Information and Asset Prices

Johan Walden
IPAM
November 2007

Outline

- **The US stock market – facts & explanations**

- **Information diffusion in US markets**

Some stylized facts about stock returns

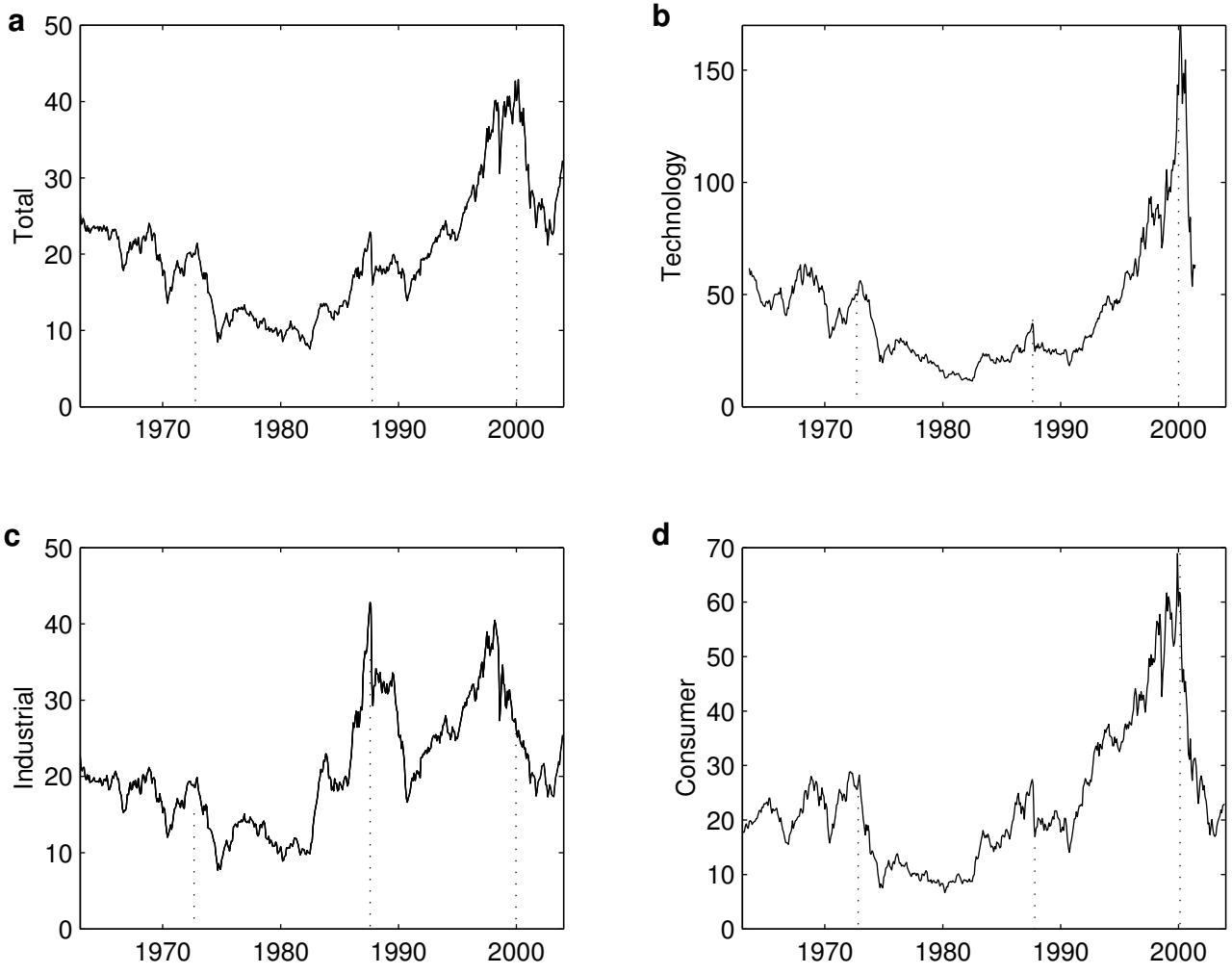
- **Heavy-tailed** (Mandelbrot 1963, Fama 1965)

- **Excess volatility** (Shiller 1981, LeRoy and Porter 1981)

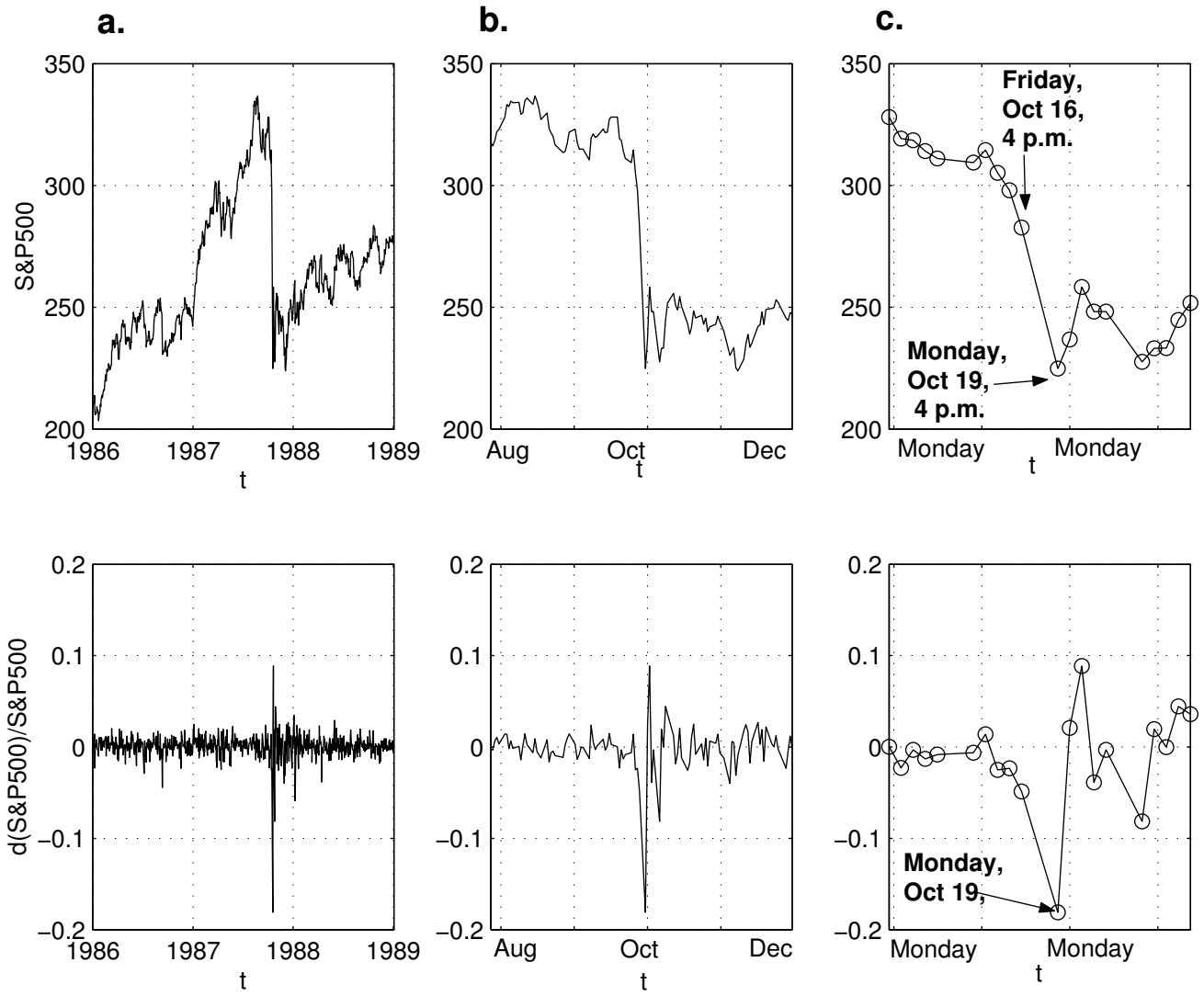
- **Time-varying volatility** (Hamilton 1989, 1990)

- **Weak relation to "information"** (Cutler, Poterba and Summers 1989, Fair 2002)

The US stock-market 1970-2005



An example: The crash on October 19, 1987



Other capital markets

Catastrophe insurance: (Ibragimov & Walden 2007, Jaffee, Imbragimov & Walden 2007)

•Tail distributions: Earthquake energy 0.8<a<1.2, Florida hurricanes: 1.5<a<2.5

Currency markets: (Tucker and Pond 1988, Osler & Savaser 2005)

•Dollar-yen ratio dropped 11% on October 7, 1998.

EUR-USD*	Kurtosis
15 min	24
30 min	19
1 h	14
6 h	7
12 h	5
24 h	5
Normal	3

*** Table from Osler and Savaser (2005)**

Some explanations

- **Heavy-tailed:** Heavy tailed exogenous information/ innovation shocks

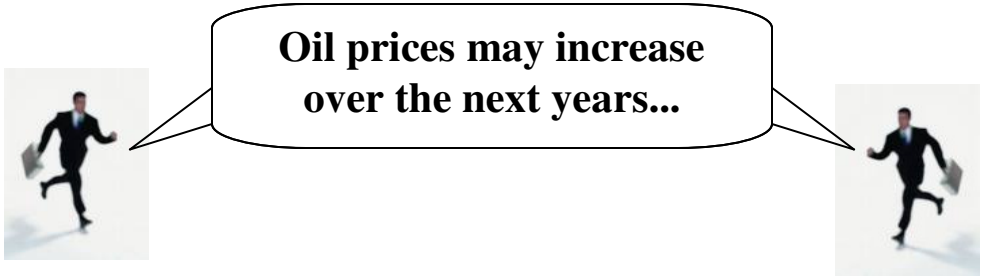
- **Excess volatility:** Bubbles, Non-stationary time series of fundamentals

- **Varying Volatility:** Exogenous regime shifts

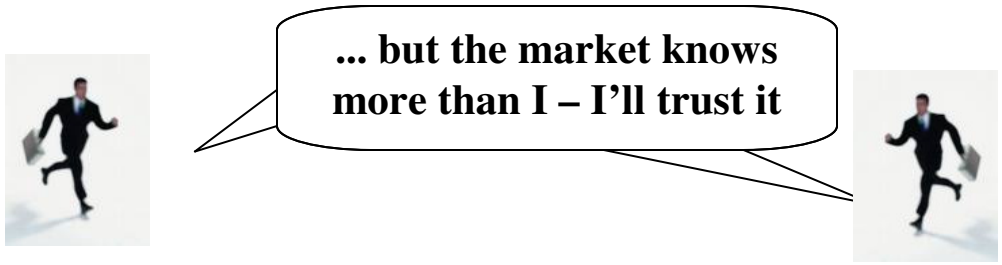
- **Weak relation to "information":** Equilibrium switch, Imperfect information aggregation

"Internal news" - Romer (1993)*

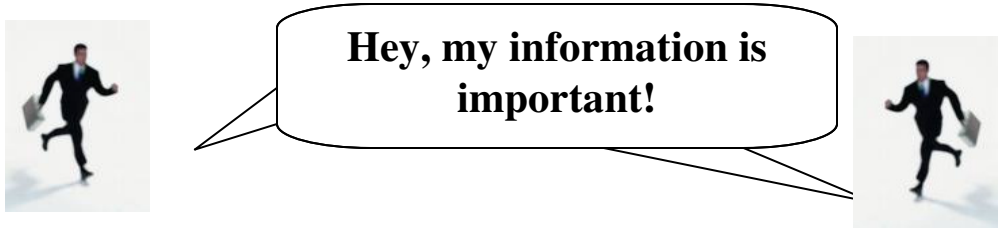
- **Investors sit on pieces of private information...**



- **... but each investor (rationally) trusts market prices...**



- **... until a small exogenous shock reveals the truth**



*** David Romer 1990, "Rational Asset-Price Movements Without News, American Economic Review 83:5 1112-1130.**

Romer (1993) - continued

- **Investors' information structure:**

Type	50% chance		50% chance
1	50% of pop	$P+\varepsilon_1$	
2	50% of pop	$P+\varepsilon_1+\delta_1$	50% of pop
3		$P+\varepsilon_1+\delta_2$	50% of pop

Romer (1993) – continued: The price impact of revelation

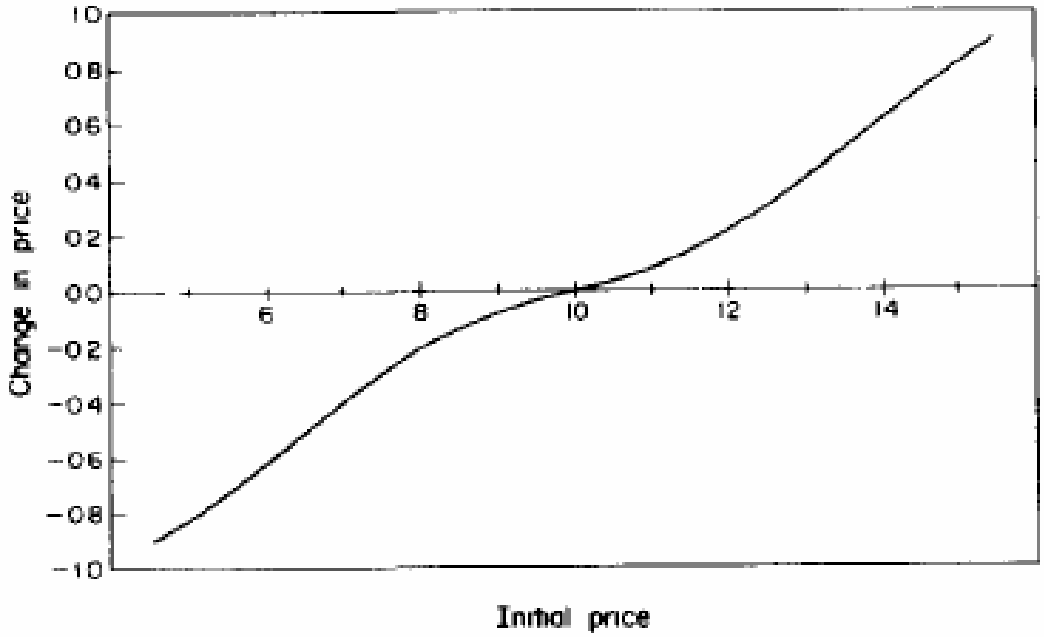


FIGURE 3. THE IMPACT ON PRICE OF A REVELATION THAT OTHER INVESTORS ARE TYPE 1'S

Outline

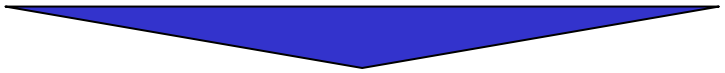
- **The US stock market – facts & explanations**

- **Information diffusion in US markets**

Key takeaways from September talk

- **Non-repeatable data makes statistical significance crucial**

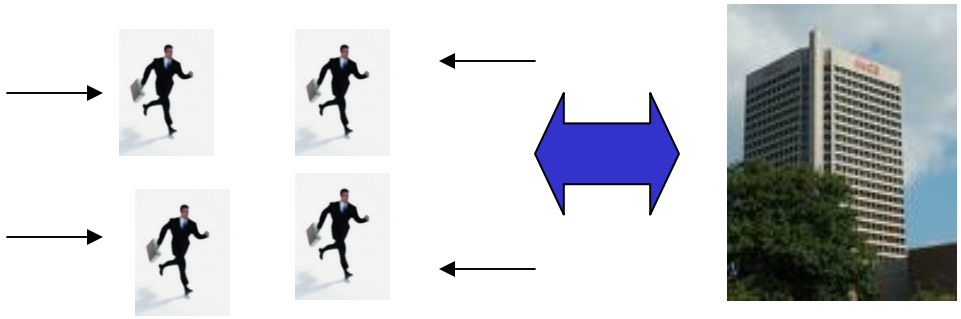
- **High uncertainty in market makes it difficult to get high statistical significance**



Theoretical structure always crucial in understanding markets

The crucial role of information

- **The classical view of information**

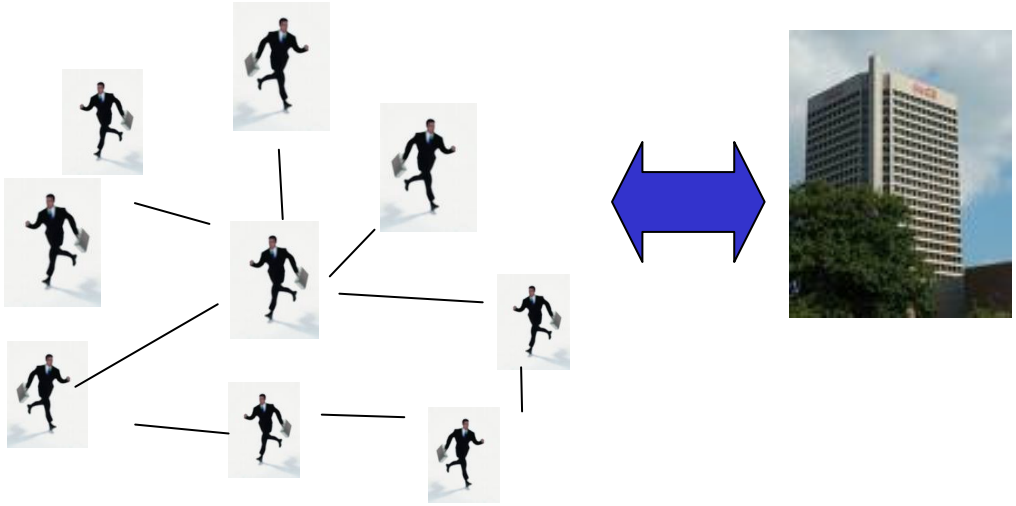


Investors

Stock

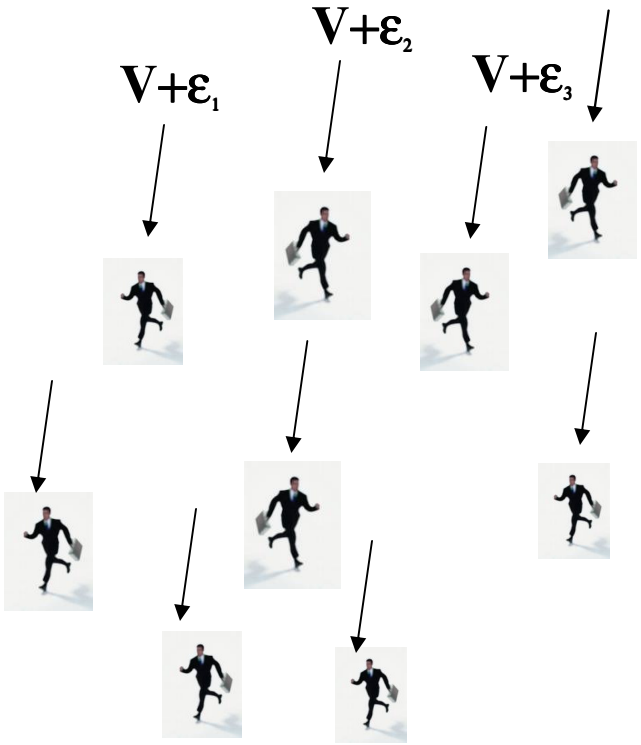
- **Grossman & Stiglitz 1980, Hellwig 1980, Admati 1985, Kyle 1985, Jackson 1991, Wang 1993, Vives 1995**

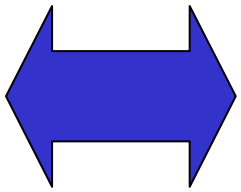
- **A network information view**



- **Ozsoylev 2005, Jackson 2004, 2005, 2007, Kelly & O'Grada 2000, Hong, Kubik & Stein 2004, Das & Sisk 2005, Tetlock, Saar-Tsechansky & Macskassy 2007, Cohen, Frazzini, & Malloy 2007.**

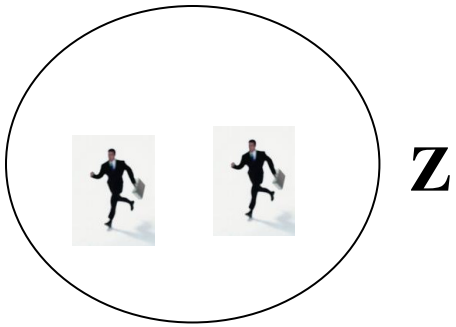
The model of Hellwig (1980)





$$P=\pi_0+qV+\pi_1'\varepsilon-\gamma Z$$

$$P^*=\pi_0+qV-\gamma Z$$

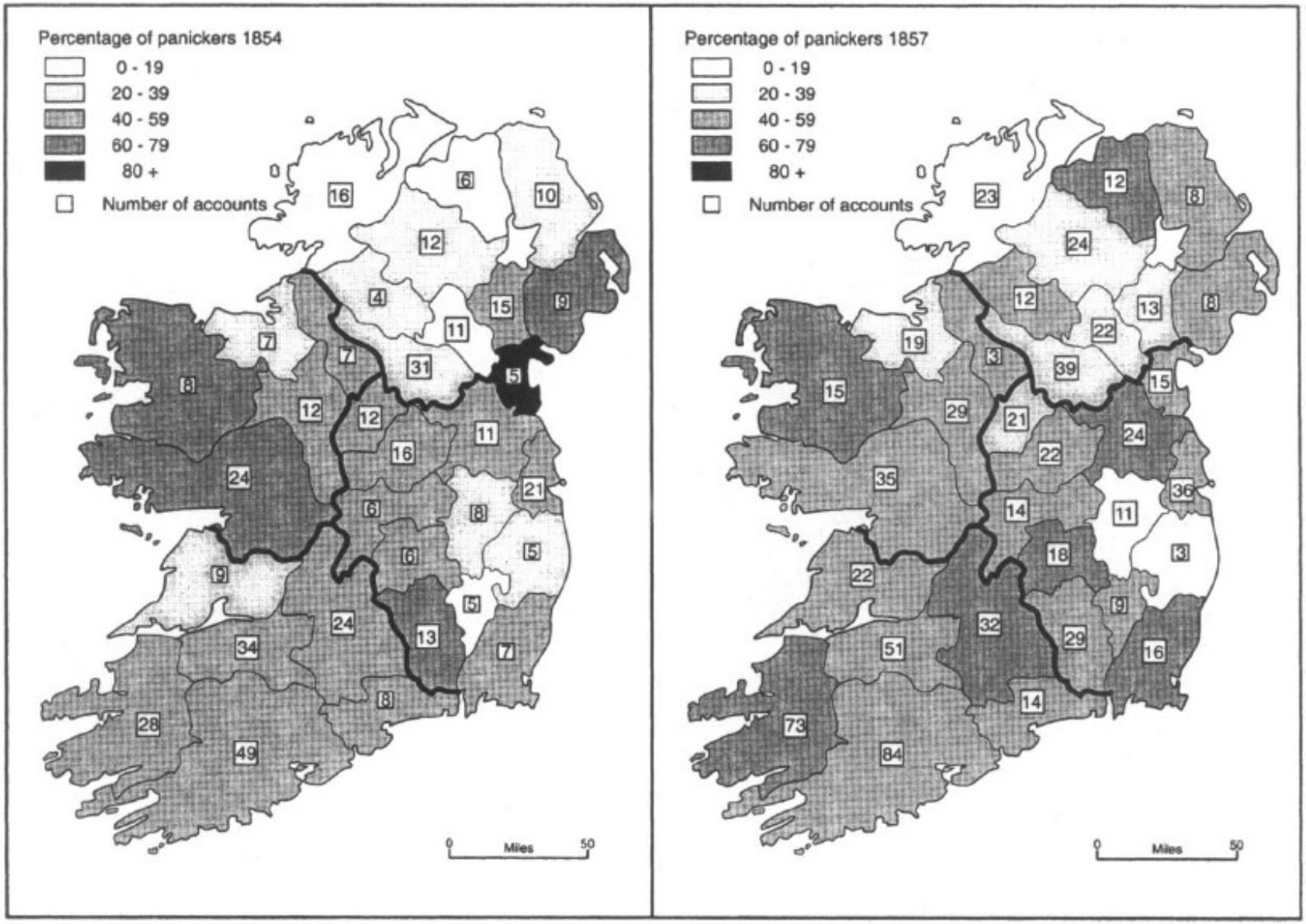


Empirical studies – Cohen, Frazzini & Malloy (2007)

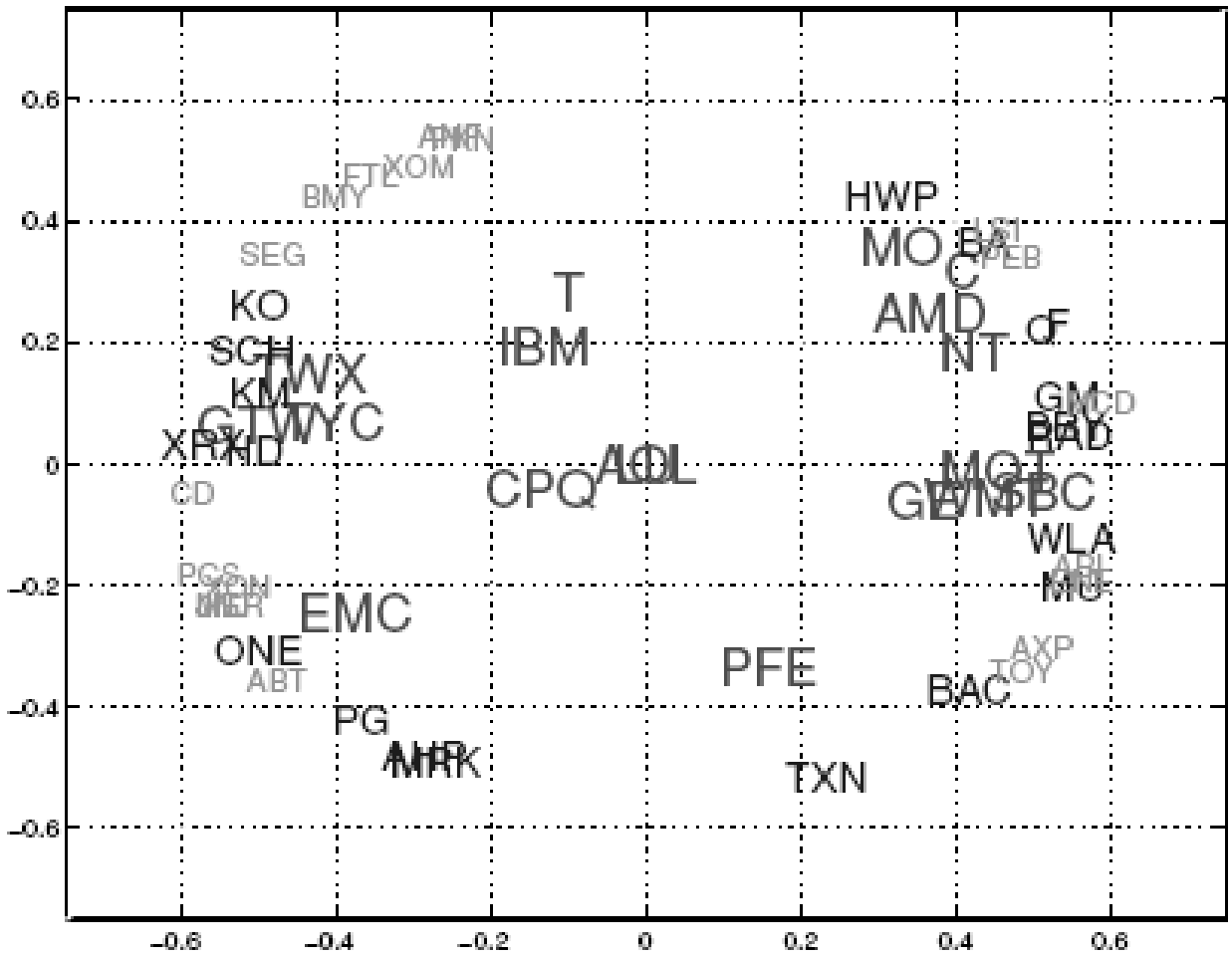
Fund manager **CEO**

Portfolio of stocks that are "connected" outperform by up to 8.4% per year

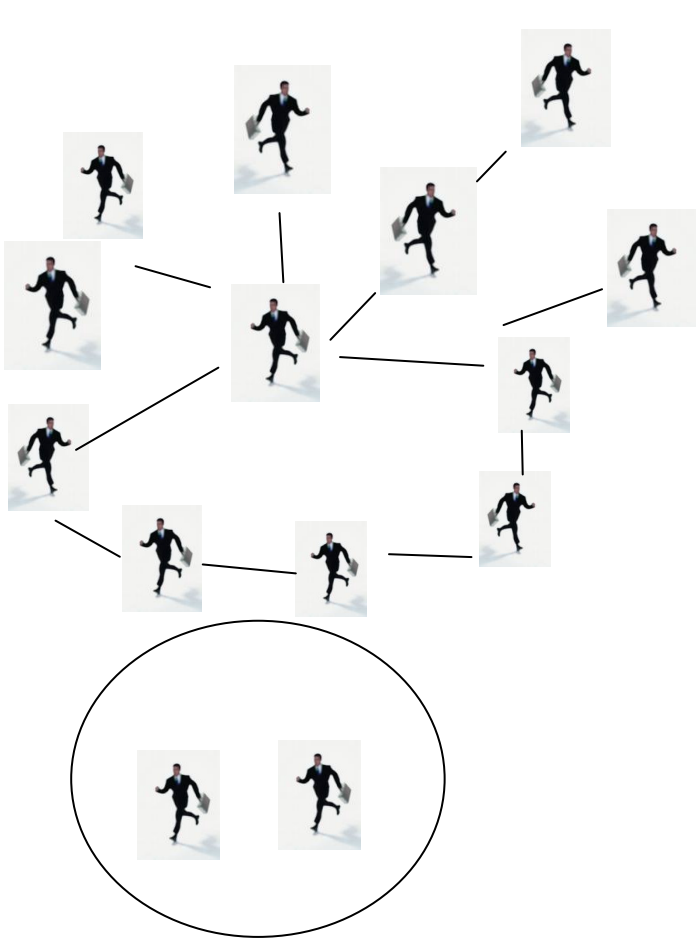
Financial Contagion in Banks - Kelly & O'Grada 2000

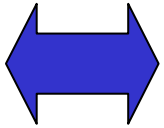


Internet communities and stock returns -Das & Sisk (2005)



Adding a network structure – Ozsoylev 2005





- **Excess volatility**
- **Network ordering w.r.t. informational efficiency**

•Model not dynamic
•Structure of network not known
•Difficult to analyze with discrete agents

An empirical approach

•**All ISE trades 2005-2006**

•**Turkish stock exchange:**

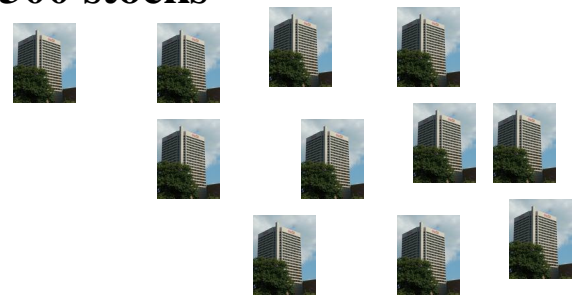
multiple price-continuous auction

•**~15 GB**

•**~700M trades**

•**~2 M accounts**

•**~300 stocks**



•**Newswires**

Related studies:

•Barber Odean (1998, 2005, 2007)