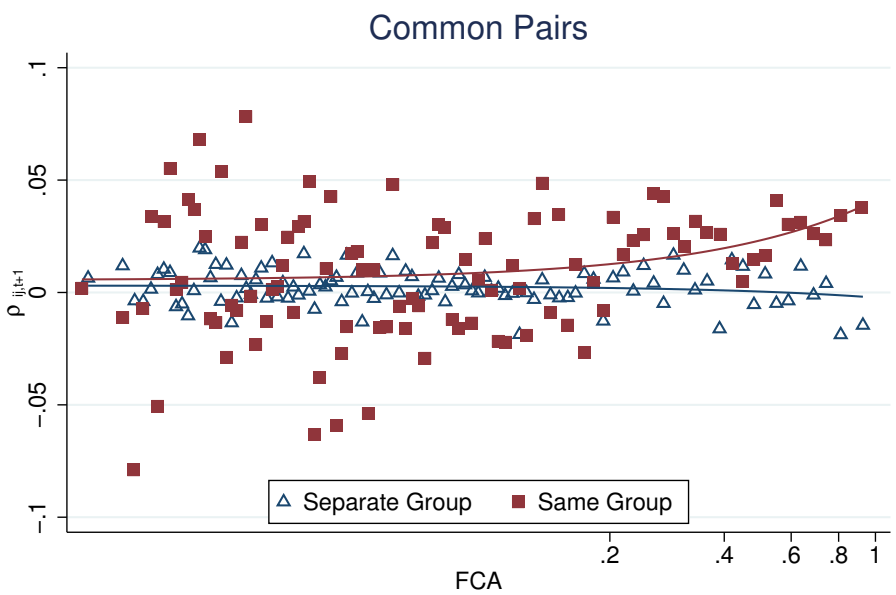
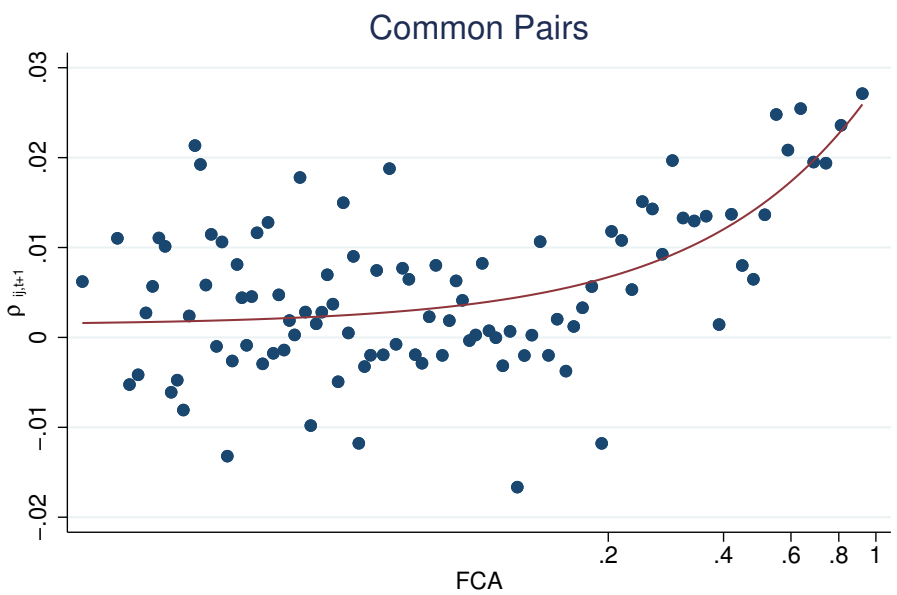
Future Correlation via *FCA*

4 Factor + Industry (Monthly)



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



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

Fortnightly

Fama MacBeth Estimation

Monthly variables

	Dependent Variable:Future Monthly Correlation of 4F+Industry Residuals										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
ln(*FCA*)	0.00228*	0.00268***	0.000744	-0.000719	0.00270***	0.00310***	-0.000228	-0.000528	-0.000467	-0.000418	-0.000462
	(2.50)	(4.65)	(1.44)	(-1.26)	(4.81)	(4.53)	(-0.34)	(-0.80)	(-0.71)	(-0.63)	(-0.70)
ρ_t		0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***
		(4.94)	(4.93)	(4.92)	(4.94)	(4.94)	(4.92)	(4.91)	(4.91)	(4.91)	(4.92)
SameGroup			0.0142***	0.0279***			0.0294***	0.0259***	0.0261***	0.0260***	0.0299***
			(7.14)	(9.16)			(8.36)	(7.60)	(7.78)	(7.49)	(8.76)
(ln(*FCA*)) × SameGroup				0.00817***			0.00821***	0.00731***	0.00733***	0.00727***	0.00820***
				(7.16)			(6.98)	(6.37)	(6.41)	(6.34)	(7.01)
ActiveHolder					0.000134	-0.00363	-0.00509	-0.00340	-0.00361	-0.00371	-0.00515
					(0.09)	(-1.16)	(-1.56)	(-0.98)	(-1.02)	(-1.07)	(-1.55)
(ln(*FCA*)) × ActiveHolder						-0.00147	-0.00179	-0.00130	-0.00130	-0.00133	-0.00165
						(-1.42)	(-1.73)	(-1.19)	(-1.15)	(-1.20)	(-1.57)
SameIndustry							-0.00266	-0.00447	-0.00494	-0.00537	-0.00369
							(-0.67)	(-1.20)	(-1.35)	(-1.47)	(-0.96)
SameSize										0.0225***	0.00991**
										(5.73)	(3.26)
SameBookToMarket										0.00617	0.00571*
										(1.95)	(2.34)
Constant	0.0123***	0.0117***	0.00437*	0.0000498	0.0117***	0.0127***	0.00154	0.0241***	0.0183***	0.0202***	0.00547*
	(5.83)	(5.91)	(2.38)	(0.02)	(6.11)	(5.82)	(0.81)	(4.95)	(3.69)	(4.95)	(2.50)
Controls	No	No	No	No	No		No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	No	Yes	Yes	No
N	294185	293797	293797	293797	293797	293797	293797	293797	293797	293797	293797
R^2	0.000437	0.0275	0.0280	0.0283	0.0278	0.0280	0.0293	0.0306	0.0311	0.0305	0.0298

t statistics in parentheses

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

Fortnightly

Fama MacBeth Estimation

Monthly variables

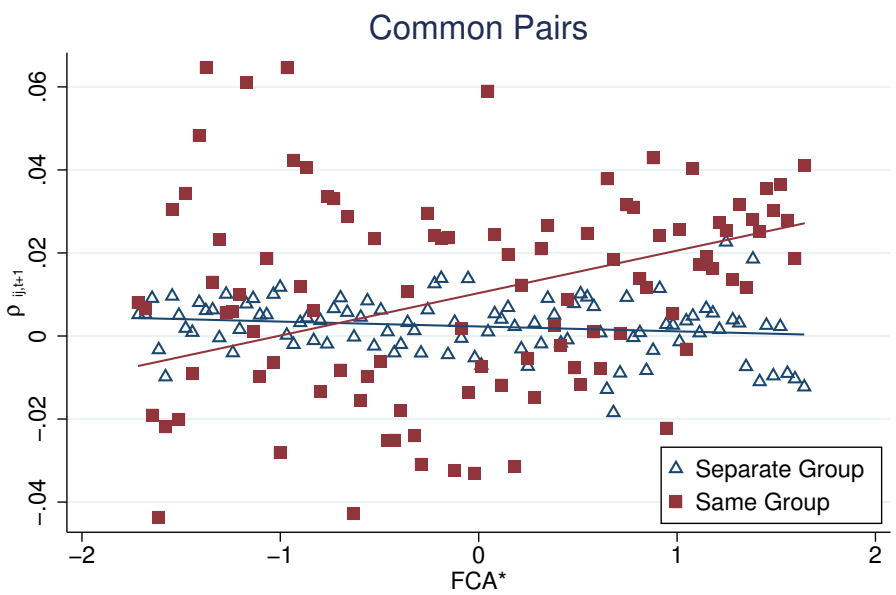
	Dependent Variable:Future Monthly Correlation of 4F+Industry Residuals									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ln(*FCA*)	0.000565	0.000535	-0.000462	-0.000467	-0.000457	-0.000463	0.0000346	-0.0000213	-0.000467	-0.000469
	(1.14)	(1.13)	(-0.70)	(-0.71)	(-0.70)	(-0.70)	(0.05)	(-0.03)	(-0.71)	(-0.71)
ρ_t	0.104***	0.104***	0.104***	0.104***	0.104***	0.103***	0.104***	0.104***	0.104***	0.103***
	(4.93)	(4.91)	(4.92)	(4.91)	(4.91)	(4.90)	(4.92)	(4.90)	(4.91)	(4.90)
SameGroup	0.0160***	0.0135***	0.0299***	0.0261***	0.0124	0.00960	0.00118	-0.000493	-0.0275	-0.0301
	(6.87)	(5.69)	(8.76)	(7.78)	(1.06)	(0.83)	(0.10)	(-0.04)	(-0.87)	(-0.97)
ActiveHolder	-0.000642	0.0000429	-0.00515	-0.00361	-0.00540	-0.00389	-0.00517	-0.00367	-0.00536	-0.00387
	(-0.41)	(0.03)	(-1.55)	(-1.02)	(-1.64)	(-1.10)	(-1.57)	(-1.04)	(-1.60)	(-1.08)
SameIndustry	-0.00353	-0.00487	-0.00369	-0.00494	-0.00336	-0.00461	-0.00337	-0.00464	-0.00333	-0.00459
	(-0.91)	(-1.32)	(-0.96)	(-1.35)	(-0.87)	(-1.25)	(-0.87)	(-1.26)	(-0.86)	(-1.24)
(ln(*FCA*)) × SameGroup			0.00820***	0.00733***	0.00834***	0.00748***			-0.0233	-0.0248
			(7.01)	(6.41)	(6.97)	(6.40)			(-0.91)	(-0.97)
(ln(*FCA*)) × ActiveHolder			-0.00165	-0.00130	-0.00168	-0.00132	-0.00162	-0.00127	-0.00166	-0.00130
			(-1.57)	(-1.15)	(-1.60)	(-1.18)	(-1.55)	(-1.14)	(-1.56)	(-1.15)
Down Market					-0.0134	-0.0128	-0.0135	-0.0128	-0.0134	-0.0128
					(-1.37)	(-1.32)	(-1.37)	(-1.33)	(-1.37)	(-1.32)
Down Market × SameGroup					0.00804	0.00725	0.0221	0.0201	0.0523	0.0511
					(0.65)	(0.60)	(1.79)	(1.65)	(1.68)	(1.67)
(ln(*FCA*)) × Down Market × SameGroup							0.0107***	0.00973***	0.0346	0.0350
							(4.73)	(4.30)	(1.34)	(1.37)
Constant	0.00865***	0.0218***	0.00547*	0.0183***	0.0190*	0.0309**	0.0205*	0.0324**	0.0190*	0.0308**
	(4.94)	(4.22)	(2.50)	(3.69)	(2.05)	(2.78)	(2.20)	(2.91)	(2.05)	(2.77)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Interaction	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	293797	293797	293797	293797	293797	293797	293797	293797	293797	293797
R^2	0.0293	0.0306	0.0298	0.0311	0.0306	0.0319	0.0306	0.0319	0.0310	0.0323

t statistics in parentheses

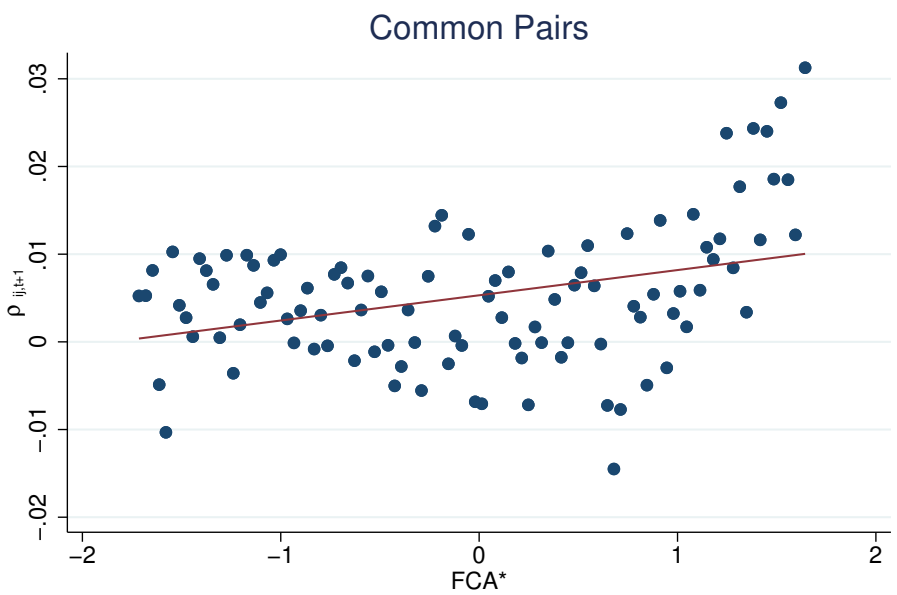
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Fama MacBeth Estimation

Monthly variables



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

Fortnightly

Fama MacBeth Estimation

Monthly variables

	Dependent Variable:Future Monthly Correlation of 4F+Industry Residuals										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FCA*	0.00337	0.00471***	0.00189*	0.000708	0.00467***	0.00492***	0.000877	0.000261	0.000348	0.000371	0.000424
	(1.71)	(6.28)	(2.36)	(0.88)	(6.22)	(4.62)	(0.99)	(0.32)	(0.43)	(0.46)	(0.51)
ρ_t		0.121***	0.121***	0.121***	0.121***	0.121***	0.120***	0.120***	0.120***	0.120***	0.120***
		(5.72)	(5.69)	(5.68)	(5.72)	(5.71)	(5.68)	(5.68)	(5.67)	(5.67)	(5.69)
SameGroup			0.0184***	0.0116***			0.0118***	0.0106***	0.0107***	0.0109***	0.0126***
			(8.85)	(4.72)			(4.60)	(4.08)	(4.19)	(4.11)	(4.93)
(FCA*) × SameGroup				0.00901***			0.00885***	0.00739**	0.00744**	0.00736**	0.00877***
				(3.89)			(3.71)	(3.15)	(3.17)	(3.12)	(3.69)
ActiveHolder					0.00303*	0.00292	0.00186	0.00232	0.00202	0.00197	0.00123
					(2.02)	(1.97)	(1.22)	(1.53)	(1.37)	(1.35)	(0.84)
(FCA*) × ActiveHolder						-0.000685	-0.00130	-0.000430	-0.000394	-0.000408	-0.000891
						(-0.46)	(-0.92)	(-0.31)	(-0.28)	(-0.30)	(-0.65)
SameIndustry							0.00125	-0.00100	-0.00165	-0.00189	0.0000177
							(0.30)	(-0.27)	(-0.46)	(-0.52)	(0.00)
SameSize										0.0294***	0.0140***
										(4.73)	(3.79)
SameBookToMarket										0.00799*	0.00717*
										(2.58)	(2.51)
Constant	0.00750***	0.00638***	0.00342***	0.00317**	0.00553***	0.00554***	0.00231***	0.0321***	0.0264***	0.0262***	0.00831***
	(5.93)	(6.21)	(3.62)	(3.36)	(6.59)	(6.49)	(4.42)	(5.08)	(4.39)	(4.99)	(6.19)
Controls	No	No	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	No	Yes	Yes	No
N	294094	293254	293254	293254	293254	293254	293254	293254	293254	293254	293254
R^2	0.000948	0.0312	0.0319	0.0322	0.0314	0.0316	0.0332	0.0349	0.0356	0.0350	0.0339

t statistics in parentheses

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

Fortnightly

Fama MacBeth Estimation

Monthly variables

	Dependent Variable:Future Monthly Correlation of 4F+Industry Residuals									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FCA*	0.000173	0.0000645	-0.000722	-0.000851	-0.000724	-0.000854	-0.000237	-0.000416	-0.000734	-0.000860
	(0.28)	(0.11)	(-0.96)	(-1.12)	(-0.96)	(-1.11)	(-0.31)	(-0.53)	(-0.97)	(-1.12)
ρ_t	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.103***
	(4.93)	(4.91)	(4.93)	(4.91)	(4.91)	(4.90)	(4.92)	(4.90)	(4.92)	(4.90)
SameGroup	0.0166***	0.0141***	0.00893***	0.00742**	-0.00888	-0.00940	-0.0000663	-0.00154	0.0542	0.0549
	(6.86)	(5.73)	(3.60)	(2.88)	(-0.77)	(-0.82)	(-0.01)	(-0.14)	(0.72)	(0.74)
ActiveHolder	-0.000592	0.0000962	-0.000770	-0.0000881	-0.000932	-0.000295	-0.000841	-0.000192	-0.000960	-0.000324
	(-0.38)	(0.06)	(-0.50)	(-0.06)	(-0.60)	(-0.19)	(-0.54)	(-0.12)	(-0.62)	(-0.21)
SameIndustry	-0.00335	-0.00466	-0.00350	-0.00473	-0.00317	-0.00440	-0.00316	-0.00441	-0.00315	-0.00439
	(-0.87)	(-1.27)	(-0.91)	(-1.30)	(-0.83)	(-1.20)	(-0.82)	(-1.21)	(-0.82)	(-1.19)
(FCA*) × SameGroup			0.0104***	0.00924***	0.0106***	0.00942***			-0.0421	-0.0440
			(6.68)	(6.08)	(6.58)	(6.01)			(-0.80)	(-0.84)
(FCA*) × ActiveHolder			-0.00188	-0.00136	-0.00190	-0.00138	-0.00179	-0.00128	-0.00187	-0.00136
			(-1.50)	(-1.03)	(-1.51)	(-1.04)	(-1.43)	(-0.97)	(-1.48)	(-1.02)
Down Market					-0.0135	-0.0129	-0.0135	-0.0129	-0.0135	-0.0129
					(-1.38)	(-1.33)	(-1.38)	(-1.33)	(-1.37)	(-1.33)
Down Market × SameGroup					0.00791	0.00714	-0.00298	-0.00243	-0.0571	-0.0588
					(0.64)	(0.59)	(-0.22)	(-0.19)	(-0.76)	(-0.79)
(FCA*) × Down Market × SameGroup							0.0134***	0.0120***	0.0560	0.0564
							(3.99)	(3.54)	(1.06)	(1.08)
Constant	0.00707***	0.0206***	0.00677***	0.0199***	0.0204*	0.0326**	0.0205*	0.0328**	0.0204*	0.0325**
	(5.42)	(4.09)	(5.19)	(3.98)	(2.07)	(2.76)	(2.08)	(2.78)	(2.06)	(2.75)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Interaction	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	293797	293797	293797	293797	293797	293797	293797	293797	293797	293797
R^2	0.0293	0.0306	0.0298	0.0311	0.0306	0.0319	0.0305	0.0318	0.0310	0.0323

t statistics in parentheses

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

Fama MacBeth Estimation

Monthly variables (Grouped by size)

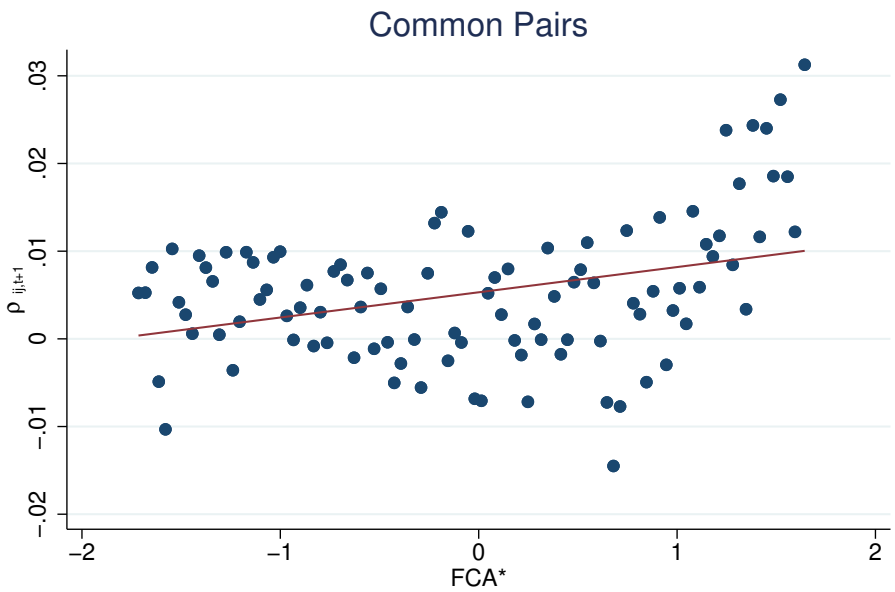
	All Firms		Big Firms		Big & Small Firms		Small Firms	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FCA*	-0.000722	-0.000851	0.000466	0.000909	-0.00302	-0.00351*	0.00217	0.00309
	(-0.91)	(-1.05)	(0.57)	(1.08)	(-1.89)	(-2.14)	(0.66)	(0.89)
SameGroup	0.00893***	0.00742**	0.00316	0.00201	0.0167***	0.0163***	-0.00427	-0.00320
	(3.53)	(2.83)	(1.13)	(0.75)	(4.08)	(4.18)	(-0.52)	(-0.41)
(FCA*) × SameGroup	0.0104***	0.00924***	0.00720*	0.00617*	0.00357	0.00337	0.0173**	0.0155**
	(6.45)	(5.86)	(2.38)	(2.00)	(1.09)	(1.00)	(3.38)	(2.97)
ActiveHolder	-0.000770	-0.0000881	-0.000162	-0.00150	0.000947	0.00152	0.0000203	0.000693
	(-0.48)	(-0.06)	(-0.09)	(-0.79)	(0.30)	(0.47)	(0.00)	(0.15)
(FCA*) × ActiveHolder	-0.00188	-0.00136	-0.00296	-0.00264	0.00182	0.00208	-0.00398	-0.00466
	(-1.45)	(-0.99)	(-1.58)	(-1.37)	(0.86)	(0.96)	(-0.80)	(-0.92)
SameIndustry	-0.00350	-0.00473	-0.0261***	-0.0276***	0.00471	0.00420	0.0168**	0.0157**
	(-0.96)	(-1.36)	(-6.90)	(-7.24)	(1.09)	(1.00)	(2.67)	(2.70)
ρ_t	0.104***	0.104***	0.0737***	0.0737***	0.112***	0.112***	0.143***	0.142***
	(5.08)	(5.07)	(4.34)	(4.35)	(4.98)	(4.98)	(4.14)	(4.12)
Constant	0.00677***	0.0199***	0.00836***	-0.0949*	0.00745**	0.0184	0.0156**	0.0352
	(5.15)	(3.80)	(4.04)	(-2.51)	(2.86)	(1.17)	(3.14)	(1.89)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Interaction	No	Yes	No	Yes	No	Yes	No	Yes
N	293797	293797	129418	129418	119521	119521	44858	44858
R^2	0.0298	0.0311	0.0256	0.0282	0.0372	0.0399	0.0567	0.0647

t statistics in parentheses

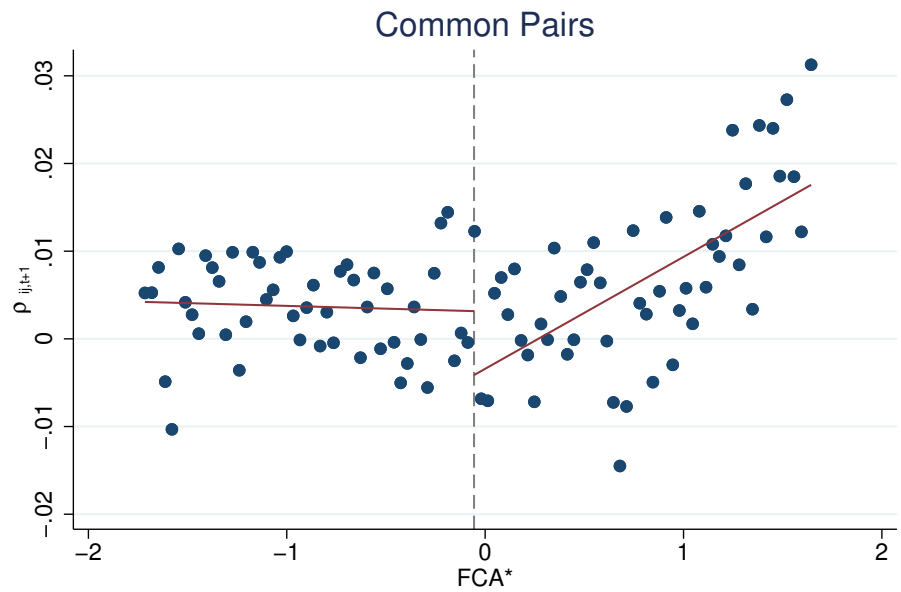
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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

Fortnightly

Fama MacBeth Estimation

Monthly variables

	Dependent Variable:Future Monthly Correlation of 4F+Industry Residuals									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FCA*	0.00337	-0.00160	-0.00266*	-0.00185	-0.00250*	-0.00171	-0.00313*	-0.00322**	-0.00309*	-0.00205
	(1.71)	(-0.96)	(-2.17)	(-1.56)	(-2.04)	(-1.44)	(-2.61)	(-2.69)	(-2.59)	(-1.73)
$(FCA^* > Median[FCA^*]) \times FCA^*$		0.0104	0.0154***	0.00849***	0.0150***	0.00815***	0.00963***	0.0101***	0.00983***	0.00760***
		(1.58)	(6.87)	(3.59)	(6.75)	(3.47)	(4.51)	(4.73)	(4.60)	(3.47)
ρ_t			0.121***	0.121***	0.121***	0.121***	0.120***	0.120***	0.120***	0.120***
			(5.71)	(5.69)	(5.71)	(5.69)	(5.68)	(5.68)	(5.68)	(5.70)
SameGroup				0.0164***		0.0165***	0.0138***	0.0139***	0.0140***	0.0175***
				(7.57)		(7.62)	(5.30)	(5.44)	(5.25)	(6.88)
ActiveHolder					0.00179	0.00152	0.00196	0.00161	0.00158	0.000955
					(1.16)	(0.96)	(1.25)	(1.06)	(1.05)	(0.64)
SameIndustry							-0.00156	-0.00227	-0.00248	-0.000317
							(-0.43)	(-0.63)	(-0.69)	(-0.08)
SameSize									0.0302***	0.0141***
									(4.98)	(3.82)
SameBookToMarket									0.00788*	0.00713*
									(2.49)	(2.47)
Constant	0.00750***	0.00240	-0.0000950	0.000189	-0.000517	-0.000201	0.0302***	0.0234***	0.0238***	0.00575***
	(5.93)	(0.86)	(-0.08)	(0.17)	(-0.48)	(-0.19)	(4.84)	(3.79)	(4.56)	(3.59)
Controls	No	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	Yes	Yes	No
N	294094	294094	293254	293254	293254	293254	293254	293254	293254	293254
R^2	0.000948	0.00166	0.0316	0.0322	0.0318	0.0324	0.0347	0.0354	0.0348	0.0336

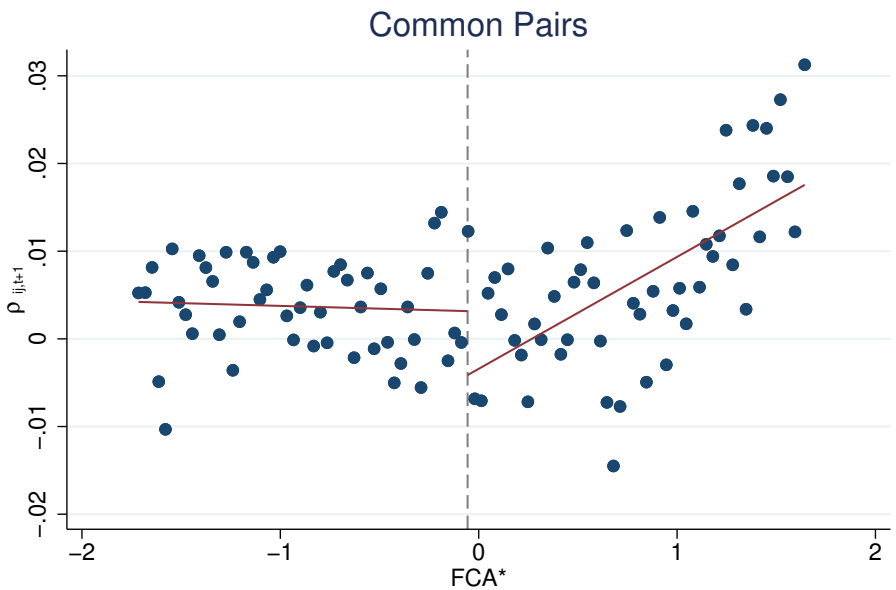
t statistics in parentheses

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

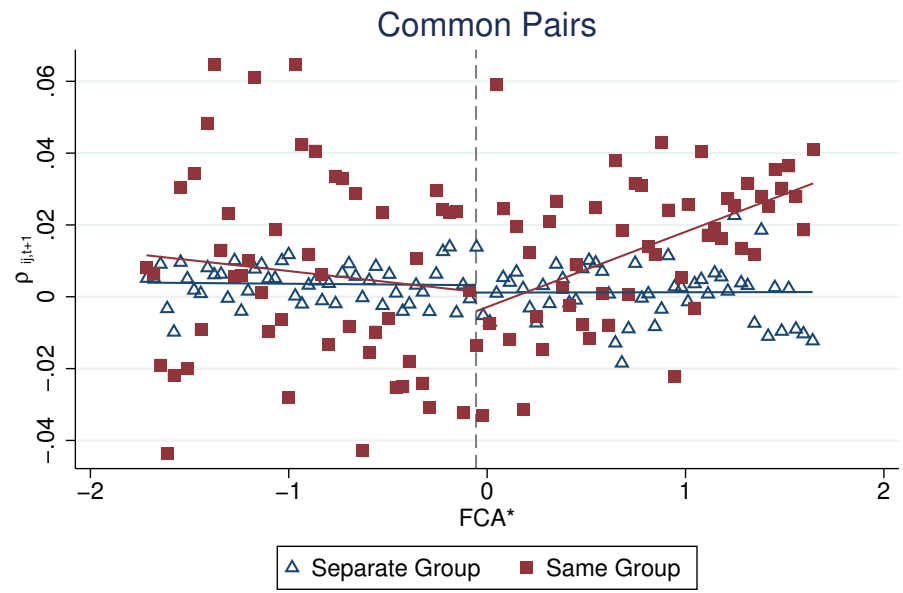
Fortnightly

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



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

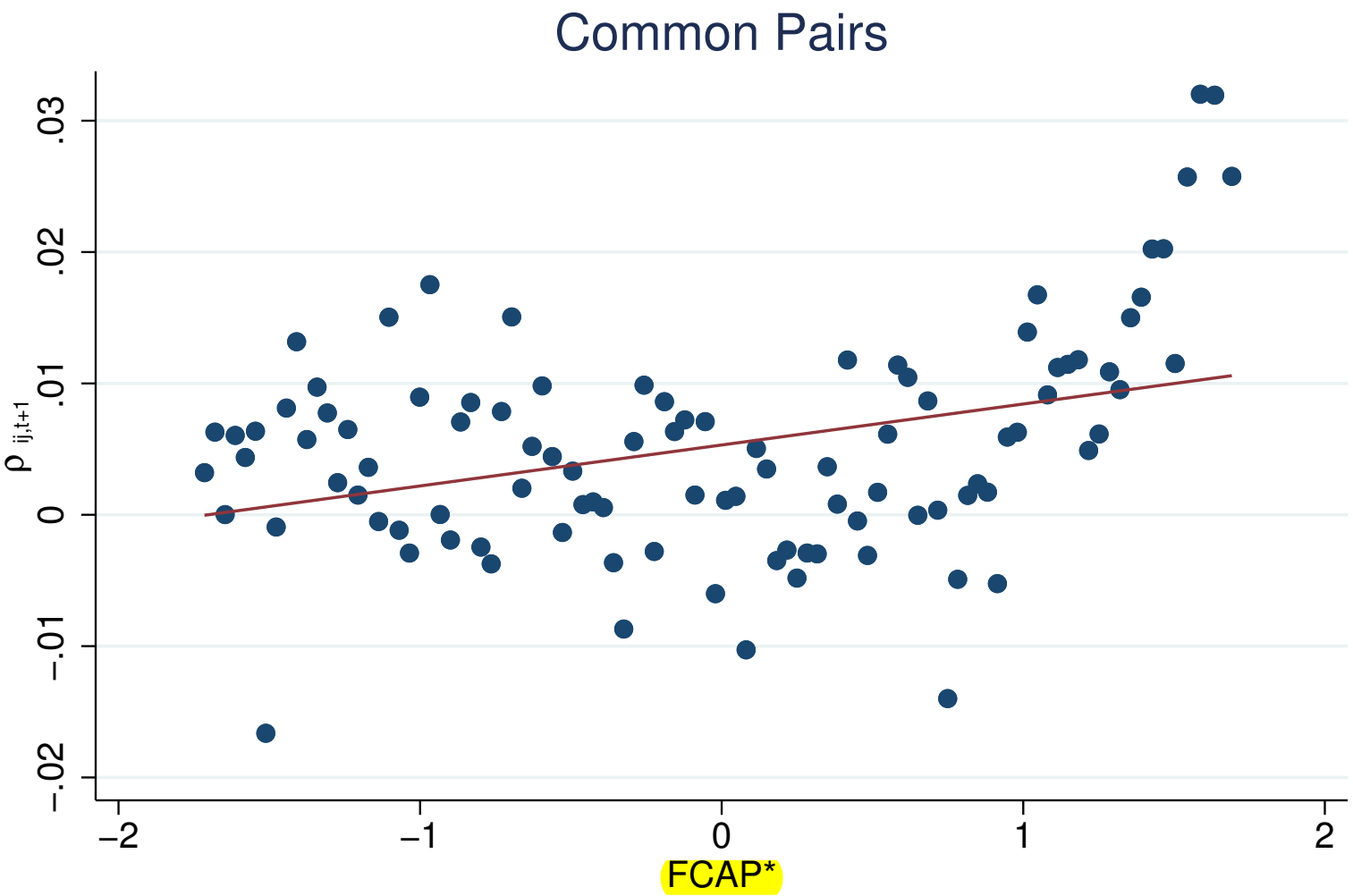
	Future Monthly Correlation of 4F+Industry Residuals			
	(1)	(2)	(3)	(4)
FCA*	-0.000565	0.000439	-0.00206	0.000369
	(-0.48)	(0.53)	(-1.70)	(0.46)
$(FCA^* > Median[FCA^*]) \times FCA^*$	0.00256		0.00613*	
	(1.10)		(2.60)	
SameGroup	0.00313	0.00216	0.00272	0.000421
	(0.67)	(0.46)	(0.60)	(0.09)
$(FCA^*) \times$ SameGroup	-0.00537	-0.00635	-0.00519	-0.00756
	(-0.88)	(-1.00)	(-0.85)	(-1.20)
$(FCA^* > Median[FCA^*]) \times (FCA^*) \times$ SameGroup	0.0208*	0.0233*	0.0171	0.0231*
	(2.30)	(2.52)	(1.89)	(2.55)
ActiveHolder	0.000847	0.00102	0.00146	0.00180
	(0.57)	(0.69)	(0.96)	(1.19)
$(FCA^*) \times$ ActiveHolder	-0.000857	-0.000872	-0.000438	-0.000385
	(-0.63)	(-0.64)	(-0.32)	(-0.28)
ρ_t	0.120***	0.120***	0.120***	0.120***
	(5.69)	(5.69)	(5.68)	(5.67)
Constant	0.00732***	0.00821***	0.0239***	0.0260***
	(4.70)	(6.17)	(3.87)	(4.36)
Controls	No	No	Yes	Yes
Interaction	No	No	Yes	Yes
N	293254	293254	293254	293254
R^2	0.0344	0.0342	0.0361	0.0359

t statistics in parentheses

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

4 Factor + Industry Future Correlation via *FCAP**

Normalized Rank Transformed for each cross section (Monthly)



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

	Dependent Variable:Future Monthly Correlation of 4F+Industry Residuals										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FCAP*	0.00246*	0.00291***	0.000736	-0.000718	0.00293***	0.00322***	-0.000234	-0.00106	-0.00105	-0.000973	-0.000630
	(2.33)	(4.04)	(1.12)	(-1.09)	(4.12)	(3.78)	(-0.31)	(-1.46)	(-1.44)	(-1.31)	(-0.87)
ρ_t		0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***	0.104***
		(4.94)	(4.93)	(4.92)	(4.94)	(4.94)	(4.92)	(4.91)	(4.91)	(4.91)	(4.92)
SameGroup			0.0144***	0.00636**			0.00779**	0.00692**	0.00705**	0.00707**	0.00841***
			(7.08)	(2.90)			(3.25)	(2.74)	(2.83)	(2.81)	(3.49)
(FCAP*) × SameGroup				0.0106***			0.0107***	0.00973***	0.00983***	0.00978***	0.0108***
				(6.50)			(6.50)	(6.08)	(6.18)	(6.07)	(6.57)
ActiveHolder					0.000527	0.000472	-0.000503	-0.0000243	-0.000240	-0.000237	-0.000905
					(0.34)	(0.31)	(-0.32)	(-0.02)	(-0.16)	(-0.15)	(-0.58)
(FCAP*) × ActiveHolder						-0.00108	-0.00206	-0.00130	-0.00131	-0.00134	-0.00181
						(-0.85)	(-1.66)	(-1.03)	(-1.01)	(-1.04)	(-1.45)
SameIndustry							-0.00256	-0.00430	-0.00475	-0.00518	-0.00359
							(-0.65)	(-1.16)	(-1.31)	(-1.43)	(-0.94)
SameSize										0.0229***	0.0101**
										(5.85)	(3.34)
SameBookToMarket										0.00609	0.00571*
										(1.93)	(2.35)
Constant	0.00638***	0.00473***	0.00246*	0.00215*	0.00452***	0.00453***	0.00224*	0.0256***	0.0197***	0.0213***	0.00680***
	(3.57)	(4.70)	(2.36)	(2.10)	(4.24)	(4.24)	(2.52)	(5.28)	(3.93)	(5.44)	(5.16)
Controls	No	No	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	No	Yes	Yes	No
N	294185	293797	293797	293797	293797	293797	293797	293797	293797	293797	293797
R^2	0.000413	0.0275	0.0280	0.0283	0.0278	0.0280	0.0293	0.0306	0.0311	0.0305	0.0298

t statistics in parentheses

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

Fortnightly

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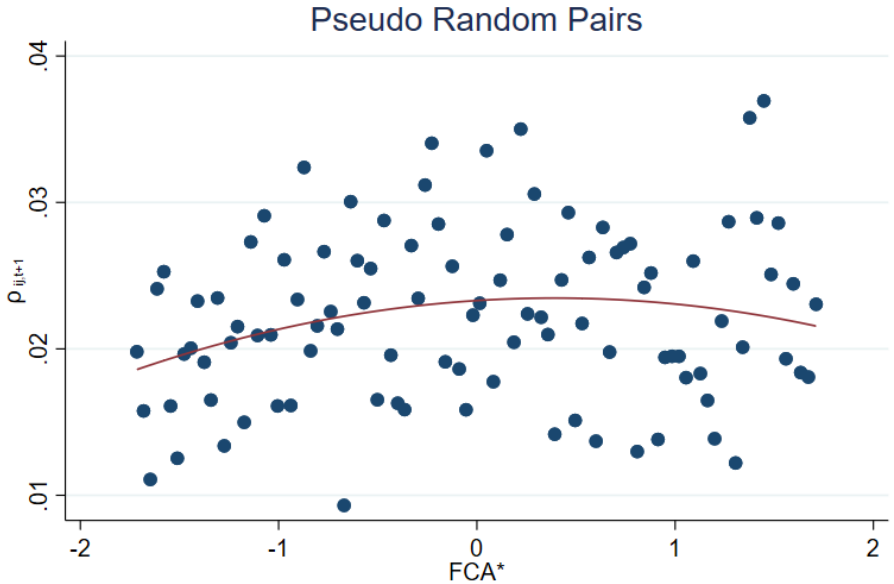
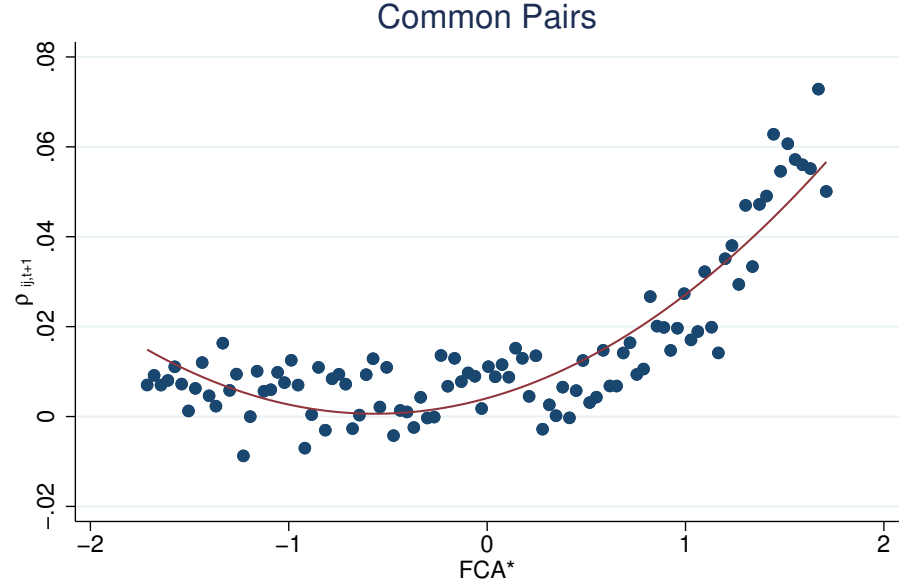
Random Pairs



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

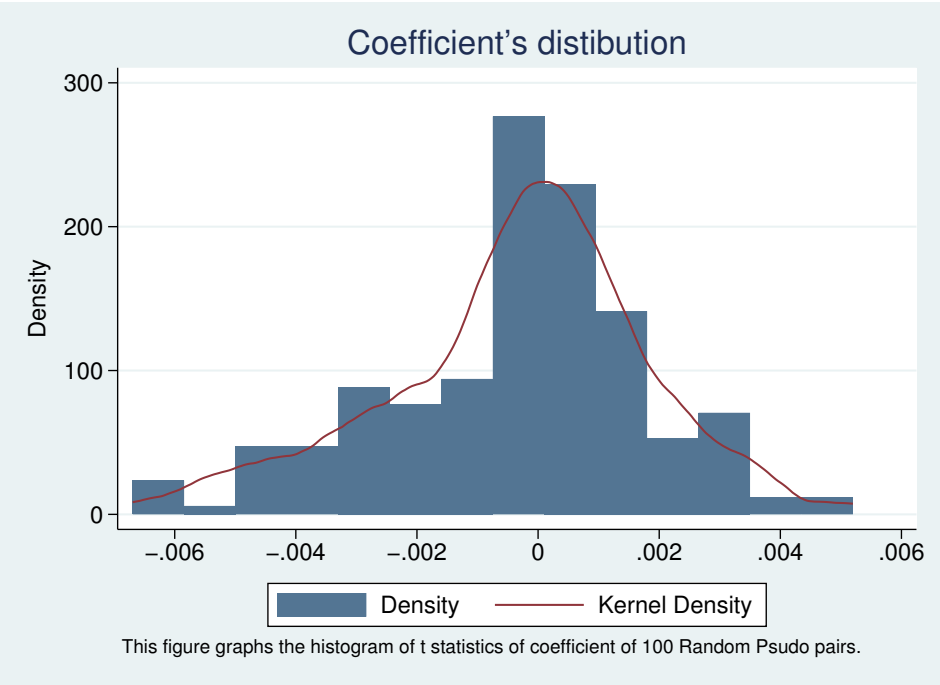
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.000606	0.00333**	0.00261**	0.00206*	0.00244*	0.00202*	0.00190
	(0.99)	(2.60)	(2.71)	(2.11)	(2.49)	(2.04)	(1.94)
(FCA* > *Median*[FCA*]) × FCA*		-0.00559*	-0.00427*	-0.00316	-0.00377*	-0.00314	-0.00274
		(-2.57)	(-2.56)	(-1.84)	(-2.19)	(-1.82)	(-1.63)
ActiveHolder		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

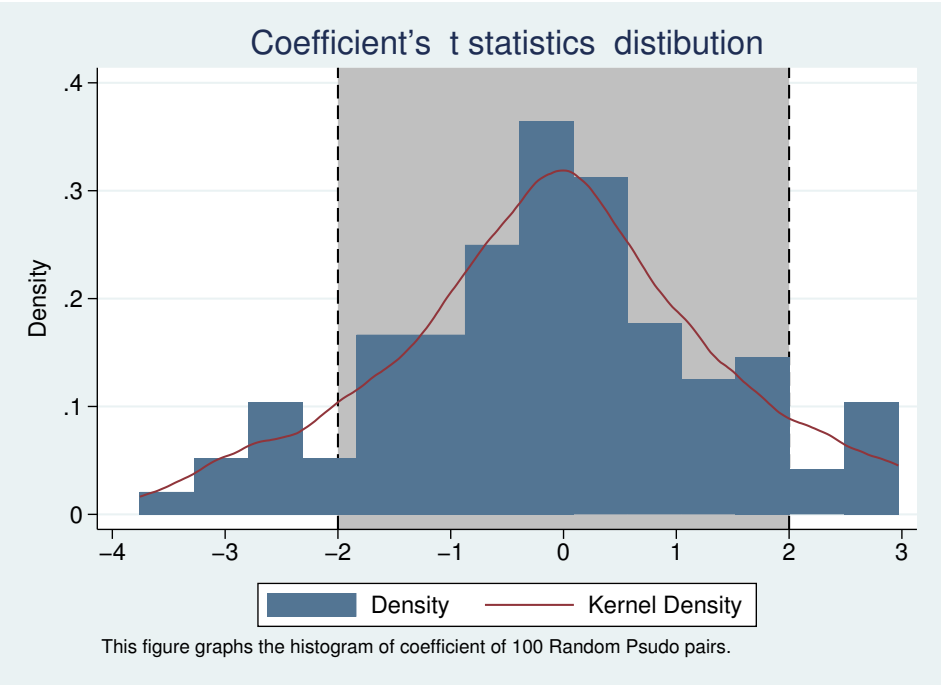
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Random Pairs

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

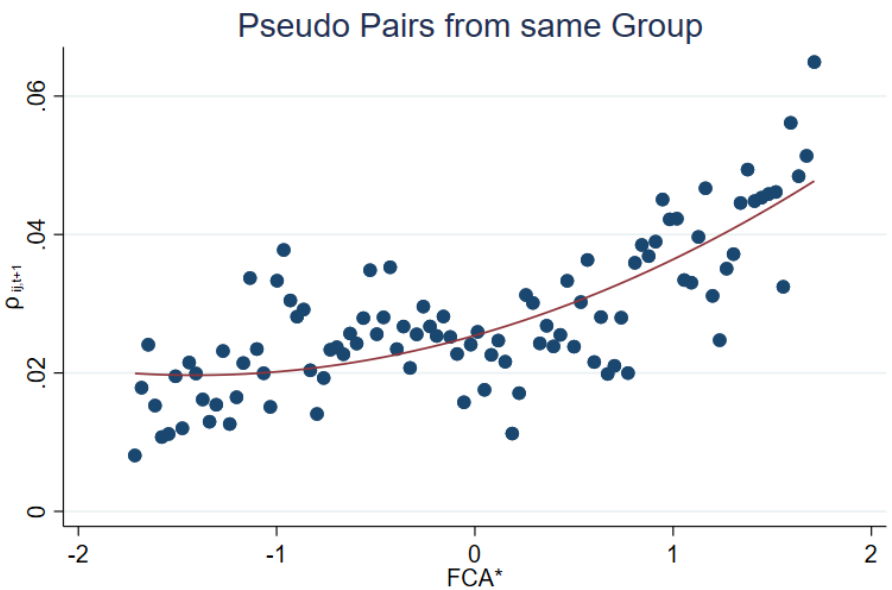


This figure graphs the histogram of t statistics of coefficient of 100 Random Psudo pairs.

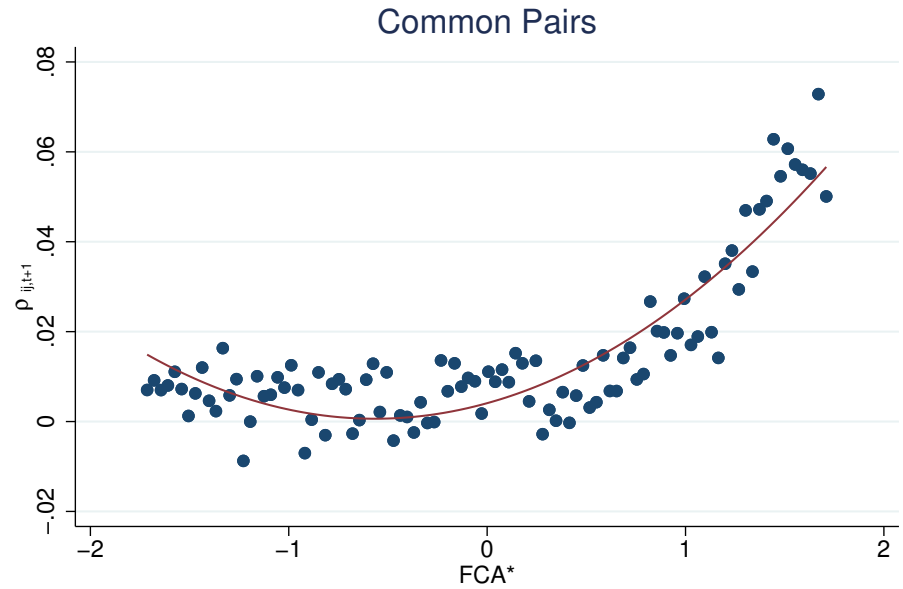


This figure graphs the histogram of coefficient of 100 Random Psudo pairs.

Random Pairs from Same Business Group



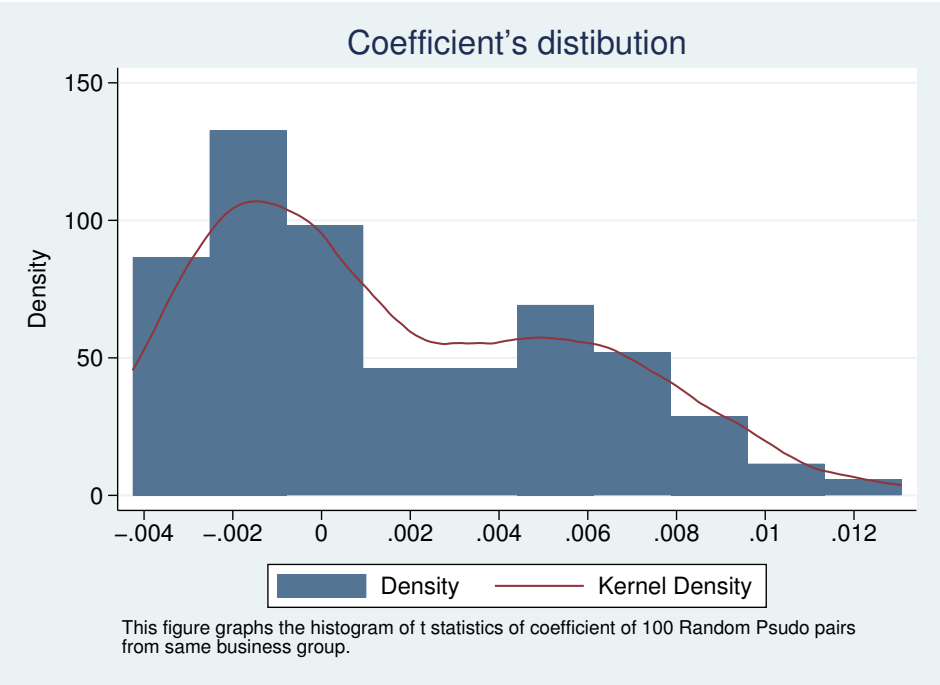
This figure graphs the correlation of daily 4Factor+Industry residuals in fortnight t+1 against normalized rank transformed of our measure of institutional connectedness.



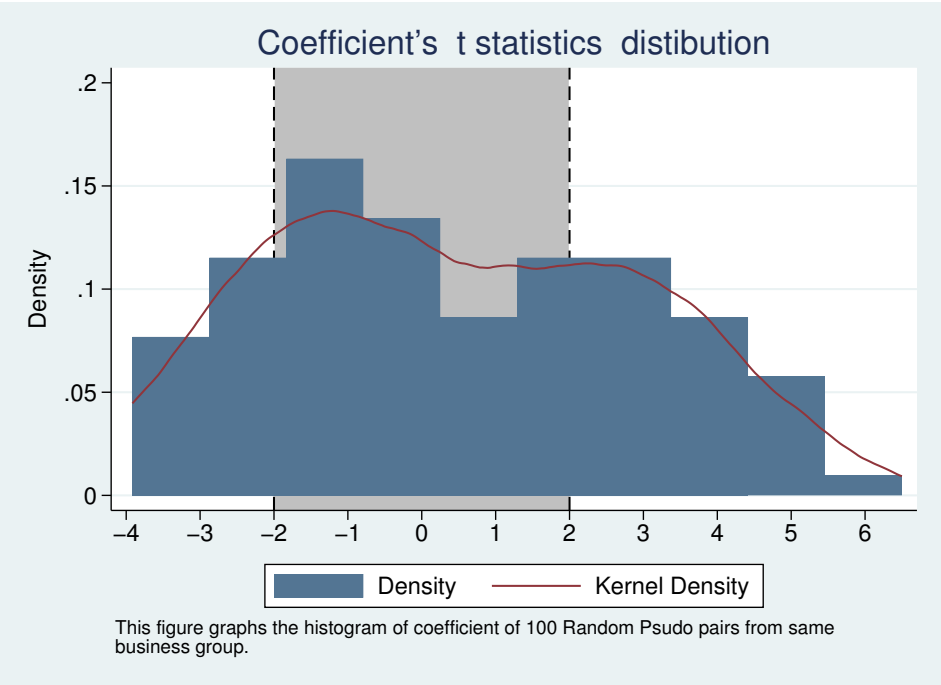
This figure graphs the correlation of daily 4Factor+Industry residuals in fortnight t+1 against our measure of institutional connectedness.

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

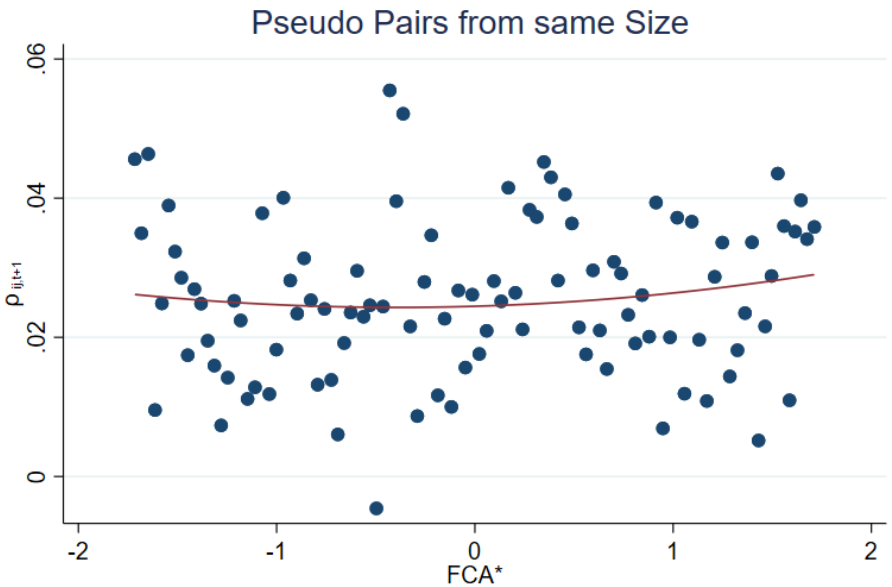
Fortnightly variables for Random group from Same Business Group

	(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

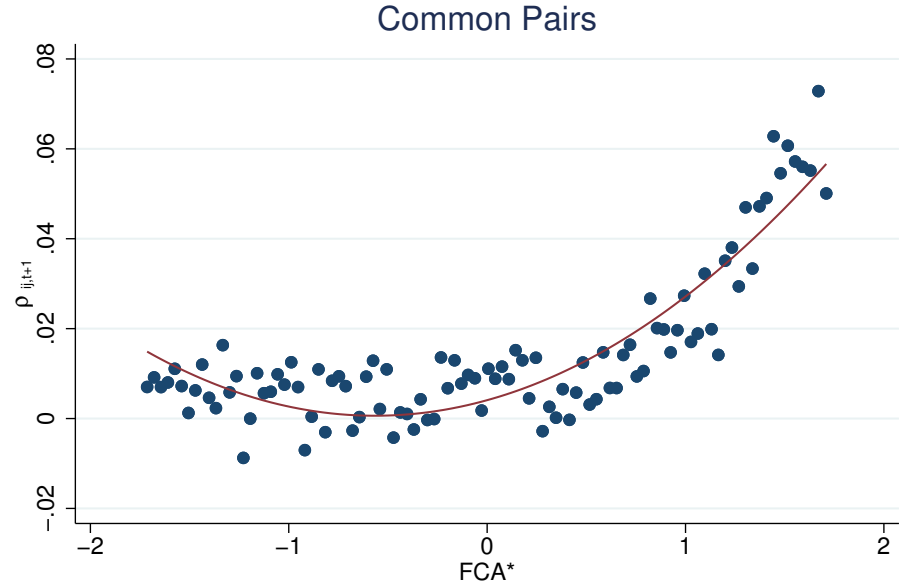
t statistics in parentheses

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

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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- Andrew Koch, Stefan Ruenzi, Laura Starks , *Commonality in Liquidity A Demand-Side Explanation* ,The Review of Financial Studies 2016
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- He,Jie (Jack) Huang,Jiekun ,Zhao,Shanc,*Internalizing governance externalities The role of institutional cross-ownership* , Journal of Financial 2019

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Measuring Common Ownership

Proof

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

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

  - Quadratic

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

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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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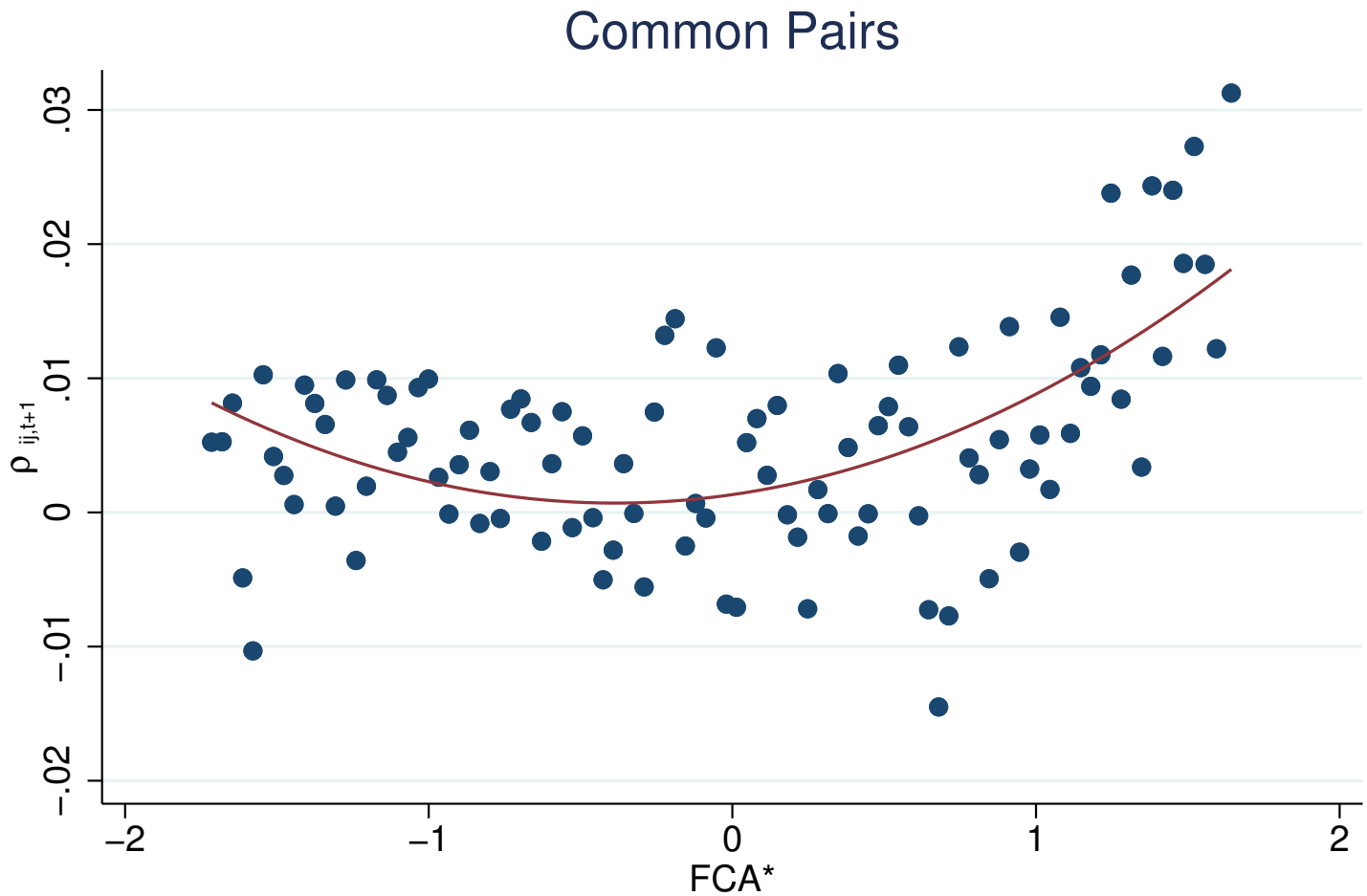
4 Factor + Industry Future Correlation via *FCA**

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

	Dependent Variable:Future Monthly Correlation of 4F+Industry Residuals										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FCA*	0.00337	0.00471***	0.00189*	0.000708	0.00467***	0.00492***	0.000877	0.000261	0.000348	0.000371	0.000424
	(1.71)	(6.28)	(2.36)	(0.88)	(6.22)	(4.62)	(0.99)	(0.32)	(0.43)	(0.46)	(0.51)
ρ_t		0.121***	0.121***	0.121***	0.121***	0.121***	0.120***	0.120***	0.120***	0.120***	0.120***
		(5.72)	(5.69)	(5.68)	(5.72)	(5.71)	(5.68)	(5.68)	(5.67)	(5.67)	(5.69)
SameGroup			0.0184***	0.0116***			0.0118***	0.0106***	0.0107***	0.0109***	0.0126***
			(8.85)	(4.72)			(4.60)	(4.08)	(4.19)	(4.11)	(4.93)
(FCA*) × SameGroup				0.00901***			0.00885***	0.00739**	0.00744**	0.00736**	0.00877***
				(3.89)			(3.71)	(3.15)	(3.17)	(3.12)	(3.69)
ActiveHolder					0.00303*	0.00292	0.00186	0.00232	0.00202	0.00197	0.00123
					(2.02)	(1.97)	(1.22)	(1.53)	(1.37)	(1.35)	(0.84)
(FCA*) × ActiveHolder						-0.000685	-0.00130	-0.000430	-0.000394	-0.000408	-0.000891
						(-0.46)	(-0.92)	(-0.31)	(-0.28)	(-0.30)	(-0.65)
SameIndustry							0.00125	-0.00100	-0.00165	-0.00189	0.0000177
							(0.30)	(-0.27)	(-0.46)	(-0.52)	(0.00)
SameSize										0.0294***	0.0140***
										(4.73)	(3.79)
SameBookToMarket										0.00799*	0.00717*
										(2.58)	(2.51)
Constant	0.00750***	0.00638***	0.00342***	0.00317**	0.00553***	0.00554***	0.00231***	0.0321***	0.0264***	0.0262***	0.00831***
	(5.93)	(6.21)	(3.62)	(3.36)	(6.59)	(6.49)	(4.42)	(5.08)	(4.39)	(4.99)	(6.19)
Controls	No	No	No	No	No	No	No	Yes	Yes	No	No
Interaction	No	No	No	No	No	No	No	No	Yes	Yes	No
N	294094	293254	293254	293254	293254	293254	293254	293254	293254	293254	293254
R^2	0.000948	0.0312	0.0319	0.0322	0.0314	0.0316	0.0332	0.0349	0.0356	0.0350	0.0339

t statistics in parentheses

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

Fortnightly

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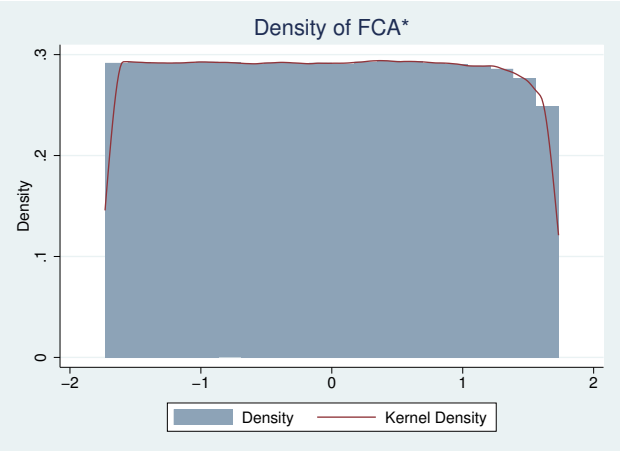
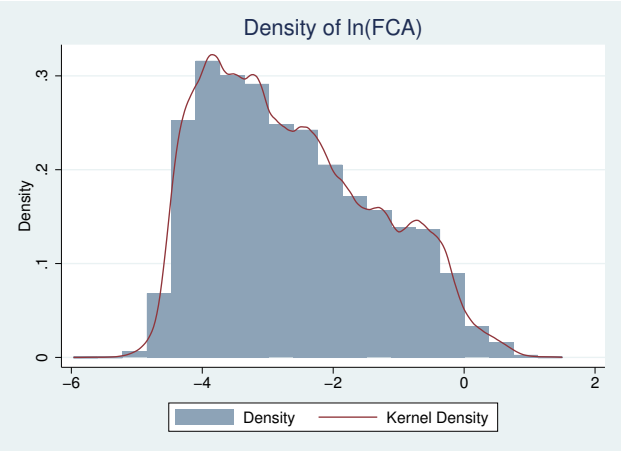
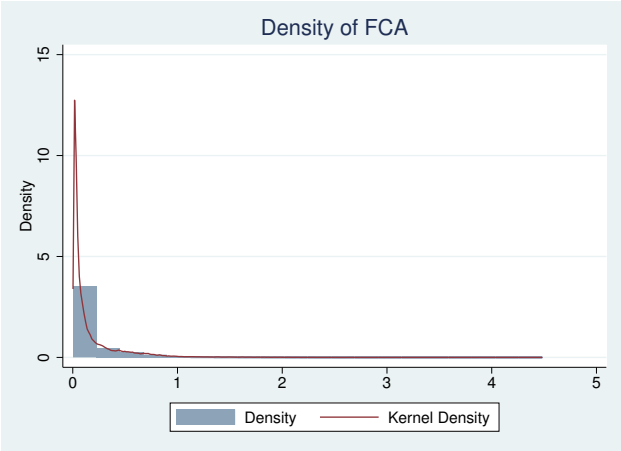
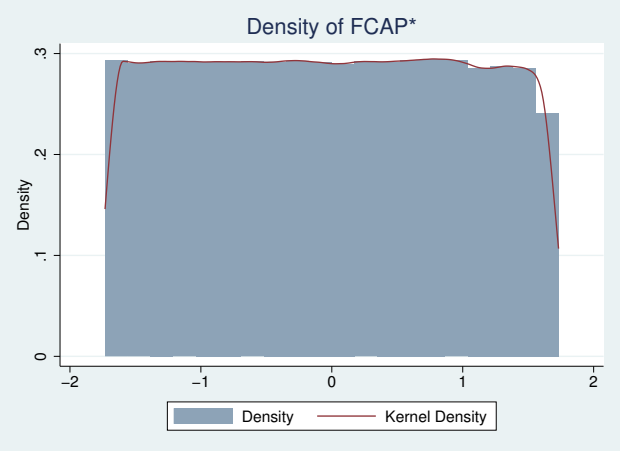
FCA vs. FCAP Distributions

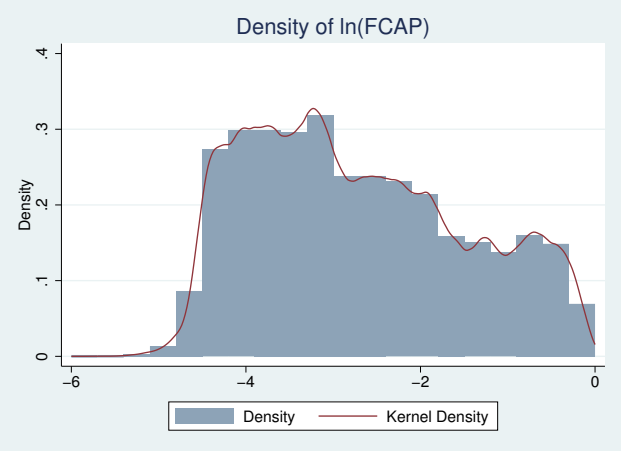
Fortnightly

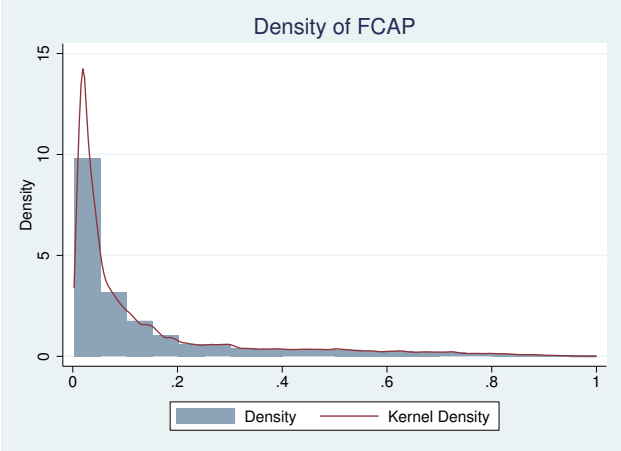












Monthly

Summary of Controls

Fortnightly

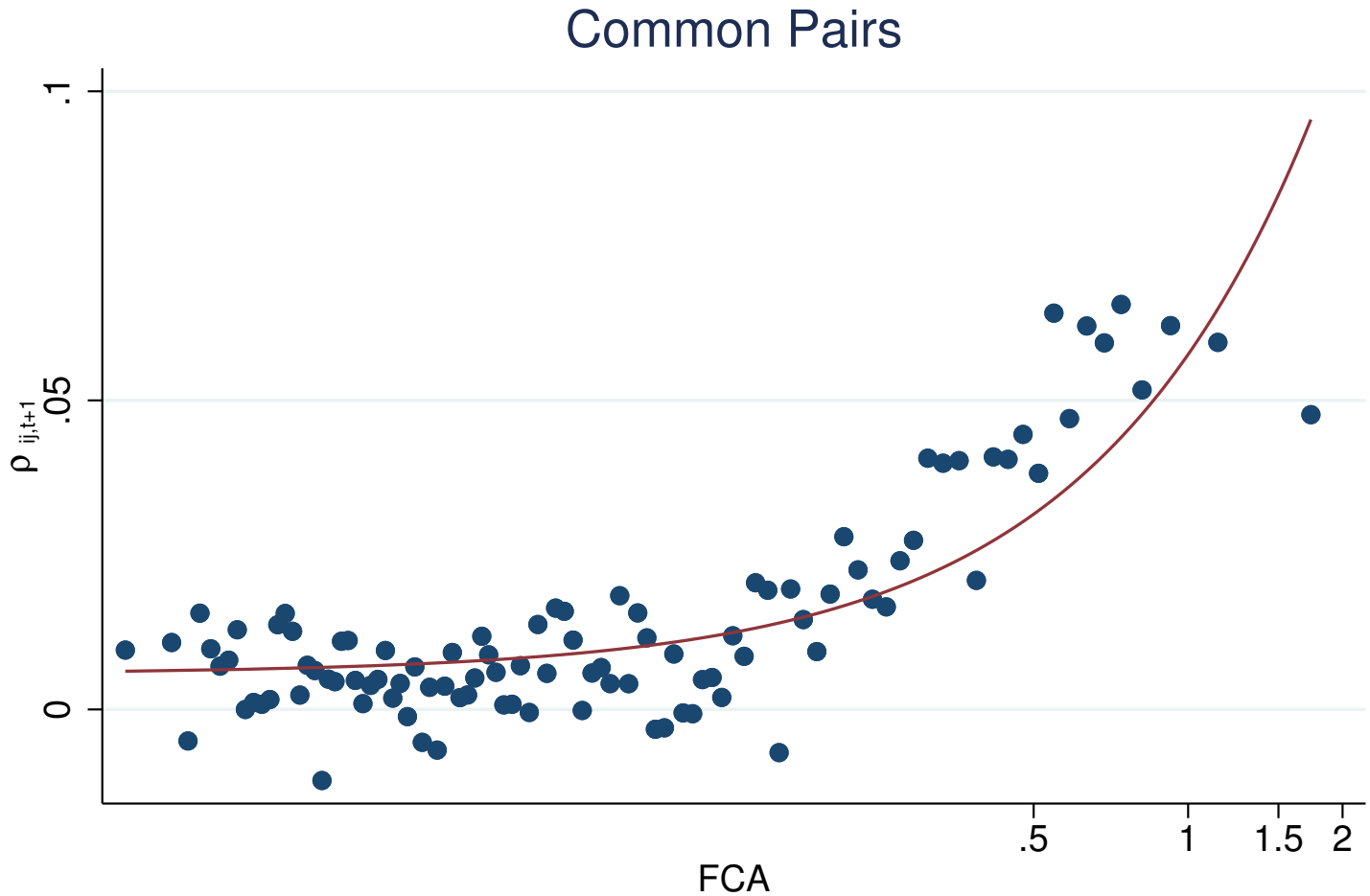
Type of Pairs	Yes	No
SameIndustry	1142	9125
	(11.1%)	(88.9%)
SameGroup	1173	9094
	(11.4%)	(88.6%)
ActiveHolder	2819	7448
	(27.5%)	(72.5%)

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

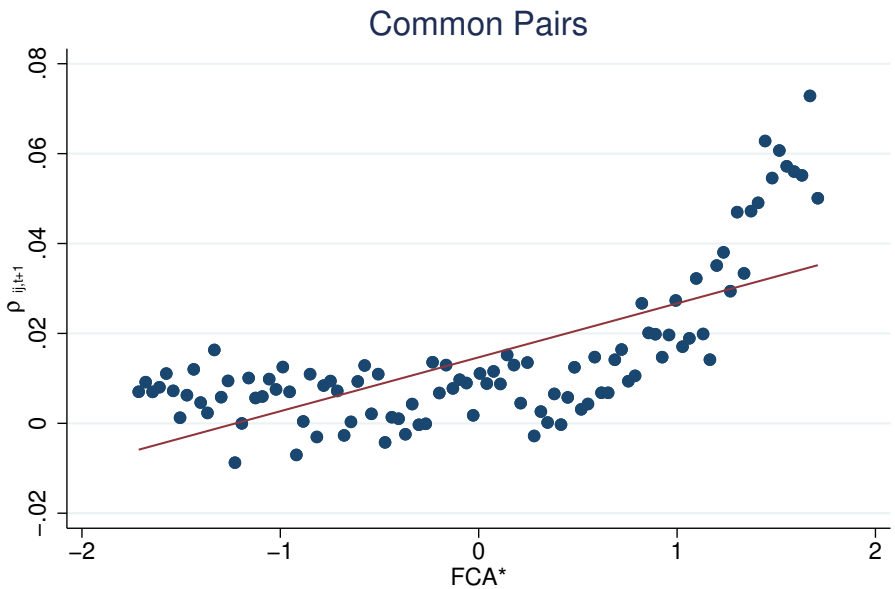
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(FCA)	0.0108***	0.00989***	0.00964***	0.00511***	0.00499***	0.00271***	0.00276***	0.00281***	0.00297***
	(8.48)	(9.12)	(8.81)	(5.15)	(4.95)	(4.12)	(4.07)	(4.16)	(3.78)
ρ_t		0.0740***	0.0739***	0.0734***	0.0733***	0.0710***	0.0708***	0.0711***	0.0723***
		(5.50)	(5.49)	(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

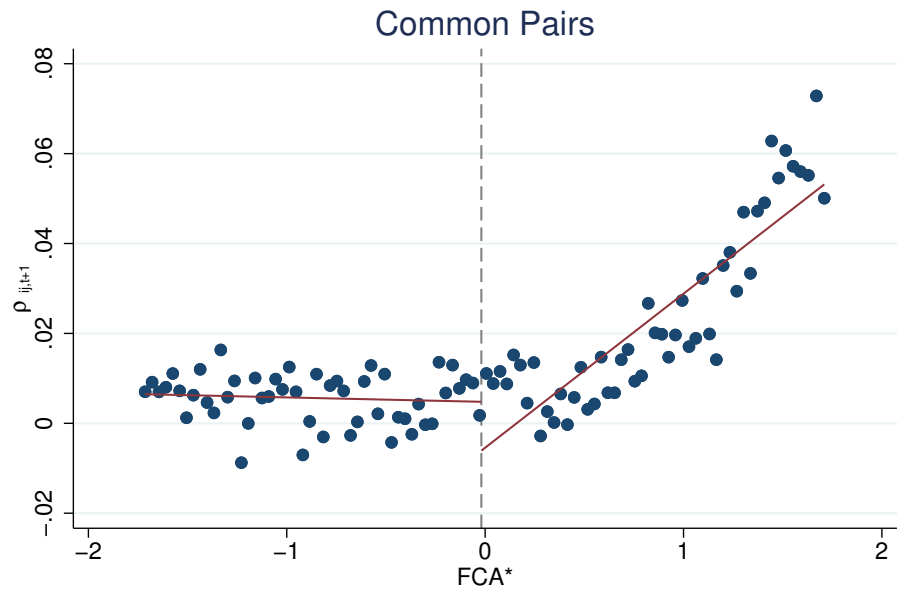
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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

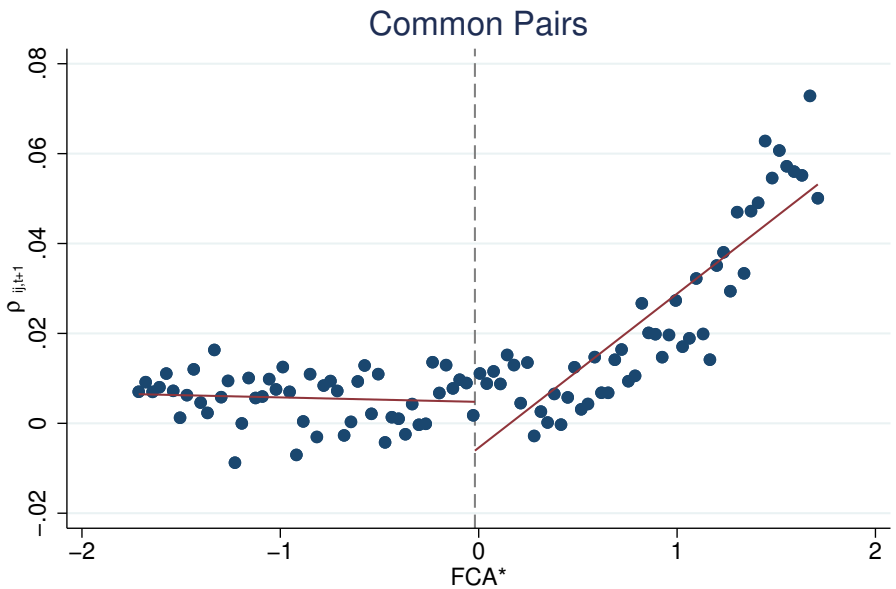
t statistics in parentheses

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

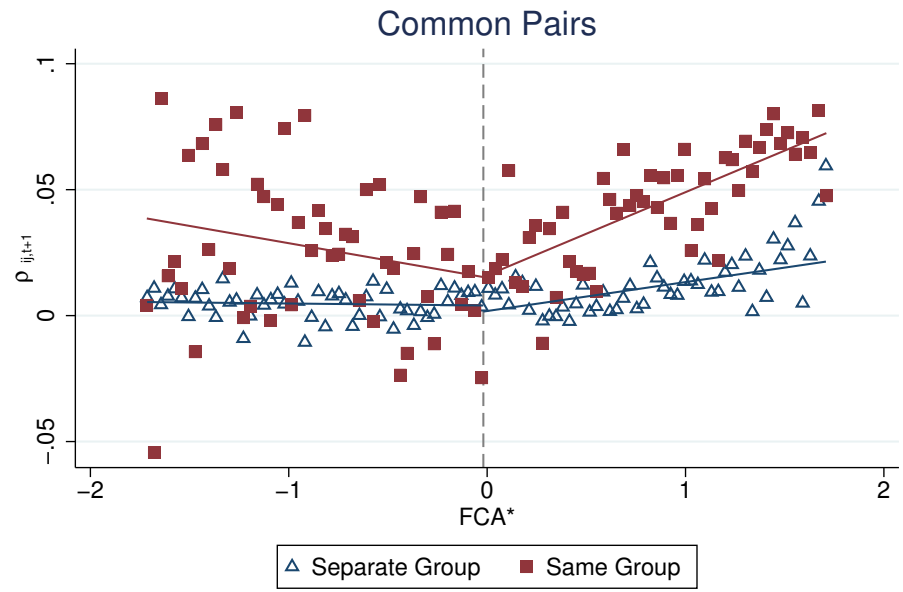
Monthly

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

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

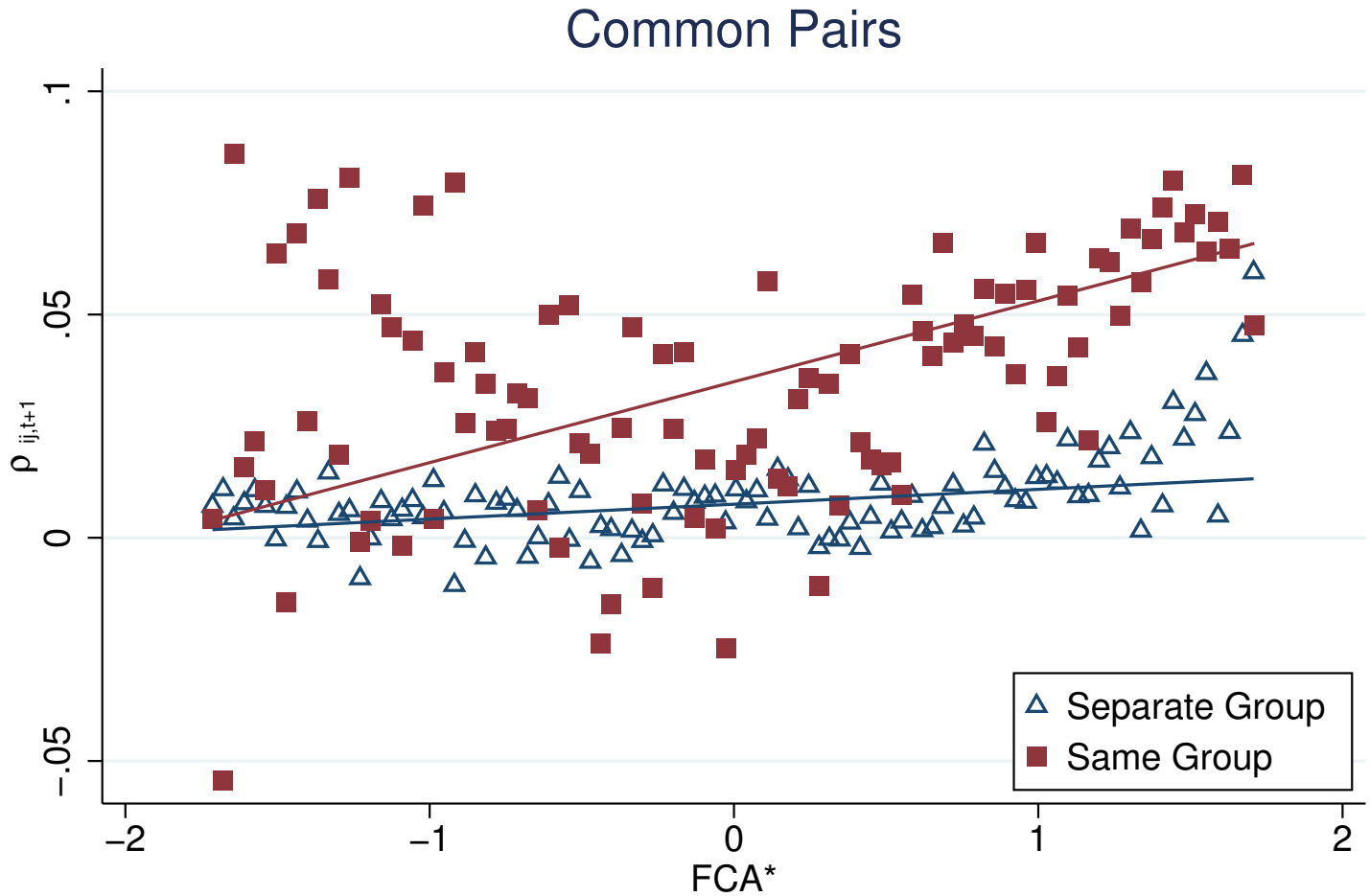
t statistics in parentheses

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

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

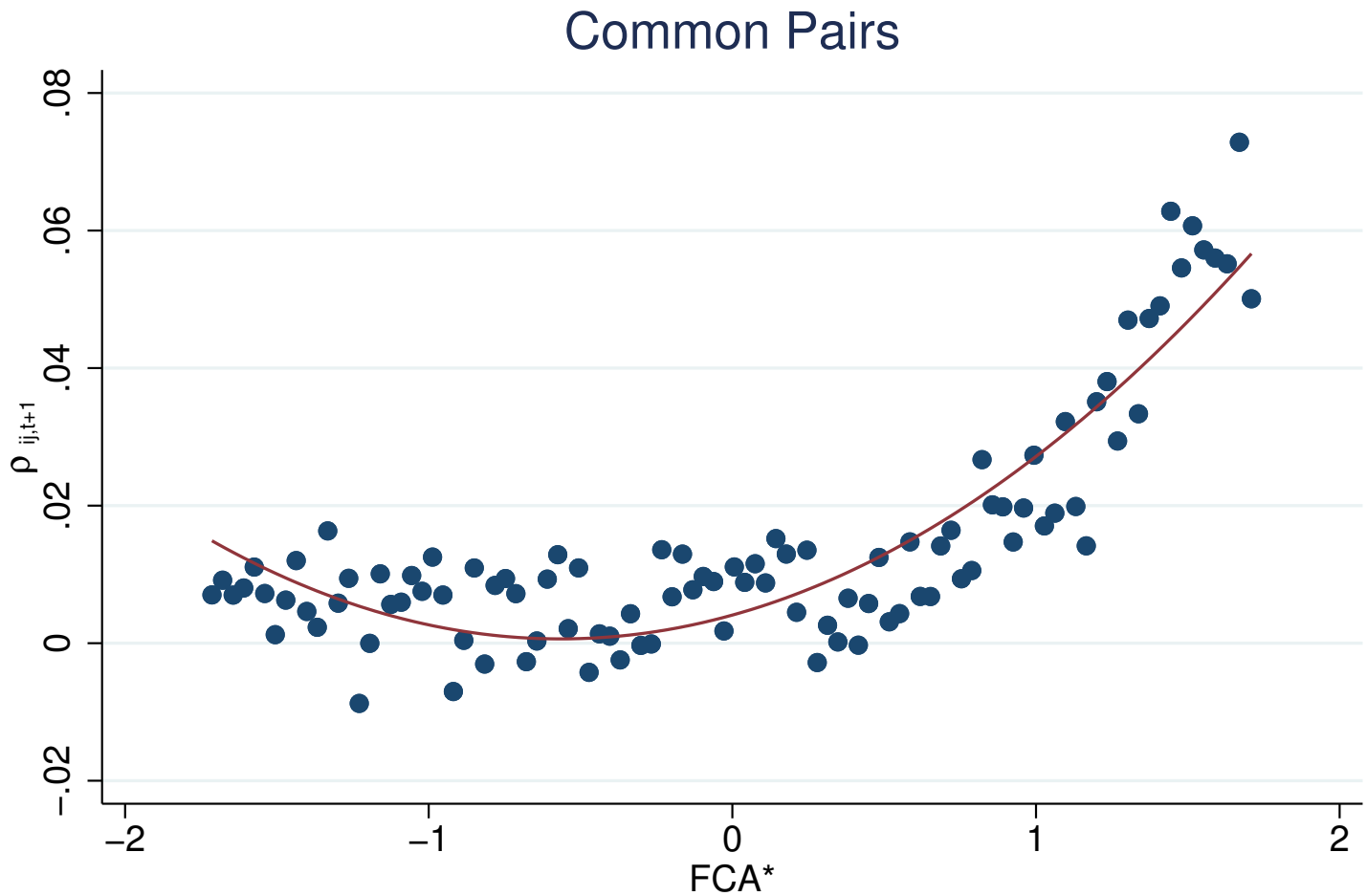
t statistics in parentheses

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

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.

Monthly

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