



# The Toyota recall crisis: Predicting corporate reputation from the media

David Geddes, Ph.D.

David Fan, Ph.D.

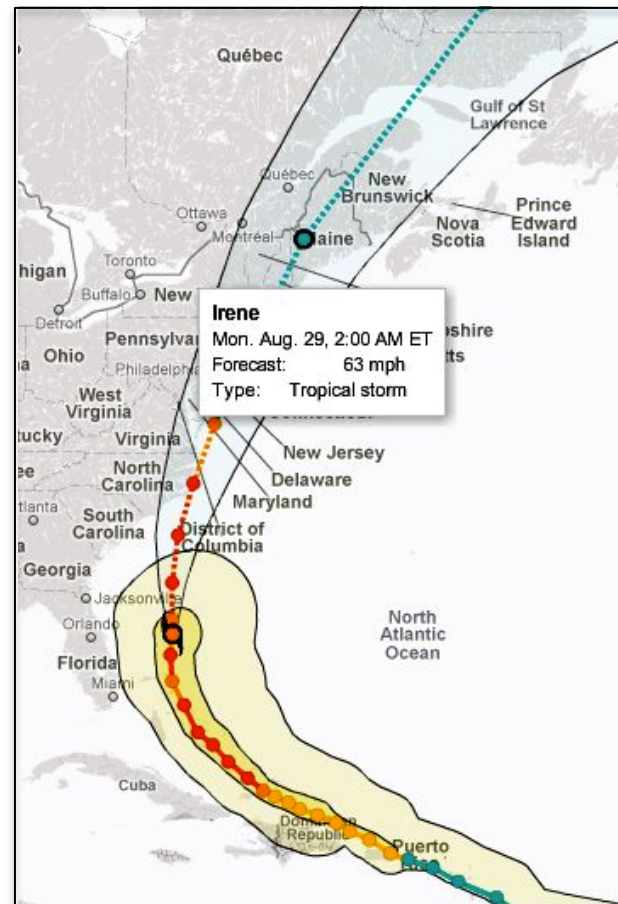
Institute for Public Relations 9<sup>th</sup> Summit on Measurement  
Philadelphia, PA

September 19, 2011



- Prediction and forecasting
  - Modeling case study
- Priorities

# Prediction and forecasting



© New York Times

# Overview

- Examine role of media and persuasive information in shaping opinions
- Apply InfoTrend model to corporate brand reputation
- Not an assessment of Toyota's crisis management

# The Toyota recall crisis

- 2007 – 2008 → Early problem indications
- Sept. 10, 2009 → Release of 911 crash call audio
- Sept. 29, 2009 → 3.9 M vehicles recalled in U.S.
- Late Jan.- Feb. → 2.3 M vehicles recalled in U.S.
- Sales suspended for eight models
- Plants closed
- Recall expanded to Europe and China
- CEO apologizes, testifies
- March 2010 → Congressional hearings
- DoT and NHTSA scrutiny

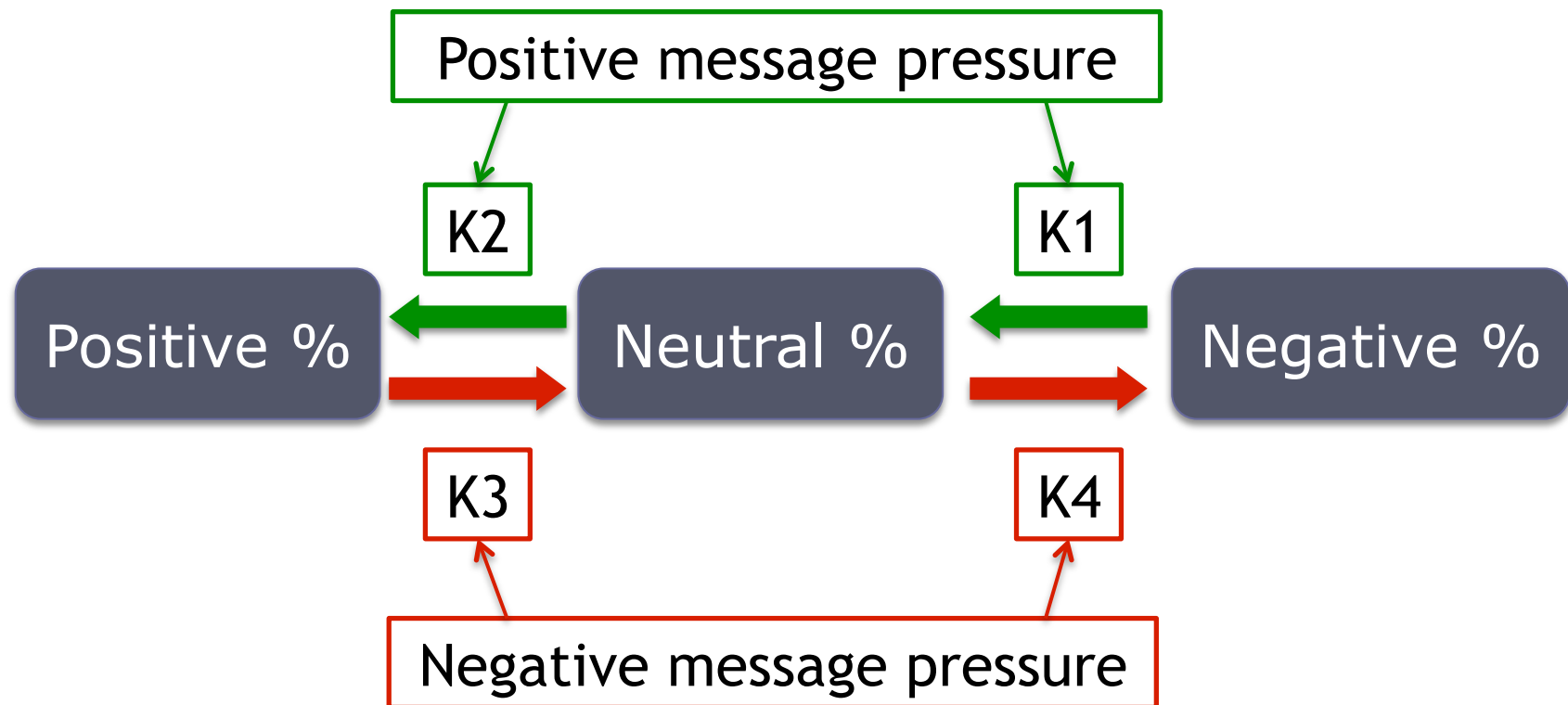
# Communications theory

- Agenda-setting theory
  - First level
  - Second level
- Information accessibility
- Validated
- Agenda setting and prediction

# InfoTrend® model structure

$$\text{Positive today} = \text{Positive yesterday} + \text{Converts} - \text{Defections}$$

# InfoTrend® model basic structure





## Minimal model structure before adaptation for Toyota

$$F_G(t) = k \sum_i C_{i,G} \exp(-p(t - t_i)) + \epsilon_G(t)$$

Don't try this  
at home

$$I_G(t) = \frac{\int F_G(t) e^{\int (F_G(t) + F_B(t)) dt} dt}{e^{\int (F_G(t) + F_B(t)) dt}} + \frac{c}{e^{\int (F_G(t) + F_B(t)) dt}}$$

# Dependent variable

- YouGov BrandIndex
  - Daily online survey
  - Aggregated weekly ... 674 average/week
  - Weighted to U.S. Census Bureau's American Community Survey
  - “Positive impression” and “negative impression” questions
- January 1, 2009 – March 31, 2011

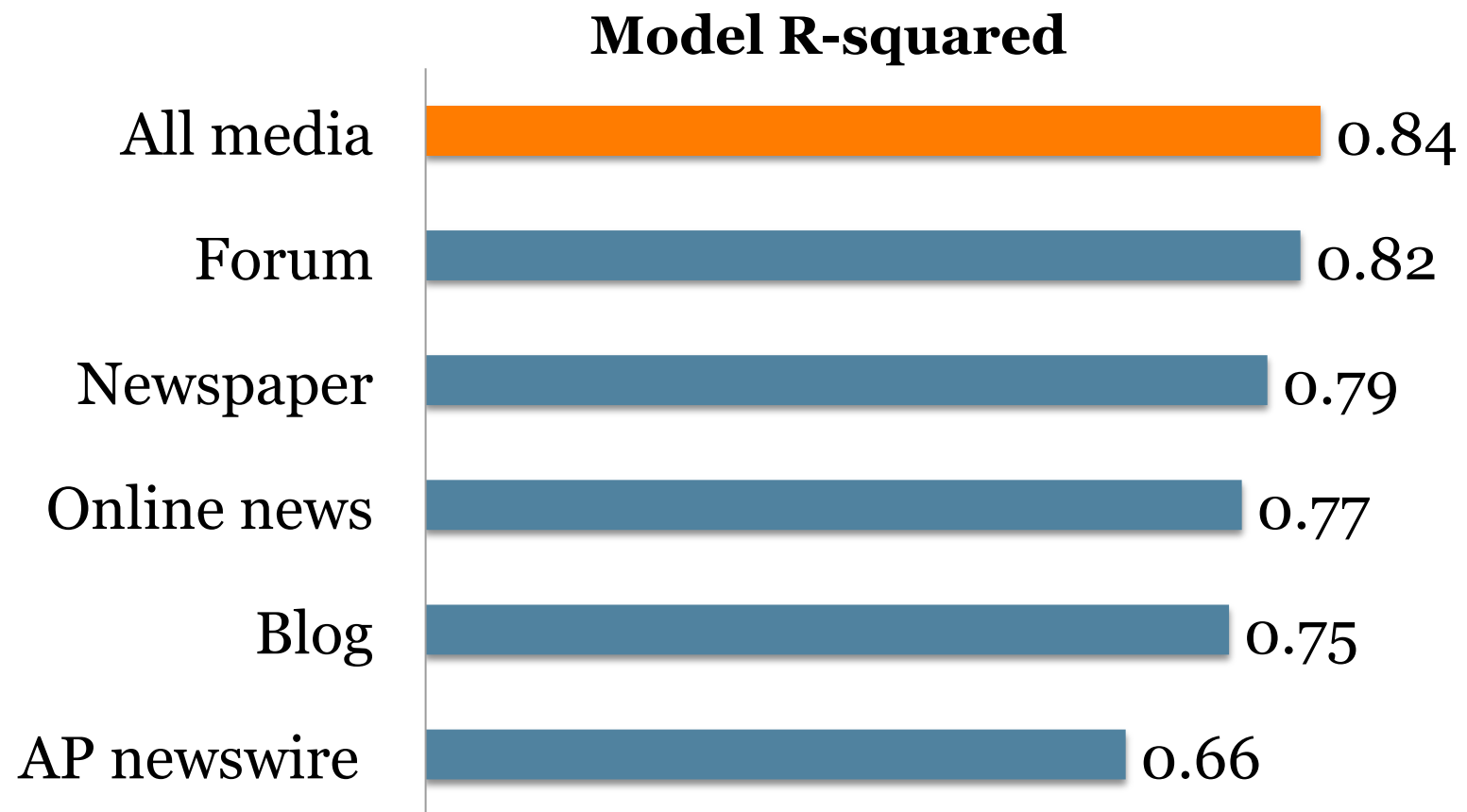
# Predictor variables

- Media categories
  - 24 major newspapers
  - 24 matched online newspaper sites
  - 25 top blogs
  - 25 top forums
  - AP news wire
  - Note: no broadcast, no Twitter
- Censored data
- Automated sentiment scoring
  - OpenText Content Analytics (Nsentiment) untrained
  - Toyota, sentence-level aggregated to document level

# Analysis

- 113 weeks of data
- Separate models by media type
- Separate models by sentiment within media type
  - 31,945 positive documents
  - 49,611 negative documents
- Model results generates daily

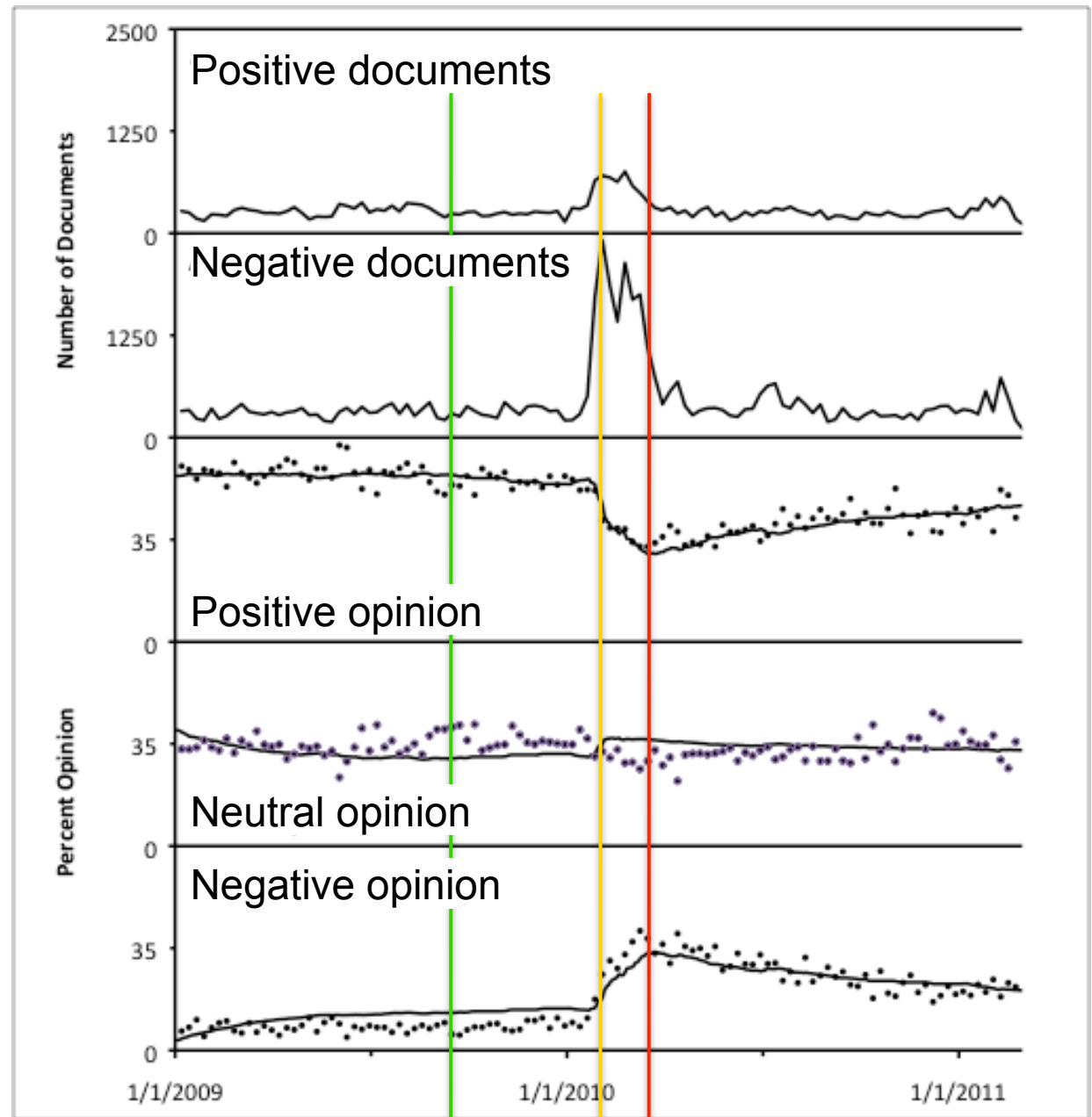
# Results



# All media

$R^2 = 0.84$

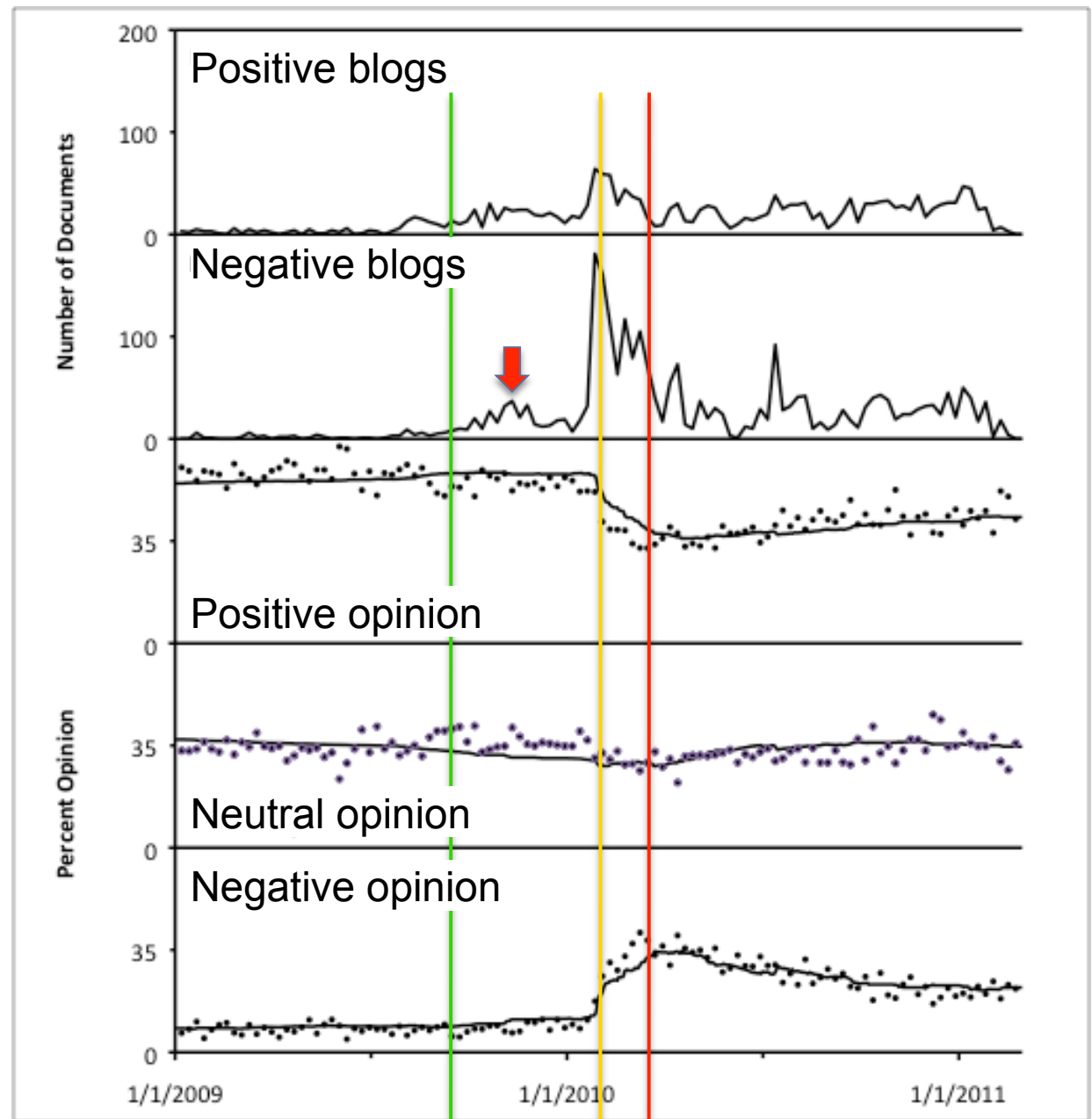
- Survey
- Model



# Blogs

$R^2 = 0.75$

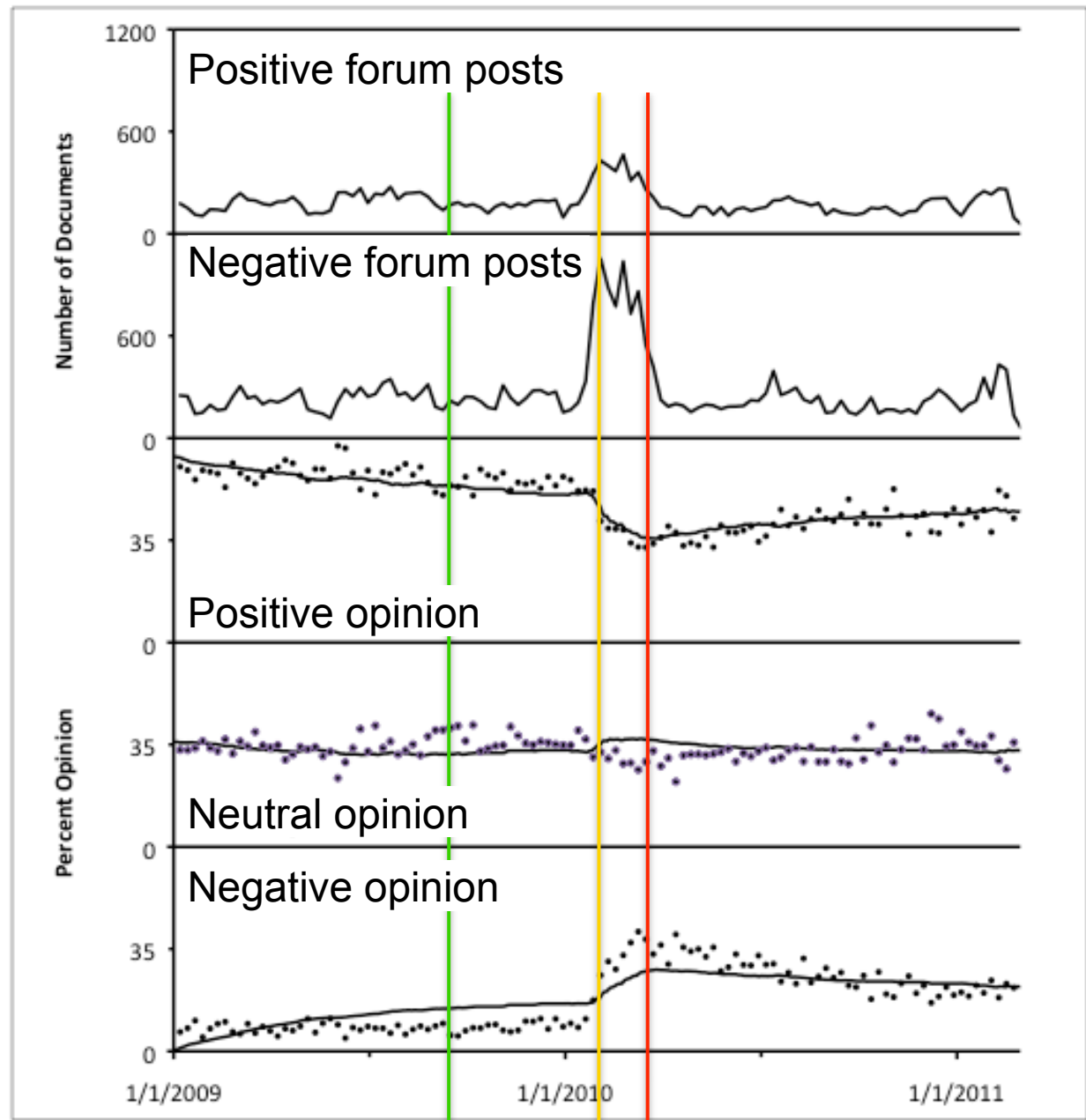
- Survey
- Model



# Forums

$R^2 = 0.82$

- Survey
- Model





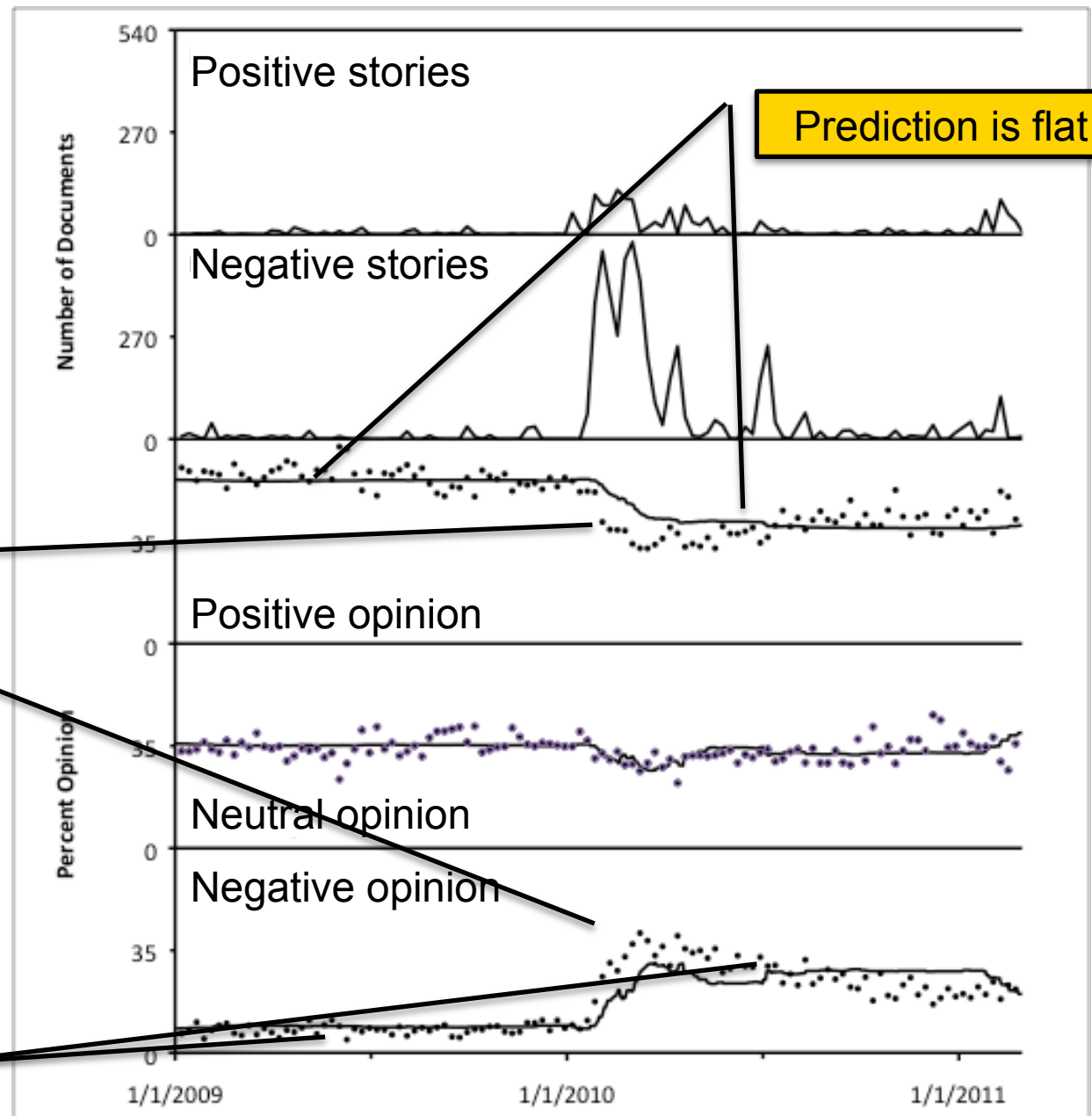
AP  
 $R^2 = 0.66$

- Survey
- Model

Prediction is high

Prediction is low

Prediction is flat

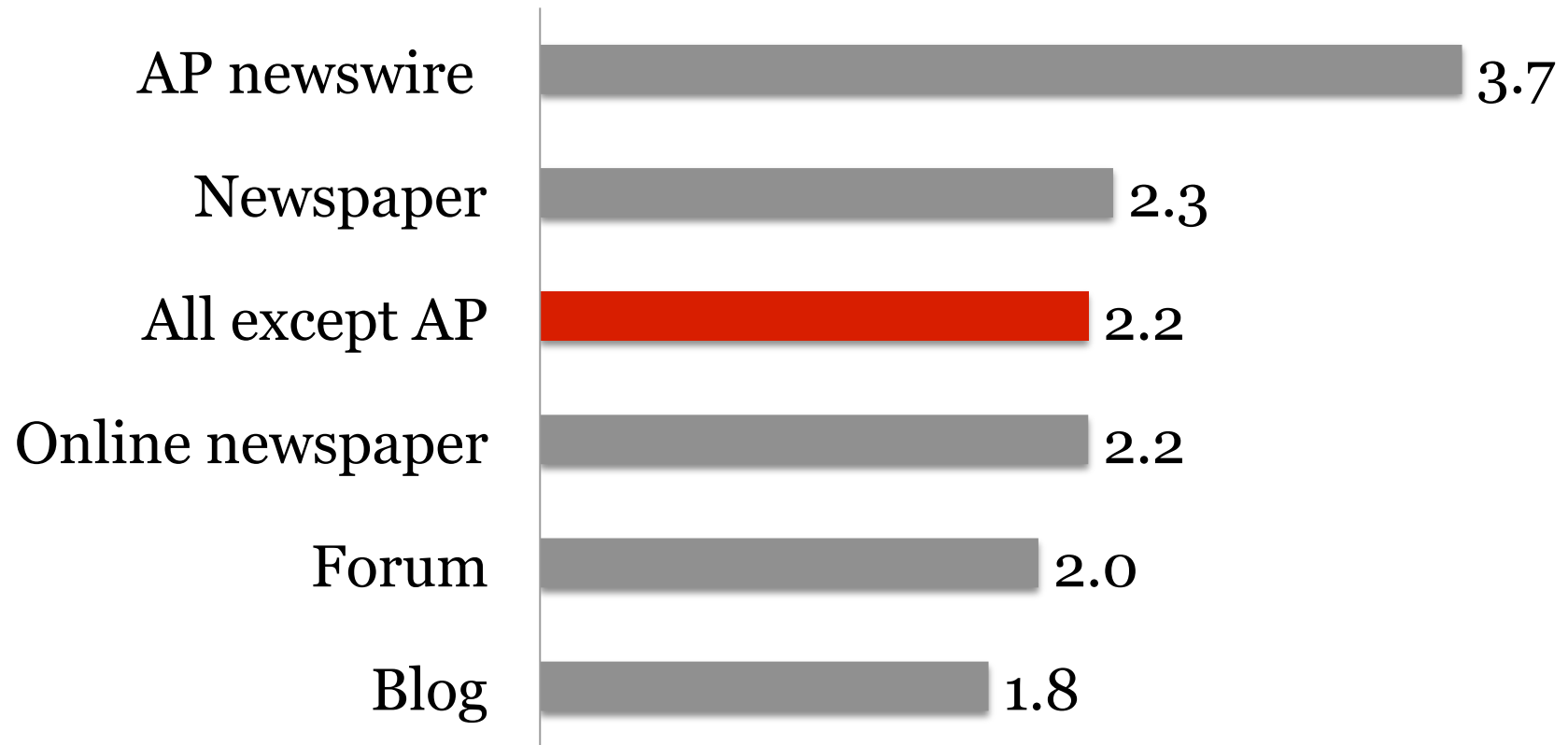


# Results

- Broad media sample is sufficient
- Sentiment matters in shaping corporate reputation
- Automated sentiment analysis good enough
- Information half-life  $\approx$  zero

# Results

## Positive/negative persuasibility ratio



# Further directions

- Message-level drivers
- Media channel influence
- Positive/negative impact
- General reputation and brand model
- Other marketing mix elements

# Priorities / industry agenda

1. Common measurement framework
2. Standard metrics
3. Better models
4. Open the box
5. Empiricism
6. Education and training
7. Research ethics
8. Break down barriers with social media measurement
9. ROI

# For further information

David Geddes, Ph.D.  
Chief Consultant and Client Relationship  
Director  
InfoTrend, Inc.

dgeddes@infotrend.com  
314-960-4780  
www.infotrend.com

David Fan, Ph.D.  
Chief Technology Office and Founder  
InfoTrend, Inc.

dfan@infotrend.com  
651-329-4264  
www.infotrend.com

A full academic research paper will be available in late 2011:

Fan, David, Geddes, David, and Flory, Felix. 2011. The Toyota recall crisis: Media impact on Toyota's corporate brand reputation. In *JSM Proceedings, AAPOR*. Alexandria, VA: American Statistical Association.