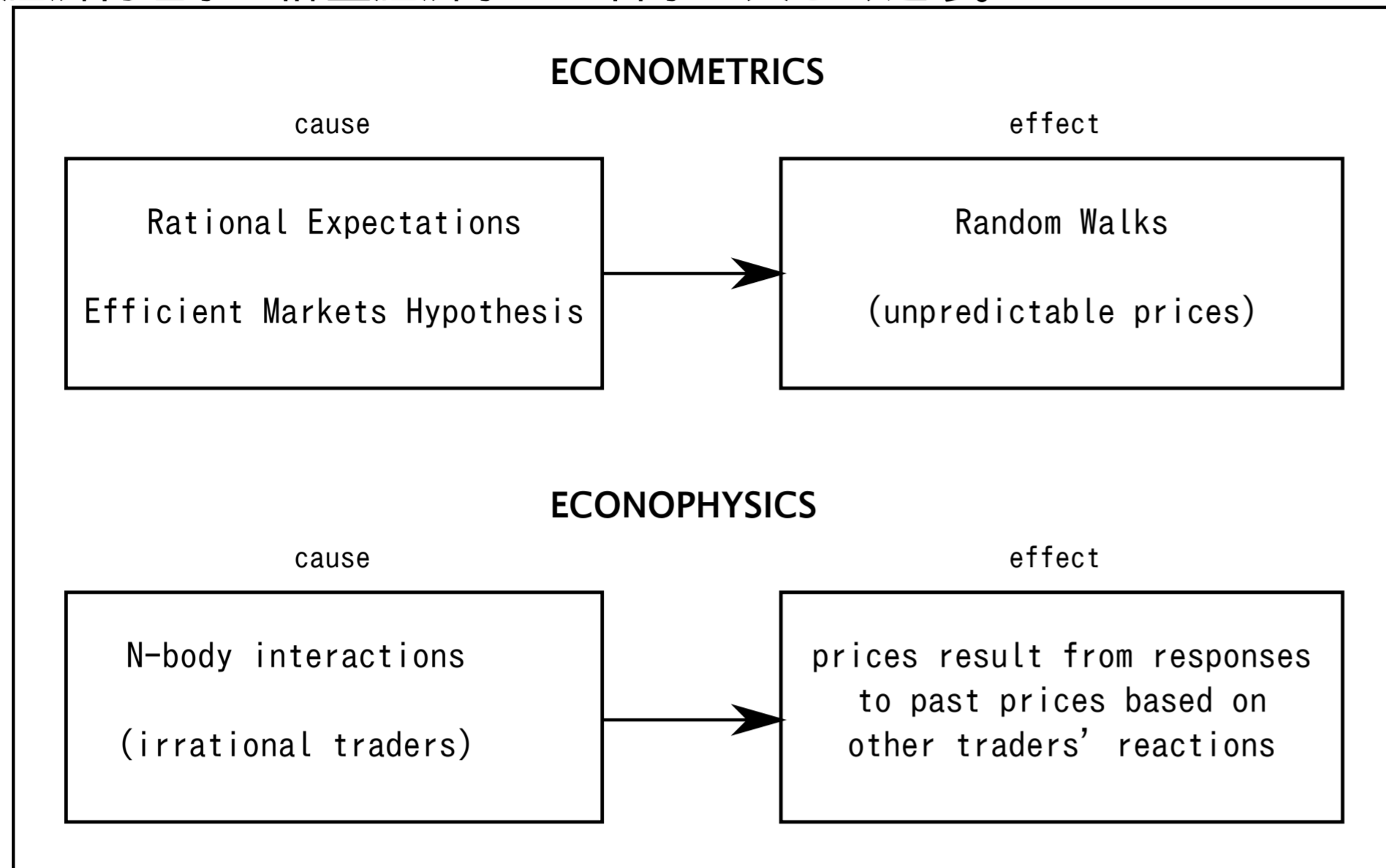


Econophysics: an alternative to econometrics

ザパート、 クリストファー データ同化研究開発センター 特任助教

現状

経済物理学と計量経済学との哲学は大きく違う。



その結果

- econometrics: statistical analysis of price returns
- econophysics: physical modeling of many-trader interactions

提案

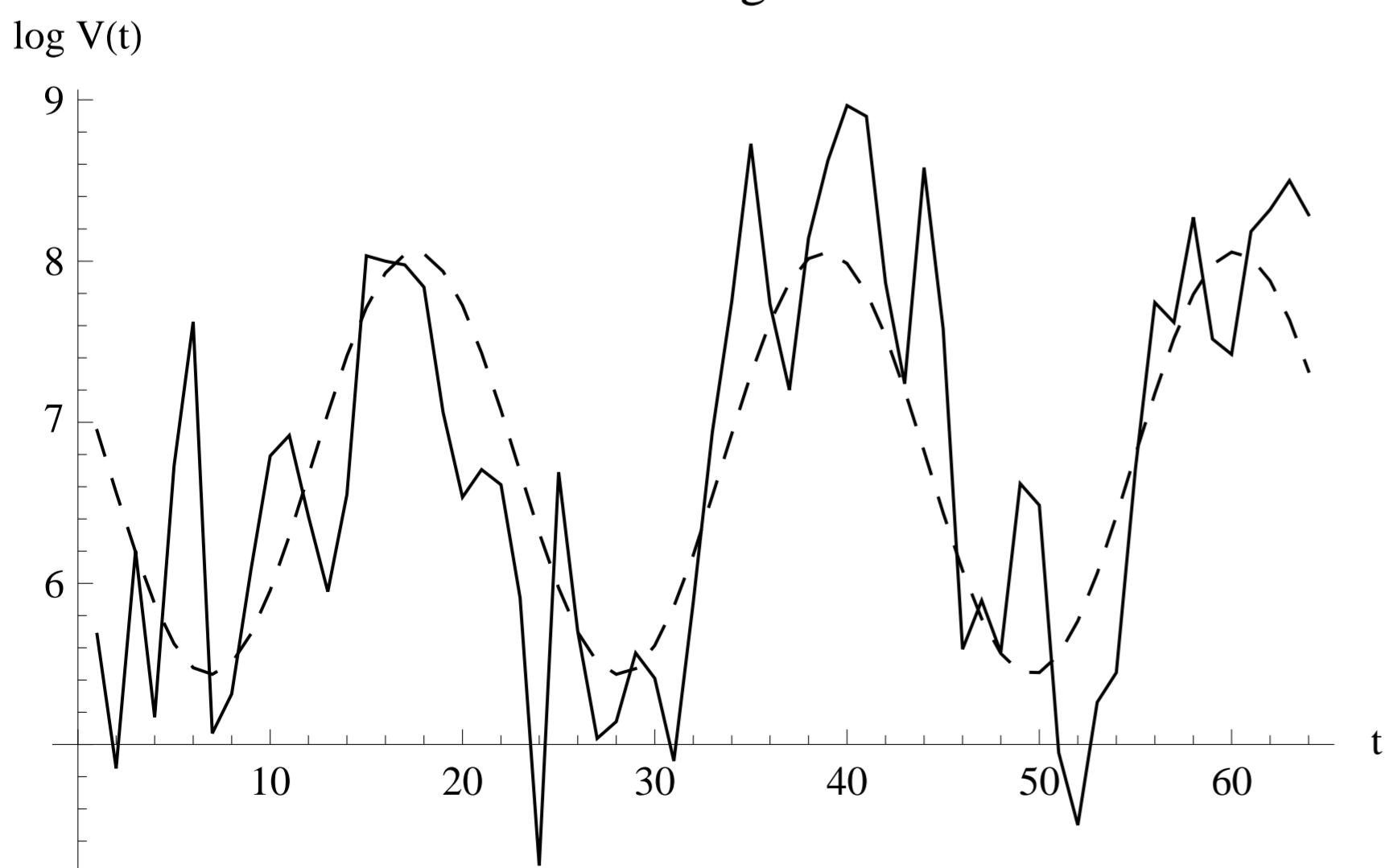
- replace fitting time series models (maximum likelihood, Bayesian statistics) with energy minimisation of a 2D Ising lattice via Simulated Annealing
- assume a 2D lattice with N binary nodes $S_i \in \{-1, 1\}, i = 1 \dots N$
- a vector of current profits/losses p_i for all nodes, updated after each tick
- a custom energy function to be minimised:

$$h_i = \underbrace{-\alpha \sum_{j \in N_i} S_i S_j p_j}_{\text{copy successful traders}} - \underbrace{\beta \min(p_i, 0)}_{\text{cut losses}} + \underbrace{\gamma \max(p_i, 0)}_{\text{take profits}}$$

where N_i denotes the local neighbourhood of the i th node, $\alpha, \beta, \gamma > 0$ and $\beta > \gamma$.

重要な点：時間の流れはトレードの出来高に従って適用する。

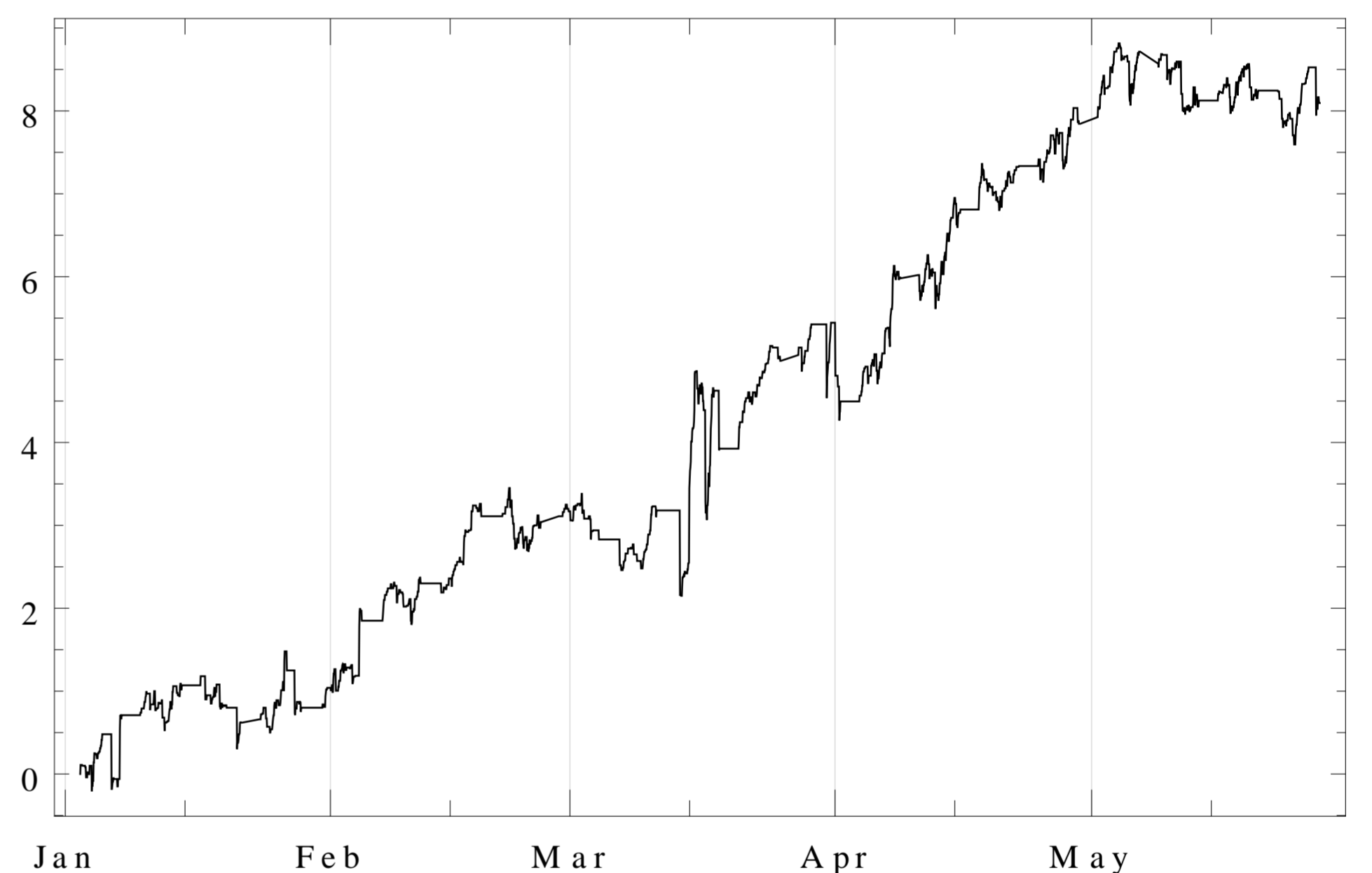
1 Monte Carlo step = 1 data tick (non-linear)
filtered trading volume



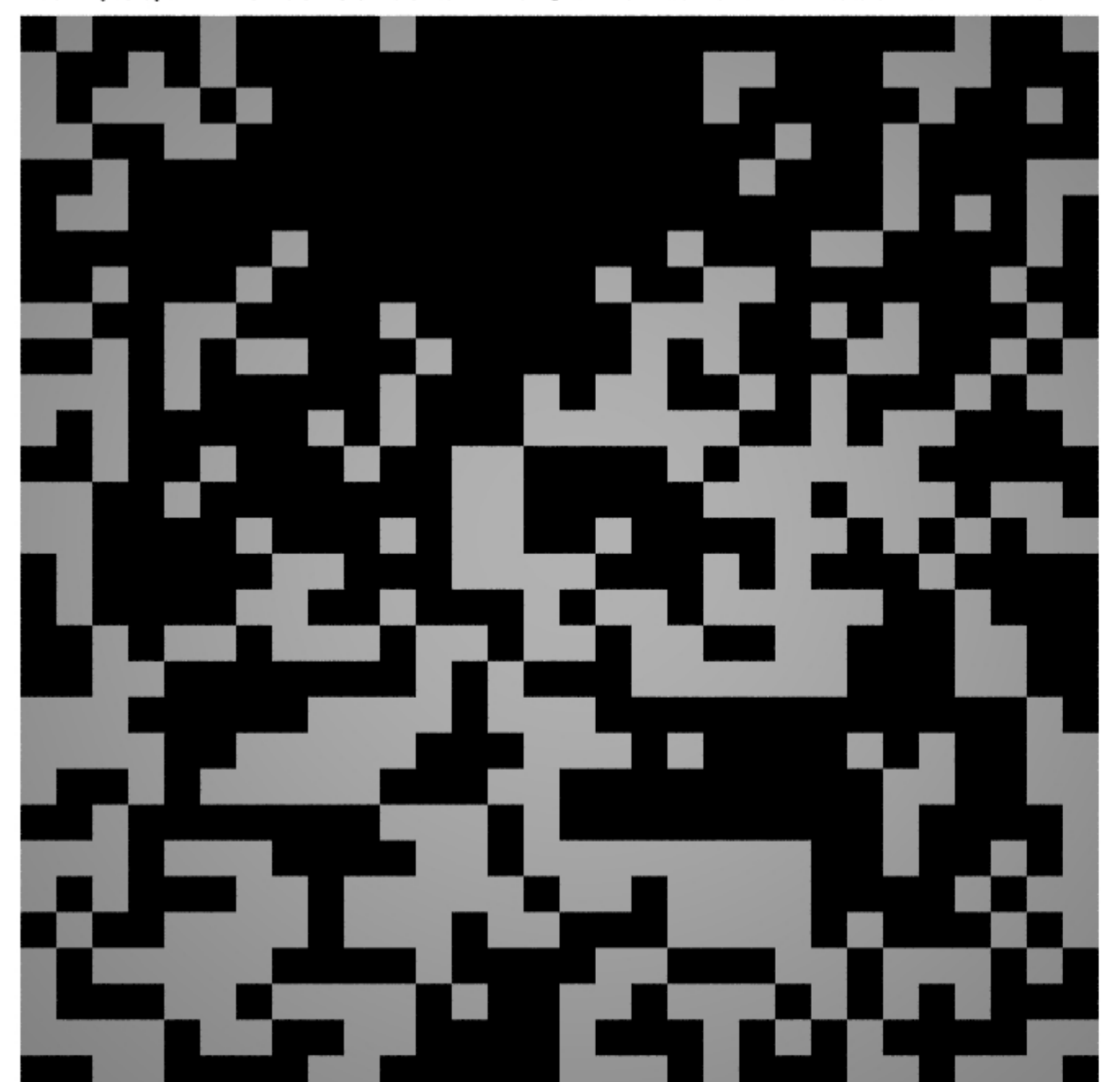
外国為替米 \$ / 円レート



2011年のドル/円相場である。Volume (bottom chart) expressed in terms of the number of trades per 24-hour time interval.
simulated trading [Yen]



2011/05/27 16:59:39 USDJPY 80.79 UP 345 DOWN 555 NET -210



793689 E 65.57 kBT 0.10 CUMULATIVE -5.846 dE>0 FLIPPED 45%