

# Connected Stocks: Evidence from Tehran Stock Exchange

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## Effects

### Hypothesis 1

Simple measures of institutional connectedness statistically and economically improve forecasts of cross-sectional variation in the correlation only for the pairs in the same business group. The effect comes from business group which is the indirect common ownership.

Table 1: text

Dependent Variable: Future Monthly Correlation of 4F+Industry Residuals									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Same Group	0.0166*** (8.54)	0.0153*** (7.90)			0.0147*** (6.97)			0.00624*** (2.81)	0.00549** (2.27)
FCA*			0.00150*** (2.90)	0.00112** (2.11)	0.000736 (1.33)	0.00944*** (7.24)	0.000397 (0.68)	0.000377 (0.65)	-0.0000113 (-0.02)
(FCA*) × SameGroup								0.00992*** (6.49)	0.0107*** (6.97)
Observations	1665996	1665996	1665996	1665996	1665996	58337	1607659	1665996	1665996
Sub-sample	All	All	All	All	All	SameGroup	Others	All	All
Group Effect	No	No	No	No	No	No	No	No	Yes
Controls	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.000180	0.000637	0.000170	0.000652	0.000804	0.0112	0.000577	0.000898	0.00575

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## **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 2: Non-connected Co-movement

Dependent Variable: Future Monthly Correlation of 4F+Industry Residuals														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
SameGroup	0.0153*** (9.38)		0.0150*** (9.26)			0.0134*** (7.81)	0.0124*** (7.10)		0.0151*** (9.03)				0.0104*** (6.09)	0.00926*** (5.34)
FCA*		0.000676*** (3.50)	0.000496* (2.56)	0.00212 (1.79)	0.000427* (2.20)	0.000408* (2.11)	0.000116 (0.67)							
(FCA*) $\times$ SameGroup						0.00247* (2.15)	0.00321** (2.90)							
(FCA > Q3[FCA])								0.00226* (2.63)	0.000744 (0.97)	0.00226* (2.63)	0.0122*** (4.40)	-0.0000291 (-0.03)	-0.0000725 (-0.07)	-0.00110 (-1.32)
(FCA > Q3[FCA]) $\times$ SameGroup													0.0141*** (4.65)	0.0161*** (5.54)
Observations	6018646	6018646	6018646	114526	5904120	6018646	6018646	6018646	5851137	6018646	114526	5904120	6018646	6018646
Sub Sample	Total	Total	Total	SameGroups	Others	Total	Total	Total	Total	Total	SameGroups	Others	Total	Total
Group Effect	No	No	No	No	No	No	Yes	No	No	No	No	No	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.000445	0.000392	0.000491	0.00699	0.000338	0.000515	0.00330	0.000372	0.00127	0.000372	0.00721	0.000323	0.000508	0.00330

*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 ( $\beta_{Businessgroup}$ ) are highly significant across all models.

Table 3: Cross-sectional average of the time-series coefficients

	Return <sub><i>i</i></sub> − <i>r<sub>f</sub></i> = <i>R<sub>i</sub></i>				
	(1)	(2)	(3)	(4)	(5)
<i>R<sub>M</sub></i>	0.801*** (29.99)	0.643*** (10.68)	0.701*** (11.05)	0.257*** (8.84)	0.280*** (9.02)
<i>R<sub>Industry</sub></i>		-2.085 (-0.92)	-1.878 (-0.93)	-0.150 (-0.48)	-0.148 (-0.50)
<i>R<sub>Businessgroup</sub></i>				0.493*** (11.36)	0.493*** (11.34)
<i>SMB</i>			0.104*** (3.52)		0.0770*** (5.24)
<i>UMD</i>			0.0282 (1.23)		0.0218 (1.94)
<i>HML</i>			0.102*** (6.05)		0.0395*** (6.39)
Constant	0.0442 (1.92)	0.0145 (0.53)	-0.0297 (-0.83)	0.0499*** (3.87)	0.0198 (1.25)
Observations	207552	207552	207552	207552	207552
<i>R</i> <sup>2</sup>	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

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,  $\Delta\text{Measure}_{\text{Market},t}$ , changes in the industry and business group portfolio's measure,  $\Delta\text{Measure}_{\text{Ind},t}$  and  $\Delta\text{Measure}_{\text{Group},t}$  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 :

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

We use the turnover measure as a daily trading measures. We control for lead and lag changes in the two portfolio and market's measures. In addition, we use size of the firm. [Table 4]

Table 4: 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*** (12.25)	0.396*** (10.74)	0.360*** (7.62)	0.425*** (12.08)	0.388*** (8.23)	0.448*** (12.20)
$\Delta\text{TurnOver}_{\text{Group}}$			0.222*** (3.46)	0.229*** (4.09)	0.253** (3.28)	0.268*** (3.82)
$\Delta\text{TurnOver}_{\text{Industry}}$	0.120** (3.25)	0.0205 (0.24)	-0.0156 (-0.23)	-0.0237 (-0.42)	-0.0833 (-1.04)	-0.0999 (-1.46)
Observations	293264	292179	184699	183442	184699	183442
Weight	-	-	MC $\times$ CR	MC $\times$ 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 5: Pairwise correlation in turnover

	Dependent Variable: Future Monthly Correlation of Delta turnover						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Same Group	0.0134** (3.13)	-0.00613* (-2.20)			-0.0102*** (-3.81)	-0.00763 (-1.75)	-0.00600 (-1.36)
FCA*			0.00784*** (4.71)	0.00308** (3.39)	0.00389*** (4.29)	0.00410*** (4.07)	0.00304* (2.23)
(FCA*) $\times$ SameGroup						-0.00244 (-0.82)	-0.00104 (-0.33)
Observations	378502	370726	378502	370726	370726	370726	370726
Group Effect	No	No	No	No	No	No	Yes
Controls	No	Yes	No	Yes	Yes	Yes	Yes
$R^2$	0.000603	0.00766	0.00110	0.00774	0.00806	0.00827	0.0236

*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

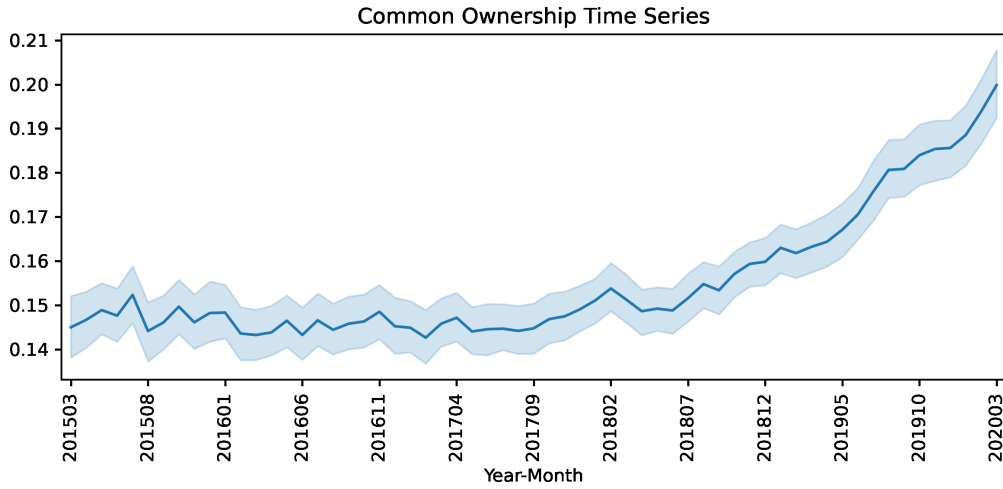


Figure 2: Time series of average common ownership measure with 95 percent interval in pairs in the same business group and others

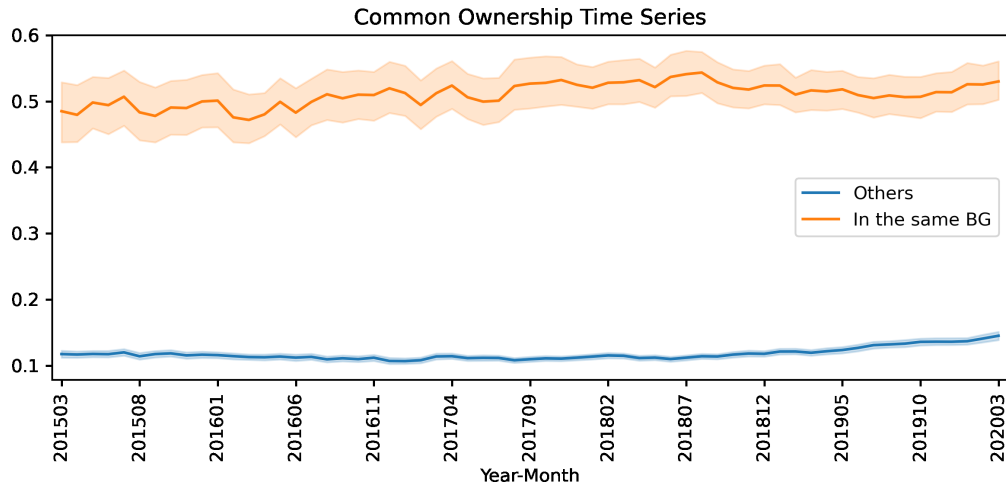


Figure 3: Time series of average common ownership measure with 95 percent interval which is grouped based on pairs' size

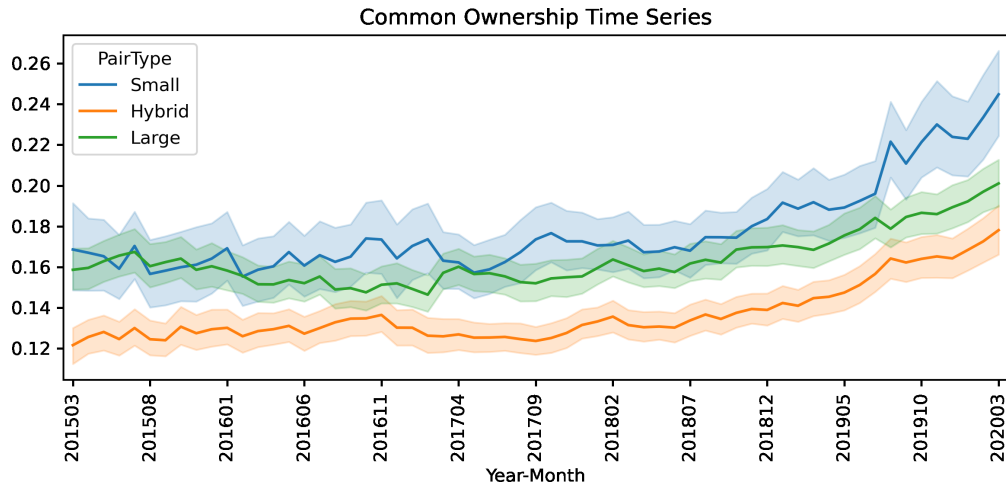


Figure 4: Percent of group affiliated firms from listed firms

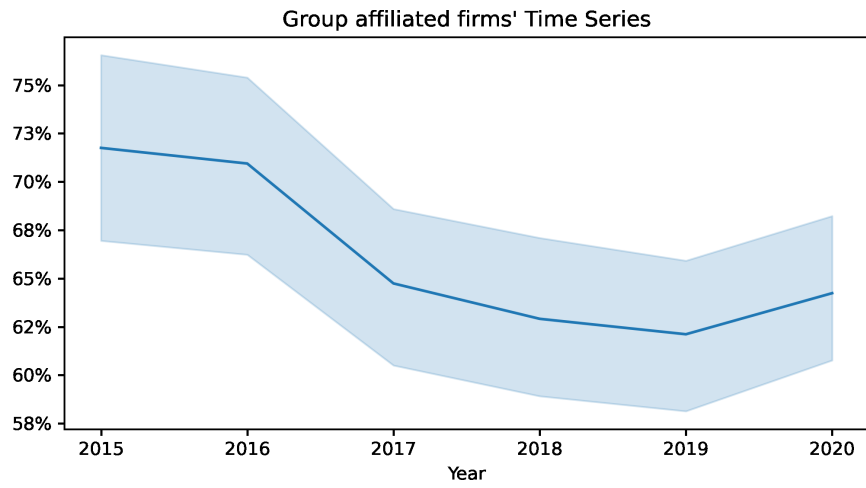


Figure 5: Percent of group affiliated firms from marketcap

