Capturing the market psychology from the Big Data

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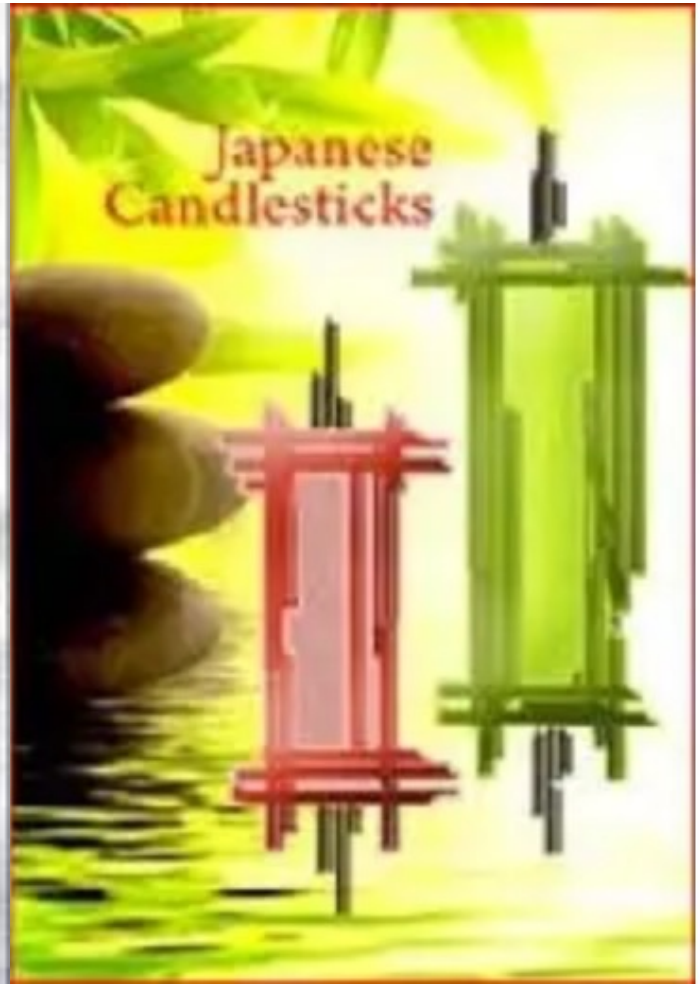
Candlestick chart method was invented by Homma Sokyu.
based on his careful observation of the rice market



The evening star

appears when the market psychology is so bullish that even sceptics scrambled to buy

The morning star

appears when the market psychology is so bearish that even the optimist scrambled to dump

Homma's role in the 21st century Japan

- Reading the mind of the market is a key task in successful trading.
- Homma's approach was to identify the market psychology based on open-high-low-close and open-close diff and sign.
- Our approach:
  - Take advantage of human bias that decision science and behavioral finance unveiled.
  - For modeling, we use Big Data with help of ML.

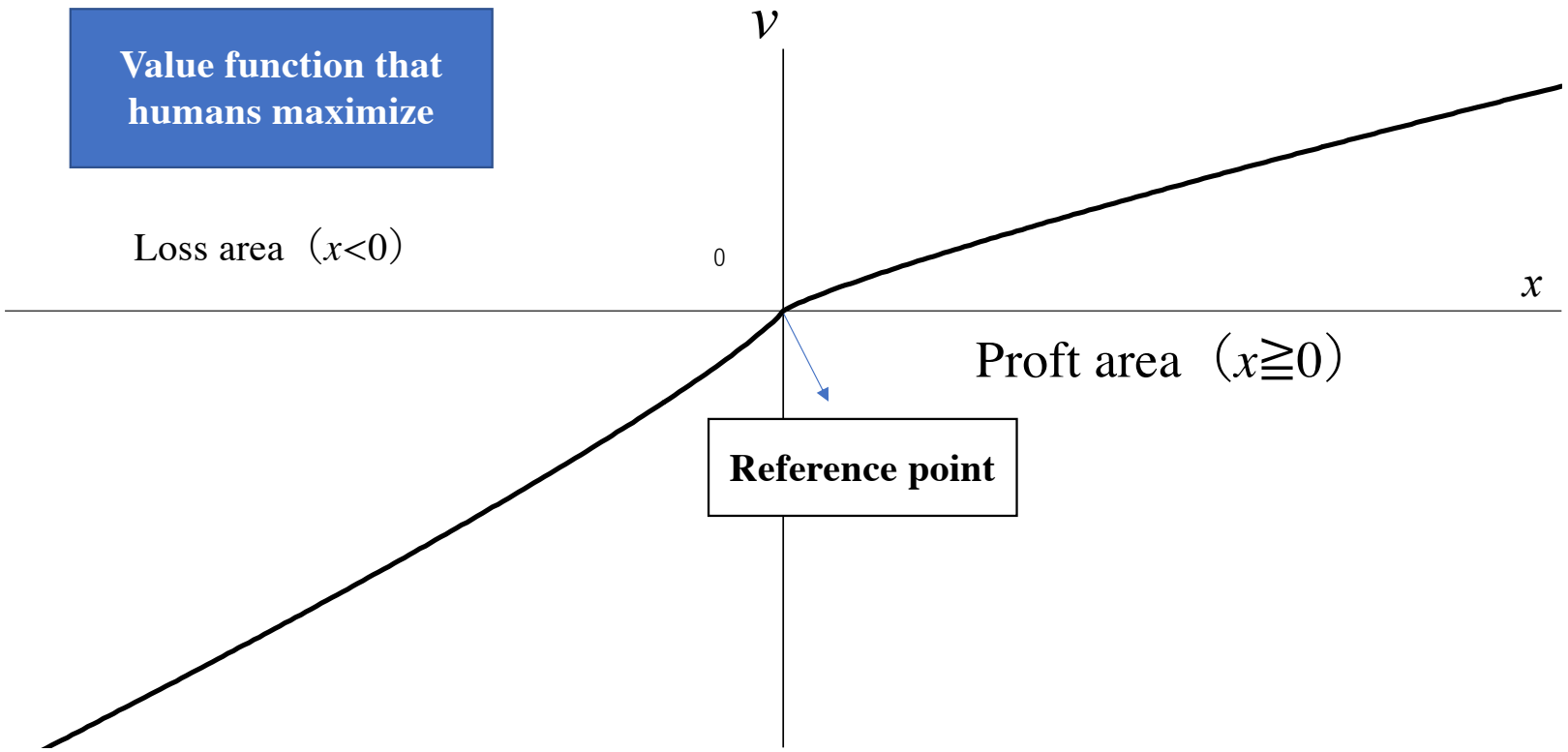
Are humans rational? Part I

Lottery choice

- You are given $1,000. Then you are offered a lottery
  A. ($1,000, 50%)
  B. ($500, 100%)
- Majority of people would choose B.

- You are given $2,000. Then you are offered a lottery
  C. ($-1,000, 50%)
  D. (-$500, 100%)
- Majority of people would choose, C.

Humans are risk averse in profit territory and risk loving in loss territory



Implication for the trading signal

- Stocks in the positive territory should be undervalued because risk averse (profit making) investors have already been sold them.
- Stocks in the negative territory should be overvalued because risk loving (loss making) investors are still holding them.

Capital Gain Overhang as a reference point proxy

$$R_t = \sum_{n=1}^{\infty} \left(V_{t-n} \prod_{\tau=1}^{n-1} [1 - V_{t-n+\tau}] \right) P_{t-n}$$

Turnover ratio for each day in the past

Sum up to 1

Source: Grinblatt and Han (2005)

Are humans rational? Part II

Herding under uncertainty:

A case for restaurant choice

Prior probability:	51%	49%
Private Signal:	A,B,B,B,B,B,B,B,B,B	
Situation:	First person went into A and the second person saw that. Second person's private signal cancels out and follow the prior probability	
People's choice:	**All 10 of them would choose A!**	

Implication for the trading signal

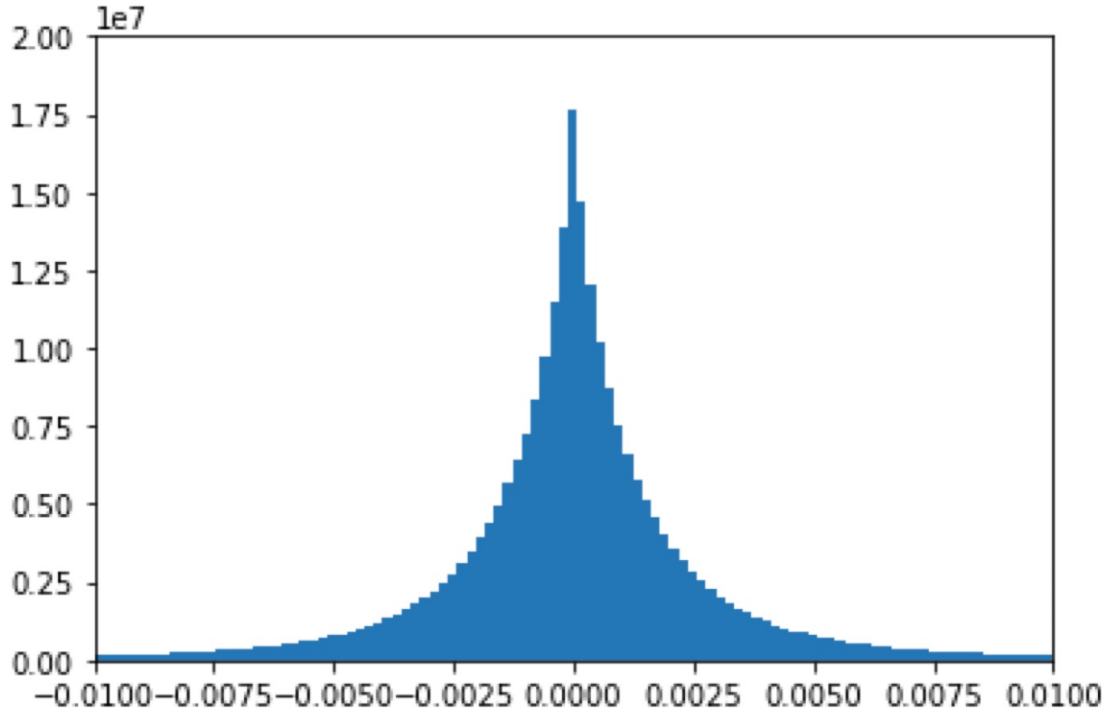
- Herding is a rational choice as an individual but irrational as a group
- Herding in the market would create overshooting from the true value of the stock
- Herding in the direction to the downside is more likely to occur quickly as humans are loss averse. Remember the steeper slope in PT.

How do we measure it?

- Stock price movement is decomposed as fundamental driven and noise driven.
- Using three factor model by FF, we estimate the noise portion as it is the residual of regression as follows.
- $\varepsilon_{i,t} = r_{i,t} - \alpha_{it} - \beta_i\left(TOPIX_t - r_f\right) - \gamma_i(HML_t) - \delta_i(SMB_t)$
- We observe the noise in 5-min frequency (t=each five-min)

Residual (Noise) distribution of 5-min tick data of all listed stocks in TSE for 2011 Jan. 5 - 2020 Oct 30.

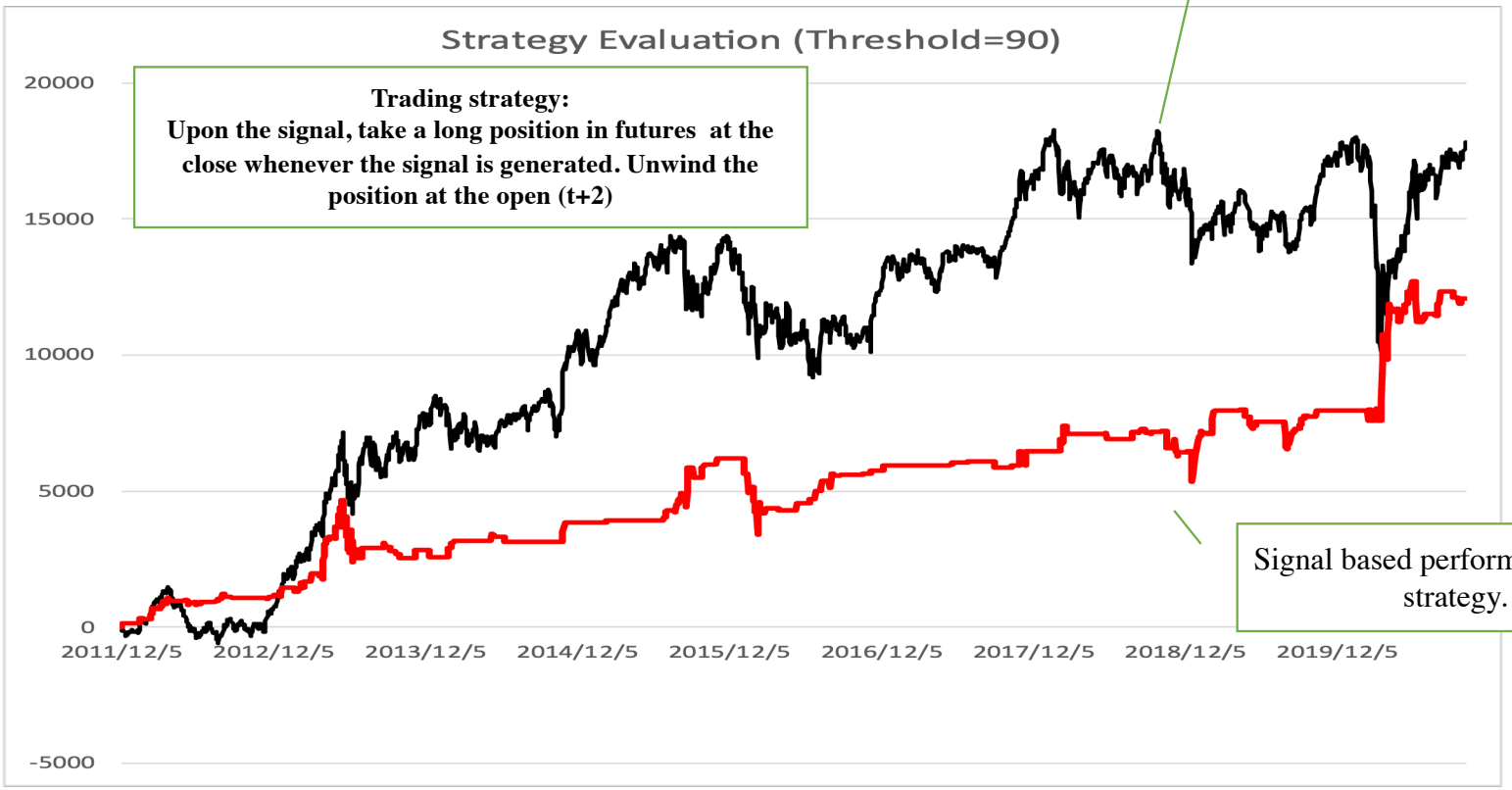
count	252,886,900
mean	0.00001
std	0.00425
min	-0.67558
25%	-0.00113
50%	0.00000
75%	0.00113
max	1.24991

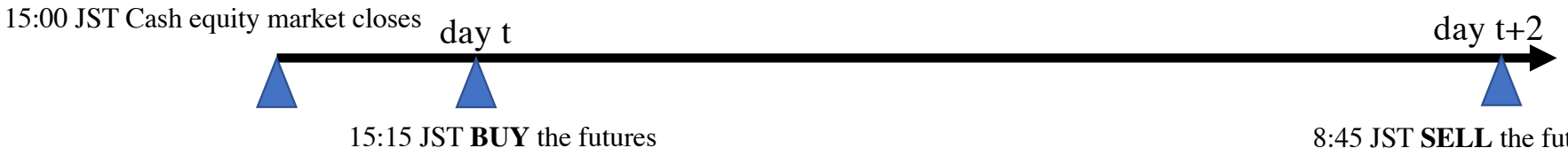


In order to detect the “HERDING”,

- Would like to find out noise traders’ selling activity in the market.
- Identify noise trader’s activity in the stocks using CGO as the reference point.
- We create HERDING INDEX by calculating the % of stocks that meets the following criteria.
  - Noise is negative
  - Reference price is within 0.5% of the last traded price

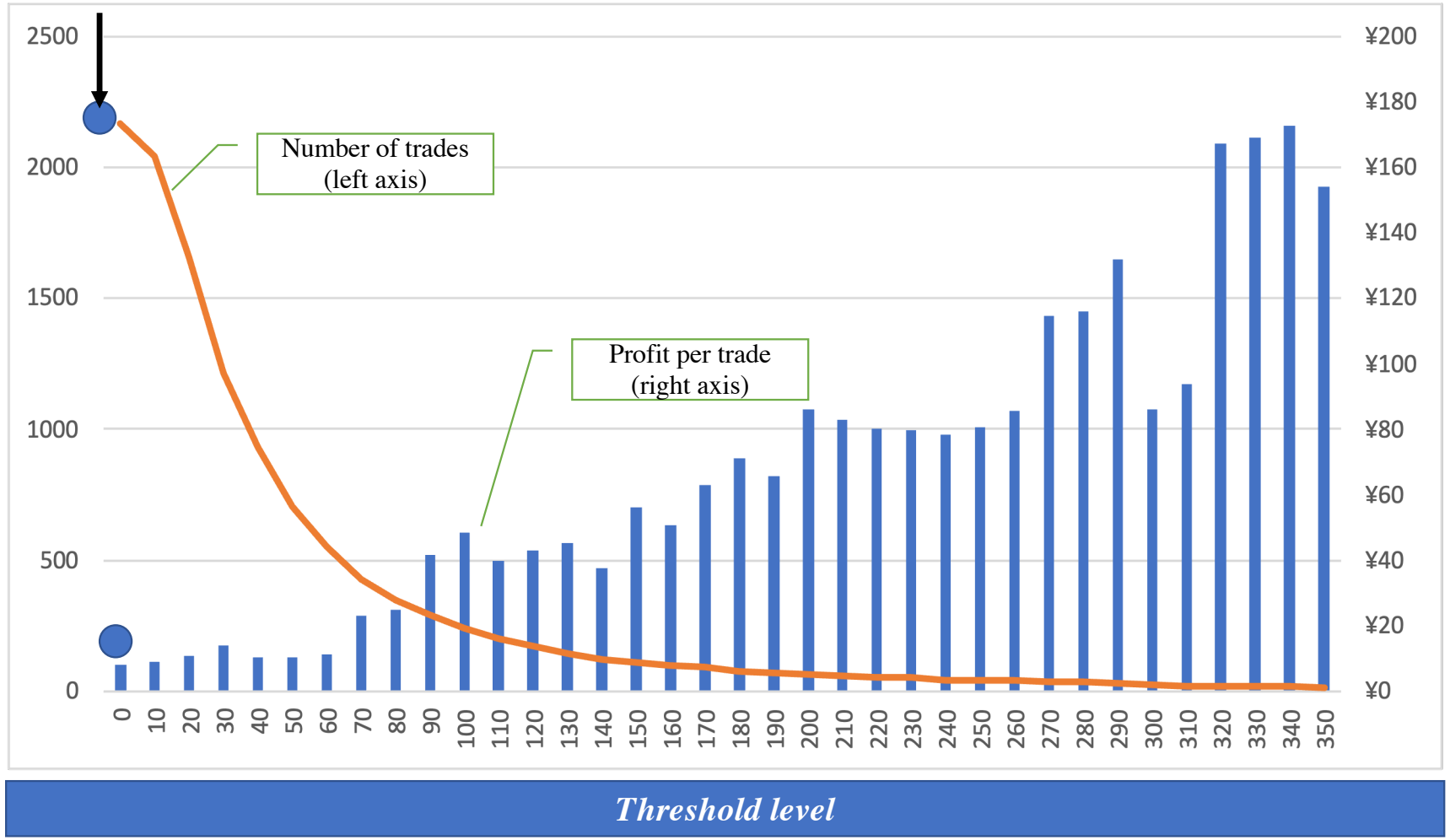
Trading strategies based on the signal





Higher threshold level will bring about sure profit but less frequent.

Benchmark



Higher threshold level will raise winning trade probabilities.