



The Future of Lotteries: Prediction Markets

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Gaming Research Center

- Is conducting disciplinary and interdisciplinary research
- Is organizing a symposium each year
- Consists of 20 professors from law, economics, psychology, other social sciences like communication science, mathematics and statistics and other sciences



The History of Prediction Markets

The interest in prediction markets started in 1906 with the research by Francis Galton.

Galton held the view that the crowd is stupid.

At one of England's many fairs, he noticed a wagering competition in which people had to guess on the weight of an ox.

Eight hundred people wrote their guesses on slips of paper; some were butchers and farmers, while others were no experts at all.

Averaging the estimates, Galton expected the result to be nowhere near the mark, because so few of the guessers were professionals in the meat business. To his surprise, however, the crowd had come within one pound of the ox's weight. The group as a whole had guessed that the ox would weigh 1,197 pounds, and the ox's actual weight was 1,198 pounds.

Galton had to revise his view regarding the wisdom of crowds.



Look Out:

- Prediction markets are offering opportunities not only of commercial interest but as well of interest for political decision makers.
- Prediction markets are outperforming polls and experts in predicting unknown events.
- Prediction markets have a high potential to generate information useful for modern governments as well.
- Prediction markets could be employed by state lotteries to exploit the wisdom of the crowd and support governmental decision making in modern democracies.



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1. What is common to honey bees, ants, birds and humans?
2. Mechanisms to generate collective wisdom in the times of the Internet
3. Results of economic research on prediction markets
4. The future of prediction markets?



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Bird Swarm

UNIVERSITY OF HOHENHEIM
Gaming Research Center





“Emergent behavior”: Individual agents in the system pay attention to their immediate neighbours rather than wait for orders from above



Examples of Emergent Behavior

- Bird swarms
- Honey bees
- Ants
- Human traffic
- Immune system
- Human brain
- Economic markets (invisible hand)



Economic Markets

Adam Smith in “An Inquiry into the Nature and Causes of the Wealth of Nations“ (1776):

“It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages.”



Tasks to be Solved

- Share information distributed among agents (for example on the food resources available in the vicinity of the hive)
- Coordinate on activities (for example foraging activities)
- Find an efficient allocation of resources (for example allocate forager bees to food resources available)



How these tasks are accomplished

- Not a leader or central decision maker is deciding
- Decision making takes place at the local level but the solution should be optimal at the global level



What do all these examples have in common?

- The whole is much more than a collection of its parts: *emergence*
- Shortsighted individuals generate farsighted wisdom: *collective wisdom*



A Common Framework

- **Agents**
- **Acting** individually
- **Holding** very limited information
- **Coordinated** by some basic mechanism
- **Motivated** by some simple principles
- **Are able** to generate collective wisdom.



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Mechanisms in the Times of the Internet

- How is Google working? One main principle for the ranking is to count links
- New dynamic search engine: Main principle for the ranking is the use by the members of the community of Internet users
- How does Wikipedia work? The result of the common wisdom of the crowd.



Example of Prediction Market

Who wants to be a millionaire?

-> The audience joker (91% right answers)
outperforms the expert joker (63% right
answers)



Experimental Prediction Markets

Run by

- Universities
- Companies offering software solutions
- Internet gaming companies
- Financial service companies



Run by Universities

- Iowa electronic markets (University of Iowa)
- Elab Global Panel (University of California at Riverside)
- Austrian Electronic Market (Vienna University of Technology)
- Election stock market (University of British Columbia)
- Gambling Future Market

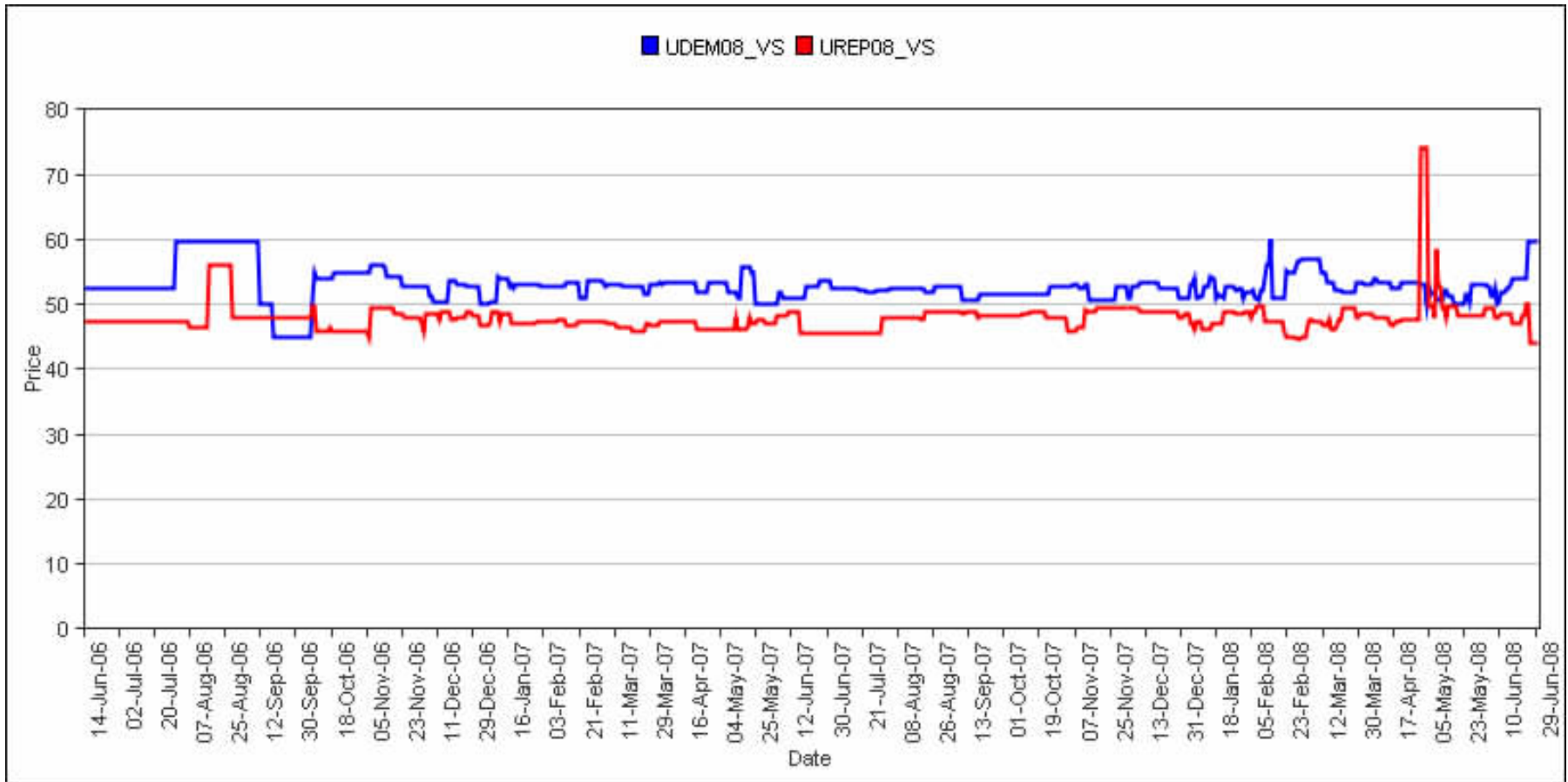


Vote Share Market

- UDEM08_VS \$1.00 times two-party vote share of unnamed Democratic nominee in 2008 election
- UREP08_VS \$1.00 times two-party vote share of unnamed Republican nominee in 2008 election



2008 US Presidential Election Vote Share Market



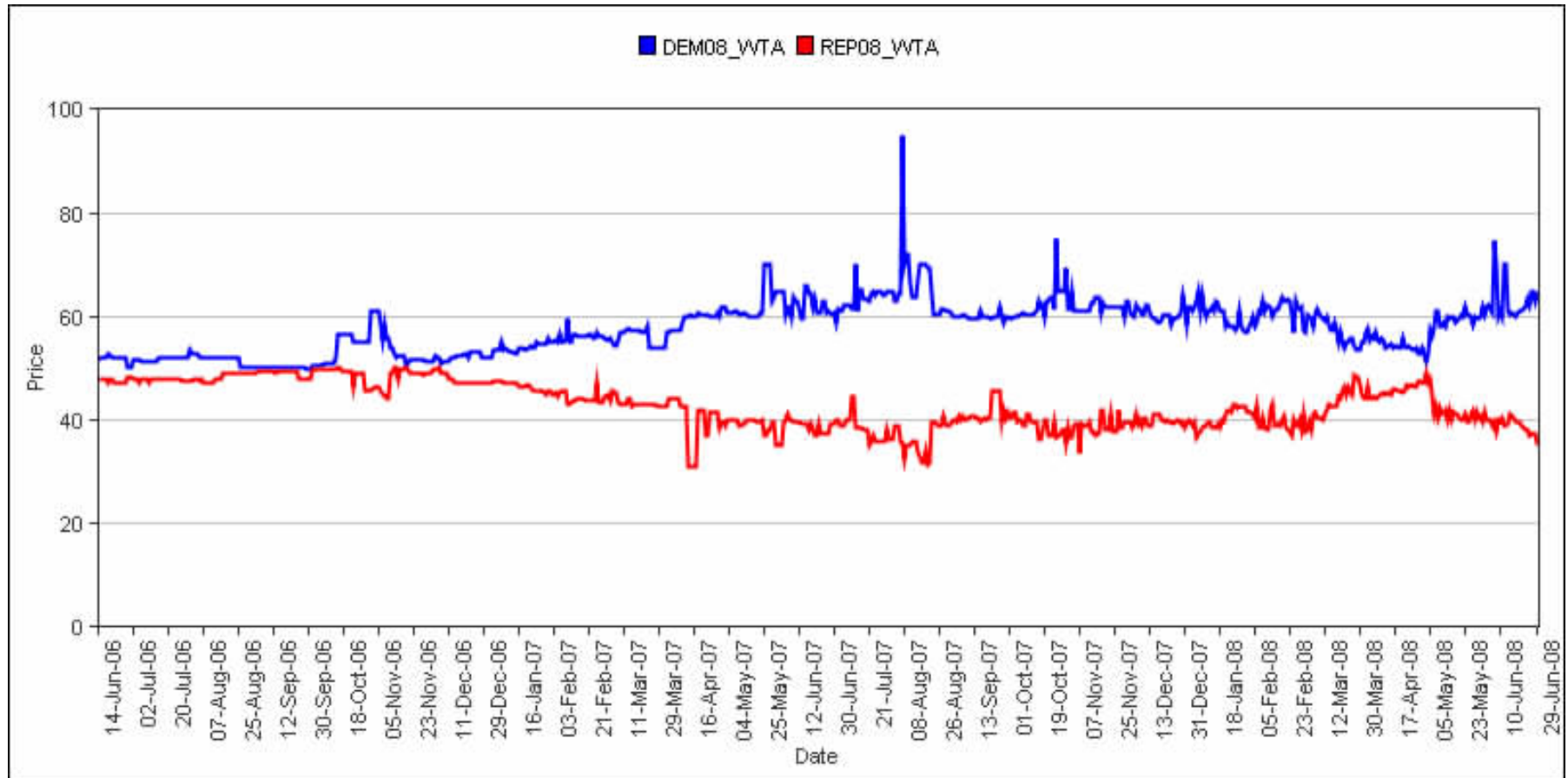


Winner-takes-all

- DEM08_WTA \$1 if the Democratic Party nominee receives the majority of popular votes cast for the two major parties in the 2008 U.S. Presidential election, \$0 otherwise
- REP08_WTA \$1 if the Republican Party nominee receives the majority of popular votes cast for the two major parties in the 2008 U.S. Presidential election, \$0 otherwise



2008 US Presidential Election Winner-takes-all Market



Predictions

Jun 02, 2008: 472 participants

User Guides

Previous Markets...

Virtual Worlds

Idea Pageant

Which Companies are Most Likely to Succeed in Second Life?

Google/YouTube

Idea Pageant

How Should Google Best Monetize YouTube?

Social Shopping

Idea Pageant

Which Web 2.0 Shopping Sites Are the Most Engaging?

Facebook Traffic

Competitive Forecasting

How Much Will Facebook Traffic Increase?

Most Popular Consumer Electronics Online Retailers

Idea Pageant

Which Consumer Electronics Online Retailers Will Have the Most Customers This Holiday Season?

Online Holiday Promotions

Idea Pageant

Which Online Promotions Will Be the Most Successful This Holiday Season?

Most Popular Holiday Online Shopping Day

Idea Pageant

Which Shopping Day Will Have the Most Unique Visitors to Online Shopping Sites?

Online Holiday Sales

Competitive Forecasting



Foresight Exchange Prediction Market

Run by nonprofit research group

Virtual currency redeemable for monthly prizes

Manifoldness of claims:

- Dinosaur recreated by 2050
- Cosmological constant >0
- Cancer cured by 2010
- 1000 GHZ CPU availability date



Predict the Future of the New German Gaming Regulation

- Conducted in 1997 and 1998 at symposia of the Gaming Research Center at the University of Hohenheim
- Number of participants in 1997 and in 1998 about 100 to 120
- How long will the „Staatsvertrag“ last?



Predict the Future of the New German Gaming Regulation

- 2007 (29.6.2007): arithmetic mean of 44,9 months
- 2008 (14.2.2008): arithmetic mean of 32,8 months



Predict the Outcome of the European Soccer Championship

- 19 companies offering internet sports betting possibilities
- One financial contract offering internet sports betting possibilities
- It is possible to calculate from the betting data the market expectations on the odds for each country of winning this championship



Prediction of the European champion

Country	Average implicate probability to win the European championship 2008*							
	CW 22	CW 23	After the 1 st	After the 2 nd	After the 3 rd	After the	After the	Price in € of
	26 th of May	2 nd of June	game of every team			quarter-final	semi-final	a certificate **
			11 th of June	15 th of June	19 th of June	23 rd of June	27 th of June	27 th of June
Germany	17,68%	17,68%	19,24%	13,44%	13,32%	37,18%	42,61%	38,5
Italy	11,79%	11,83%	7,92%	4,88%	14,73%			0,01
Spain	12,87%	13,03%	16,64%	18,90%	16,36%	34,26%	57,39%	38,5
Portugal	10,37%	10,51%	14,24%	15,52%	15,32%			0,01
France	9,69%	9,74%	6,71%	3,56%				0,01
Croatia	6,27%	6,30%	5,30%	9,65%	10,19%			0,01
The Netherlands	6,68%	6,73%	13,72%	19,35%	20,23%			0,01
Czech Republic	5,06%	4,73%	4,25%	3,19%				0,01
Switzerland	3,26%	3,17%	0,96%					0,01
Greece	3,38%	3,21%	0,92%					0,01
Russia	3,34%	3,58%	2,49%	2,95%	6,25%	21,18%		0,01
Sweden	2,63%	2,62%	3,13%	2,60%				0,01
Romania	2,18%	2,18%	2,27%	3,17%				0,01
Turkey	2,03%	2,00%	0,93%	1,74%	3,61%	7,39%		0,01
Poland	1,82%	1,73%	0,90%	0,28%				0,01
Austria	0,93%	0,95%	0,37%	0,35%				0,01

* The implicate probability to win for every country represents the subjective estimation of the bettors and can be calculated from the odds of a bookmaker. The average implicate probability to win was calculated by the mean of the odds from 19 international online-bookmakers.

** Price of a certificate to get a fixed return of €100 if the country has won the tournament; www.sportzertifikate.de

For further details, see "The reseach centre of gaming predicts the European champion 2008"; <https://gluecksspiel.uni-hohenheim.de>



Run by Companies Offering Software Solutions

- Foresight exchange prediction market (hosted by Consensus Point)
- Global risk prediction market (Newsfuture)



Run by Internet Gaming Companies

- Paddypower (Dublin, Ireland)
- Intrade (Dublin, Ireland)
- Centrebet (Australia)



Run by Financial Service Companies

- Hollywood stock exchange (Century City, California)
- Economic derivatives (Goldman Sachs together with Deutsche Bank)



Prediction Markets Forecasting

- Elections
- Movie revenues and Oscar winners
- Corporate sales and project completion
- Economic indicators (rate of unemployment, savings etc.)
- Politics (Iraq having weapons of mass destruction)
- Geopolitical risk (Pentagon was stopped by negative publicity)
- Influenza outbreaks



Conclusions

At the present time prediction markets are run by

- Universities for scientific and education purposes
- Companies offering software solutions for scientific and commercial use
- Gambling industry as gambling
- Financial service companies as financial market instrument

Prediction markets are offering opportunities to investigate topics not only of commercial interest but as well of interest for political decision maker.

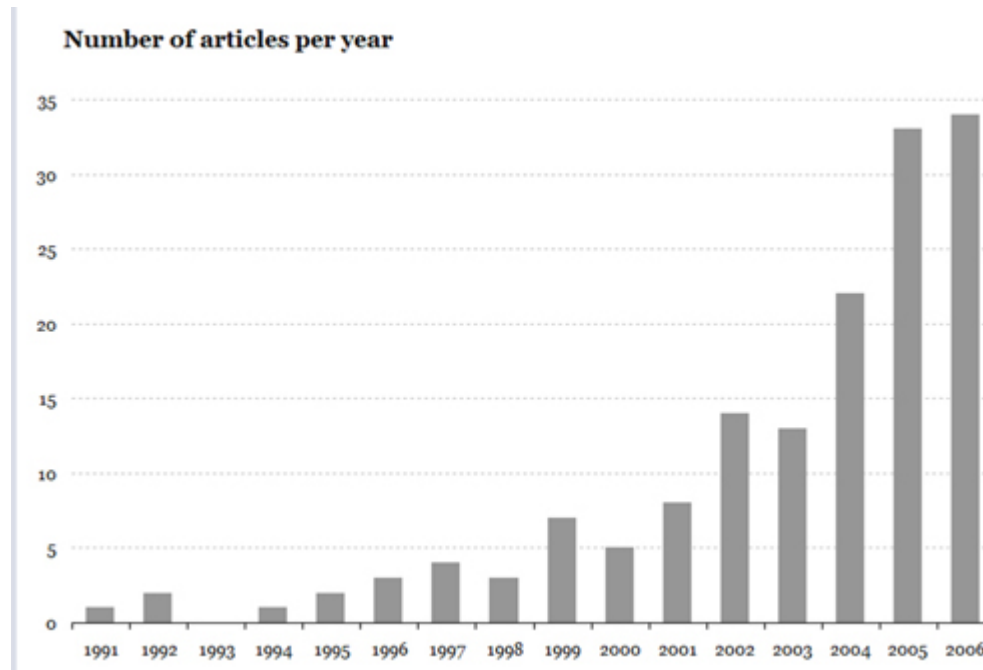


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Scientific Studies on Prediction Markets



Source: Tziralis and Tatsiopoulos



Prediction Markets at Work I

- Prediction markets typically provide very accurate forecasts
 - > Forecasts by prediction markets outperform polls and experts
- Prediction markets incorporate new information rapidly
 - > Prediction markets react faster to new information than polls or experts
- Prediction markets show no systematic error
 - > There are no systematic profit opportunities available



Prediction Markets at Work II

- The law of one price holds
 - > Very few arbitrage opportunities that exist only very short and with only small potential profit
- Attempts at manipulating these markets typically fail
 - > None of the attempts analyzed had an effect on prices, except during a short transition phase



Prediction Markets at Work III

- **One** evidence is available that money-at-stake seems not to play a very important role for the efficiency of the prediction markets: NewsFutures versus Tradesports (Servan-Schreiber, Wolfers, Pennock and Galebach, 2004)
 - > Neither type of market was systematically more accurate than the other across 208 American Football outcomes during the 2003–2004 NFL season



Conclusion

Prediction markets are outperforming polls
and experts in predicting uncertain or
unknown events



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Basic Assumptions

- Prediction markets are the best general institution we know for aggregating information
- Current democracies fail largely by not aggregating enough available information



Scenarios for the Future

- Prediction markets as gaming
- Prediction markets in commercial use
- Prediction markets as a means to support decision making by modern democratic governments (run by state lotteries)



The Future

People vote on values and bet on beliefs?



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Look Out:

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- Prediction markets could be employed by state lotteries to exploit the wisdom of the crowd and support governmental decision making in modern democracies.



Thank you for your attention.

