Comments on:

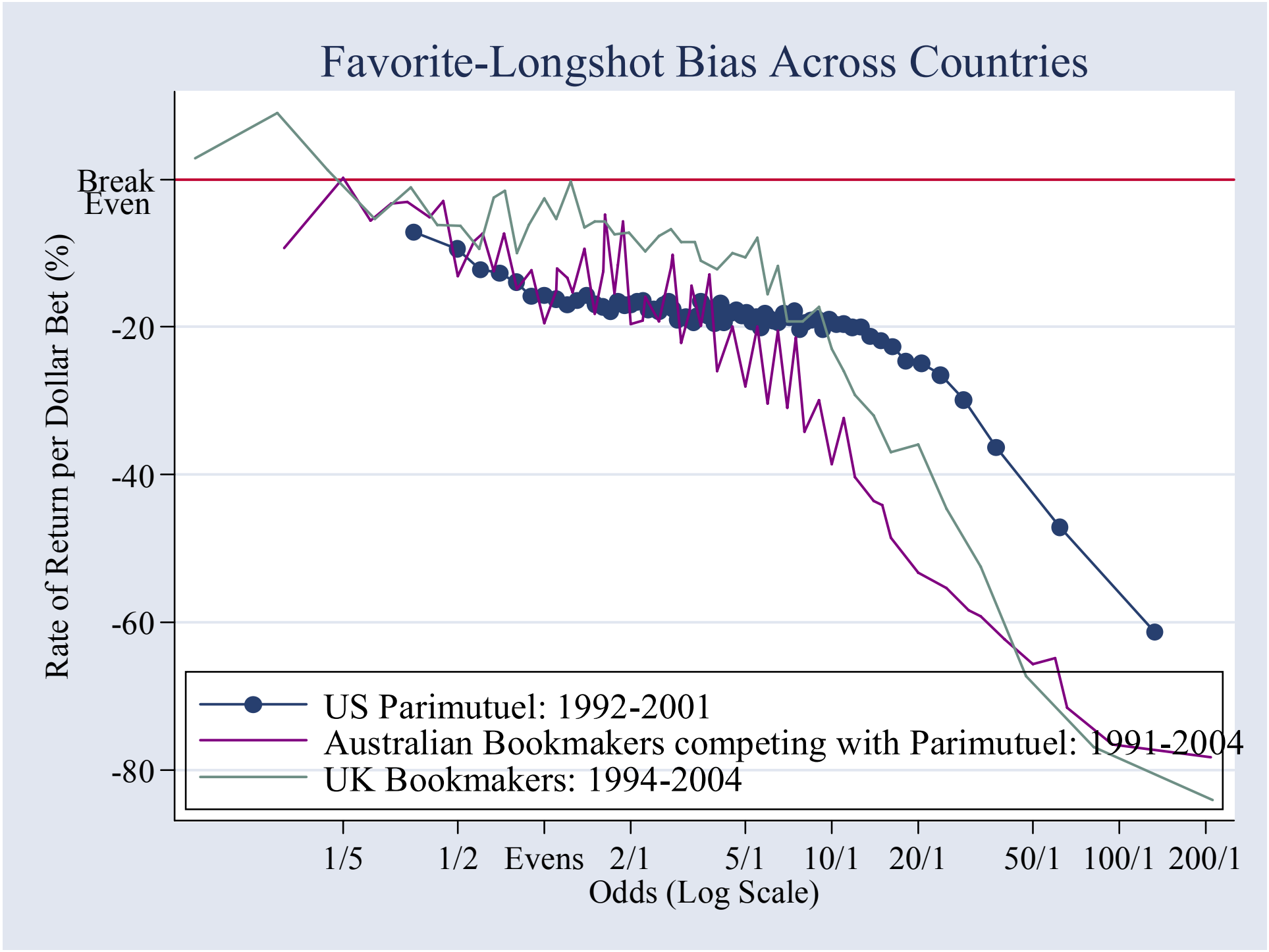
1. Alexander Koch & Hui-Fai Shing:
"Bookmaker and Pari-Mutuel Betting: Is a (Reverse) Favourite-Longshot Bias Built-in?"
2. Tom Gruca and Joyce Berg:
"Public Signal Bias and Prediction Market Accuracy"
3. Lionel Page:
"Ignorance Prior Bias in Prediction Markets"

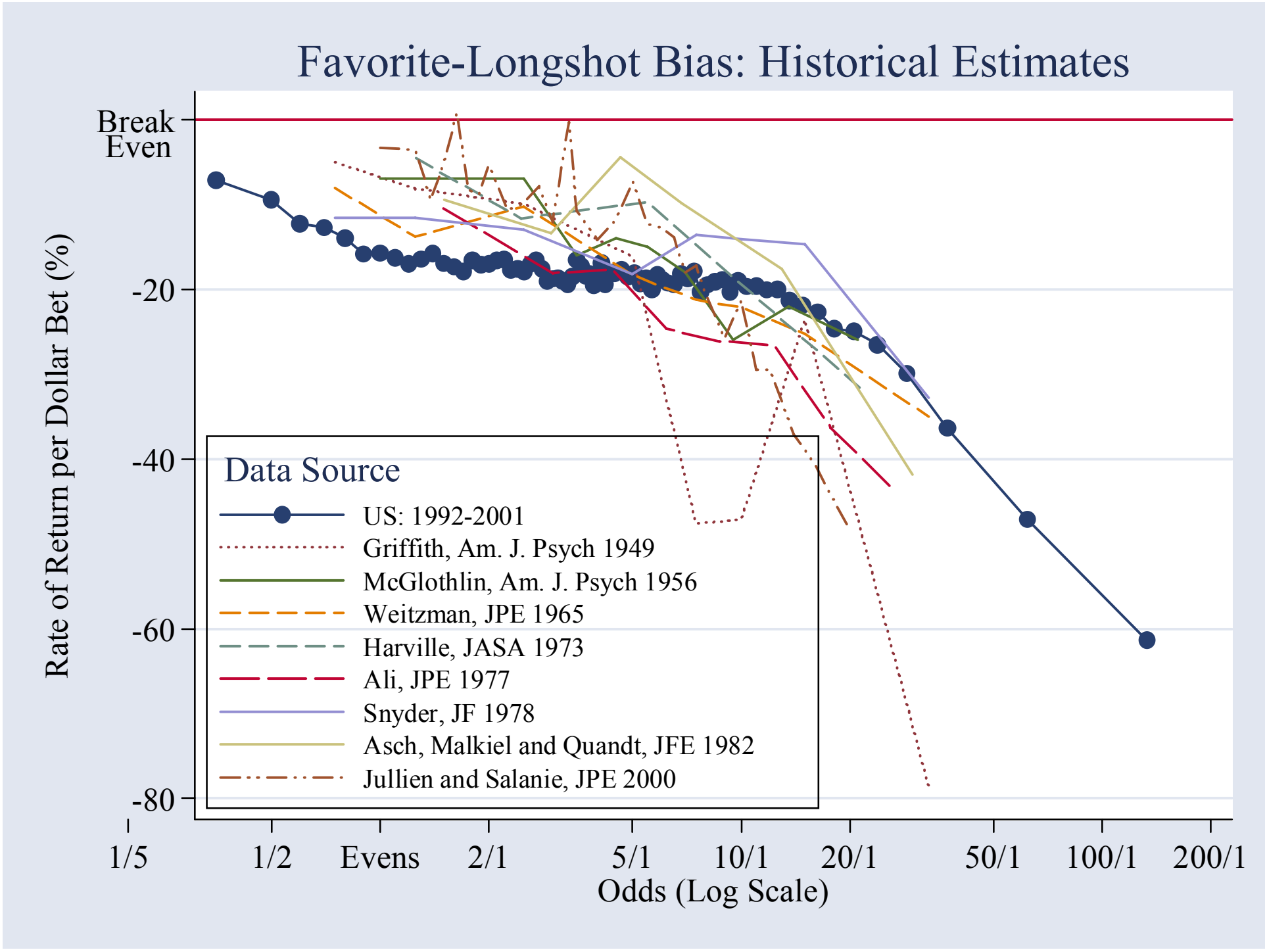
Justin Wolfers
The Wharton School, University of Pennsylvania
CEPR, IZA & NBER

Koch and Shing: Exploring the Odds Grid

- Explore the effects of the "coarseness" of allowable odds
- Bookmakers: "Grid" of allowable odds yields:
  - Fine distinctions among favorites
    ($1.19 or $1.10 pay 2/11 and 1/10, respectively)
  - Coarse distinctions among longshots
    (500/1 or 990/1 both pay 500/1)

  → Hurts longshots more → Favorite-longshot bias
- Parimutuel system. "Breakage" yields:
  - Coarse distinctions among favorites
    (Payoffs of $1.19 or $1.10 both pay $1.10)
  - Fine distinctions among longshots
    (500/1 or 990/1 pay 500/1 or 990/1)
  - Hurts favorites more → Reverse longshot bias
- Is the "grid" of allowable odds actually as characterized?
  - Why is it an equilibrium?
- Implication: Longshot bias depends on market structure
  - But is this counterfactual?


Favorite-Longshot Bias Across Countries
Break Even
-20
-40
-60
-80
Rate of Return per Dollar Bet (%)
US Parimutuel: 1992-2001
Australian Bookmakers competing with Parimutuel: 1991-2004
UK Bookmakers: 1994-2004
1/5
1/2
Evens
2/1
5/1
10/1
20/1
50/1
100/1
200/1
Odds (Log Scale)


Favorite-Longshot Bias: Historical Estimates
Break Even
-20
-40
-60
-80
Rate of Return per Dollar Bet (%)
Data Source
US: 1992-2001
Griffith, Am. J. Psych 1949
McGlothlin, Am. J. Psych 1956
Weitzman, JPE 1965
Harville, JASA 1973
Ali, JPE 1977
Snyder, JF 1978
Asch, Malkiel and Quandt, JFE 1982
Jullien and Salanie, JPE 2000
1/5
1/2
Evens
2/1
5/1
10/1
20/1
50/1
100/1
200/1
Odds (Log Scale)

Koch & Shing: Conclusions

- More generally: Is the relevant research puzzle:
  - Difference in the favorite-longshot bias across markets?
  - Or similarities?
- Favorite-Longshot Bias is a quantitative puzzle
  - Does this paper explain the magnitudes?

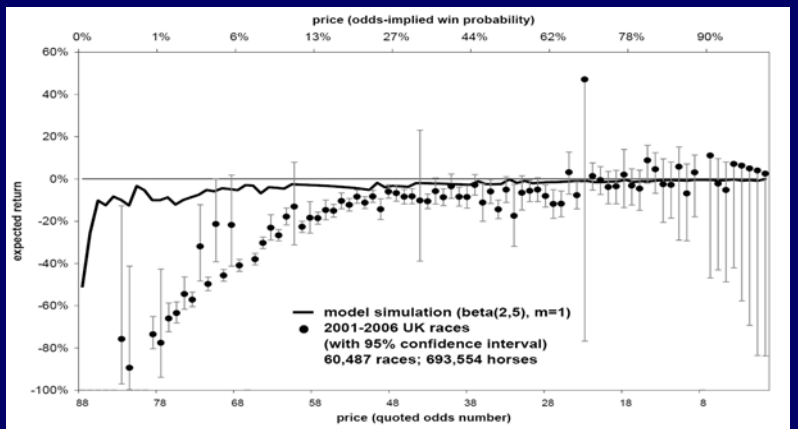


Figure 3: Actual FL bias present in UK horse races vs model-based simulation

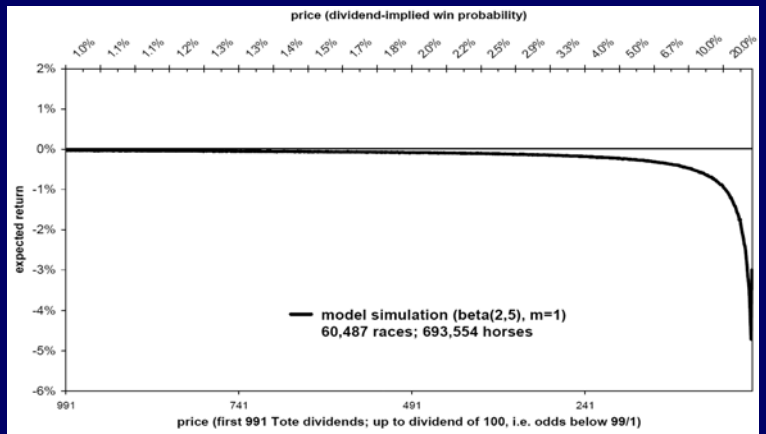
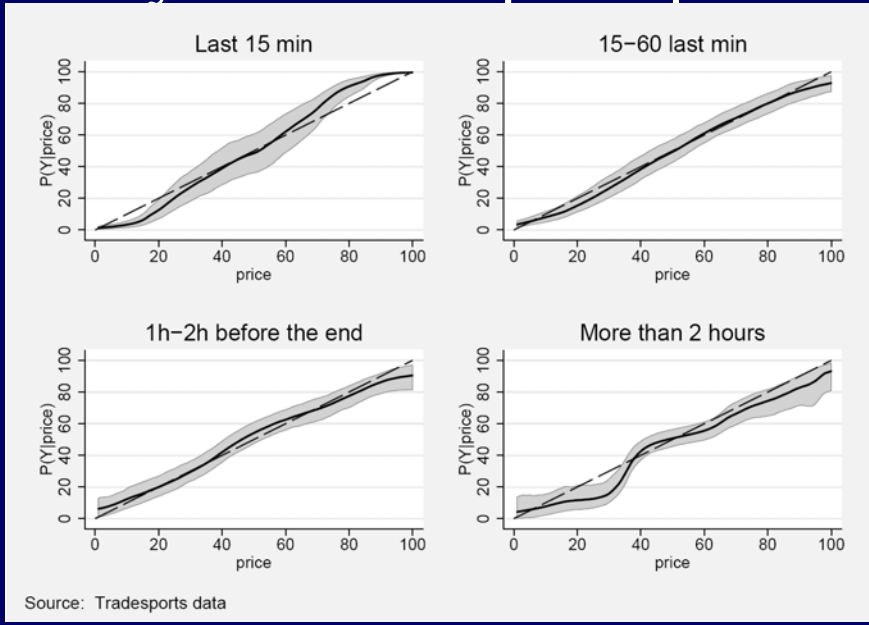


Figure 6: Model-based simulation for UK Tote grid

- Are betting odds as coarse as suggested?
- Model test: Impact of BetFair on Favorite bias

Page: Favorite-Longshot Bias Thru Time

- Contrasts two theories:
  - Miscalibration over small probabilities
  - Ignorance prior bias (should decrease with info)
- Analyzes Tradesports prices on 500 sporting events



- Observes: Favorite-longshot bias becomes more pronounced through time

Page: What is Being Tested?

- What does the time dimension yield?
  - More time => More info
    - » Definitely true: Ignorance prior should be less relevant
    - » But: Regressions test ignorance prior *bias*
    - » Question: Should ignorance prior *bias* decline through time?
  - Miscalibration over small probabilities
    - » Authors argue that this should be time-invariant. Why?
      - This paper simply falsifies any theory which asserts that probability-weighting is time-invariant
    - » Complementary/competing hypothesis:
      Errors in small probabilities v. Errors in future volatility
      - Overweighting future volatility ↔ Underbet likely events

Page: More Evidence

- Political prediction markets:
  - Leigh, Wolfers, Zitzewitz (this conference) find some evidence of increasing F-L bias through time
- Finance-related prediction markets:
  - Zitzewitz, "Price Discovery Among the Punters"
  - Finds declining F-L bias through time (InTrade.com)

Table 5. DJIA Binary Option Returns by Hour and Moneyness

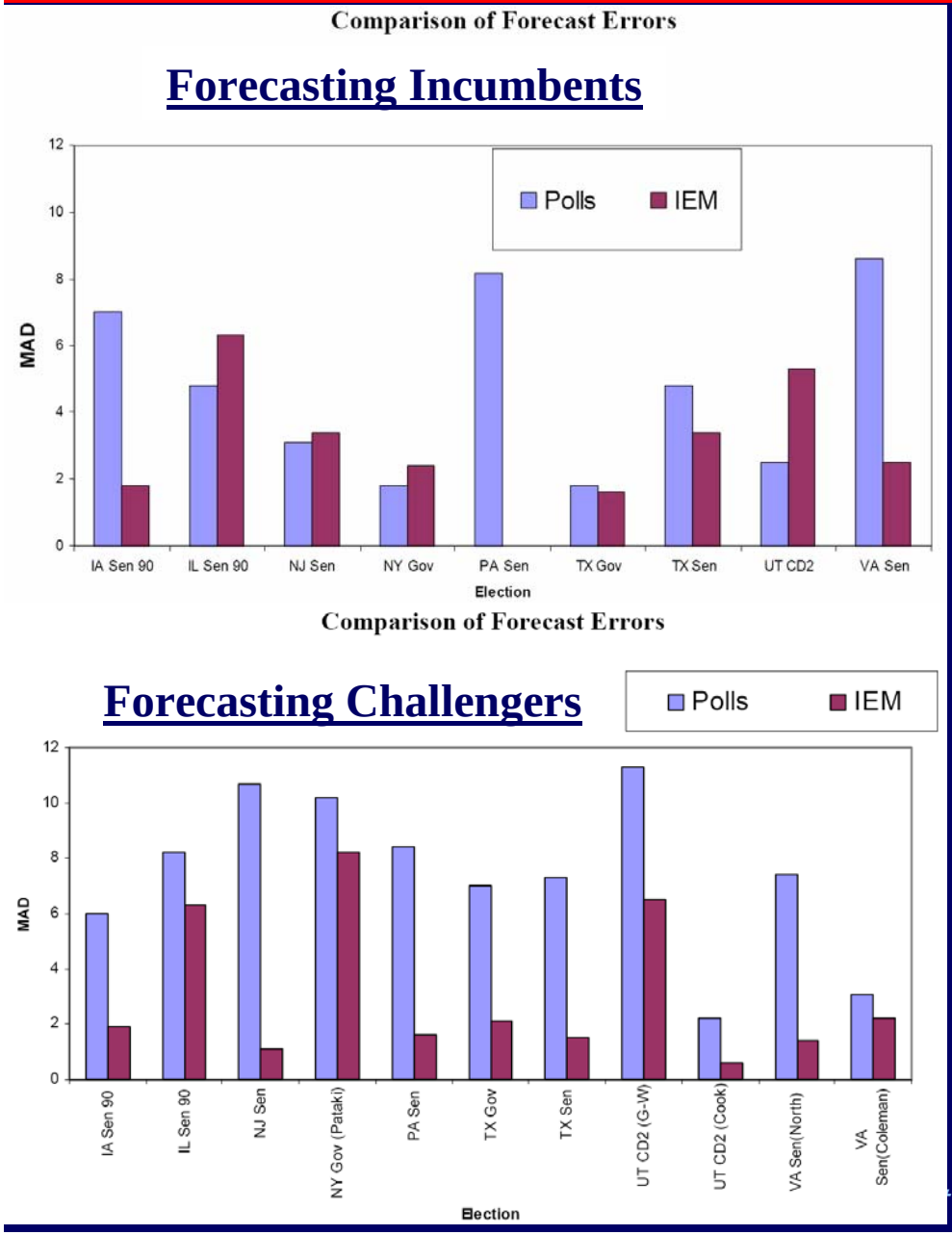
	Longshots			Favorites			
	Moneyness at time of binary options trade (most recent DJIA spot less strike price, in basis points)						
Trade time	-50 or less	-50 to -25	-25 to 0	0 to 25	25 to 50	50 or more	Total
Contracts expiring at 10 AM ET							
Before 7 AM	-8.4***	-15.0***	-1.7	2.7	13.9***	6.6***	-0.3
7 to 8 AM	-5.6***	-9.3***	-11.4***	6.2*	7.8***	-0.5	-1.9
8 to 9 AM	-6.4***	-8.1***	-5.0	2.0	10.8***	5.8***	-1.1
9 to 10 AM	-1.0	0.8	0.5	-1.6	4.9***	1.6	-0.1
Total	-5.0***	-3.3	-0.4	-0.7	7.5***	4.0***	-0.3

Gruca and Berg: Public Signals & Markets

Their idea:

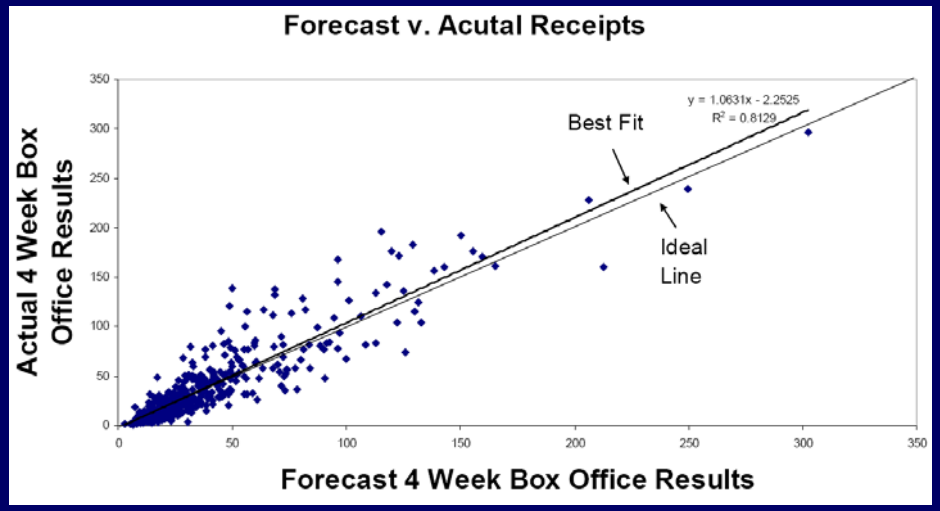
- H1: If public signals are biased: Markets will correct bias
  ⇒ Markets outperform public signal
- H2: If public signals are unbiased:
  - Gruca & Berg: ⇒ markets will not outperform public signals
  - But: A⇒B does NOT imply: Not A⇒Not B
  - Performance of markets v. polls must depend on private signals
    - » eg Public signals about flu outbreaks are unbiased
      But markets appear to forecast the flu better than others
- What I like best:
  - The idea that one role of markets is de-biasing
    - » Idea is implicit in Erikson and Wlezien's analysis of markets v. polls
    - » The idea has much broader applicability (eg litigation)

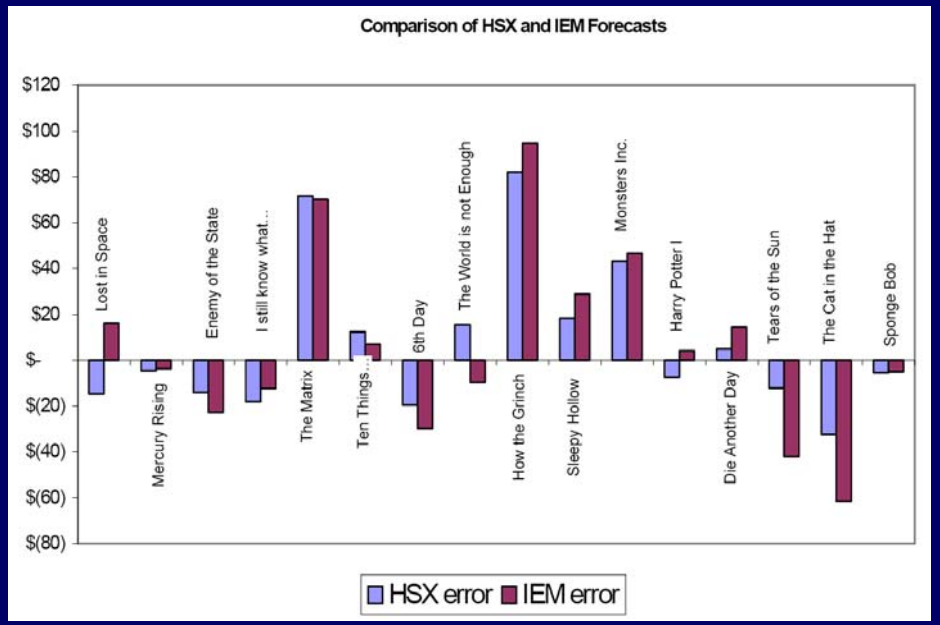
Gruca & Berg: Polls v. Markets



- Gruca & Berg:
  - Polls are biased for incumben
  - Polls unbiased for challengers
  - And markets beat polls for challengers, but not incumbents
- But: How can a poll be unbiased for an incumbent, but biased for his challenger?
  - Need to normalize polls
  - Especially when markets and outcomes are normalized

Gruca & Berg: IEM v. HSX





- Gruca & Berg:
  - HSX is unbiased
  - Iowa market does not outperform Hollywood Stock Exchange
  - Confirming: In the presence of an unbiased public signal markets aren't better
- But: Isn't this just a comparison of real-money v. play-money markets?
- Surely markets do better than some "experts"

What do Traders Do?

- Contract pays $1 if event occurs
- Many traders, each characterized by:
  - *q:* Subjective beliefs about prob. event occurs
  - *y:* Wealth
  - *U:* Utility function (Log utility)
- Traders: Maximize expected utility
  - Choose *X:* How many contracts to buy/sell,
  - Given , π, the price

$$Max \underset{\{x\}}{EU_j} = q_j Log(y + x_j(1-\pi)) + (1-q_j) Log(y - x_j \pi)$$

$$yielding: \quad x_j^* = y \frac{q_j - \pi}{\pi(1-\pi)}$$

What do Markets Do?

- Supply = Demand ($\sum x(\pi)=0$)

$$\int_{-\infty}^{\pi} y \frac{q-\pi}{\pi(1-\pi)} f(q)dq = \int_{\pi}^{\infty} y \frac{\pi-q}{\pi(1-\pi)} f(q)dq$$

- Implies: *Price = Mean belief*

$$\pi = \int_{-\infty}^{\infty} qf(q)dq = \bar{q}$$

- And if beliefs (q) are correlated with wealth (y)

$$\int y \frac{q-\pi}{\pi(1-\pi)} dF(q \le \pi, y) = \int y \frac{\pi-q}{\pi(1-\pi)} dF(q \ge \pi, y)$$

$$\pi = \int q \frac{y}{\bar{y}} dF(q, y)$$

=Wealth-weighted mean belief