Electronic Marketplaces

Oct. 13, 2011

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Four Things

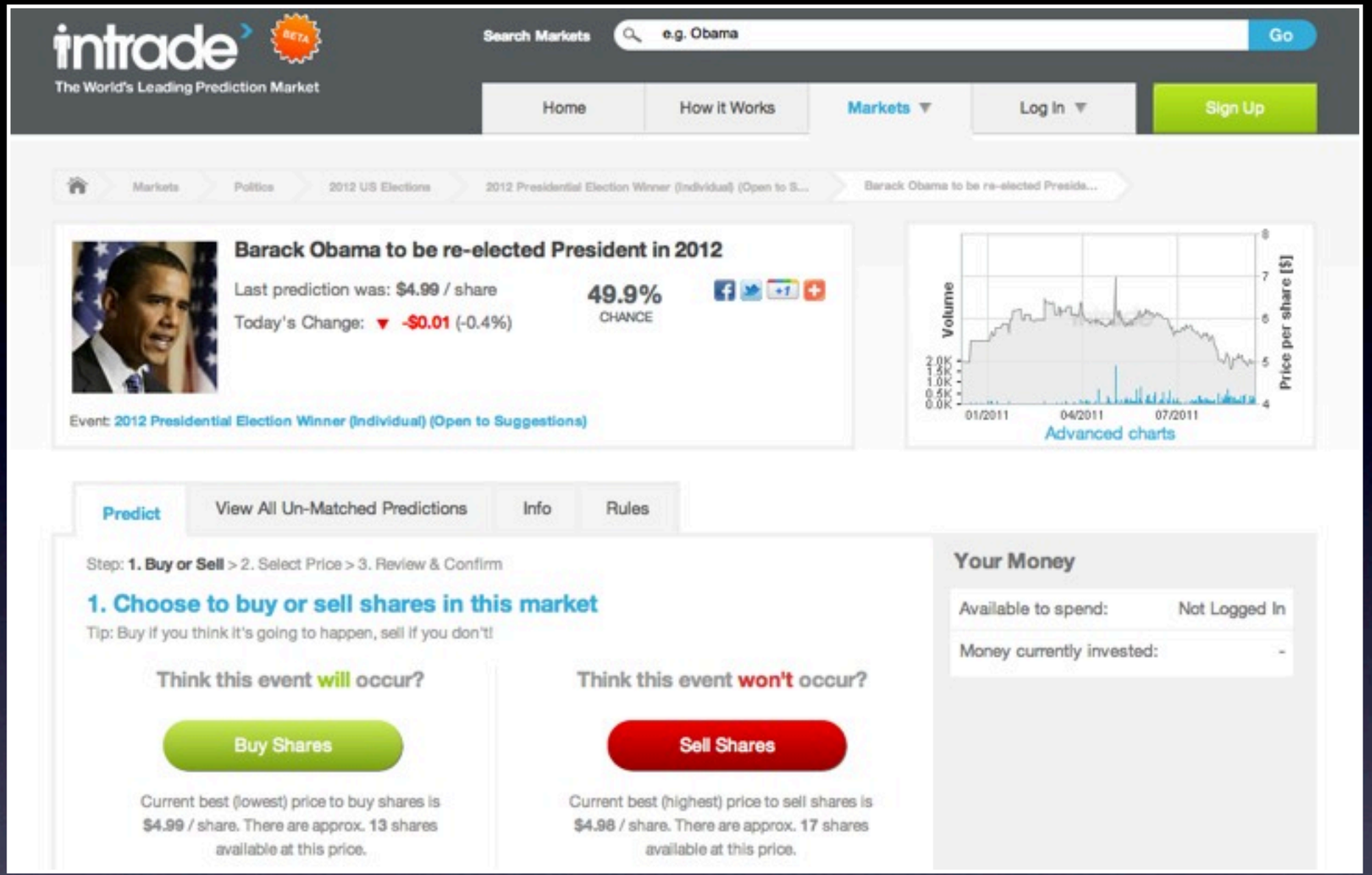
1. Prediction Market Basics

2. Automated Market Making

3. Applications to Finance

4. Some Project Ideas

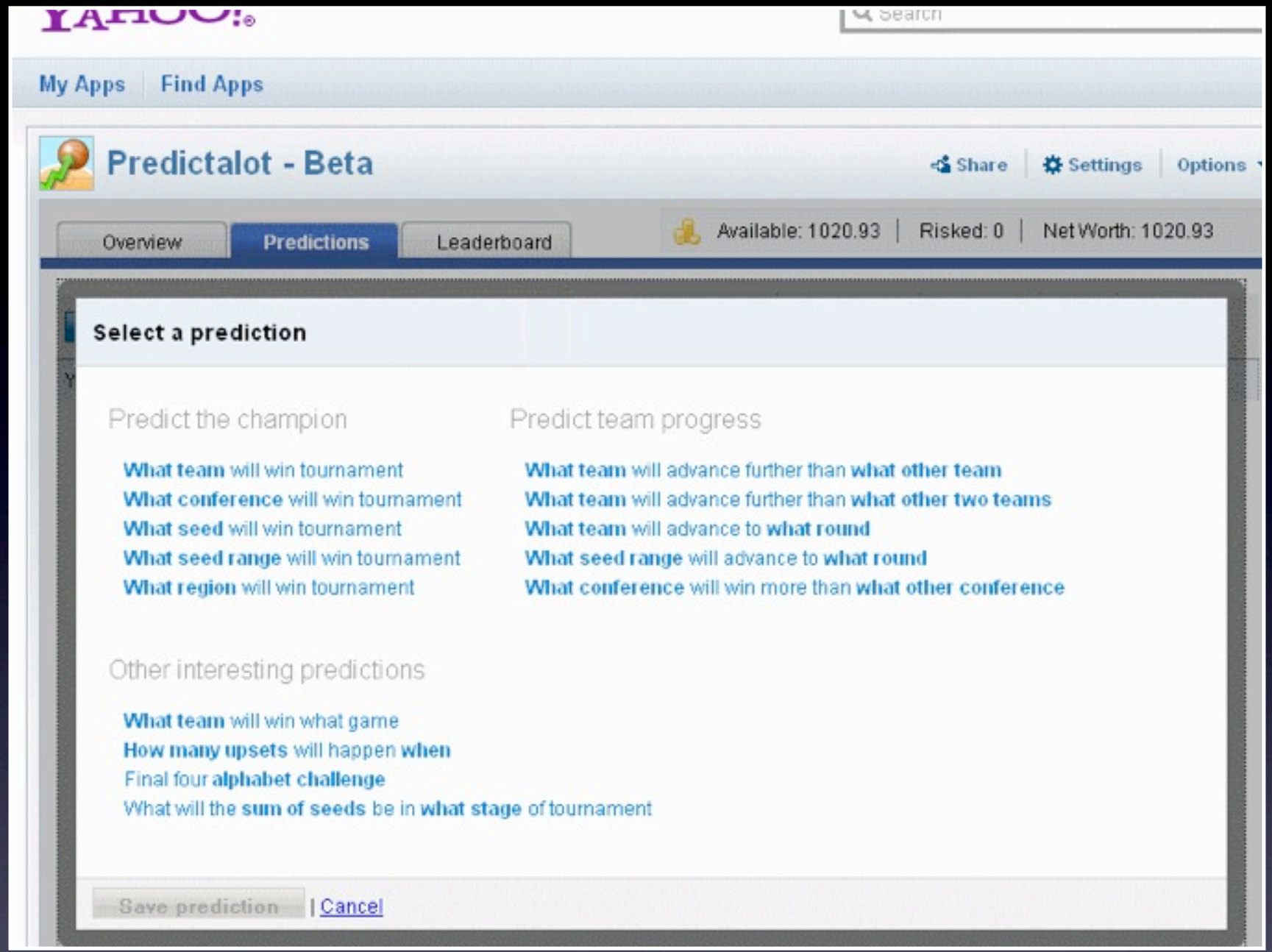
1. What's a Prediction Market?


intrade
BETA
The World's Leading Prediction Market
Search Markets
e.g. Obama
Go
Home
How it Works
Markets
Log In
Sign Up
Markets
Politics
2012 US Elections
2012 Presidential Election Winner (Individual) (Open to S...
Barack Obama to be re-elected Preside...
Barack Obama to be re-elected President in 2012
Last prediction was: $4.99 / share
Today's Change: -$0.01 (-0.4%)
49.9%
CHANCE
Event: 2012 Presidential Election Winner (Individual) (Open to Suggestions)
Volume
Price per share [$]
01/2011
04/2011
07/2011
Advanced charts
Predict
View All Un-Matched Predictions
Info
Rules
Step: 1. Buy or Sell > 2. Select Price > 3. Review & Confirm
1. Choose to buy or sell shares in this market
Tip: Buy if you think it's going to happen, sell if you don't!
Think this event will occur?
Buy Shares
Current best (lowest) price to buy shares is $4.99 / share. There are approx. 13 shares available at this price.
Think this event won't occur?
Sell Shares
Current best (highest) price to sell shares is $4.98 / share. There are approx. 17 shares available at this price.
Your Money
Available to spend: Not Logged In
Money currently invested: -

Intrade

Question	Chances
Will the feasibility analysis show the new system can be built for less than $650/unit?	26%
Which new prototype will get the highest score in quality testing?	22%
Will research project X make it in to a product line by 2012?	89%

Inkling Markets



Predictalot

Events and Definitions

Payouts:

Binary and Linear

Think about Traders

The Fallacy of Rational Traders

Zero-Intelligence Modeling

Gode + Sunder ’93

It has no intelligence, does not seek or maximize profits, and does not observe, remember, or learn.

The Simple Static Model

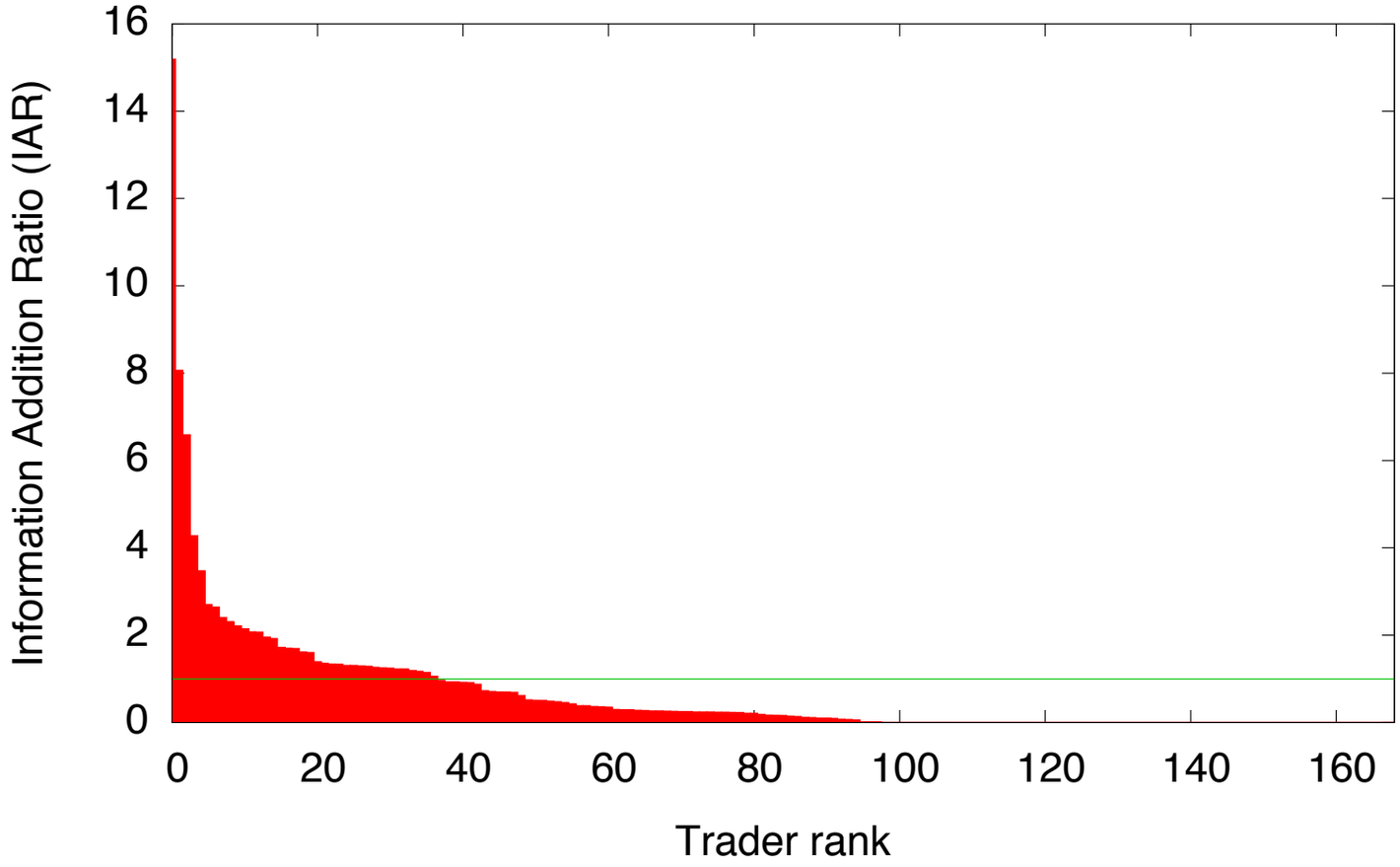
Epsilon-Tweak Model

The same, attractive equilibrium

Traders in Practice

Gates Hillman

Prediction Market

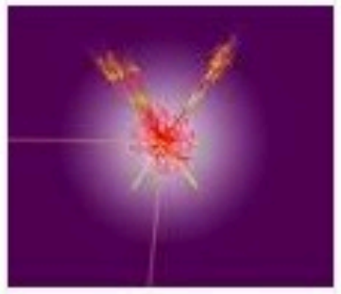

Information Addition Ratio (IAR)
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
120
140
160
Trader rank

IAR vs. Rank

Conclusions about Traders

2. Automated Market Making

1. Not enough volume



Higgs Boson Particle to be observed on/before 31 Dec 2012

Last prediction was: **$3.00** / share

Today's Change: -

30.0%
CHANCE

Event: **Observation of the Higgs Boson Particle**

Predict | View All Un-Matched Predictions | Info | Rules

Best (highest) price members are buying at

Price	Quantity
$3.00 / Share	1 share
$2.80 / Share	9 shares
$2.20 / Share	3 shares
$0.80 / Share	1 share

Best (lowest) price members are selling at

Price	Quantity
$3.70 / Share	1 share
$3.80 / Share	1 share
$3.90 / Share	2 shares
$4.10 / Share	2 shares
$4.35 / Share	2 shares

Intrade Higgs Boson

2. Market too large

(huh?)

EVENT

Trader 1 Bids on

Trader 2 Bids on

SPACE

When does the market clear?

No trade

and

NP-hard

w/ Automated MM

3. Run lots of markets on obscure events

Robots:

Cheaper than people

Case Study: LMSR

Cost function based market maker

Payout Vector

To go from **x** to **y**, pay

C(**y**) - C(**x**)

$$C(\mathbf{x}) = b \log \sum \exp(x_i / b)$$

Red Sox - Yankees

(5,3) → (6,3)

b=10

$$C(\mathbf{y}) - C(\mathbf{x}) = 0.562$$

Bounded Loss

$b \log n$

Contrast with fixed prices

Marginal Prices

Prices change instantaneously as bets are made

$$p_i = \exp(x_i/b) / \text{sum } \exp(x_j/b)$$

Form a probability distribution!

No-regret online learning

Weighted Majority

My research

How to add in profit, depth, ...

Latest result has four properties

1. Bounded loss

2. Can make a profit

3. Zero bid/ask spread (in the limit)

4. Unbounded depth (in the limit)

These are hard conditions to mutually satisfy

3. Applications to Finance

Operationalizing Risk Measures

Finance was here first

AI is here better

Sharpe, VAR, Others

Example

Sharpe

μ/σ

Risk measure view

Given a set of candidate strategies

...the best is the one with highest Sharpe

Automated trader view

Given the chance to make a trade

...do it if it increases your Sharpe

What does this look like in practice?

Step back

Risk measures are trading agents

Famous risk measures suck

Famous risk measures suck as trading agents

Make better trading agents

Make better risk measures

4. Final Project Ideas

1. Improve Predictalot

2. Dig through my GHPM data

3. Simulate different market makers vs. the same agents...