Connected Stocks: Evidence from Tehran Stock Exchange

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Effects

Hypothesis 1

Simple measures of institutional connnectedness statistically and economically improve forecasts of cross-sectional variation in the correlation. The effect is stronger for pairs that are in the same business groups.

	Dependent Variable: Future Monthly Correlation of 4F+Industry Residuals								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
FCA*	0.00320***	0.00235***			0.00154	0.00105	0.00103	0.000548	0.000948
	(4.05)	(3.90)			(1.73)	(1.51)	(1.12)	(0.80)	(1.37)
Same Group			0.0194***	0.0183***	0.0176***	0.0172***	0.0111***	0.00952**	0.00829*
			(9.72)	(6.03)	(7.15)	(5.09)	(3.53)	(2.73)	(2.25)
(FCA*) × SameGroup							0.00679*	0.00744**	0.00734**
							(2.41)	(3.32)	(3.30)
Observations	436735	434850	436735	434850	436735	434850	436735	434850	434850
Group Effect	No	No	No	No	No	No	No	No	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes	Yes
R^2	0.000306	0.0360	0.000496	0.0363	0.000719	0.0364	0.000909	0.0366	0.0432

t statistics in parentheses

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

Hypothesis 2

Pairs of companies belonging to the same business group have a higher correlation than pairs not in the same group. In addition, Pairs that belong to the same group and have a common ownership co-move more than pairs that don't have common ownership.

Table 1: one of these tables

	Future Monthly Correlation of 4F+Industry Residuals					
	(1)	(2)	(3)	(4)	(5)	(6)
(FCA > $Median$[FCA])		-0.00168	-0.00337**	0.00855**		-0.00513***
		(-1.45)	(-2.89)	(2.76)		(-4.32)
SameGroup	0.0122***		0.0135***			0.00574*
	(5.81)		(6.48)			(2.02)
(FCA > $Median$[FCA]) × SameGroup						0.0181***
						(5.91)
FCA*					0.00174*	
					(2.43)	
Observations	5148109	5148109	5148109	76240	76240	5148109
Sub Sample	Total	Total	Total	SameGroups	SameGroups	Total
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.000455	0.000439	0.000485	0.0136	0.0135	0.000513

t statistics in parentheses

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

	Future Monthly Correlation of 4F+Industry Residuals					
	(1)	(2)	(3)	(4)	(5)	(6)
Common Ownership		-0.00350**	-0.00445***	0.00651*		-0.00527***
		(-3.30)	(-4.22)	(2.48)		(-4.72)
SameGroup	0.0122***		0.0140***			0.00607*
	(5.81)		(7.01)			(2.09)
Common Ownership × SameGroup						0.0157***
						(5.51)
FCA*					0.00174*	
					(2.43)	
Observations	5148109	5148109	5148109	76240	76240	5148109
Sub Sample	Total	Total	Total	SameGroups	SameGroups	Total
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.000455	0.000456	0.000504	0.0135	0.0135	0.000528

t statistics in parentheses

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

Hypothesis 3

Stock returns of group affiliated firms exhibit robustly positive comovement even after controlling for both market and industry effects. Group betas ($\beta_{Businussgroup}$) are highly significant across all models.

Table 2: Cross-sectional average of the time-series coefficients

	$\text{Return}_i - r_f = R_i$				
	(1)	(2)	(3)	(4)	(5)
R_M	0.801***	0.643***	0.701***	0.257***	0.280***
	(29.99)	(10.68)	(11.05)	(8.84)	(9.02)
$R_{Industry}$		-2.085	-1.878	-0.150	-0.148
		(-0.92)	(-0.93)	(-0.48)	(-0.50)
$R_{Businessgroup}$				0.493***	0.493***
				(11.36)	(11.34)
SMB			0.104***		0.0770***
			(3.52)		(5.24)
UMD			0.0282		0.0218
			(1.23)		(1.94)
HML			0.102***		0.0395***
			(6.05)		(6.39)
Constant	0.0442	0.0145	-0.0297	0.0499***	0.0198
	(1.92)	(0.53)	(-0.83)	(3.87)	(1.25)
Observations	207552	207552	207552	207552	207552
R^2	0.123	0.196	0.213	0.672	0.679

t statistics in parentheses

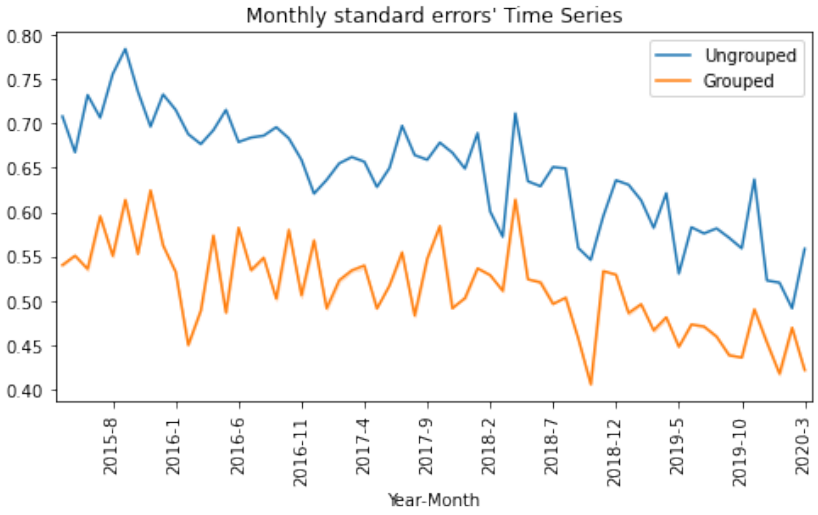
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Channels

Trading

For each firm, we calculate daily institutional imbalances, which is the net buying value of institutional investors relative to total traded value on that day (InsImb $= \frac{\text{Buy}_{\text{value}} - \text{Sell}_{\text{value}}}{\text{Buy}_{\text{value}} + \text{Sell}_{\text{value}}}$). We expect that institutional imbalances have a lower variation in groups due to the correlated tradings that the ultimate owner ordered to do. So, we calculate the monthly standard deviation of the group's imbalances and compare them to unaffiliated ones. As we expected grouped standard error is 13.1% and significantly (with t-stat of 12.57) lower than ungrouped firms.

	count	mean	std	min	median	max
Ungrouped	60	0.645	0.063	0.492	0.653	0.784
Grouped	60	0.514	0.050	0.406	0.514	0.625



According to the main hypothesis, we need to compare comovement between pairs in groups with low standard error and other pairs. For this purpose, we define **Low Imbalance std** dummy for groups whose average standard errors are lower than half of the sample. So, this dummy is equal to one if at least one pair's firms belong to the low imbalance std business group.

	Future Monthly Corr. of 4F+Ind. Residuals						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCA*	0.00116	0.00114	0.00106		0.00574*	0.00107	0.00154*
	(1.66)	(1.66)	(1.53)		(2.44)	(1.56)	(2.14)
Same Group	0.0165***	0.0166***	0.00974*	0.0108**		0.00977*	0.00850*
	(4.74)	(4.61)	(2.40)	(2.82)		(2.40)	(2.05)
Low Imbalance std		-0.000538	-0.00249	-0.00260	0.0222***	-0.00249	-0.00177
		(-0.48)	(-1.92)	(-1.97)	(5.40)	(-1.92)	(-0.54)
Low Imbalance std × SameGroup			0.0284***	0.0285***		0.0282***	0.0286***
			(5.95)	(6.00)		(4.09)	(3.99)
Low Imbalance std × SameGroup × FCA*						-0.000322	-0.000725
						(-0.06)	(-0.13)
Observations	434850	434850	434850	434850	38382	434850	434850
Group Effect	No	No	No	No	No	No	Yes
Sub-sample	Total	Total	Total	Total	Same Groups	Total	Total
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.0364	0.0366	0.0369	0.0367	0.0691	0.0370	0.0433

t statistics in parentheses

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

Furthermore, we should show that stocks in groups have a similar daily trading behavior. Accordingly, for each firm we run time-series regressions of the firm's daily change in trading measure, $\Delta\text{Measure}_{i,t}$, on changes in market measure,$\Delta\text{Measure}_{Market,t}$, changes in the industry and business group portfolio's measure,$\Delta\text{Measure}_{Ind,t}$ and $\Delta\text{Measure}_{Group,t}$ and ,as well as control variables.

We compute the daily change of measure by this definition $\Delta\text{Measure}_{i,t} = \ln(\frac{\text{Measure}_{i,t}}{\text{Measure}_{i,t-1}})$. We estimate the following regression for each stock across trading days in given year separately and cross-sectional averages of the estimated coefficients are reported, with t-statistics in parentheses :

$$\begin{aligned}\Delta\text{Measure}_{i,t} = \alpha + \beta_{Market,t}\Delta\text{Measure}_{Market,t} + \beta_{Ind,t}\Delta\text{Measure}_{Ind,t} \\ + \beta_{Group,t}\Delta\text{Measure}_{Group,t} + \delta\text{Controls} + \varepsilon_{i,t}\end{aligned}$$

We use the turnover and Amihud measure as a daily trading measures separately. For both measures we control for lead and lag changes in the two portfolio and market's measures. In addition,for turnover measure, we use size of the firm and Amihud, we include lead, lag, and contemporaneous market returns, contemporaneous firm return squared. [Table 3,4]

In a second test of our proposed channel, we control for stock characteristics in a multivariate regression. we regress β_{Group} on the previous year's excess control right from cash flow right, controlling for firm size and average of trading measure. In our main specification, we include time-fixed effects and cluster the standard errors at the firm and time-dimension level to account for time-series and cross-sectional dependence. [Table 5,6] The

Table 3: cross-sectional average of the time-series coefficients for daily changes in turnover

	Dependent Variable: $\Delta\text{TurnOver}_i$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta\text{TurnOver}_{\text{Market}}$	0.405***	0.396***	0.360***	0.425***	0.388***	0.448***
	(12.25)	(10.74)	(7.62)	(12.08)	(8.23)	(12.20)
$\Delta\text{TurnOver}_{\text{Group}}$			0.222***	0.229***	0.253**	0.268***
			(3.46)	(4.09)	(3.28)	(3.82)
$\Delta\text{TurnOver}_{\text{Industry}}$	0.120**	0.0205	-0.0156	-0.0237	-0.0833	-0.0999
	(3.25)	(0.24)	(-0.23)	(-0.42)	(-1.04)	(-1.46)
Observations	293264	292179	184699	183442	184699	183442
Weight	-	-	MC × CR	MC × CR	MC	MC
Control	No	Yes	No	Yes	No	Yes
R^2	0.129	0.168	0.246	0.286	0.247	0.286

t statistics in parentheses

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

Table 4: cross-sectional average of the time-series coefficients for daily changes in illiquidity

	Dependent Variable: ΔAmihud_i					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta\text{Amihud}_{\text{Market}}$	0.290***	0.298***	0.365***	0.234***	0.373***	0.244***
	(9.76)	(3.38)	(11.12)	(5.29)	(11.48)	(5.70)
$\Delta\text{Amihud}_{\text{Group}}$			0.182***	0.167***	0.161**	0.148**
			(3.58)	(3.86)	(2.93)	(3.11)
$\Delta\text{Amihud}_{\text{Industry}}$	0.0687*	0.144	0.00964	-0.0107	0.0162	-0.00565
	(2.02)	(1.59)	(0.19)	(-0.25)	(0.30)	(-0.12)
Observations	293264	291933	184699	183301	184699	183301
Weight	-	-	MC × CR	MC × CR	MC	MC
Control	No	Yes	No	Yes	No	Yes
R^2	0.118	0.223	0.219	0.320	0.224	0.324

t statistics in parentheses

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

specification is :

$$\begin{aligned}\beta_{Group,i,t} =& \alpha + \beta_1 \text{GroupVariable}_{i,t-1} + \beta_2 \ln(\text{Size})_{i,t-1} \\ &+ \beta_3 \text{trading measure}(avg)_{i,t-1} + \text{time effects} + \varepsilon_{i,t-1}\end{aligned}$$

which our group variables are:

1. Excess = (cr − cfr)/cr
2. ExcessDiff = cr − cfr
3. ExcessDummy $= \begin{cases} 1 & \text{cr} - \text{cfr} > 0 \\ 0 & \text{cr} - \text{cfr} \leq 0 \end{cases}$
4. ExcessHigh $= \begin{cases} 1 & \text{Excess} \geq \text{Q3(Excess)} \\ 0 & \text{Excess} < \text{Q3(Excess)} \end{cases}$
5. Low Imbalance std $= \begin{cases} 1 & std_{InsImb,t} \leq \text{Median}(std_{InsImb,t}) \\ 0 & std_{InsImb,t} > \text{Median}(std_{InsImb,t}) \end{cases}$

Table 5: β_{Group} of daily changes in the turnover on Excess control right $((cr - cf)/cr)$ and other measures

	Dependent Variable: β_{Group}													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Excess	0.310***	0.417***												
	(3.58)	(4.76)												
ExcessDummy			-0.00418	0.0907*										
			(-0.10)	(2.24)										
ExcessDiff					0.638***	0.840***								
					(4.65)	(6.22)								
ExcessHigh							0.287***	0.323***						
							(4.17)	(4.42)						
Low Imbalance std									0.216***	0.0975*				
									(4.82)	(2.26)				
Position											-0.0103	0.0176		
											(-0.54)	(0.93)		
Centrality													0.618***	0.0662
													(3.31)	(0.37)
Observations	1153	1153	1168	1168	1153	1153	1168	1168	1145	1145	1153	1153	1113	1113
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R^2	0.0178	0.0884	0.00206	0.0665	0.0313	0.109	0.0278	0.0923	0.0203	0.0687	0.00239	0.0645	0.00825	0.0562

t statistics in parentheses

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

Table 6: β_{Group} of daily changes in the Amihud measure on Excess control right $((cr - cf)/cr)$ and other measures

	Dependent Variable: β_{Group}													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Excess	0.174*	0.354***												
	(2.55)	(4.78)												
ExcessDummy			-0.0190	0.0764*										
			(-0.48)	(1.99)										
ExcessDiff					0.285**	0.554***								
					(2.86)	(5.59)								
ExcessHigh							0.242***	0.346***						
							(4.39)	(5.52)						
Low Imbalance std									0.126**	0.0471				
									(3.15)	(1.20)				
Position											-0.0102	0.0312		
											(-0.62)	(1.81)		
Centrality													0.684***	0.271
													(4.02)	(1.58)
Observations	1153	1153	1168	1168	1153	1153	1168	1168	1145	1145	1153	1153	1113	1113
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R^2	0.00898	0.0857	0.00196	0.0607	0.0102	0.0882	0.0266	0.104	0.0107	0.0648	0.00260	0.0641	0.0117	0.0438

t statistics in parentheses

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

Figure 1: Time series of average common ownership measure with 95 percent interval for all pairs

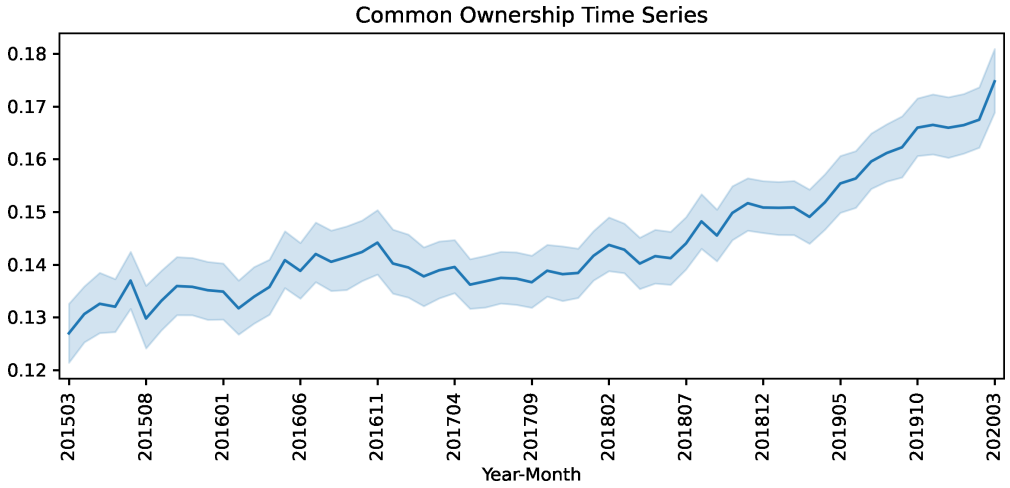


Figure 2: Time series of average common ownership measure with 95 percent interval in pairs in the same business group and others

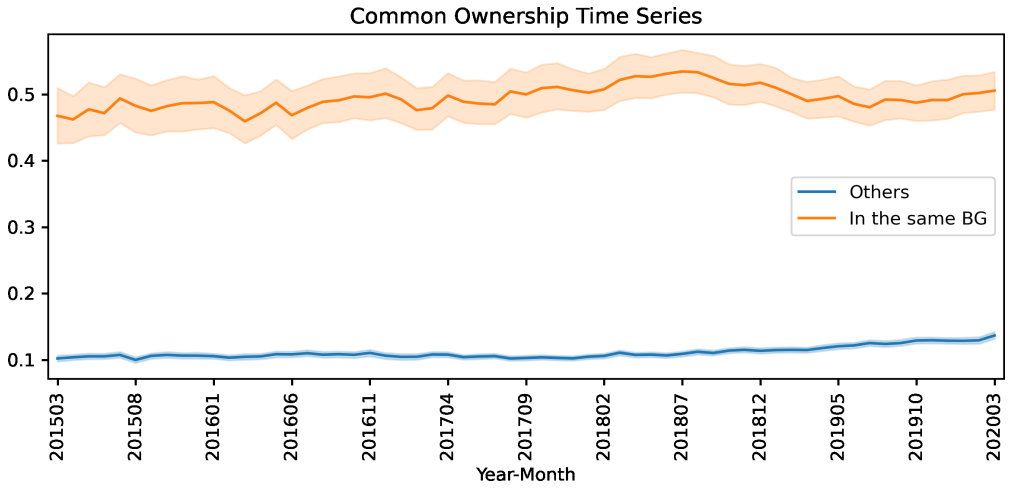


Figure 3: Time series of average common ownership measure with 95 percent interval which is grouped based on pairs' size

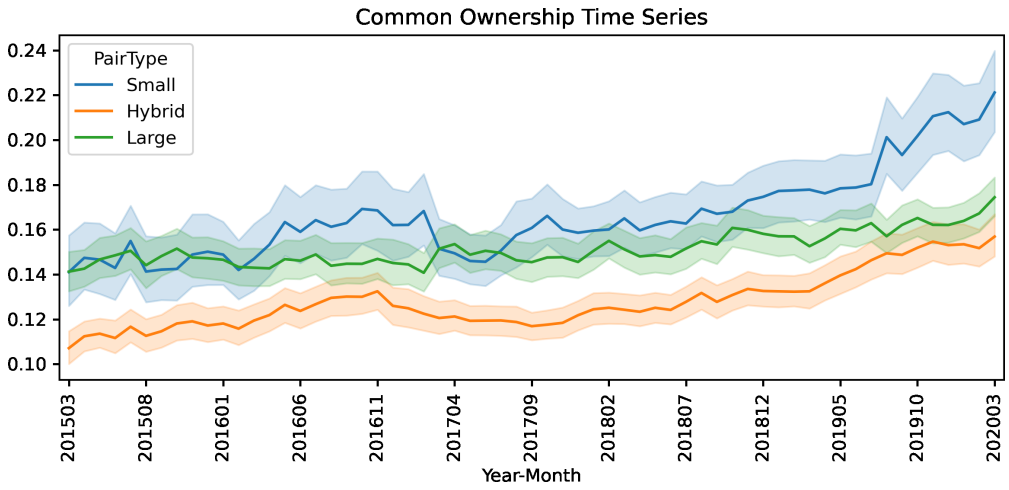


Figure 4: Percent of group affiliated firms from listed firms

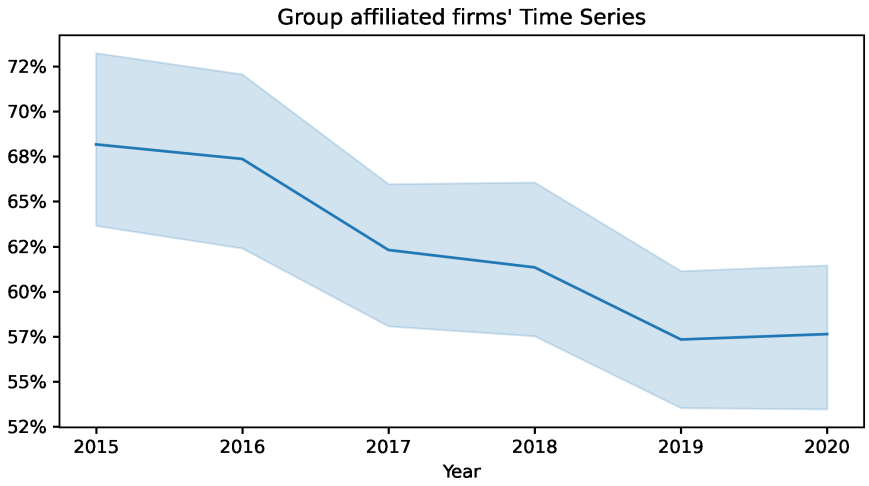


Figure 5: Percent of group affiliated firms from marketcap