CENTRE FOR RISK RESEARCH

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Toward an understanding of price movements in betting markets: Profitable trading against the herd

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Efficient Market Hypothesis

Markets for speculative assets always fully incorporate relevant information in prices

Herding

Participants neglect private info, adjust actions– more representative of previous price movements

Effect

Price volatility in excess of variations in fundamental information–
Bubbles, crashes and bank runs

Herding in financial markets

No conclusive evidence (e.g. Sias 2004)

Herding in the Lab

Mixed results

(e.g., Cipriani & Guarino, 2005; Spiwoks et al., 2008)

Using betting markets to examine herding

- Subjective judgments revealed as odds
- Share characteristics with other financial markets
  e.g. many, complex, inter-dependent factors influence asset prices)
- Ease of entry, many participants, access to info
- An unequivocal outcome in finite time frame
- Several thousand markets per annum
- Advantages over lab-based study: dynamic real-world environ, time stress, experts/familiarity

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Our belief

Herding is far more common in markets than previous studies have been able to show and leads to inefficiency

Hypotheses 1

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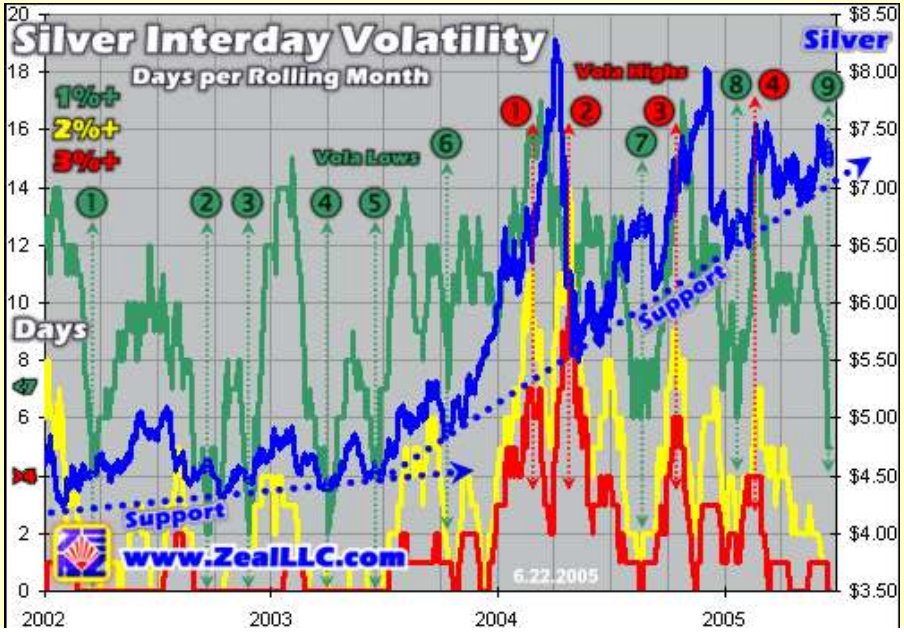
Volatility : Increased volatility in market prices results in increased efficiency of market prices.



Hypotheses 2

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Bettors know that informed bettors bet late:
to protect information (Asch et al., 1982)
to reduce transac ion costs (bid–ask higher in early market)
capture liquidity

Herding Prevalence: Bettors display herding behavior, but to a greater extent in the later stages of the market than in earlier stages.

Hypotheses 3

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Betting exchanges facilitate the practice of laying 'known losers': horses which are deliberately pulled up or are not allowed to run on their own merits (Marginson, 2010)

Laying: Bettors herd to a greater extent on 'sell' (lay) signals than 'buy' (back) signals.

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Hypotheses 4

Inefficiency: Herding presents an inefficiency, such that it is possible to make positive returns by betting against those who herd.

Data

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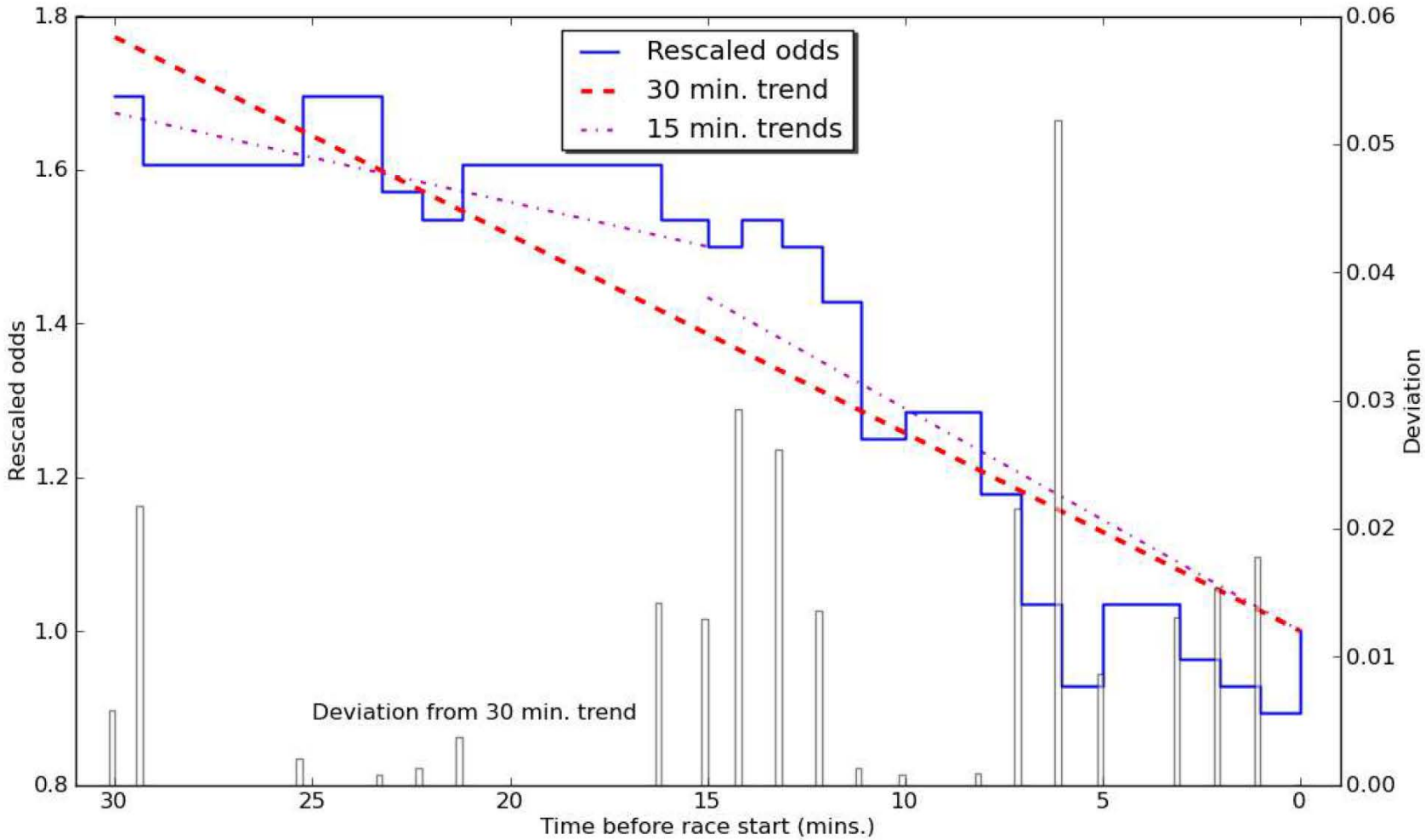
- Betfair odds on 62,124 horses,6058 UK races, 2009/10
- Odds at 1 minutes intervals from 9am to races start (8,500,000 data points)
- Segments: (i) 9am–race start (ii) 30min prior– start (iii) 15min prior–start (iv) 30min prior– 15 min prior
- Training races (first 75%), holdout races (last 25%)


Rescaled odds
30 min. trend
15 min. trends
Deviation from 30 min. trend
Rescaled odds
Deviation
Time before race start (mins.)
1.8
1.6
1.4
1.2
1.0
0.8
0.06
0.05
0.04
0.03
0.02
0.01
0.00
30
25
20
15
10
5
0

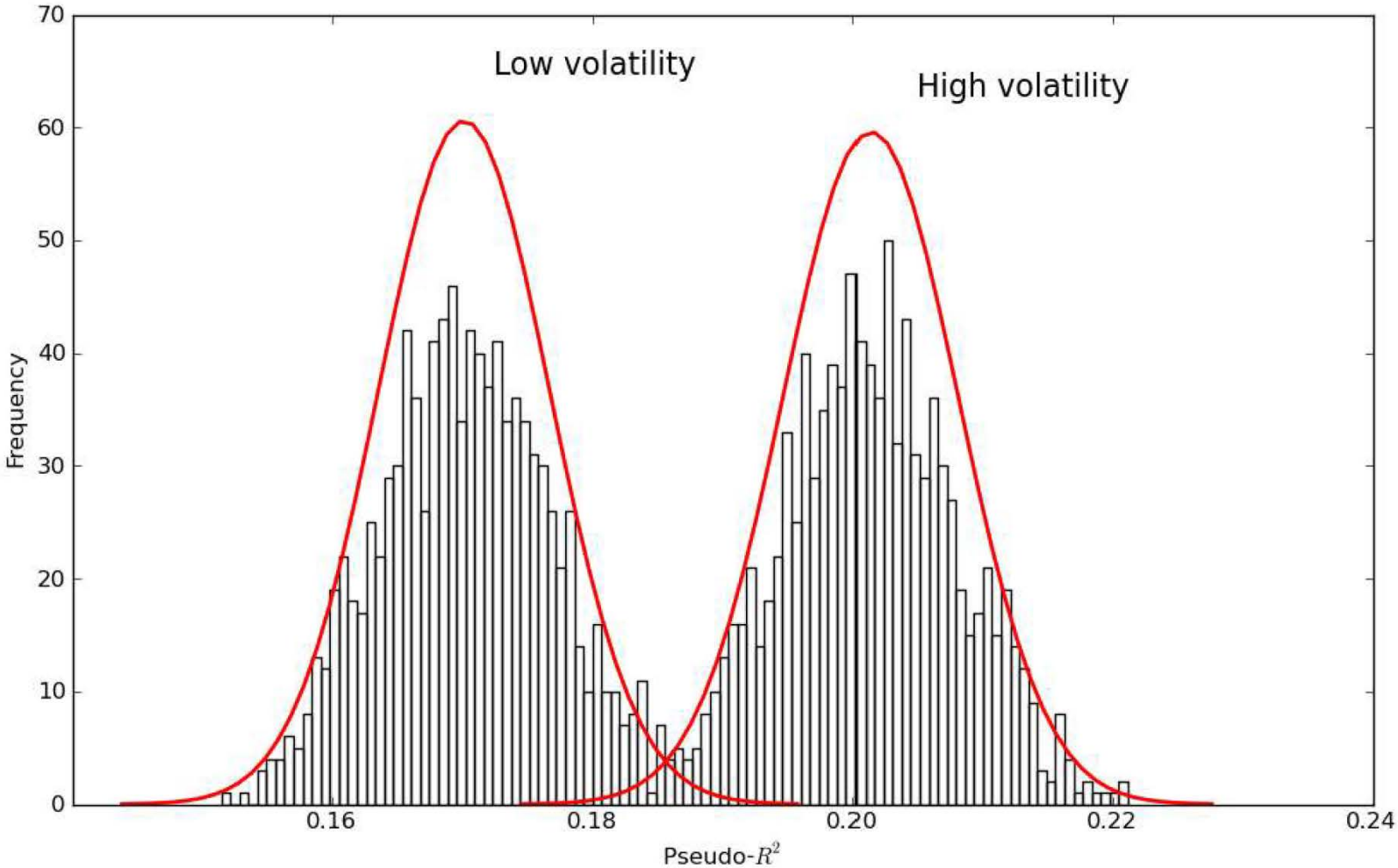
Testing Volatility/Efficiency Hypothesis

$$p_{ij} = \frac{\exp\left(\lambda \ln(p_{ij}^{s}\right)}{\sum_{i=1}^{n_j}\left(\lambda \ln(p_{ij}^{s}\right)}$$

istribution of the pseudo-R^2 for high and low volatility sets using a boo strap methods

High/low volatility races different efficiency levels?

$$z = \frac{\mu(R_H^2) - \mu(R_L^2)}{\sqrt{s^2(R_H^2) - s^2(R_L^2)}}$$



R^2 High Vol: 0.2014, Low vol: 0.1701 z=3.33, p<0.001

Herding Prevalence Hypothesis- Results

Segment 1: whole betting period

Large odds movements do not result in odds-implied probs differing from true winning probabilities, i.e. herding behavior is not apparent

Segments 2 & 3: Last 30 mins; Last 15 mins

Large odds movements in the later stages do cause odds-implied probs to differ from true-winning probabilities, but only where odds increase, i.e., bettors herd on increasing odds, not on decreasing odds

Segment 4: 30-15 mins from start

Opposite effect, i.e., bettors herd on decreasing odds but not on increasing odds

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Hypothesis 4: Herding presents an inefficiency

$$p_{ij} = \frac{\exp\left(f_{3+}\left(\mu_3^+\right)_{ij} + f_{4-}(\mu_4^-)_{ij} + \lambda \ln(p_{ij}^s)\right)}{\sum_{i=1}^{n_j} \exp\left(f_{3+}\left(\mu_3^+\right)_{ij} + f_{4-}(\mu_4^-) + \lambda \ln(p_{ij}^s)\right)}$$

Betting strategy

Betting strategy:

Kelly assigns bet sizes f_i over all n horses in race to max the log of expected wealth after the race

Kelly max asymptotic rate of growth of wealth

Betting Results

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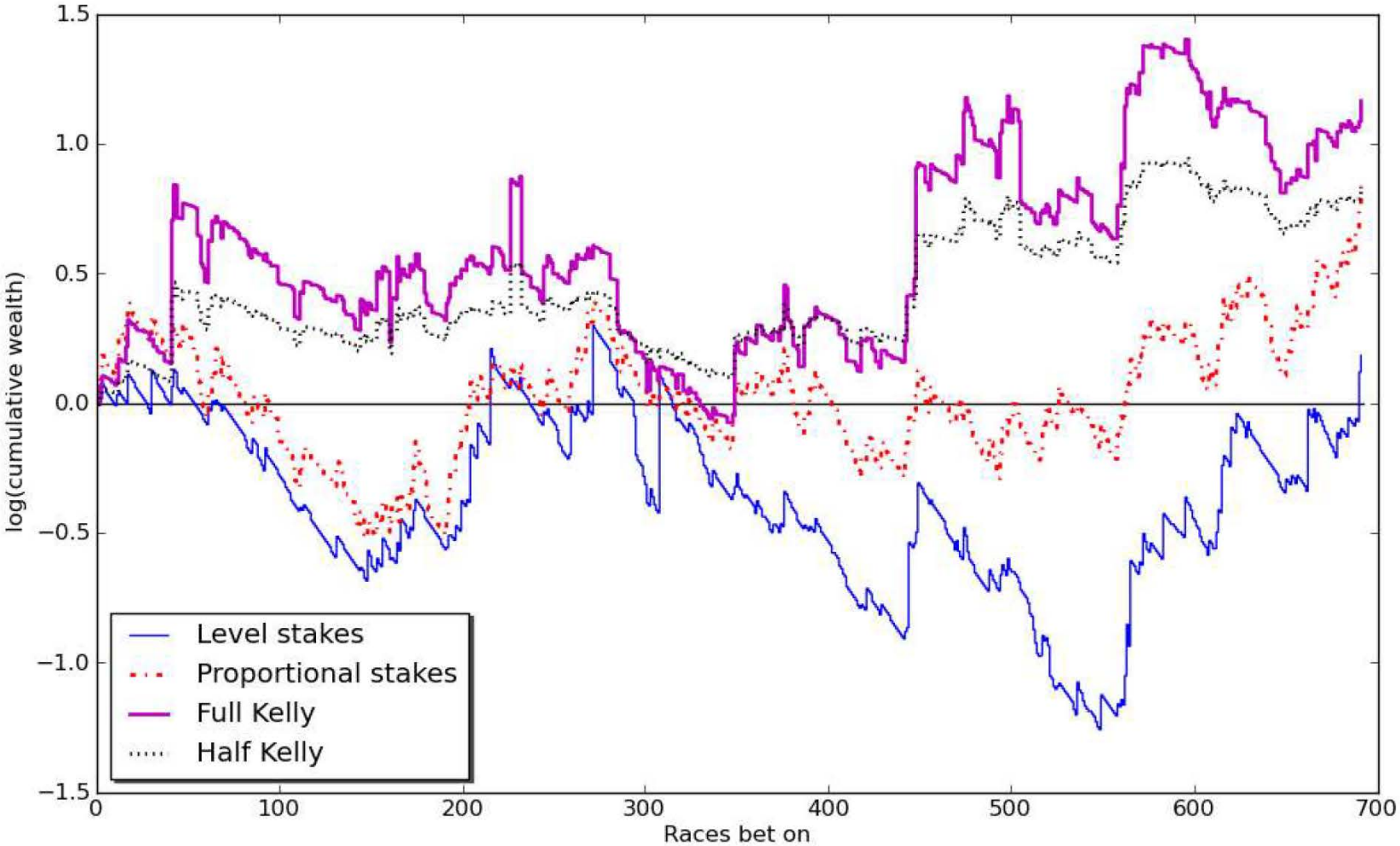

Volatility

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Volatile mkts are more efficient–
contrast with FM lit (eg Shiller)

Corrections can occur when economies
under stress (Kaminsky, 1999)

Volatility in betting mkts:

Introducing informed/insider traders to inefficient mkt–
^efficiency & volatility.
Noise traders with no info-based reason to trade ^ volatility
Also ^ liquidity .....attracting informed traders ^ efficiency

Conclusions

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- Increased volatility associated with ^ efficiency
- Bettors herd, but only under certain conditions
- More herding than empirical studies in financial markets suggest.
- Interplay of informed and less informed activity results in largely efficient market
- However, significant profits are possible from trading on herding behaviour

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