

Market clustering and price instability

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Risklab / BoF / ESRB - Conference on Systemic Risk Analytics

Outline

Key question: does crowded trading with joint portfolio trading affect price formation?

- 1 Related literature

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- 2 Data description
- 3 Empirics
- 4 Conclusions:
 - Yes, crowded trades by peers trading similarly cause fat tails

Relevant literature

- 1 Clustering when groups of investors trade in the same stocks, while only traded by these investors (i.e. homogeneous trading of groups of investors). Disequilibrium because:
 - Order deluge due to group behaviour
(Stein (2009); Braun-Munzinger et al. (2016))
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- 3 We contribute to the market microstructure literature (Madhavan (2000)) where prices deviate from fundamentals due to:
 - Liquidity fluctuations (Chordia et al. (2001); Weber and Rosenow (2006); Acharya et al. (2013))
 - Aggressive or crowded trading in fire sales situations (Coval and Stafford (2007); Thurner et al. (2012); Aymanns and Farmer (2015))

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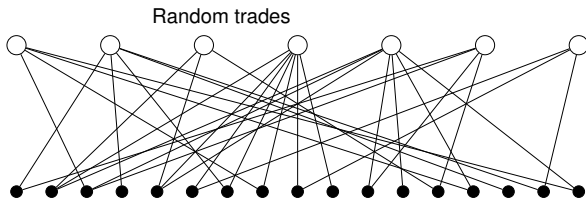
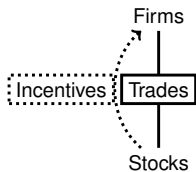
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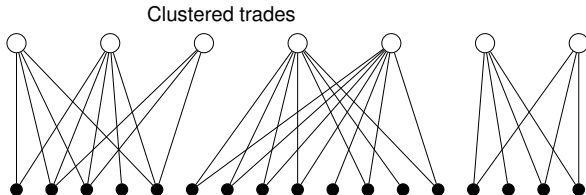
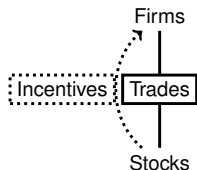
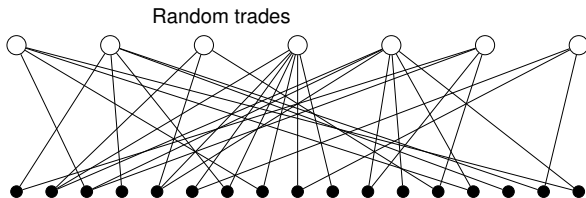
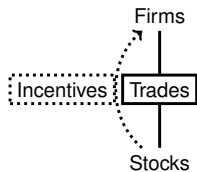
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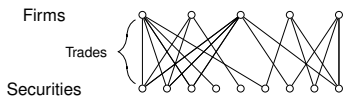
- The range is $[-1, \infty)$

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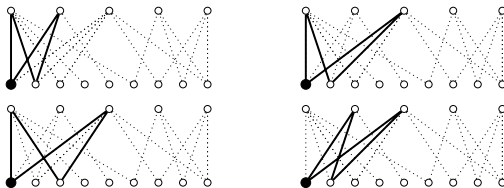
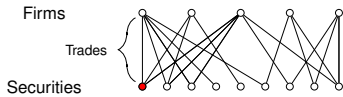
- The market clustering observation is defined as the number of shared securities, summed over all pairs of investors. For each pair of firms, we first establish if they both trade in the security. If this is the case, we count the number of securities which these two firms are also trading simultaneously.

$$M_{S,t} = \sum_f^{n_{F,t}} \sum_{f' > f}^{n_{F,t}} \left(a_{sf,t} a_{sf',t} \sum_{s' \neq s}^{n_{S,t}} a_{s'f,t} a_{s'f',t} \right). \quad (2)$$

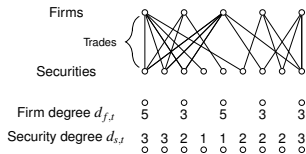
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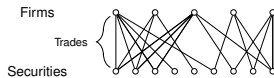
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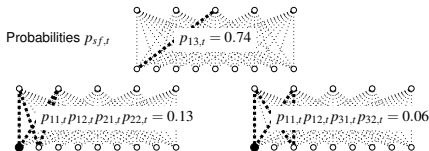
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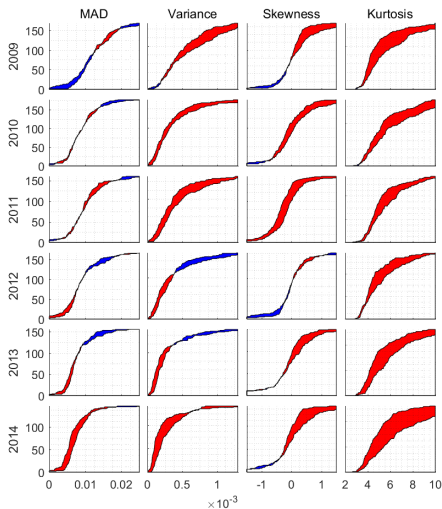


Firm degree $d_{f,t}$	5	3	5	3	3				
Security degree $d_{s,t}$	3	3	2	1	1	2	2	2	3



Firms									
Securities									
$\langle M_{s,t} \rangle^*$	5.3	5.3	2.8	0.8	0.9	2.8	2.8	2.8	5.3
$M_{s,t}$	4	4	2	0	0	0	1	1	2
$m_{s,t}$ (Equation (1))	-0.24	-0.24	-0.28	-1	-1	-1	-0.64	-0.64	-0.62

Are low and high market clustering different?

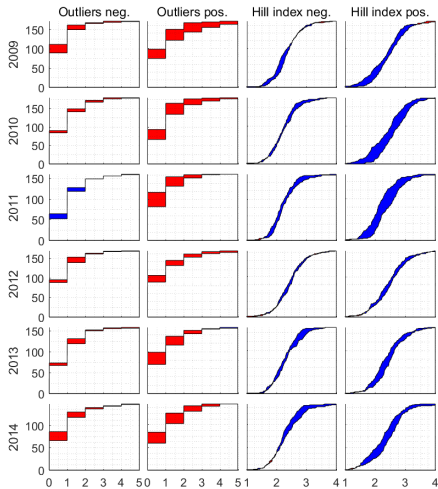


Crowded trades by peers trading similarly cause fat tails

	2009		2010		2011		2012		2013		2014	
	KS	MWW	KS	MWW	KS	MWW	KS	MWW	KS	MWW	KS	MWW
MAD	=	=	=	=	=	=	=	=	=	=	+	+
Variance	+	=	=	+	+	+	=	=	+	+	+	+
Skewness	+	=	+	+	+	+	=	=	+	+	+	+
Kurtosis	+	+	+	+	+	+	+	+	+	+	+	+

KS = Kolmogorov-Smirnov, MWW = Mann-Whitney-Wilcoxon

Are low and high market clustering different?



More liquidity in normal times, fatter tails

	2009	2010	2011	2012	2013	2014
Outliers neg.	≠=	==	==	==	==	≠=
Outliers pos.	≠+	≠+	≠+	==	≠+	≠+

χ = Chi-square test, MWW = Mann-Whitney-Wilcoxon

	2009	2010	2011	2012	2013	2014
Hill index neg.	- =	==	= -	==	==	==
Hill index pos.	--	--	--	==	--	--

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- hold when log returns are normalized by the time-varying volatility (GARCH)

Conclusions

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- Seems to mainly affect the positive tail
- Depending on the composition of the portfolio of your peers, the VaR will be under- or overestimate risk
- With data on the holdings of participants in the system a *adjusted Value at Risk* can be computed

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