



Trading on Media Emotion

MarketPsych Data LLC
June 28, 2017

Agenda

- **Media sentiment data**

- Using unstructured media data in predictive modeling.

- **Pockets of Value**

- Information underreaction (price trends) and overreaction (price reversals).

- **Machine learning**

- Basic packages and techniques for trading models.

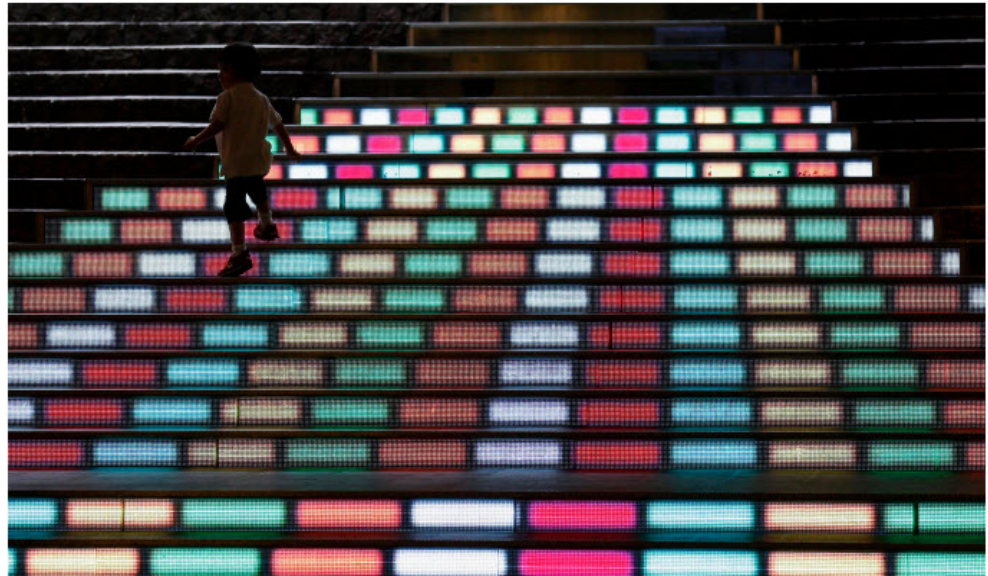
- **Trading track records**

- Our three endeavors to trade using machine learning algorithms.

I) Media Sentiment Data

- We produce and use the Thomson Reuters MarketPsych Indices (TRMI) in our analyses.
- Identifying media references to 187 countries, 10,000 global companies, 61 stock indexes, 45 currencies, 36 commodities.
- History from 1998-present for both news and social.
- Highly dimensional: Emotions and complex meanings
- Derived from 2000 news and 800 social media sources.
- Separate news and social feeds

THOMSON REUTERS
MARKETPSYCH INDICES



Quantifying Global Media

Turning unstructured information into big data via text analysis.



Professional
News
(Examples)

Automated
Text Analysis



Social
Media
(Examples)

Automated
Text Analysis

Show results: ☒ word position ☒ word distance ☒ entities ☒ geo

Source= (), Title=, Symbol=

Instantiation: 3.2948939800262 secs
Processing: 0.013120174407959 secs
Total: 3.3080141544342 secs

Symbol:

0 Goldman Sachs analysts EntityCa
Expectancy ForecastUp(4) Apple AAPL Entity Entity(f) 5 to5 (1) Cu
Expand(f) Loose(f) Up(8) margins8 (1) Margins PosAcct Margins(f) Acct
11 'S 11 (1) 12 quarterly 12 (1) 13 conference 13 (1) 14 call 14 (1) 15 24

VECTOR			
Noun	Geo	Meaning	Tense Quantity
AAPL	Entity		future 2
AAPL	Economist		future 1
AAPL	Trader		future 1
AAPL	ForecastUp		future 1
AAPL	Expand		future 1
AAPL	Loose		future 1
AAPL	Up		future 1
AAPL	Margins		future 1
AAPL	AccountingGood		future 1
AAPL	PosAccountingExpectations		future 1
AAPL	Pos_Acct		future 1

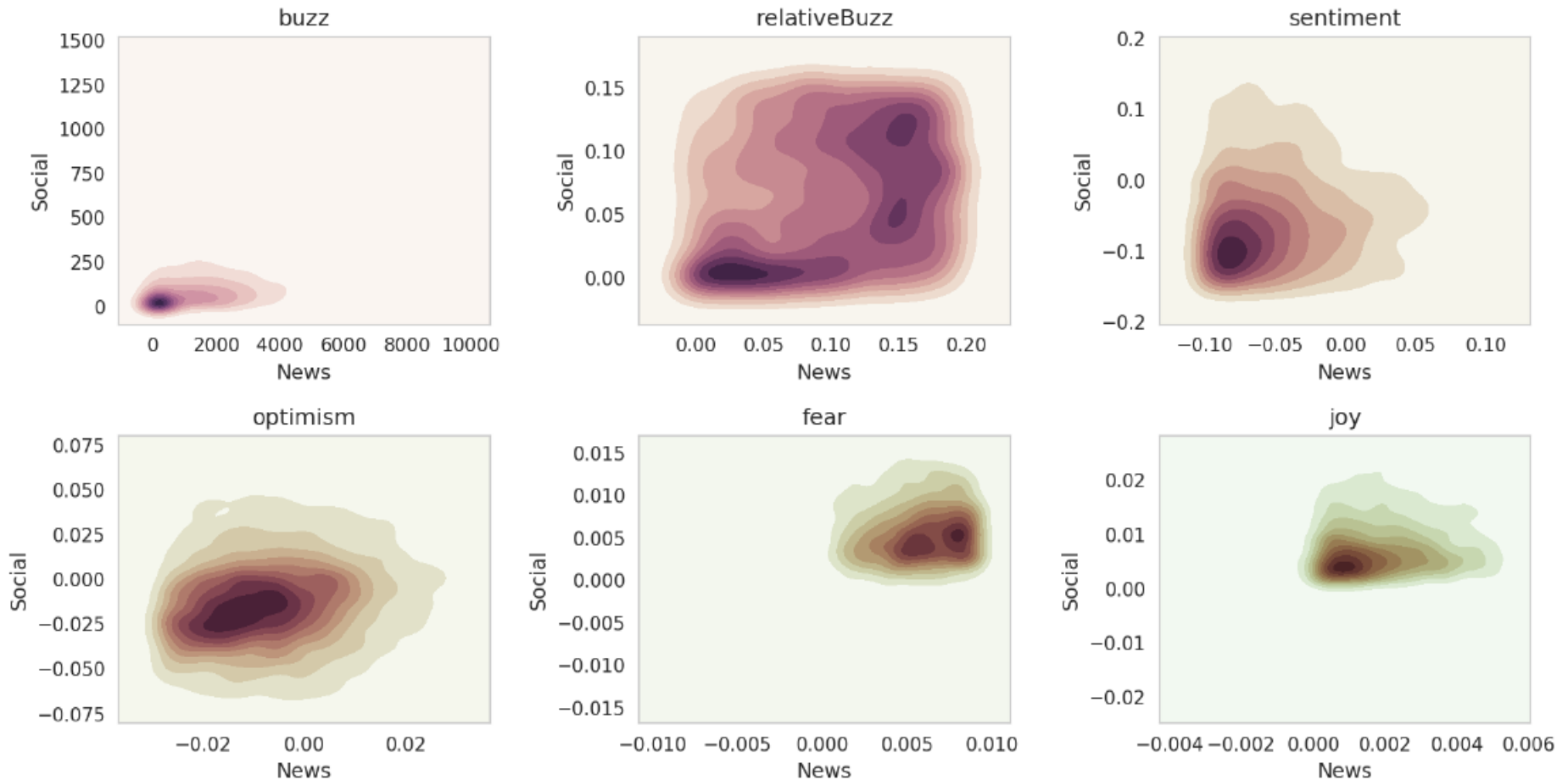
RELEVANCE	
Entities	
Item	Relevance
aapl	1.000

Geographic references	
Item	Relevance

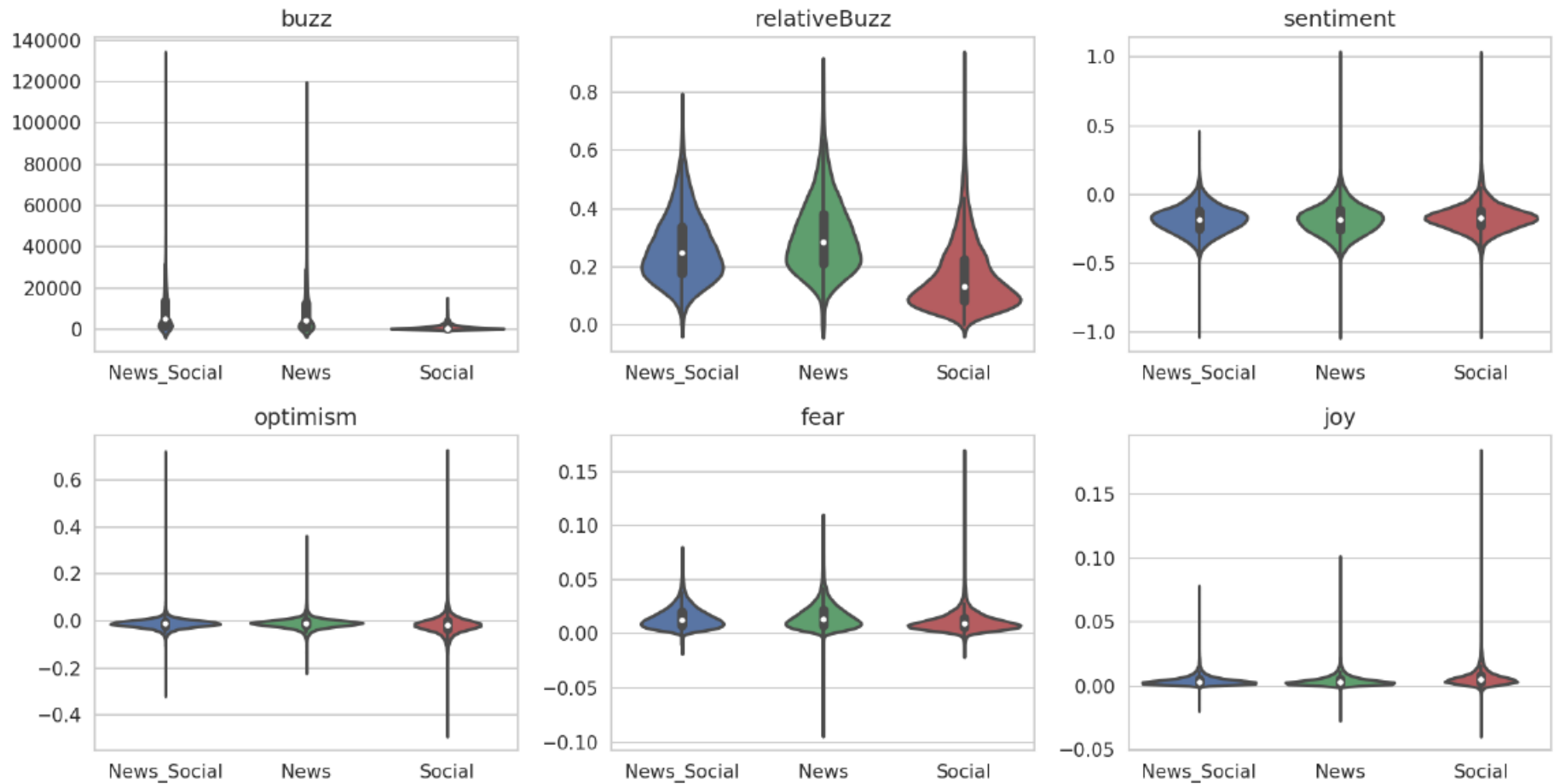
Sentences

- Goldman Sachs analysts expect Apple to report expansion

Sentiment Data of News Versus Social (Euro)

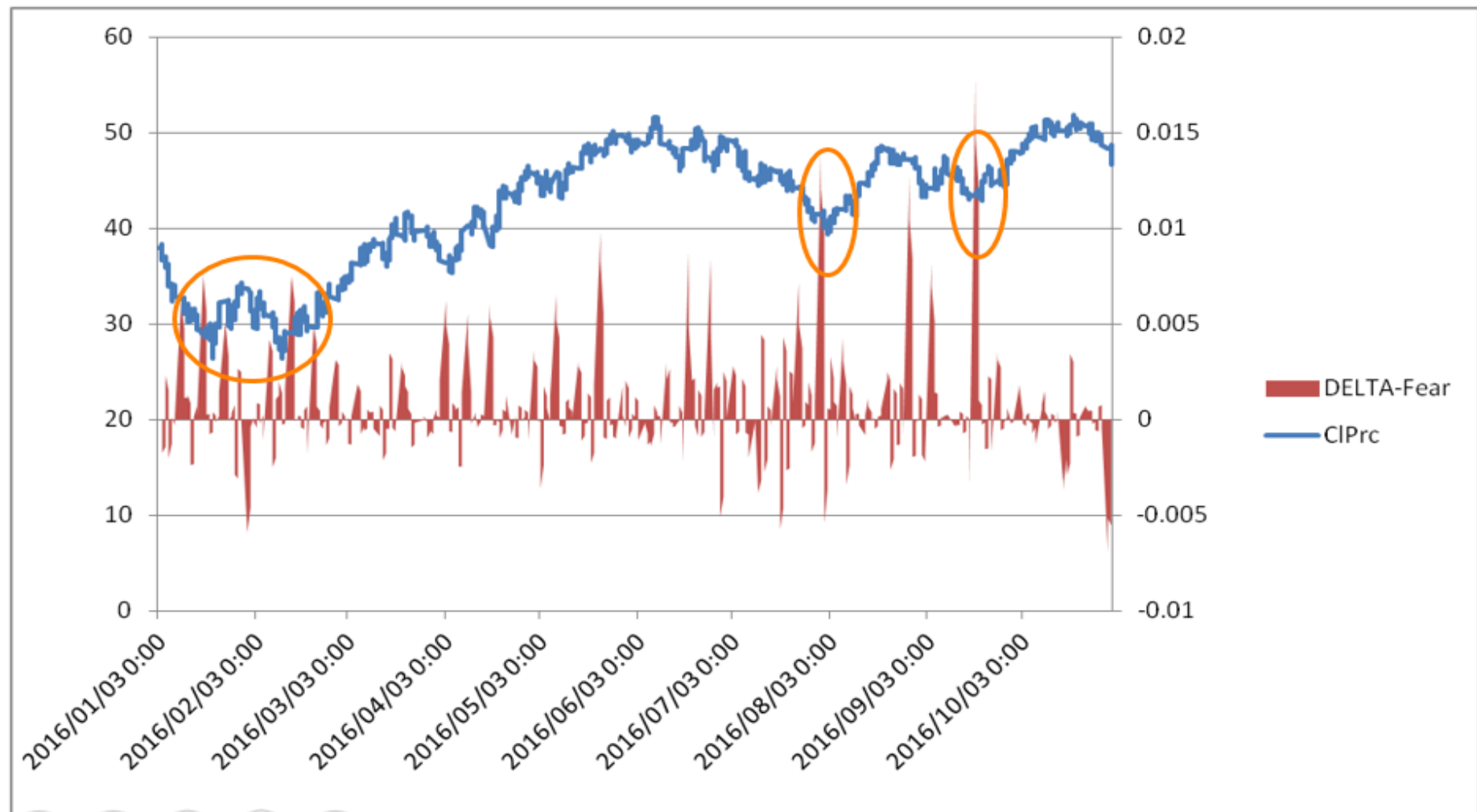


Sentiment Data in Violin Plots (Crude oil)



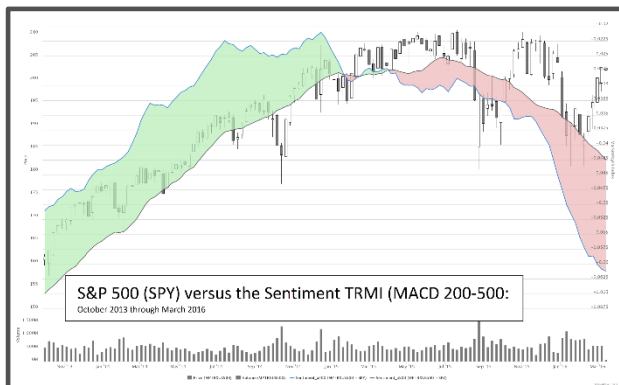
Spikes in Fear Predict Crude Oil Reversals

Fear vs WTI Futures

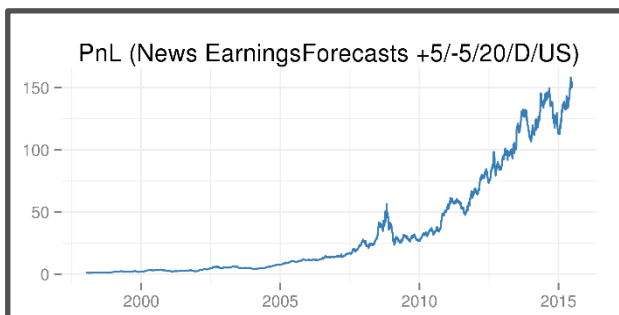


Source: Noriyuki Suzuki, Thomson Reuters

II) Pockets of Value in Media Sentiment



Moving average crossover models



Cross-sectional rotation models

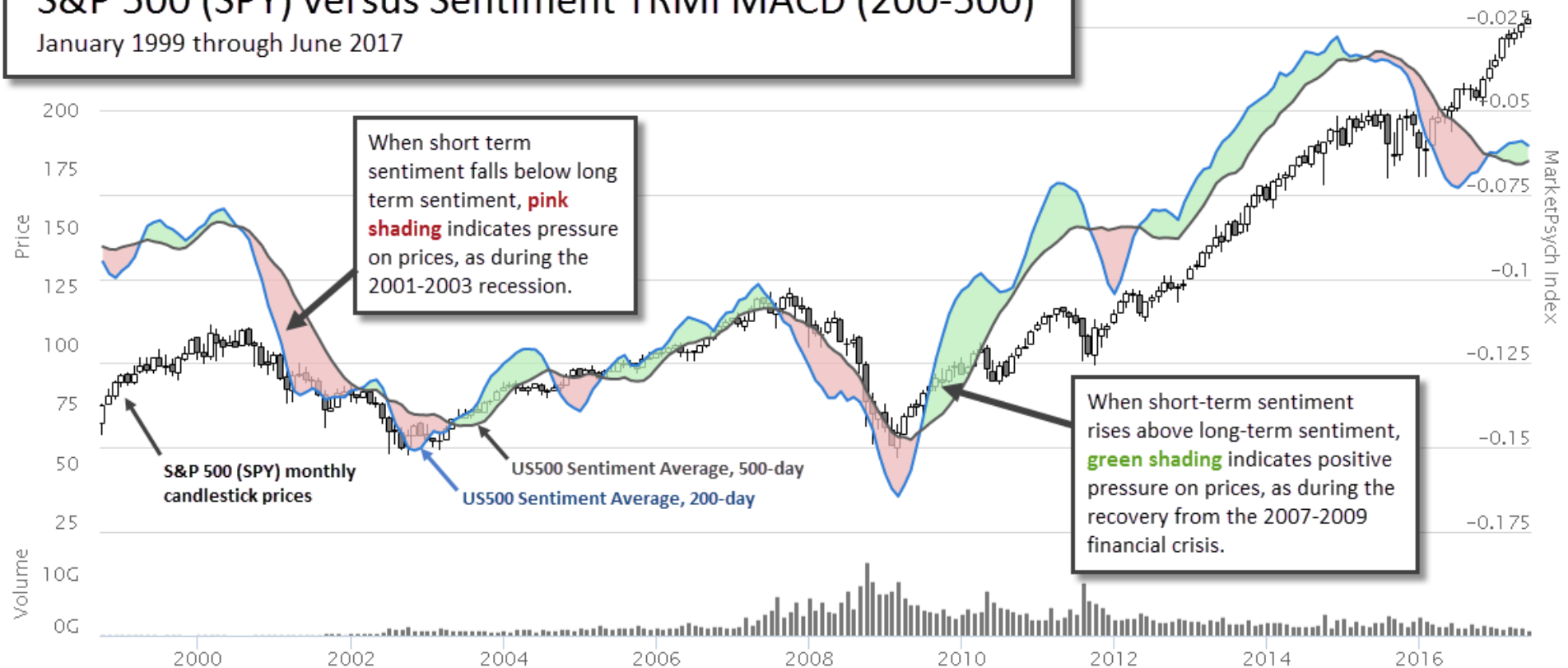
Sentiment and news flow are non-linear. Transforming into the below features shows promise:

1. **Z-scores:** Sentiment deltas or rates of change.
2. **Conditioning on fundamental or technical factors:**
Improves detection of overreaction and underreaction events.
3. **Moving average crossovers (MACDs)**
Reduces noise and captures changes and drifts in sentiment over time.
4. **Cross-sectional rotation models**
Absolute levels and relative rankings.
Go long the top quantile of assets with the highest values on a TRMI, and go short those with the lowest values.

Moving Average Crossovers Capture Trends

S&P 500 (SPY) versus Sentiment TRMI MACD (200-500)

January 1999 through June 2017



Cross-sectional Models Capture Reversals



EXTREMITY ARBITRAGE

- Sentiment and news flow is non-linear.
- Go long the **top quantile of** assets with the highest values on a TRMI, and go short those with the lowest values.
- Rank by average over N-period average TRMI.
- Update rankings each N periods.
- Plot equity curves.
- Assume no transaction costs

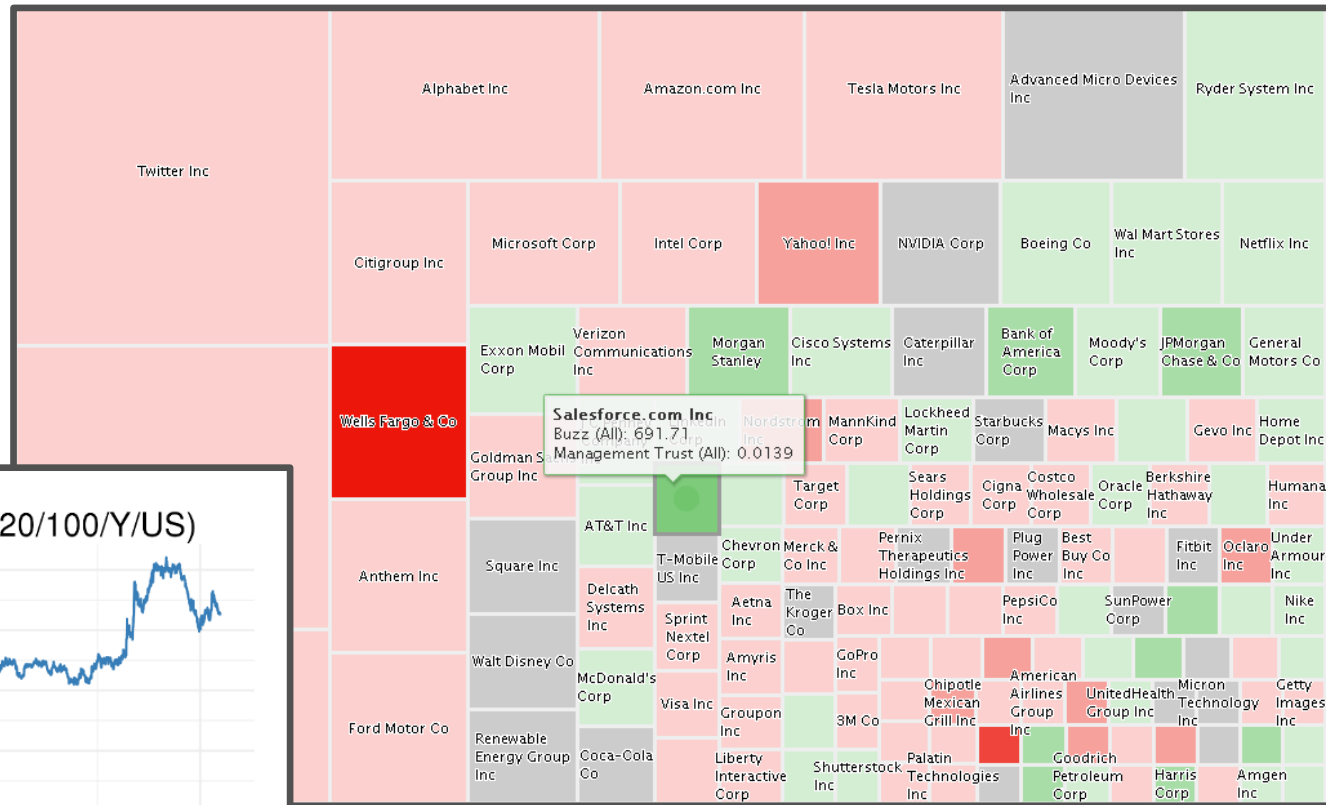
*Studies performed by MarketPsych Head of Research **CJ Liu**.*

Arbitraging Leadership Sentiment

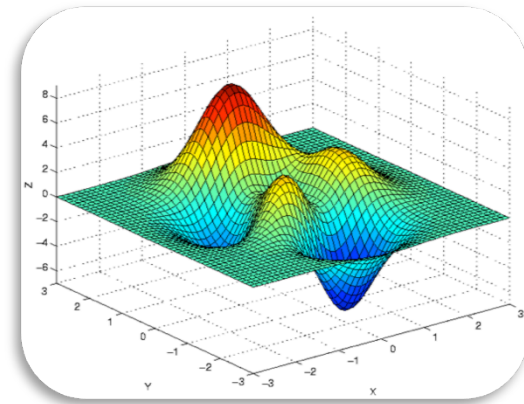
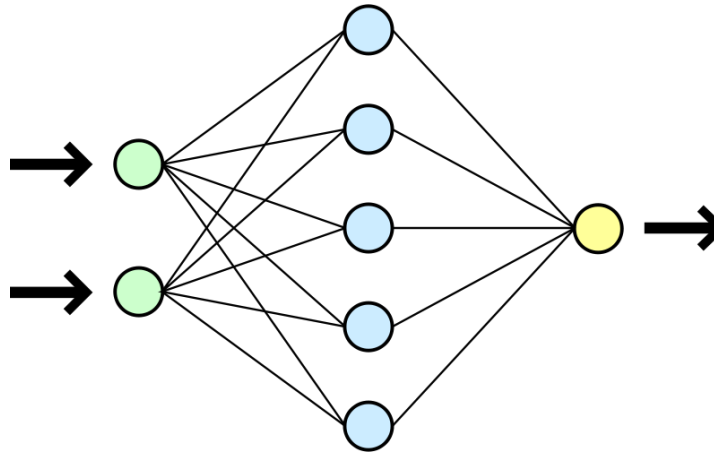
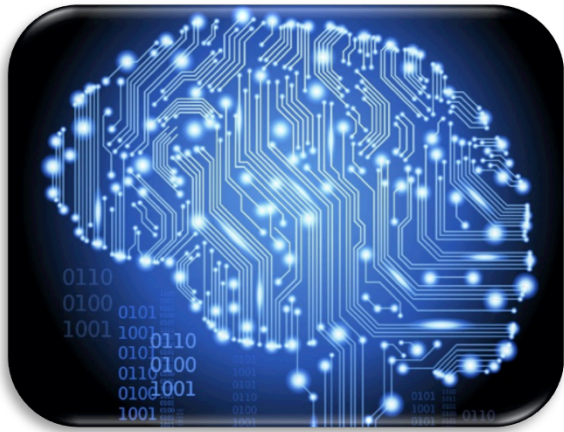
Short the most trusted (green) and buy the least trusted (red) management teams.

“[A]ward-winning CEOs underperform their matches by 15 – 26% over the three years following the award.”

~ Malmendier & Tate, 2009. “Superstar CEOs”



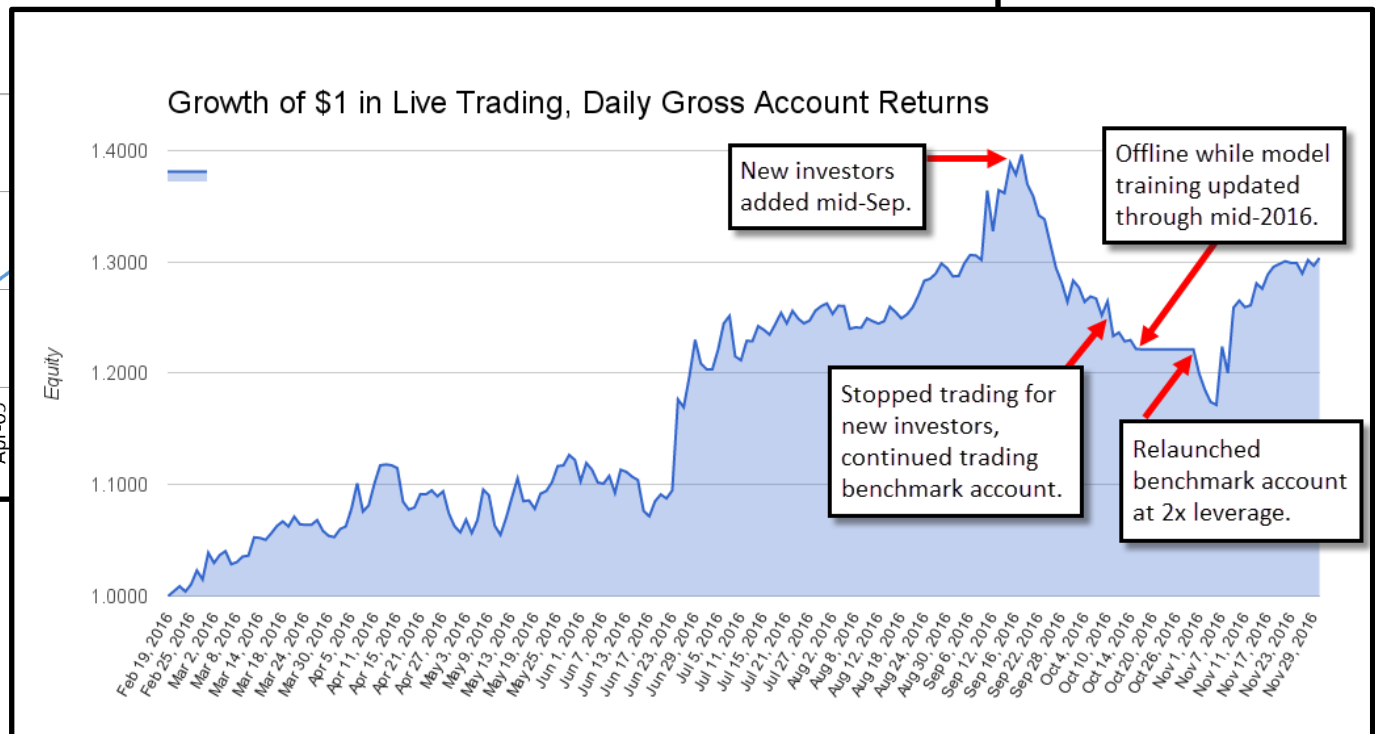
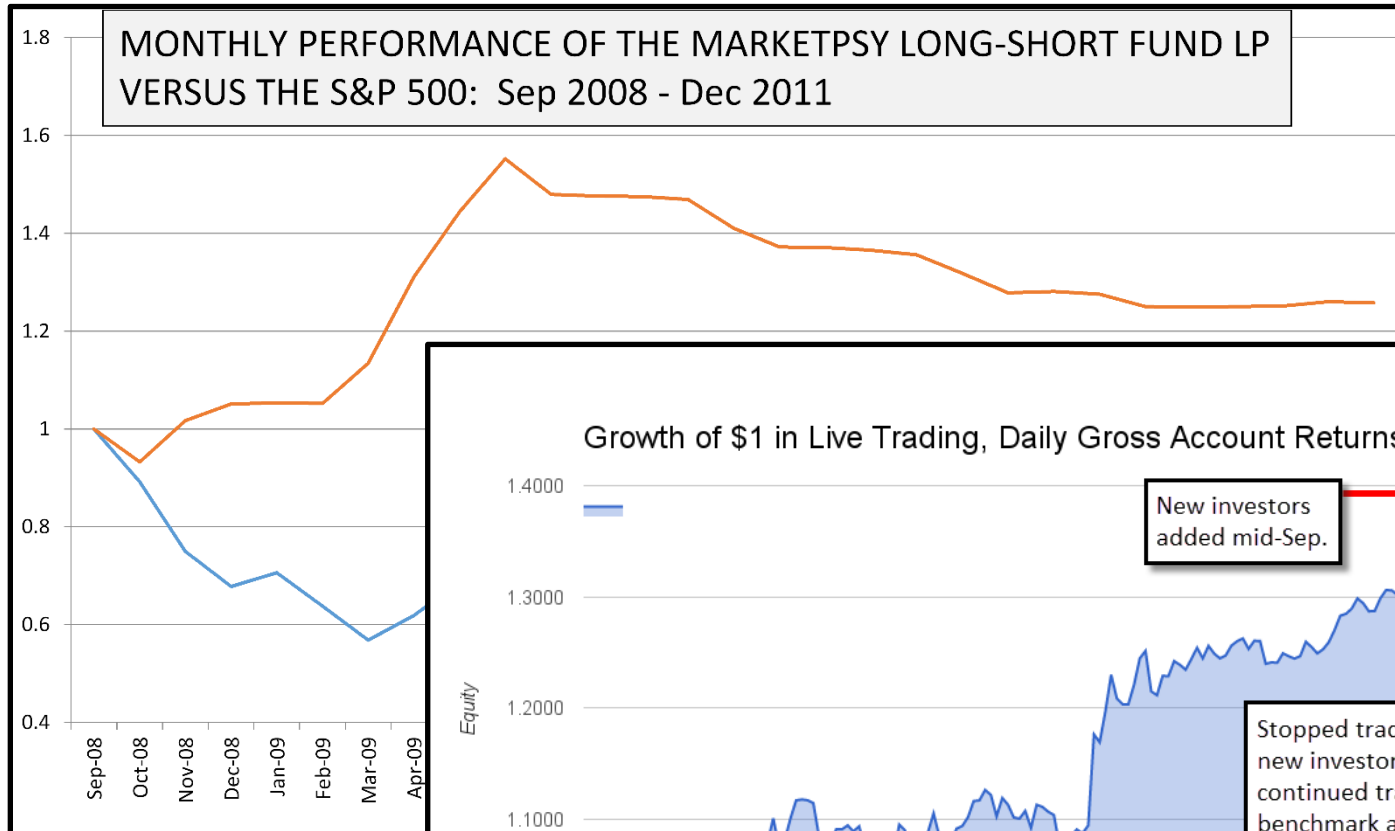
III) Machine Learning



Machine Learning Algorithms

- Neural nets (e.g., CNN and feed-forward architectures)
- Support Vector Machines (SVMs)
- Nearest Neighbors (KNN)
- **Random forest** (Decision Trees)
- **Gradient boosting** (ensembles of trees)
- Deep learning toolkits: Tensor Flow, Theano
- Later examples will show actual trading results from the **bolded** techniques.

IV) Trading Results



Hedge Fund: Sep 2008 – Dec 2010

- Ran successful sentiment-based paper trading strategy from 2006-2008. Raised capital based on its success.
- Started the MarketPsy Long Short Fund LP.
- Launched Sep 2, 2008 and ran it through Dec 2010.
- Used Association Rules (up to 4-layer decision trees).

Association Rules to Combine Findings

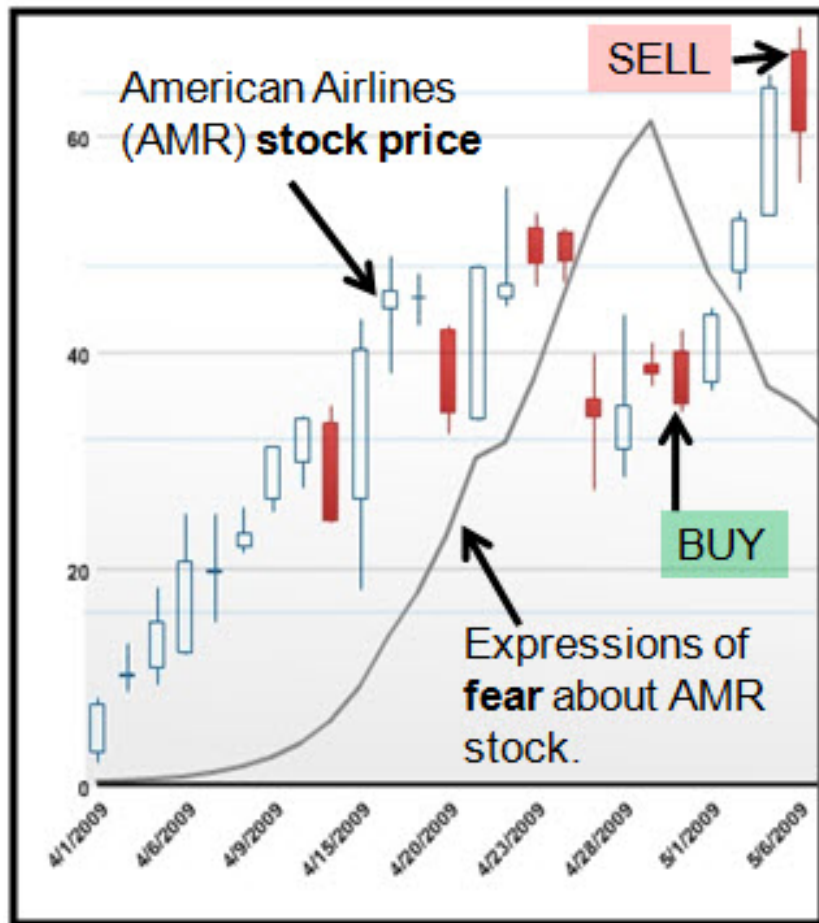
- Generated via data-mining with a backtesting protocol.
- To prevent overfitting:
 - Training on 50% of data
 - 20% random tickers
 - 20% every fifth quarter
 - 10% most recent period,
 - A human “sanity check” (itself tested for accuracy).
- Example trading rules:
 - **Short** on High TotalKeywords, High Liking, High Perfection and Upwards Price Momentum.

TKover100|Liking_p_d3_10>-0|Perfection_p_d3_10>-0|PR5d21d>0|PR10_a>0

- **Long** on High TotalKeywords, Good Accounting News with Low Enthusiasm and Downward price momentum.

TKover100|Perfection_p_d3_10<-0|AccountingGood_n_a10>0|PR10_a<-0|

Trading Example: AMR Overreaction

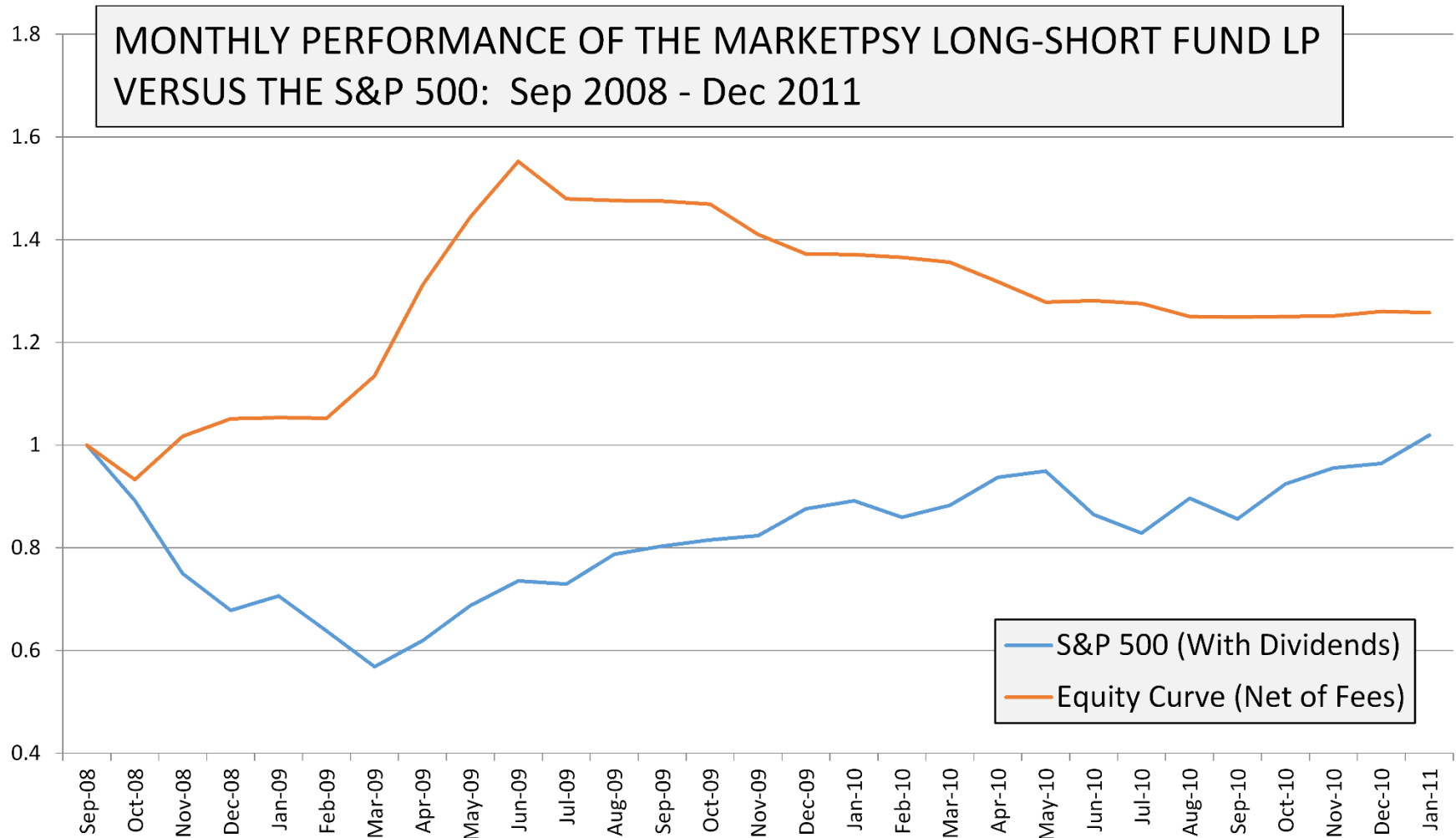


- I. 4/25/09: WHO director declares “public health emergency” regarding the “Swine Flu”.
- II. Anxiety rises in AMR online stock message boards about reduced travel (see grey line).
- III. 4/27/09: WHO pandemic alert level to Phase 4.
- IV. 4/30/09: MarketPsy bought AMR at \$4.81/share,
- V. 5/6/09: MarketPsy sold AMR at \$5.95/share.

PAST PERFORMANCE IS NOT INDICATIVE OF FUTURE PERFORMANCE.

There can be no assurance that any investment program or fund described herein will achieve its objectives.

MarketPsy Long Short Fund LP: Sep 2008 – Dec 2010

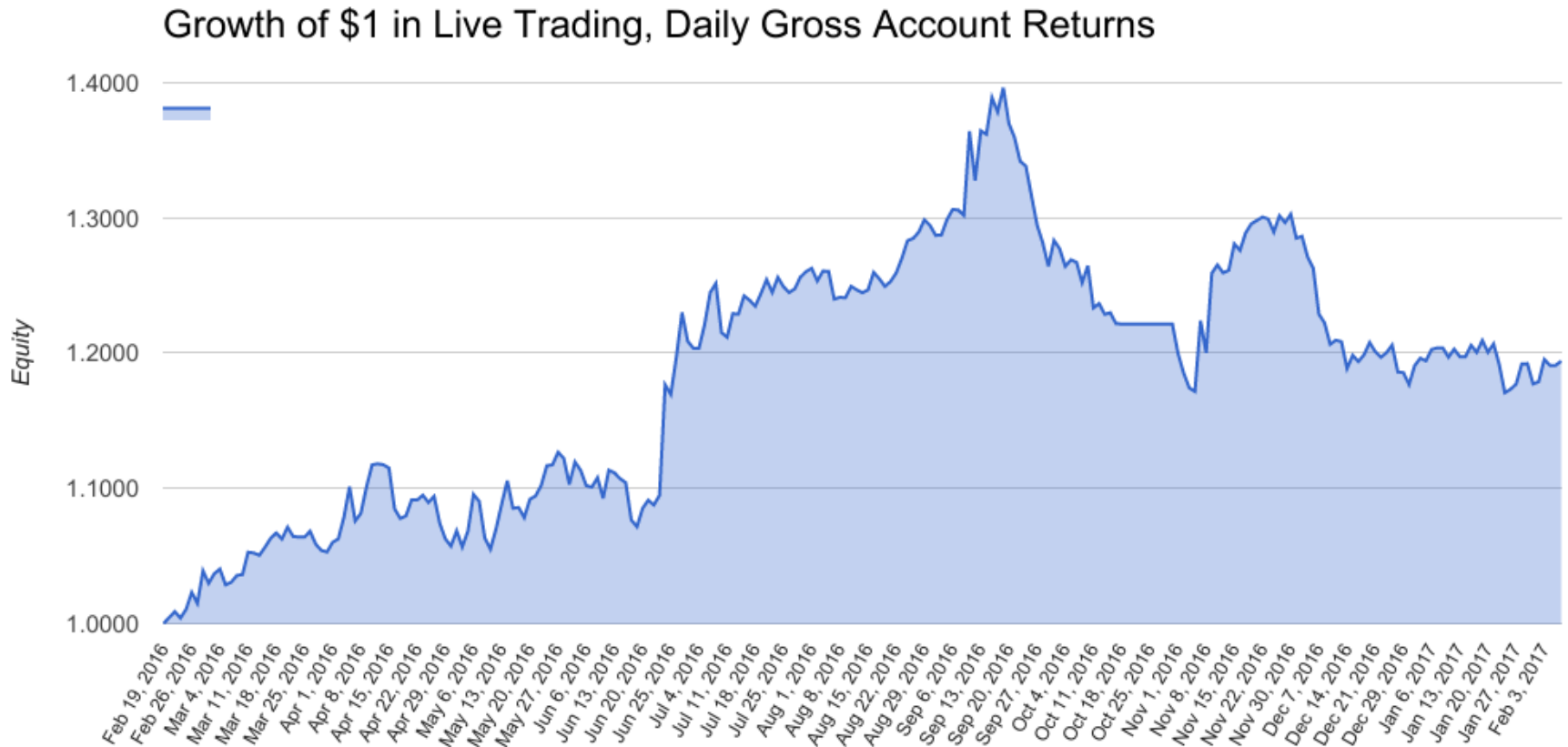


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Live Gross Daily NAV Performance*

Feb 22, 2016 through Feb 8, 2017 (then stopped)

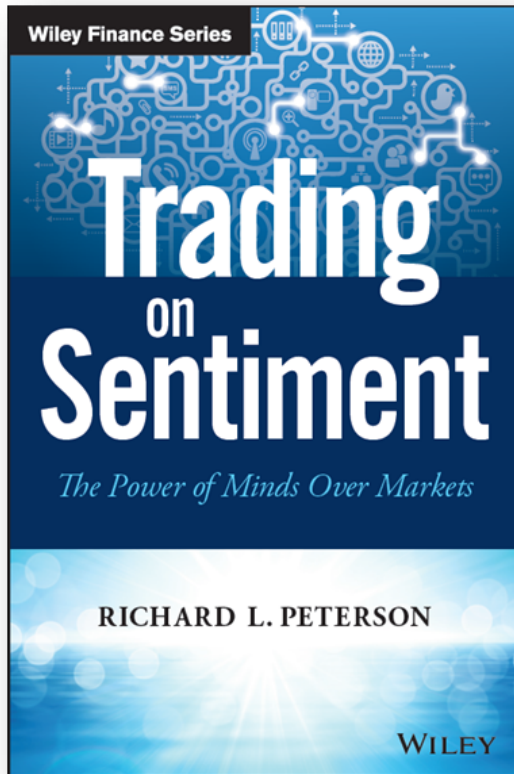


* Results depicted represent the gross daily account NAV and do not include management or performance fees.

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Q & A



www.marketpsych.com

- Media sentiment contributes to systematic price patterns:
 - Trends (underreaction to information)
 - Reversals (overreaction).
- Beware of regime-dependent overfitting. Long data histories are needed.
- Predictive model utility may expire within a few months of launch (alpha decay).
- If careful to condition sentiment with other factor, balance risk and, prevent overfitting, significant value emerges.

Disclaimers (Page 1)

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Disclaimers (Page 2)

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