REUTERS/Thomas Peter

San Francisco QWAFAFEW

News & Social Media Analytics for Behavioral Market Mispricings
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AGENDA

- Preliminaries

- Market Mispricings

- Relative Popularity

- Market Sentiment

Trending Research

HFT & Trade Execution

Enhancing Equity Trading Strategies and Trade Execution using Sentiment and Illiquidity
Elektron Whitepaper (2015)

Using automated text analytics to quantify high frequency news-implied market reactions
J Empirical Finance (2013)

Stock Selection

Reuters Sentiment and Stock Returns
J Behavioral Finance (2014)

Improving the Power of Predicted Surprise with TRNA News Sentiment
StarMine Whitepaper (2014)

Commodities & Energy

The Role of News in Commodity Markets
Working paper (2015)

News sentiment in the gold futures market
J Banking & Finance (2014)

FX

Emotions Matter: Sentiment and Momentum in Foreign Exchange
J Behavioral Finance (2017)

Private Information in Currency Markets
Working paper (2016)

Thomson Reuters
Machine Readable News

News Analytics ▪ News Archive ▪ MarketPsych Indices

Supply-Chain Economics

Economic Linkages Inferred from News Stories and the Predictability of Stock Returns
Working paper (2016)

Social Media Listening & Supply Chains
Thomson Reuters internal analysis (2016)

Global Macro

Using News Sentiment Momentum for Tactical Asset Allocation
J Portfolio Management (2015)

The adverse effects of systematic leakage ahead of official sovereign debt rating announcements
J Financial Economics (2015)

Systemic Risk

Does Unusual News Forecast Market Stress?
Working paper (2016)

SenSR: A News Sentiment-Based Systemic Risk Indicator
Working paper (2016)

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Thomson Reuters Machine Readable News

Reuters & 3rd-Party News *(Examples)*

Professional News *(Examples)*

Social Media *(Examples)*

News Analytics

MarketPsych Indices

Real-Time Feed per News Item

Aggregated News Feed

Aggregated Social Media Feed

Entities
- · Companies
- · C&E
- · Document-Level

Analytics
- · Real-time processing ≈ 300ms
- · State-of-the-art NLP
  - ◦ Sentiment, Relevance, Novelty
- · Native Japanese-language analytics

Thomson Reuters Permanent Identifier
- · Companies
  - · Securities
    - · Quotes
- · Deals, People, …

https://permid.org/

Entities
- · Companies
- · Markets
- · Countries
- · Currencies
- · C&E

Analytics
- · Feeds updated minutely
- · Analytics
  - ◦ Volume Metric *(Buzz)*
  - ◦ Emotional Indices *(Sentiment, Fear, Trust, Anger, …)*
  - ◦ Event Indices *(Layoffs, Mergers, Social Unrest, …)*
  - ◦ Macro Indices *(Inflation, Sanctions, Unemployment, …)*

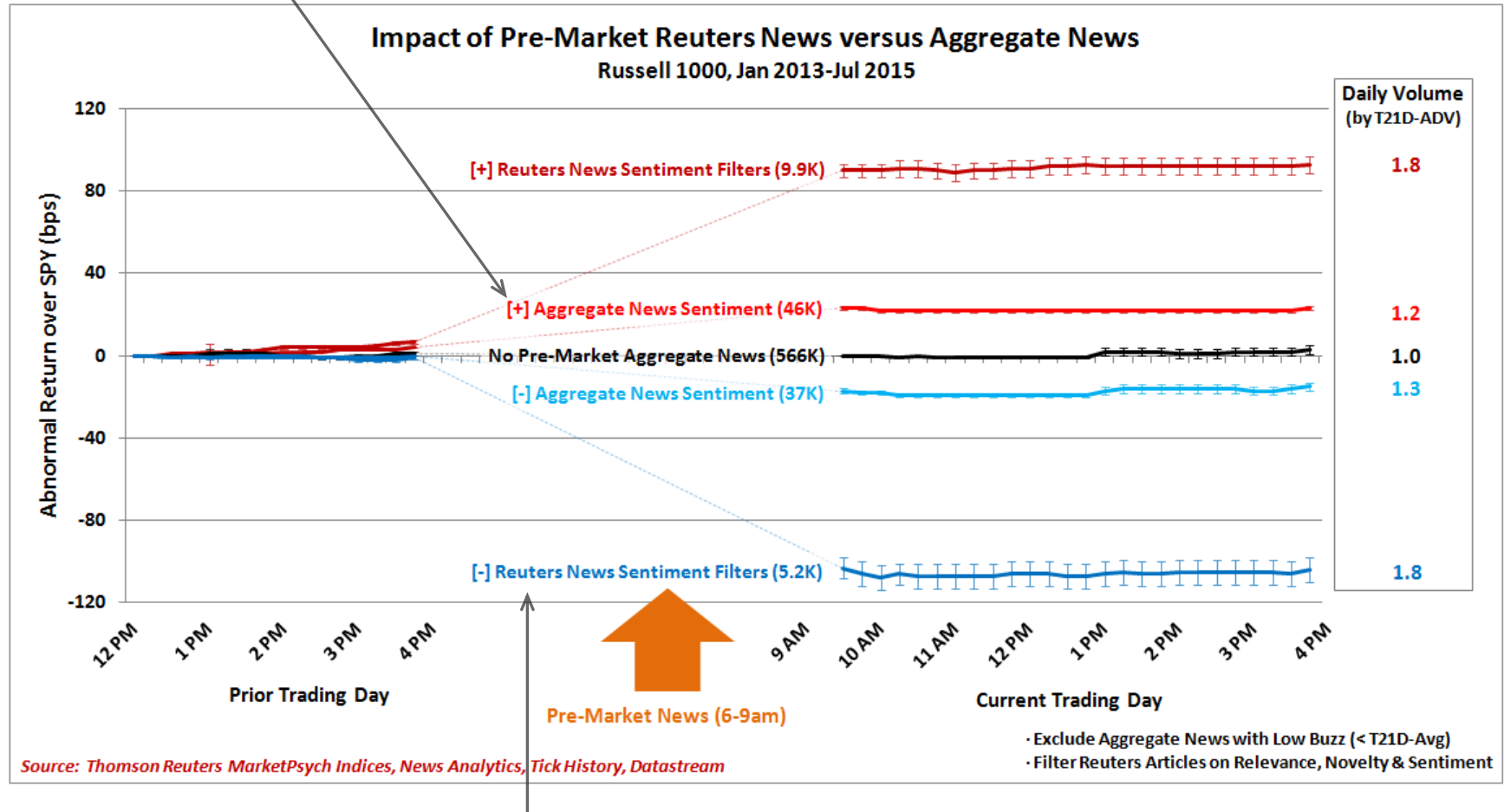**Precision & Granularity**

Breadth of Content

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Pre-Market News: Aggregated vs. Reuters

MarketPsych Indices
· Aggregated professional news
· Noisy news sentiment signal

Impact of Pre-Market Reuters News versus Aggregate News
Russell 1000, Jan 2013-Jul 2015

Daily Volume (by T21D-ADV)

[+] Reuters News Sentiment Filters (9.9K) — 1.8

[+] Aggregate News Sentiment (46K) — 1.2

No Pre-Market Aggregate News (566K) — 1.0

[-] Aggregate News Sentiment (37K) — 1.3

[-] Reuters News Sentiment Filters (5.2K) — 1.8

Y-axis: Abnormal Return over SPY (bps): 120, 80, 40, 0, -40, -80, -120

X-axis (Prior Trading Day): 12 PM, 1 PM, 2 PM, 3 PM, 4 PM

Pre-Market News (6-9am)

X-axis (Current Trading Day): 9 AM, 10 AM, 11 AM, 12 PM, 1 PM, 2 PM, 3 PM, 4 PM

· Exclude Aggregate News with Low Buzz (< T21D-Avg)
· Filter Reuters Articles on Relevance, Novelty & Sentiment

Source: Thomson Reuters MarketPsych Indices, News Analytics, Tick History, Datastream
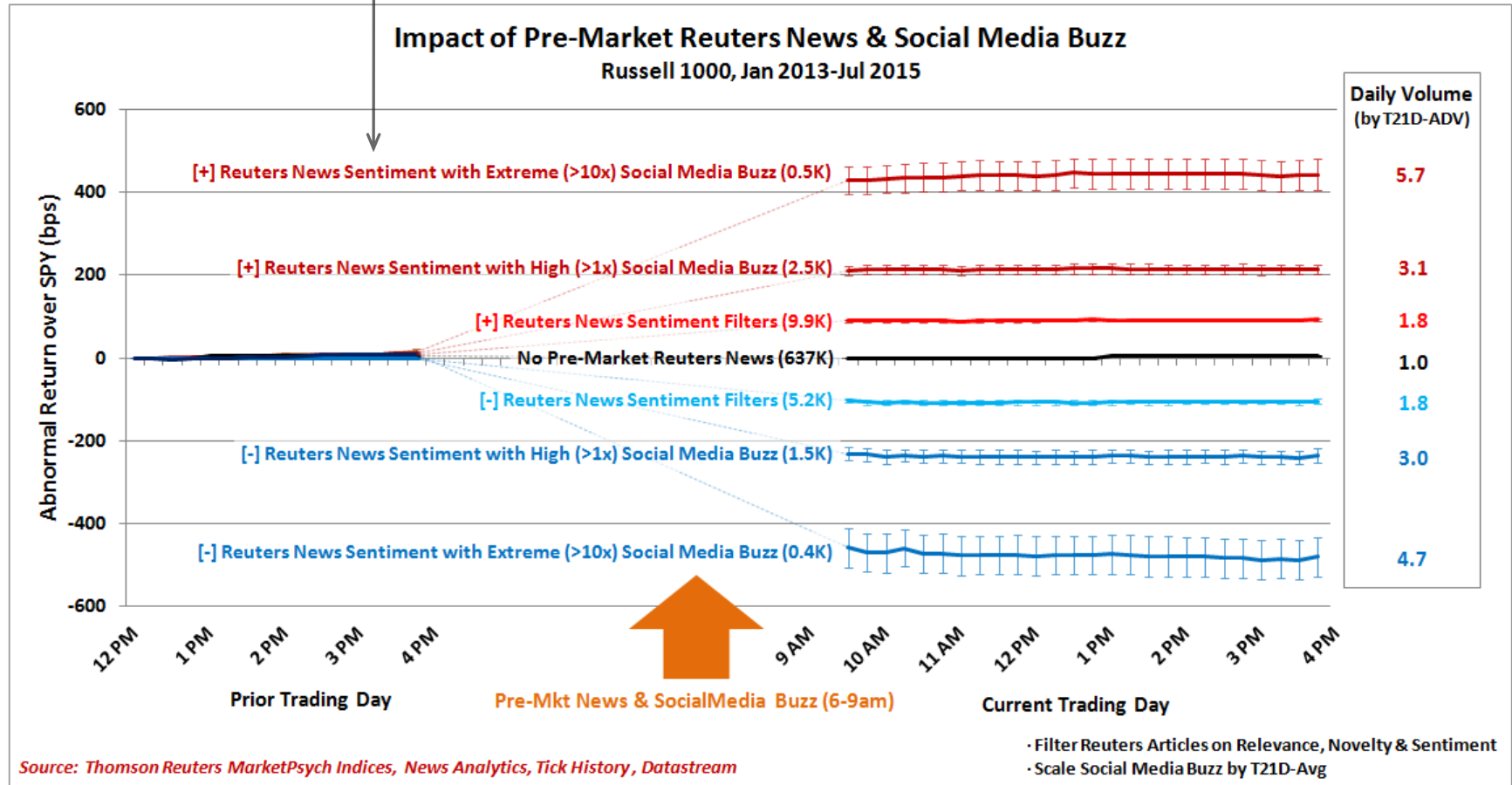
News Analytics
· Filter to relevant, breaking Reuters news
· Strong news sentiment signal

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Investor Attention on Pre-Market News

Social Media Buzz on breaking news
correlated with trading activity at market open

Impact of Pre-Market Reuters News & Social Media Buzz
Russell 1000, Jan 2013-Jul 2015

Daily Volume (by T21D-ADV)

- [+] Reuters News Sentiment with Extreme (>10x) Social Media Buzz (0.5K) — 5.7
- [+] Reuters News Sentiment with High (>1x) Social Media Buzz (2.5K) — 3.1
- [+] Reuters News Sentiment Filters (9.9K) — 1.8
- No Pre-Market Reuters News (637K) — 1.0
- [-] Reuters News Sentiment Filters (5.2K) — 1.8
- [-] Reuters News Sentiment with High (>1x) Social Media Buzz (1.5K) — 3.0
- [-] Reuters News Sentiment with Extreme (>10x) Social Media Buzz (0.4K) — 4.7

Y-axis: Abnormal Return over SPY (bps); values 600, 400, 200, 0, -200, -400, -600

Prior Trading Day: 12 PM, 1 PM, 2 PM, 3 PM, 4 PM
Pre-Mkt News & SocialMedia Buzz (6-9am)
Current Trading Day: 9 AM, 10 AM, 11 AM, 12 PM, 1 PM, 2 PM, 3 PM, 4 PM

· Filter Reuters Articles on Relevance, Novelty & Sentiment
· Scale Social Media Buzz by T21D-Avg

Source: Thomson Reuters MarketPsych Indices, News Analytics, Tick History, Datastream

Social Media Buzz $\overset{proxy}{\approx}$ **Investor Attention on News**
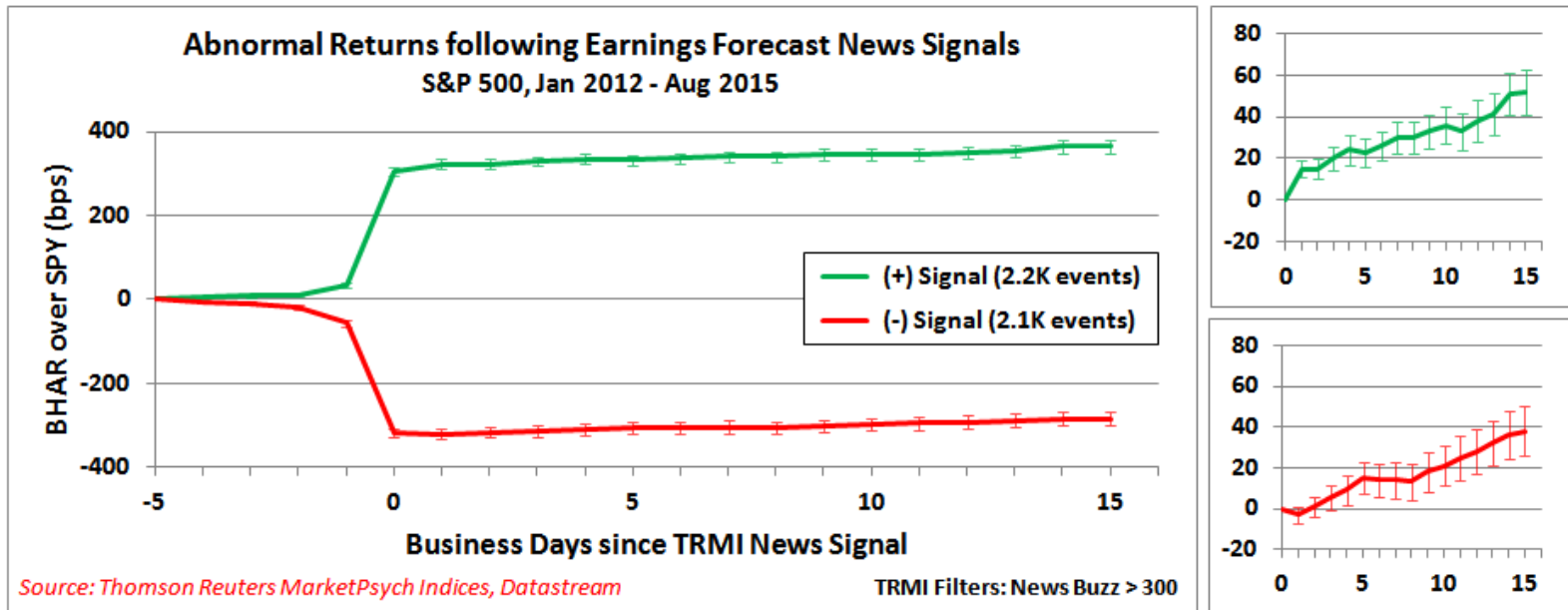
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Media-Driven Behavioral Market Mispricings

TRMI News Signals: *Earnings Forecast * Buzz*

Volume of words & phrases on expectations of improving earnings, less those of worsening earnings

*Identify signals from top (bottom) decile over T12M, with positive (negative) Day 0 returns

Strong market reaction coincident
with earnings forecast news signals

Significant post-news
event abnormal return drift

Availability & Loss-Aversion - - - - - - - → Over-reaction to **negative** earnings forecast news
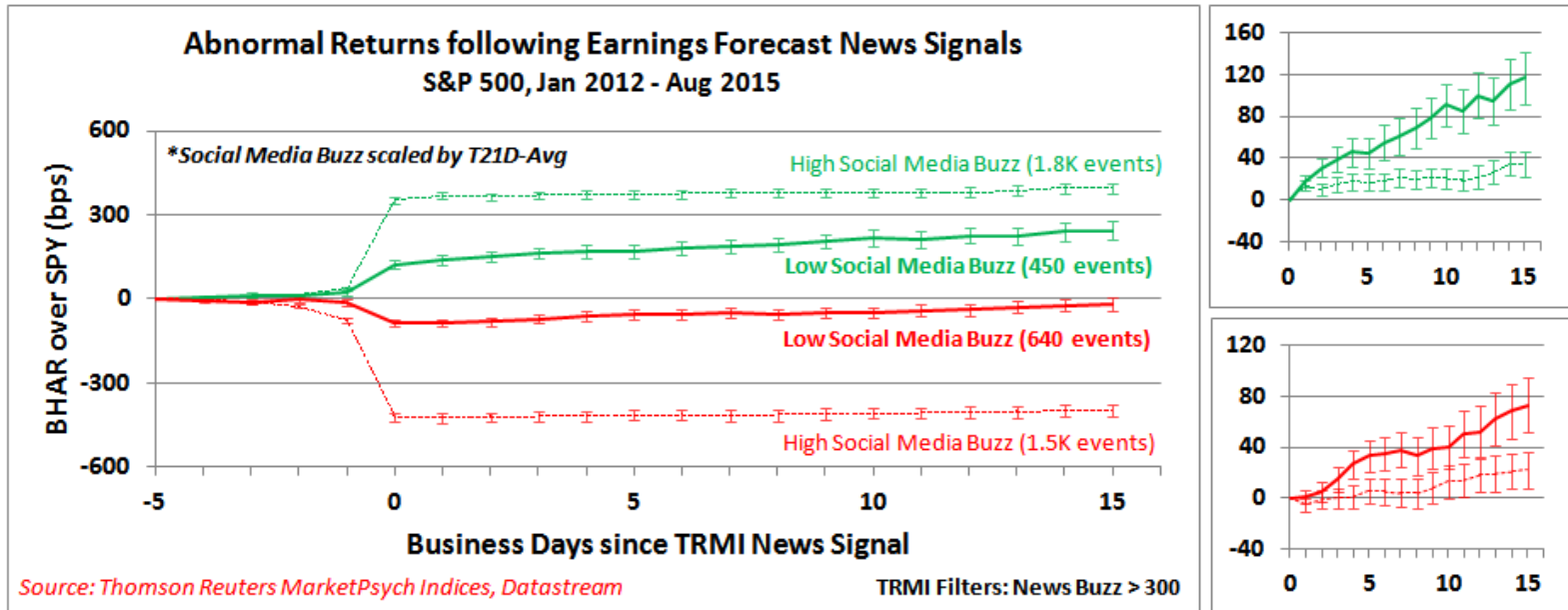
Overconfidence & Anchoring - - - - - - → Under-reaction to **positive** earnings forecast news

See *Fuller & Thaler: How We Use Behavioral Finance to Invest.* Raife Giovinazzo (2016)

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Media-Driven Behavioral Market Mispricings

TRMI News Signals conditioned on Social Media Buzz

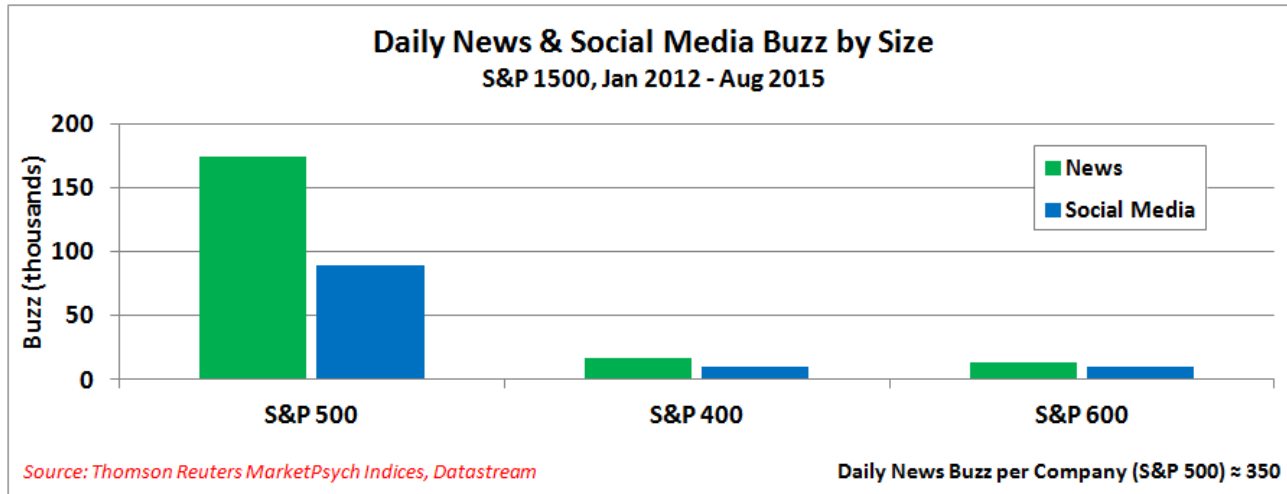Social Media Buzz: Volume of company-specific words & phrases in Social Media sources

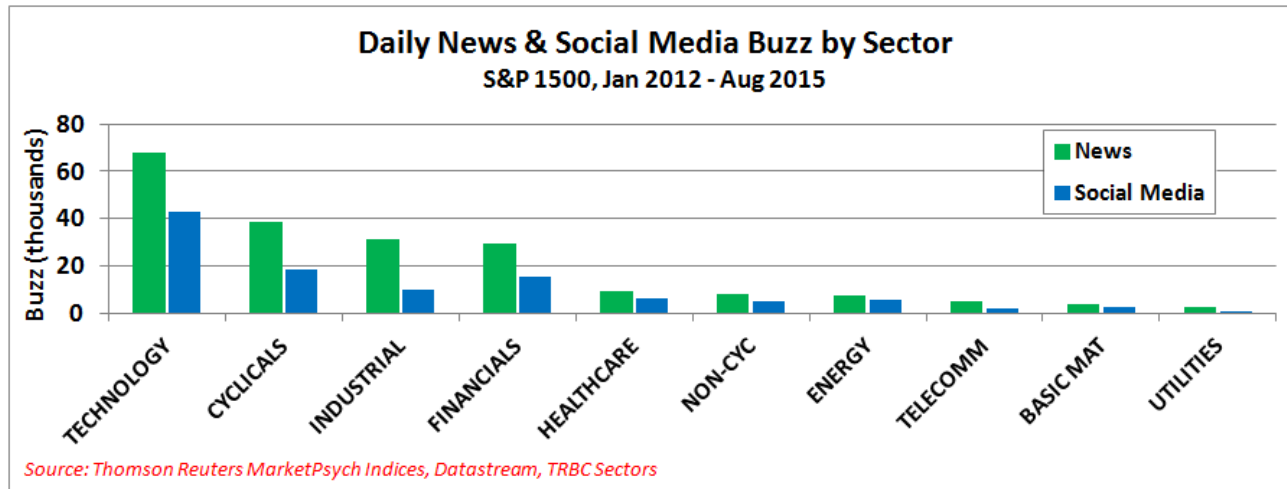Stronger market reactions to earnings forecast news signals with **high** Social Media Buzz

Greater post-news event abnormal return drift following news signals with **low** Social Media Buzz

Behavioral market mispricings are strongest following news signals with *low* investor attention

See *Investor Attention and the Pricing of Earnings News.* Curtis et al. (2014)

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Daily News & Social Media Volumes

Daily News & Social Media Buzz by Size
S&P 1500, Jan 2012 - Aug 2015

Source: Thomson Reuters MarketPsych Indices, Datastream

Daily News Buzz per Company (S&P 500) ≈ 350

News & Social Media Buzz dominated by **large caps**

Daily News & Social Media Buzz by Sector
S&P 1500, Jan 2012 - Aug 2015

Source: Thomson Reuters MarketPsych Indices, Datastream, TRBC Sectors
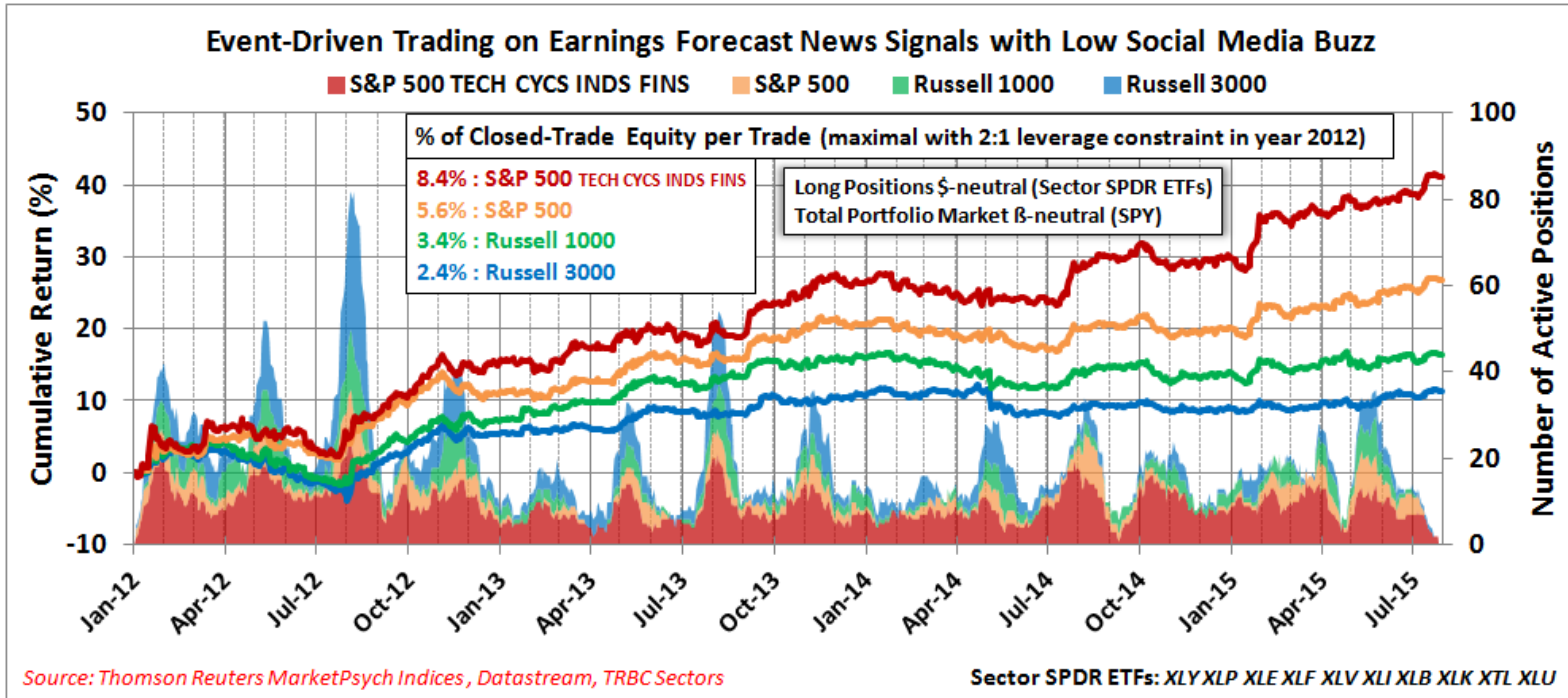
News & Social Media Buzz dominated by sectors:
- **Technology**
- **Consumer Cyclicals**
- **Industrials**
- **Financials**

Media-Driven Mispricing Signals

Pure Alpha Equity Curves
Outperformance over sectors and market

Event-Driven Trading on Earnings Forecast News Signals with Low Social Media Buzz

Legend: S&P 500 TECH CYCS INDS FINS · S&P 500 · Russell 1000 · Russell 3000

% of Closed-Trade Equity per Trade (maximal with 2:1 leverage constraint in year 2012)
- 8.4% : S&P 500 TECH CYCS INDS FINS
- 5.6% : S&P 500
- 3.4% : Russell 1000
- 2.4% : Russell 3000

Long Positions $-neutral (Sector SPDR ETFs)
Total Portfolio Market ß-neutral (SPY)

Source: Thomson Reuters MarketPsych Indices, Datastream, TRBC Sectors

Sector SPDR ETFs: XLY XLP XLE XLF XLV XLI XLB XLK XTL XLU

*Enter trades at close of following day, with 15-day holding periods

Performance improves over universes with increasingly large News & Social Media Buzz

Behavioral market mispricings are strongest on companies with large News & Social Media exposure
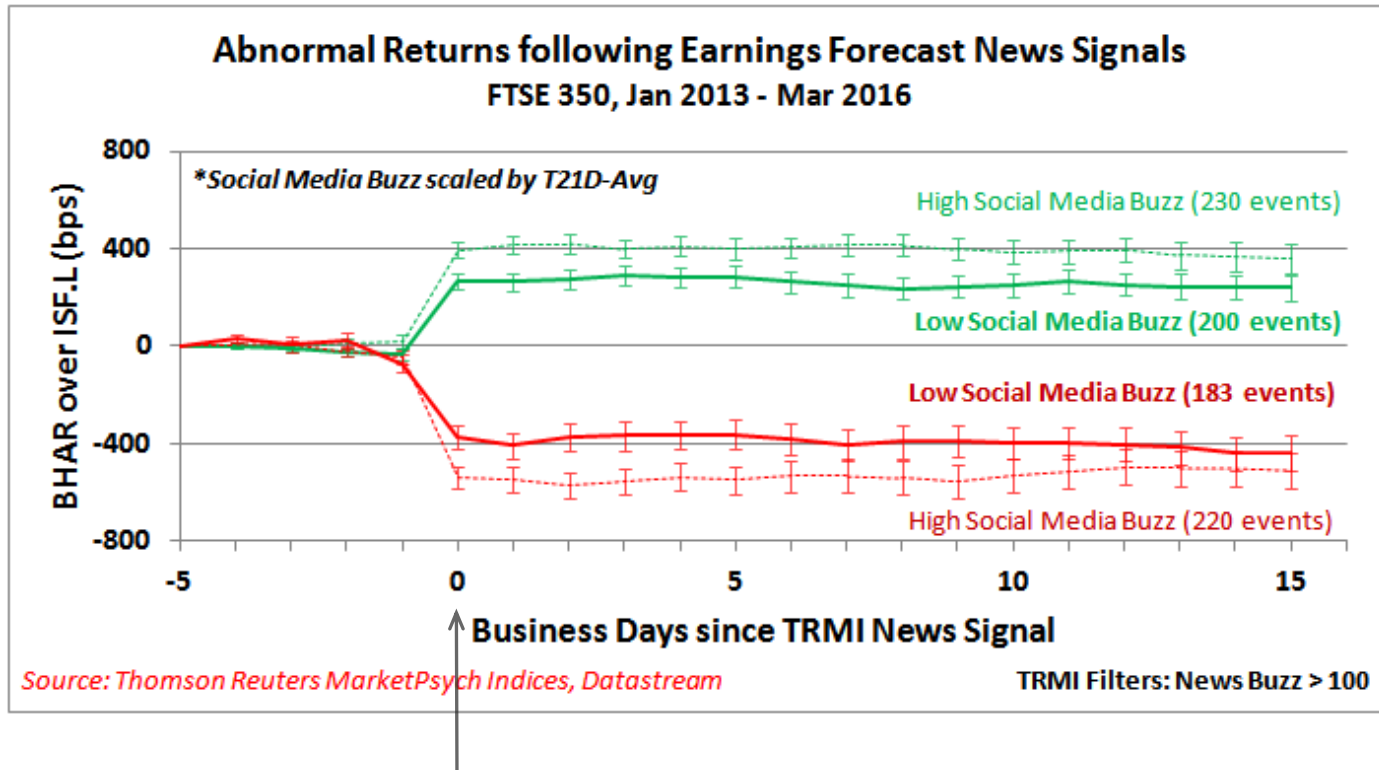
UK News & Social Media Signals

TRMI News Signals conditioned on Social Media Buzz
UK Companies (FTSE 350)

Abnormal Returns following Earnings Forecast News Signals
FTSE 350, Jan 2013 - Mar 2016

*Social Media Buzz scaled by T21D-Avg

High Social Media Buzz (230 events)
Low Social Media Buzz (200 events)
Low Social Media Buzz (183 events)
High Social Media Buzz (220 events)

BHAR over ISF.L (bps)

Business Days since TRMI News Signal

Source: Thomson Reuters MarketPsych Indices, Datastream

TRMI Filters: News Buzz > 100

No post-event return drift following earnings forecast news in UK

Strong market reaction coincident with earnings forecast news signals
&
Market reaction significantly increases with **high** Social Media Buzz

→ News & Social Media analytics *might* be used to identify **behavioral market mispricings** in the UK

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Investment Styles & Popularity

Factor Investing: Smart beta hype or strategic value?

JPM, 2014

Diversify across
Asset Classes

· Global Stocks
· Global Bonds
· Commodities

Diversify across
Style Premia

· Value
· Momentum
· Carry
· Defensive
· Trend-Following

Conclusion
Strategic style diversification reduces sensitivity (risk) to the macro environment

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Research Goal: Identify firm-specific News & Social Media drivers of style performance

JPM, 2014

Morningstar
May 2015

Proposal
Measure firm-specific relative popularity as the 1Q-1Q change in Social Media Buzz

Screen Fundamental Value signals

· Increasing Social Media Buzz → Over-valued signal
· Decreasing Social Media Buzz → Under-Valued signal

Relative popularity drives returns
· Permanent risk premia
· Temporary behavioral mispricings

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Fundamental Value & Social Media Popularity

Value & Profitability: StarMine Intrinsic Value & Earnings Quality Models

Intrinsic Value & Earnings Quality Portfolios
S&P 1500, Q1 1998 - Q4 2015

Screen out *increasing* Social Media Buzz

Screen out *decreasing* Social Media Buzz
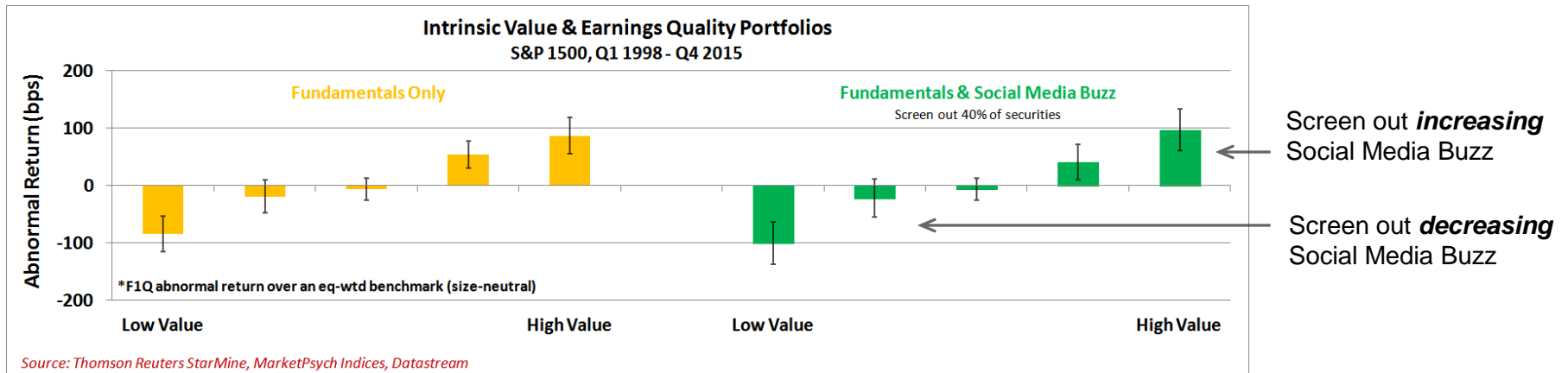
Restrict to S&P 500 Large Social Media Buzz
Restrict to years 2009-2015 Emergence of Social Media

Intrinsic Value & Earnings Quality Portfolios
S&P 500, Q1 2009 - Q4 2015
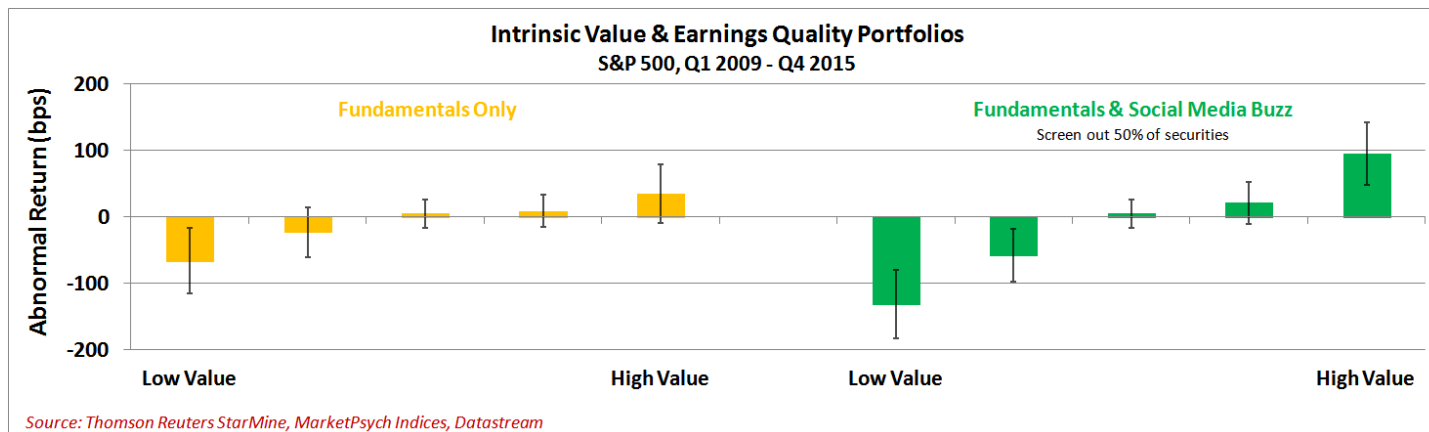
Use News & Social Media signals to strengthen fundamental factors

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Market News Sentiment Indices
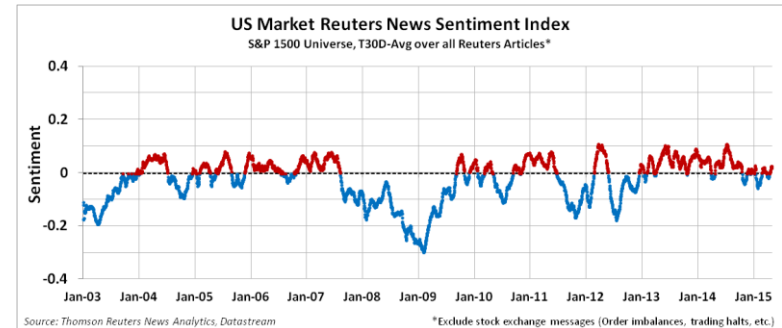
Behavioral Influence of Market Sentiment

Market Sentiment ⊥ Market Return

Post-Earnings Announcement Drift
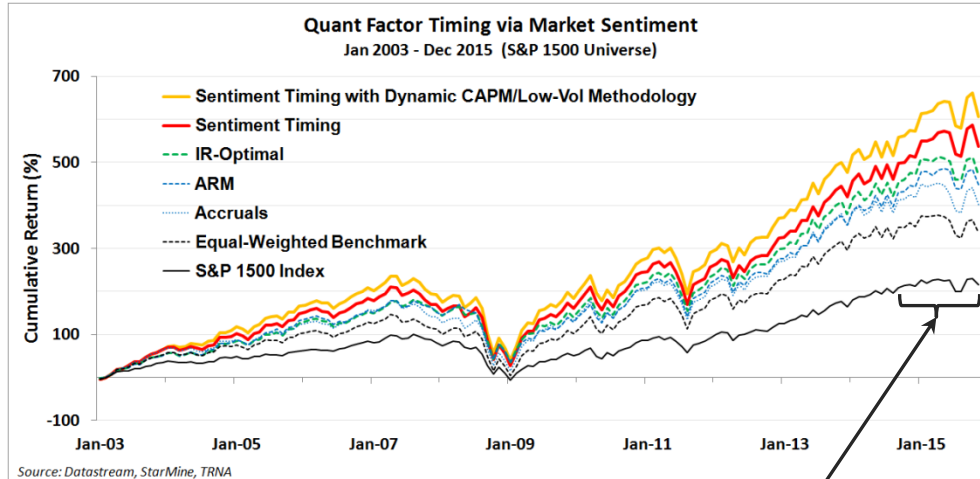
Accruals & Earnings Revisions Anomalies

Risk Pricing
- (-) Market Sentiment → CAPM
- (+) Market Sentiment → Low-Vol Anomaly

Nov 2014

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MACHINE READABLE NEWS
SENTIMENT & INVESTOR BEHAVIOR
BY ELIJAH DEPALMA, PhD

US Market Reuters News Sentiment Index
S&P 1500 Universe, T30D-Avg over all Reuters Articles*

Source: Thomson Reuters News Analytics, Datastream   *Exclude stock exchange messages (Order imbalances, trading halts, etc.)

Investment Style Timing (Value vs. Momentum)
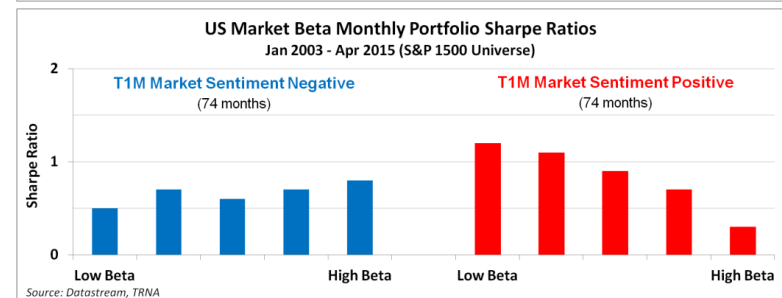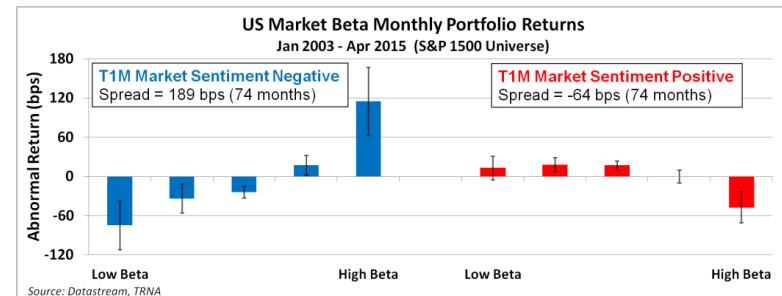
Dynamically exploit Accruals vs. Earnings Revisions Anomalies

- Value investing in (-) sentiment periods → Accruals anomaly
- Momentum investing in (+) sentiment periods → Earnings revisions anomaly

Quant Factor Timing via Market Sentiment
Jan 2003 - Dec 2015 (S&P 1500 Universe)

- Sentiment Timing with Dynamic CAPM/Low-Vol Methodology
- Sentiment Timing
- IR-Optimal
- ARM
- Accruals
- Equal-Weighted Benchmark
- S&P 1500 Index

Source: Datastream, StarMine, TRNA

Out-of-sample performance

F1M Market Beta Portfolios

US Market Beta Monthly Portfolio Returns
Jan 2003 - Apr 2015 (S&P 1500 Universe)

T1M Market Sentiment Negative
Spread = 189 bps (74 months)

T1M Market Sentiment Positive
Spread = -64 bps (74 months)

Source: Datastream, TRNA

US Market Beta Monthly Portfolio Sharpe Ratios
Jan 2003 - Apr 2015 (S&P 1500 Universe)

T1M Market Sentiment Negative
(74 months)

T1M Market Sentiment Positive
(74 months)

Source: Datastream, TRNA

CAPM
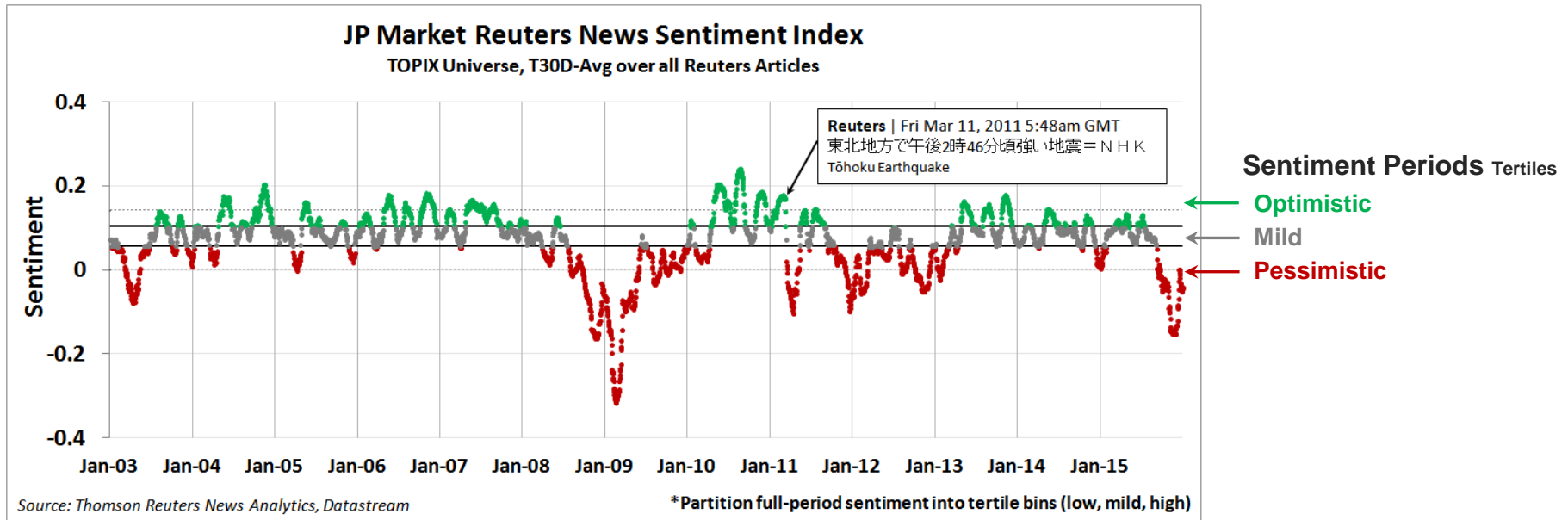
Market β ~ Risk Factor

Diversify market risk

Low-Vol Anomaly

Market β ~ Alpha Factor

Tilt towards low risk

See *Investor Sentiment, Beta and the Cost of Equity Capital.* Antoniou et al. (2015)

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Japanese Market News Sentiment & Momentum

JP Market Reuters News Sentiment Index
TOPIX Universe, T30D-Avg over all Reuters Articles

Reuters | Fri Mar 11, 2011 5:48am GMT
東北地方で午後2時46分頃強い地震＝ＮＨＫ
Tōhoku Earthquake

Sentiment Periods Tertiles
← **Optimistic**
← **Mild**
← **Pessimistic**

Source: Thomson Reuters News Analytics, Datastream
*Partition full-period sentiment into tertile bins (low, mild, high)

Momentum Portfolios: StarMine Long-Term Price Momentum

JP Market News Sentiment & Momentum
TOPIX Universe, Jan 2003 - Dec 2015

Pessimistic   Mild   Optimistic

Momentum Portfolios (size-neutral)

Source: Thomson Reuters News Analytics, StarMine, Datastream
*Contemporaneous (same month) market sentiment period & momentum portfolios

Extreme Pessimistic   Extreme Optimistic
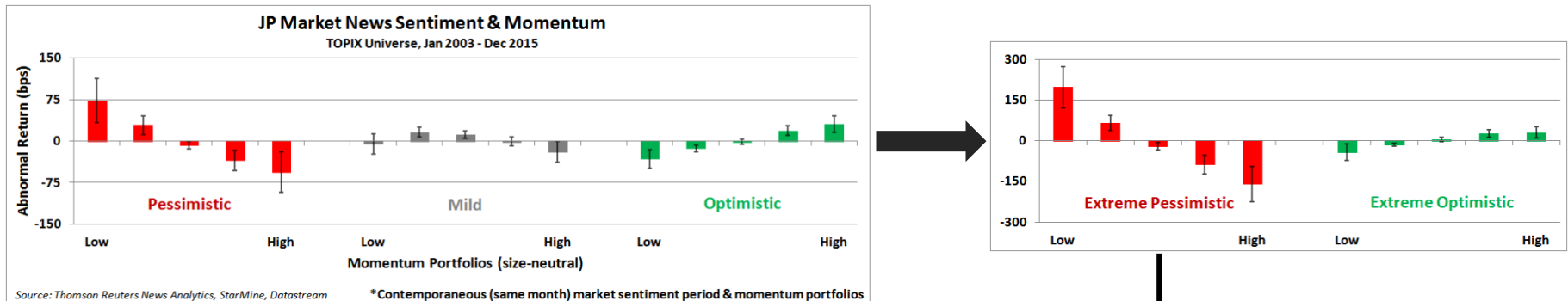
Momentum failure in JP equities is *sensitive* to market sentiment
· Japan has the world's largest % of population ages 65+ (World Bank)

See *Momentum and Investor Sentiment: Evidence from Asian Stock Markets.* Anusakamar et al. (2012)

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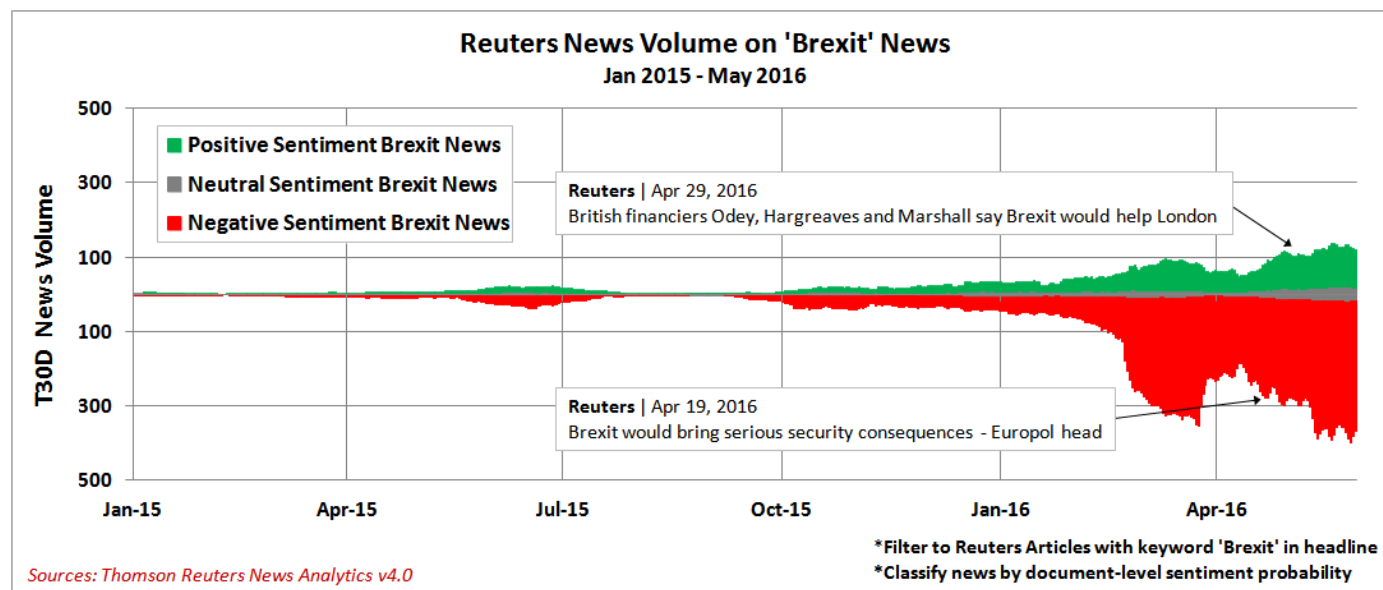
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Future Directions

Macro News Sentiment Indices

Corporate News
· Filter companies by sector, size, etc.

· Filter to news on earnings, mergers, etc.

Economic & Government News
· Document-level sentiment News Analytics v4.0

· Currencies, Treasuries, Legal, Politics, etc.

Reuters News Volume on 'Brexit' News
Jan 2015 - May 2016

Legend:
- Positive Sentiment Brexit News
- Neutral Sentiment Brexit News
- Negative Sentiment Brexit News

Reuters | Apr 29, 2016
British financiers Odey, Hargreaves and Marshall say Brexit would help London

Reuters | Apr 19, 2016
Brexit would bring serious security consequences - Europol head

Y-axis: T30D News Volume (500, 300, 100, 100, 300, 500)
X-axis: Jan-15, Apr-15, Jul-15, Oct-15, Jan-16, Apr-16

*Filter to Reuters Articles with keyword 'Brexit' in headline
*Classify news by document-level sentiment probability

Sources: Thomson Reuters News Analytics v4.0

Research in Progress

Market Cap-Weighted vs. Fundamentally-Weighted Indices
· Russell 1000 vs. FTSE RAFI US 1000

· Identify hypotheses for underlying drivers

· Construct predictive macro news sentiment indices

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