Identifying the herding effect of Chinese stock market

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Outline

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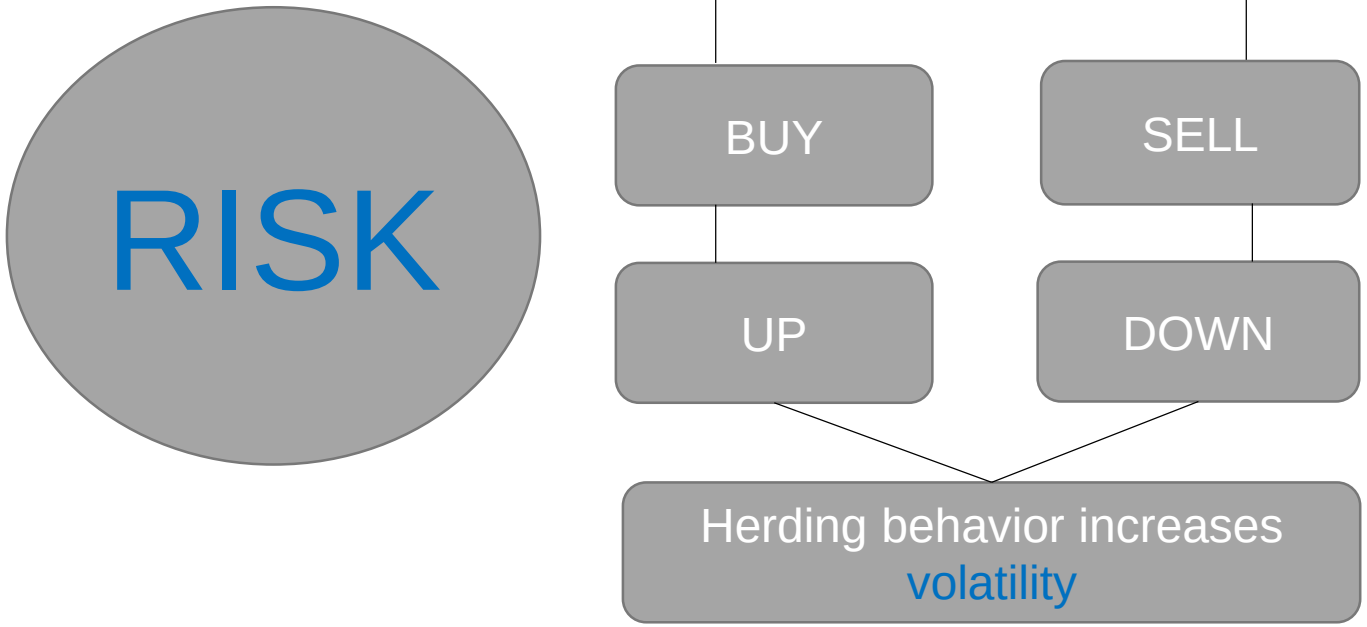
- Data
- Conclusion
- Question

What is the herding effect ?

- Group mentality：follow the behavior of most people
- In the capital market：similarity of investment decision

Investor：profit or loss
Regulator：finanal security



Mainstream method for identifying herding effect

CSAD model：（Cross Sectional Standard Deviatdion）

$$CSAD_t = \frac{1}{N}\sum_{i=1}^{N} |R_{i,t} - R_{m,t}|$$

$$CSAD_t = \alpha + \beta_1 \left|R_{m,t}\right| + \beta_2 (R_{m,t})^2 + \varepsilon_t$$

$$CSAD_t^{(down)} = \alpha + \beta_1^{(down)} \left|R_{m,t}^{(down)}\right| + \beta_2^{(down)} [R_{m,t}^{(down)}]^2 + \varepsilon_t \quad (\text{if } R_{m,t} < 0)$$

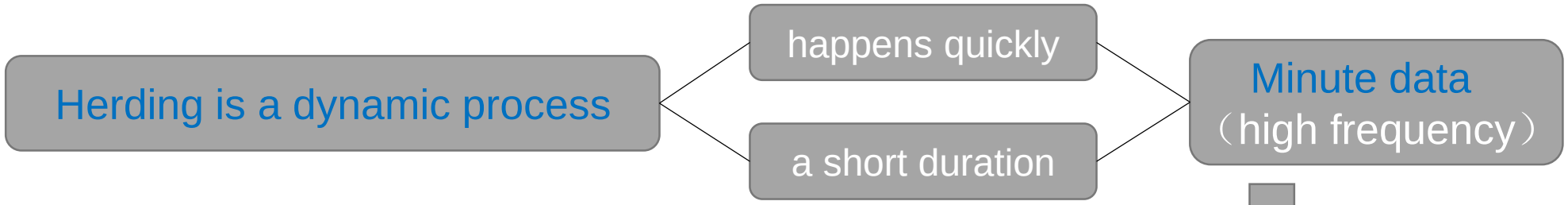
（$second\ order\ coefficient\ \beta_2$ is significantly negative ）

	2014	2015	2016
β_2	+12.00（NO）	-3.99（NO）	-0.26（NO）
$\beta_2^{(down)}$	+4.90（NO）	**-6.34（YES）(-6.11***)**	**-2.7645（YES）(-4.30***)**

Main caveat of the approach:

- The approach is applied to daily stock price data of a few months long; the window has to be long to insure that the regressional terms can be estimated
- The approach only tells whether the long window studied has the herding effect or not
- Herding behavior is a dynamic process; it may only occur for a few tens of minutes or even shorter
- The desired approach for studying herding behavior has to tell when and how long the behavior has occurred
- For this purpose, high frequency data has to be used

To overcome the difficulty, high frequency data have to be used



（CSAD identities the herding by using **daily data**）

（New method）

Correlation coefficient：

$$R = \frac{\sum(x-\bar{x})(y-\bar{y})}{\sqrt{\sum(x-\bar{x})^2 \sum(y-\bar{y})^2}}$$

Mutual information：

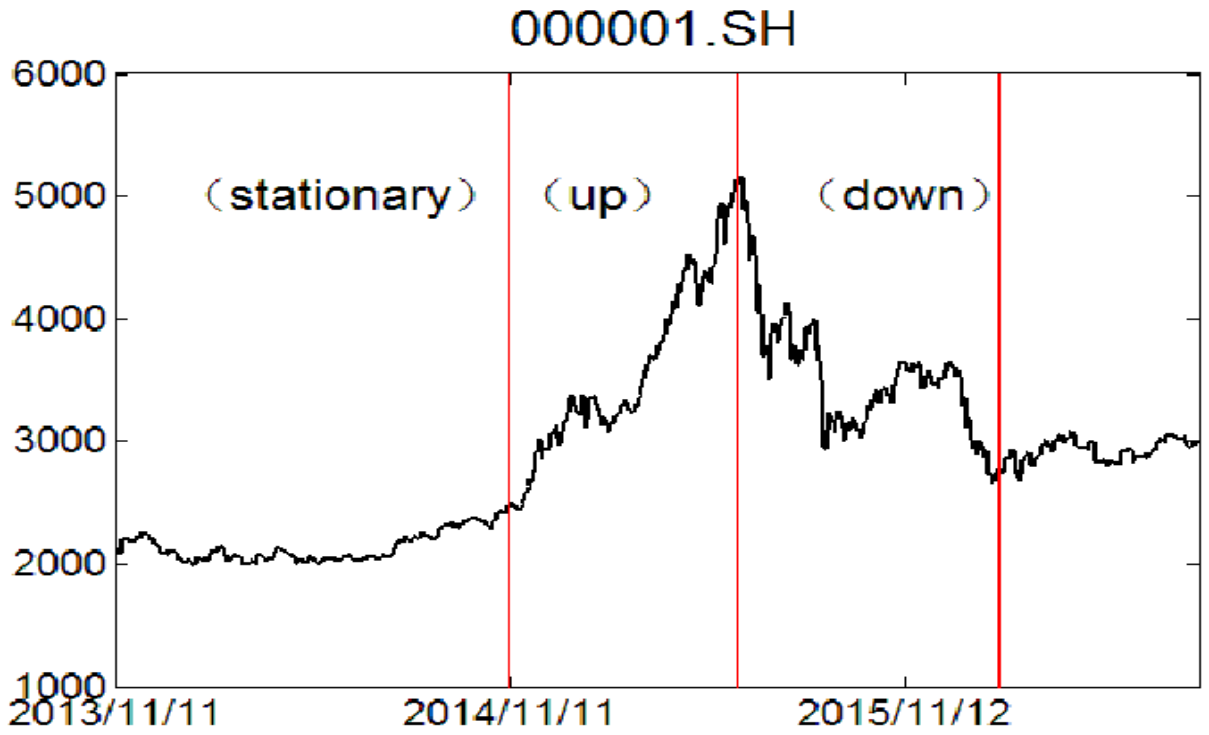
$$I(X;Y) = \sum_{x \in X} \sum_{y \in Y} p(x,y) \log \frac{p(x,y)}{p(x)p(y)}$$

X：return of company
Y：return of market

Data：

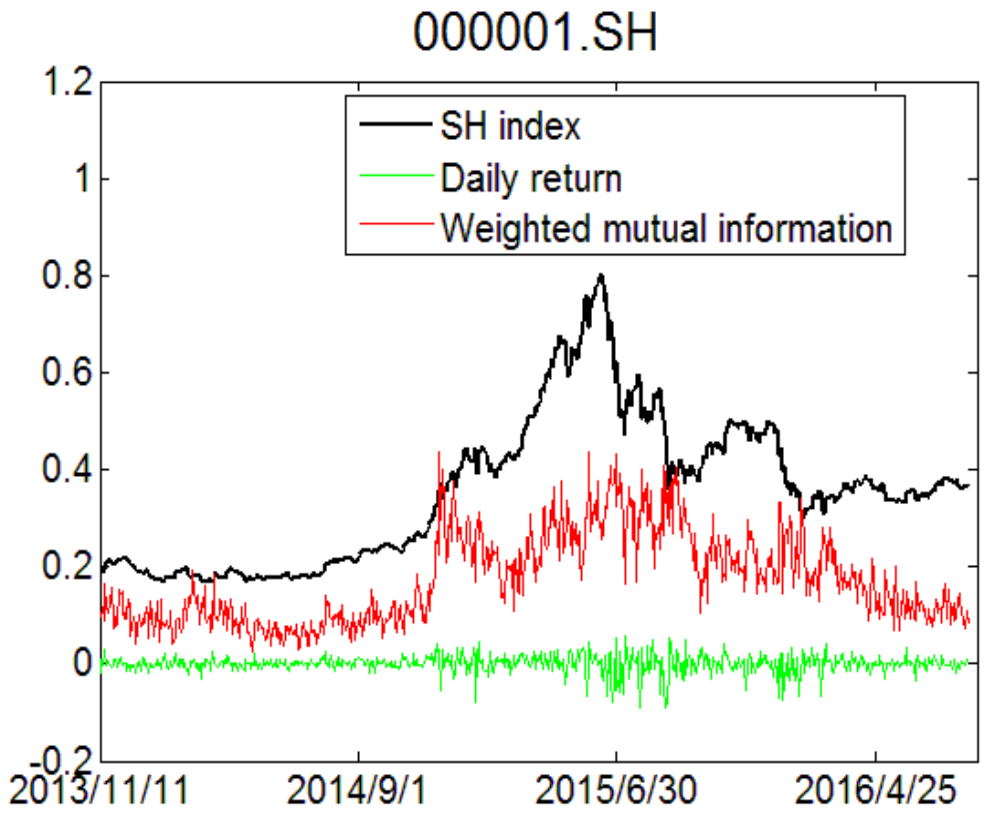
- Data： the stock price of each company & the Composite Index
- Company： 943 in Shanghai and 1524 in Shenzhen
- Timescale： 2013/11/11—2016/08/08（673 days）
- Minute(240 /day)-- High frequency

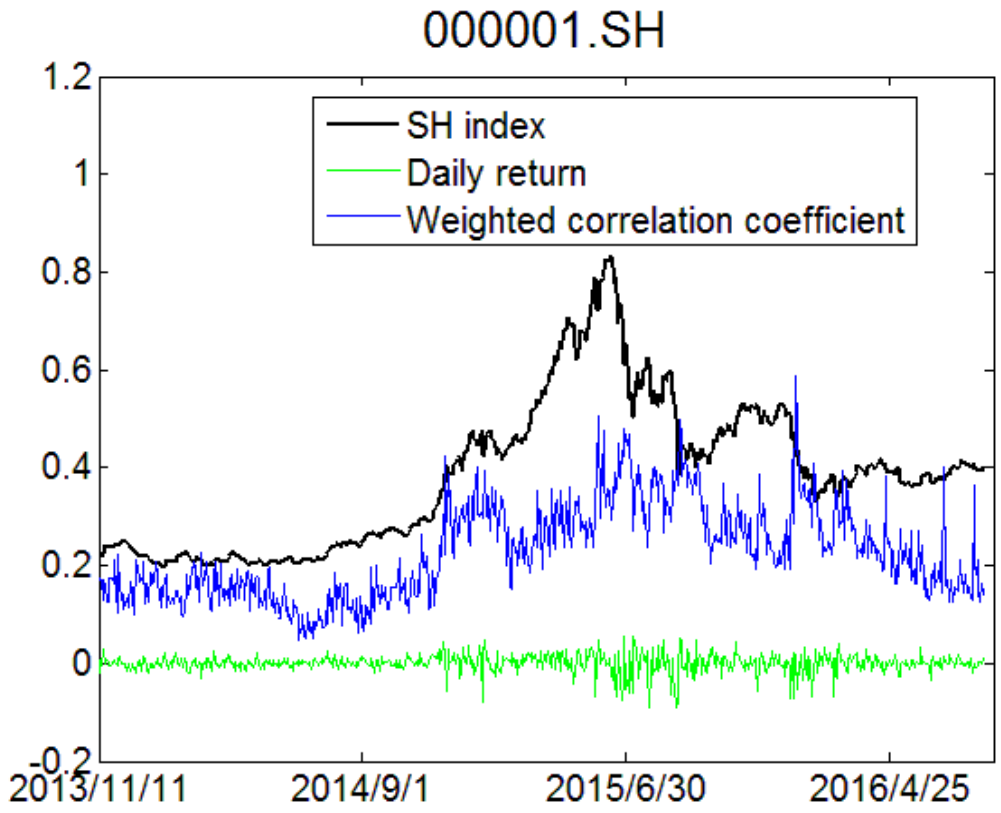
The SH composite index in recent 3 years：



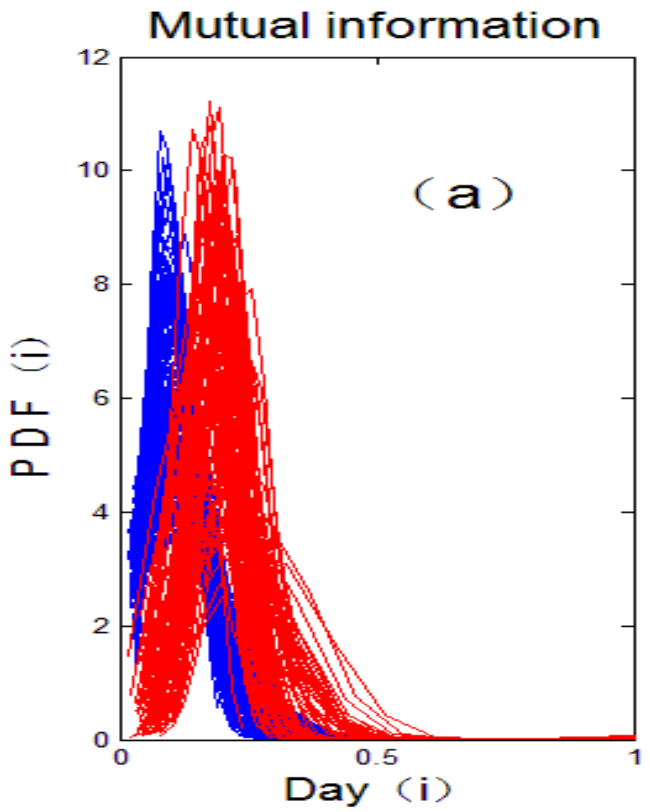
Turbulent 2015

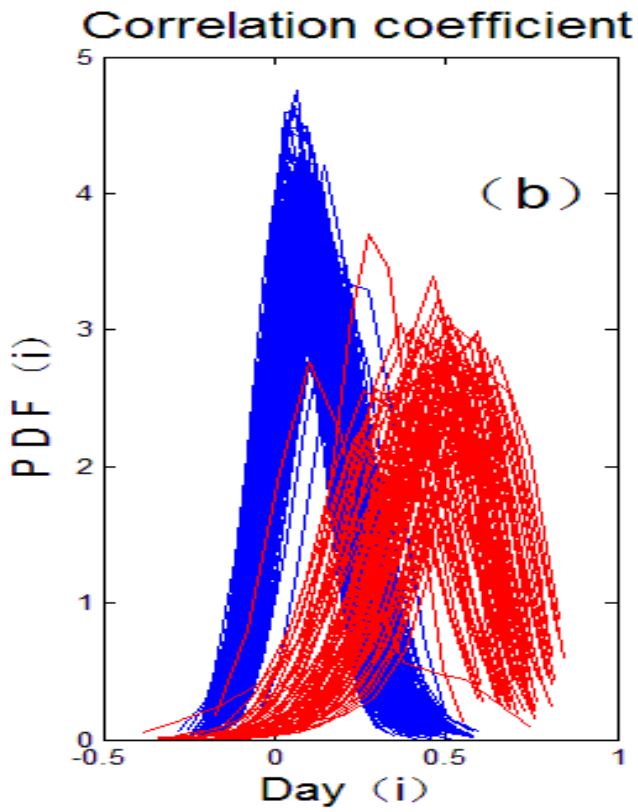
Market correlation：





Market correlation in different period：





Blue：Stationary
Red：Turbulent

PDF（i）
probability distribution

Conclusion:

- Using high frequency data is the key to capturing the herding effect

Question:

- Were the herding behaviors self- organized or induced by governmental policies?
- How damaging were herding behaviors to the financial system ?
- What need regulators do so that investors can be more rational ?

THINKING:

Can CSAD be replaced with Shonnon entropy ?

$$CSAD = \frac{1}{N}\sum_{i=1}^{N}\left|R_{i,t} - R_{m,t}\right|$$

$$Var(X) = \frac{1}{N}\sum_{i=1}^{N}\left|R_{i,t} - R_{m,t}\right|^2 = \frac{1}{N}\sum_{i=1}^{N} P_i[x_i\text{-}E(X)]^2$$

$$Var(X) = N\,(CSAD)^2$$

（X：Probability Density）

$$ShonnonEntropy = -\sum_{i=1}^{N} P_i \ln(P_i)$$

RELATIONSHIP

?

CSAD model ⟶ $H_t = \alpha + \beta_1\left|R_{m,t}\right| + \beta_2(R_{m,t})^2 + \varepsilon_t$

Thank You !