Understanding the News that Moves Markets

Bloomberg

EMNLP 2018

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Gideon Mann

Head of Data Science, Office of the CTO

TechAtBloomberg.com

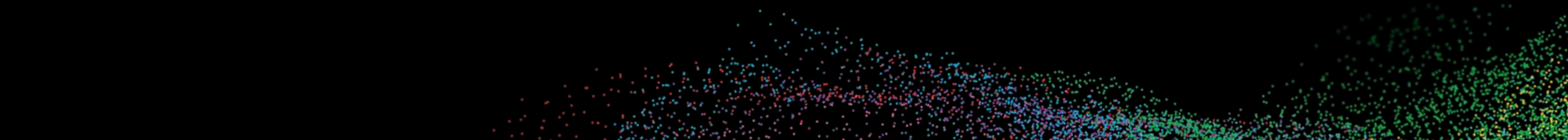
My journey: bad hair to no hair

What this talk is not about:

How to make money on the stock market

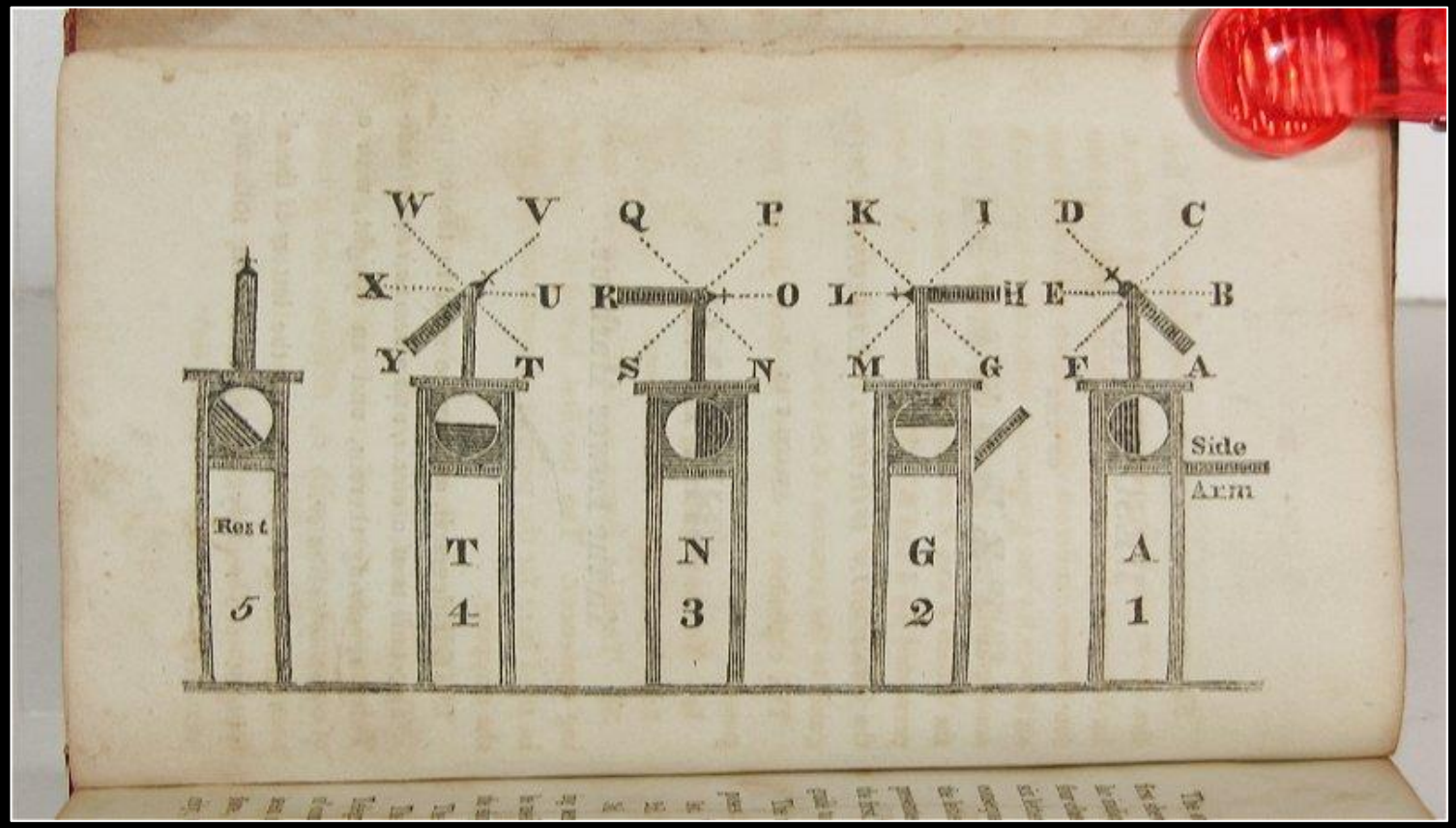
What this talk is about:

Financial technology
The news that moves markets
Computer Things
BlocksWorld



Financial Technology

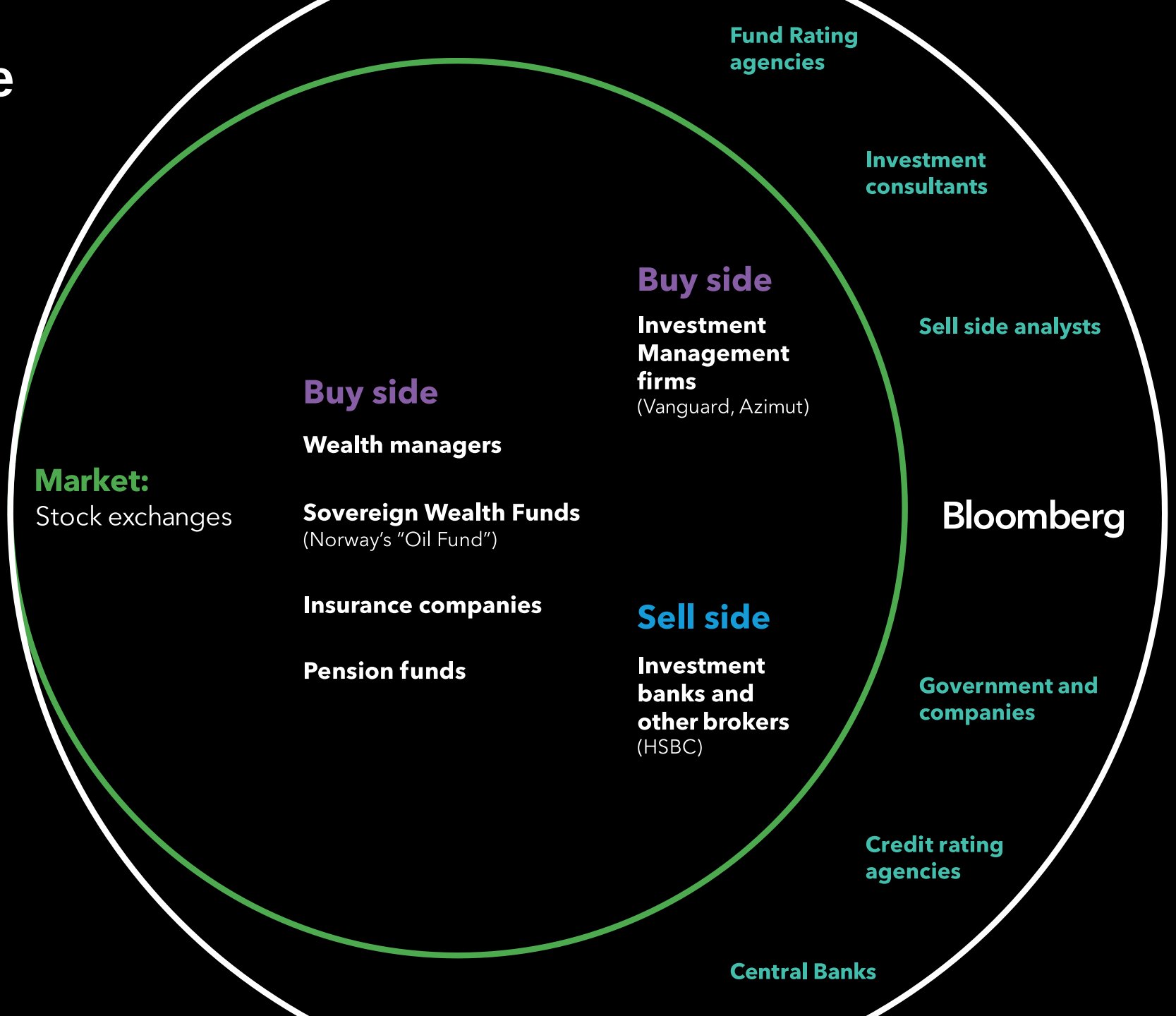
Financial Technology II



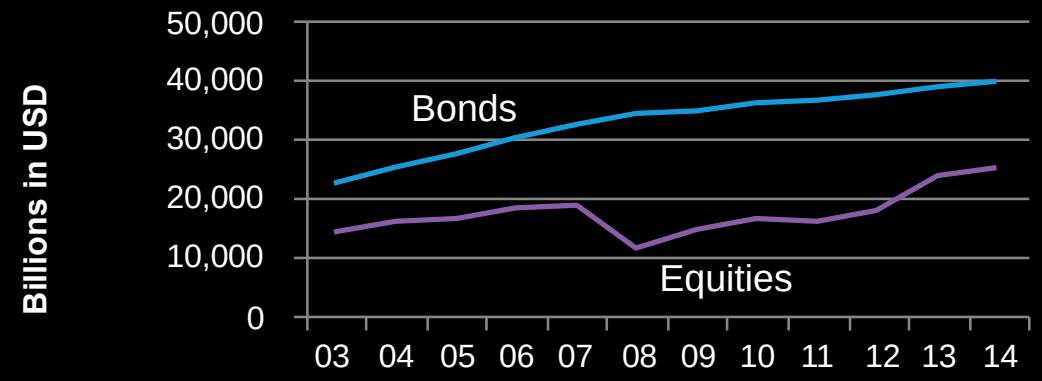
Financial Technology III

What is the finance ecosystem?

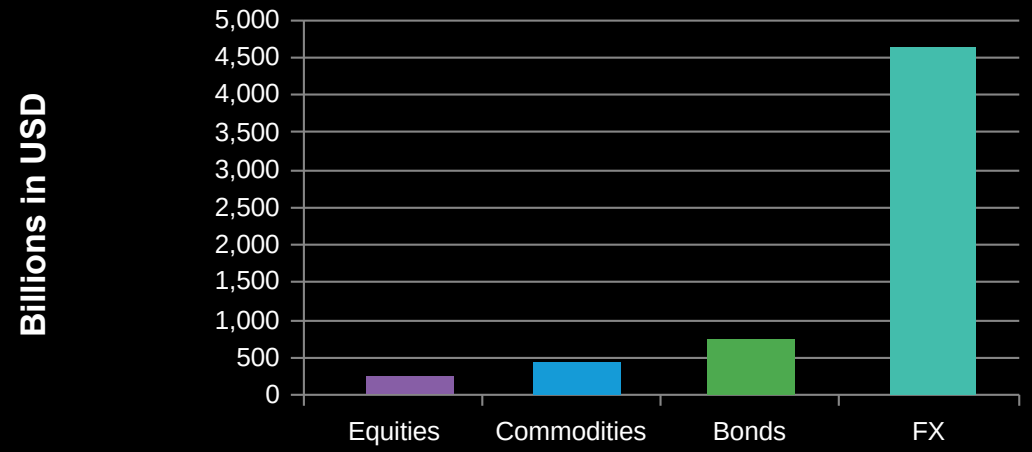
Savers
(Companies, charities, governments, individuals - me and you)



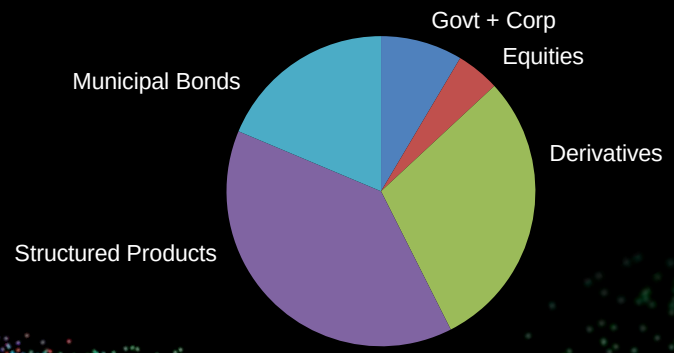
Bonds have more market value than equities



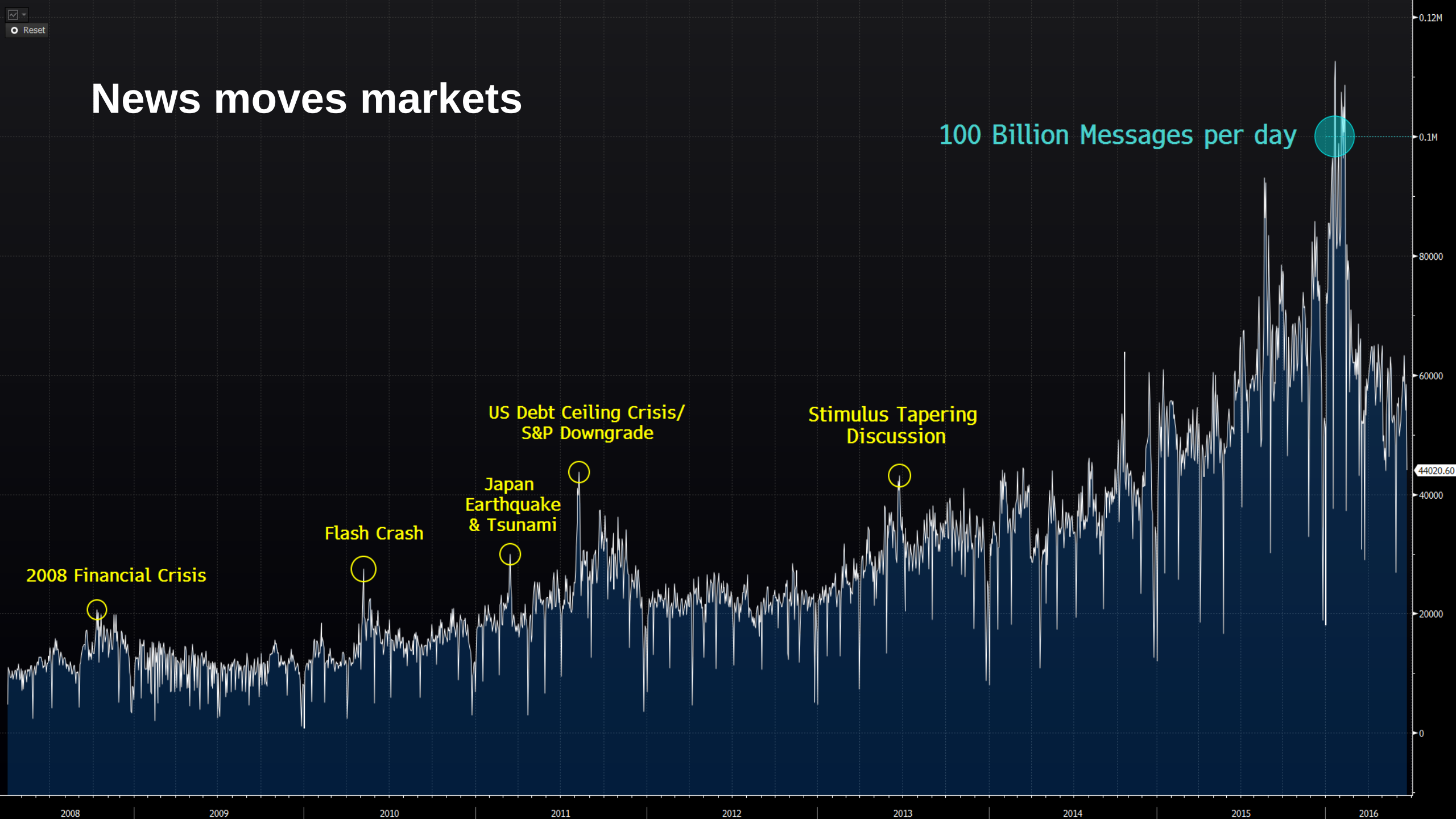
FX has the most daily notational volume



Vastly more structured products and derivatives than equities



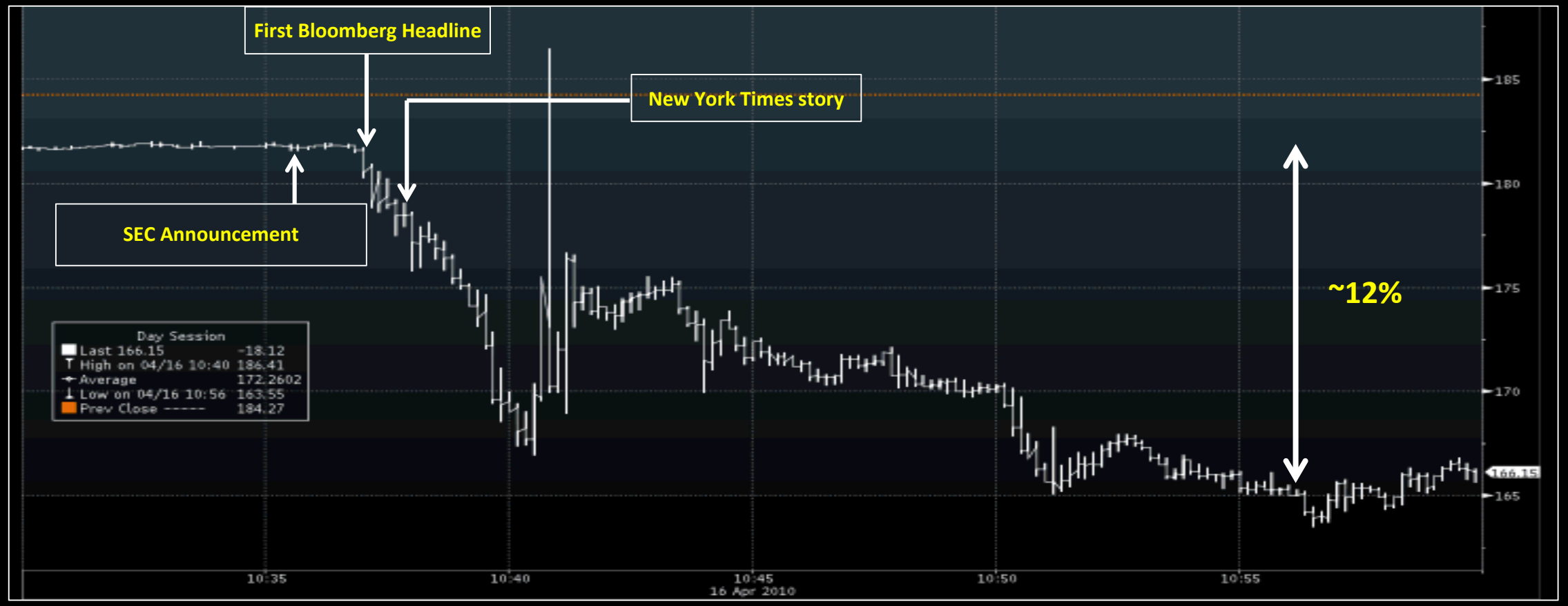
Sources: WCAUUS Index, http://www.sifma.org/research/statistics.aspx


Reset
News moves markets
100 Billion Messages per day
US Debt Ceiling Crisis/
S&P Downgrade
Stimulus Tapering
Discussion
Japan
Earthquake
& Tsunami
Flash Crash
2008 Financial Crisis
0.12M
0.1M
80000
60000
44020.60
40000
20000
0
2008
2009
2010
2011
2012
2013
2014
2015
2016

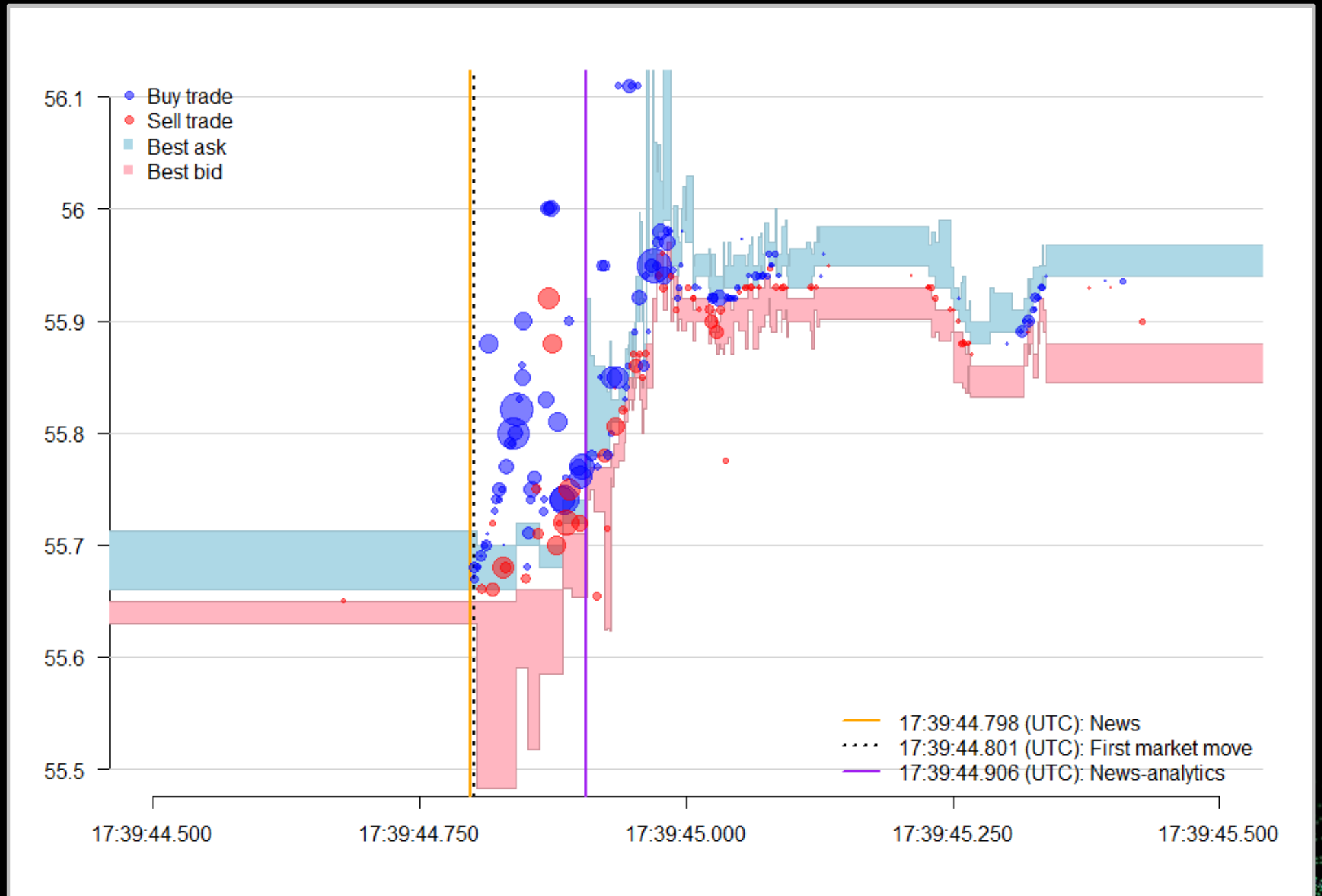
Not all channels are the same…

[Dredze et al. 2016]
[Osborne, Dredze 2014]

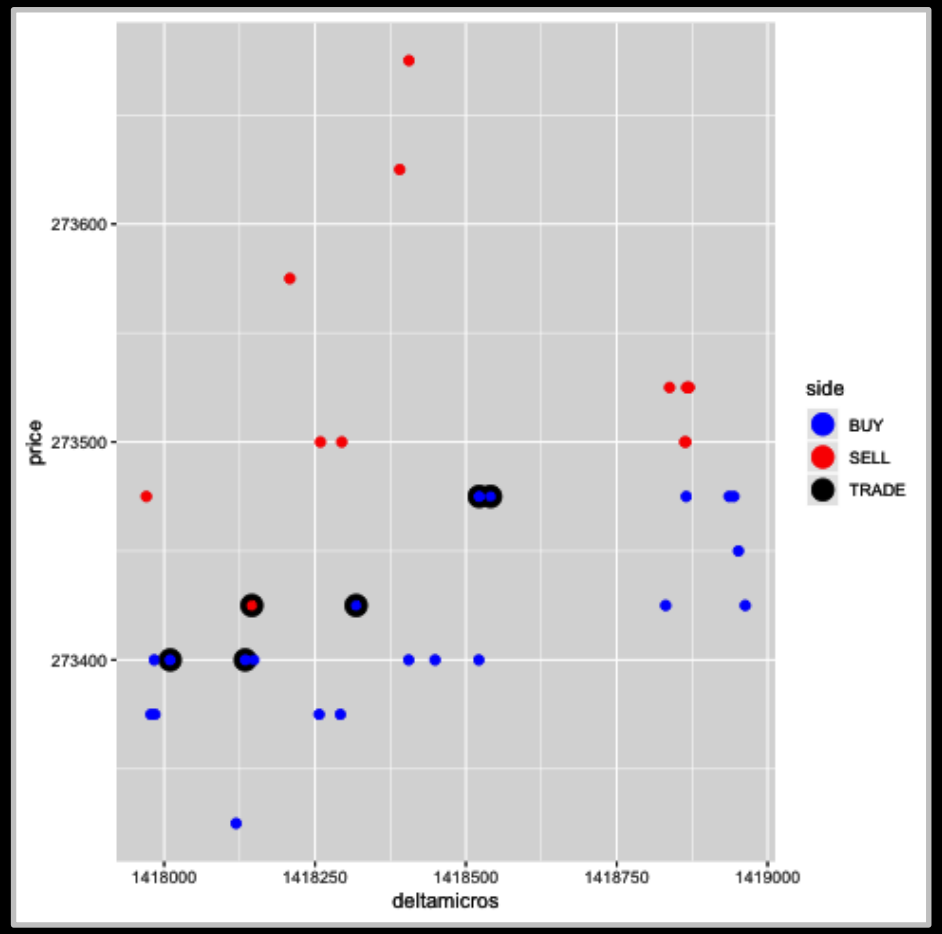
…not all sources are the same

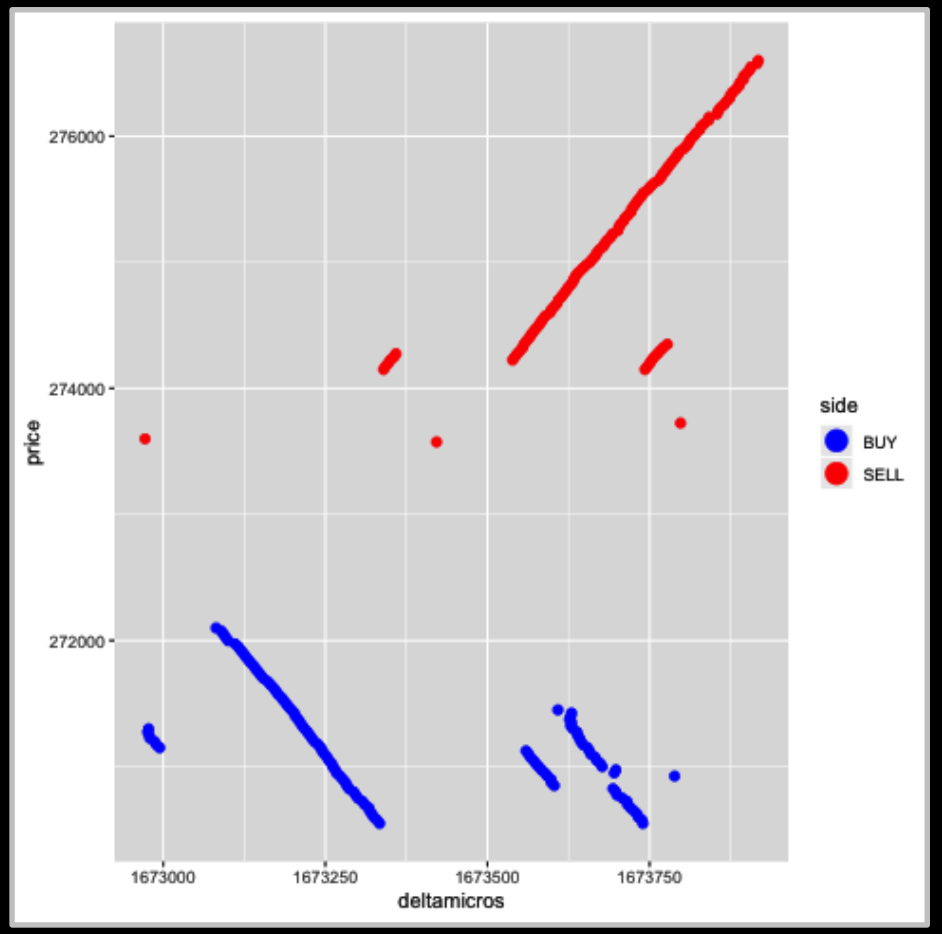


Broadcomm is said to explore deal to acquire chipmaker Qualcomm



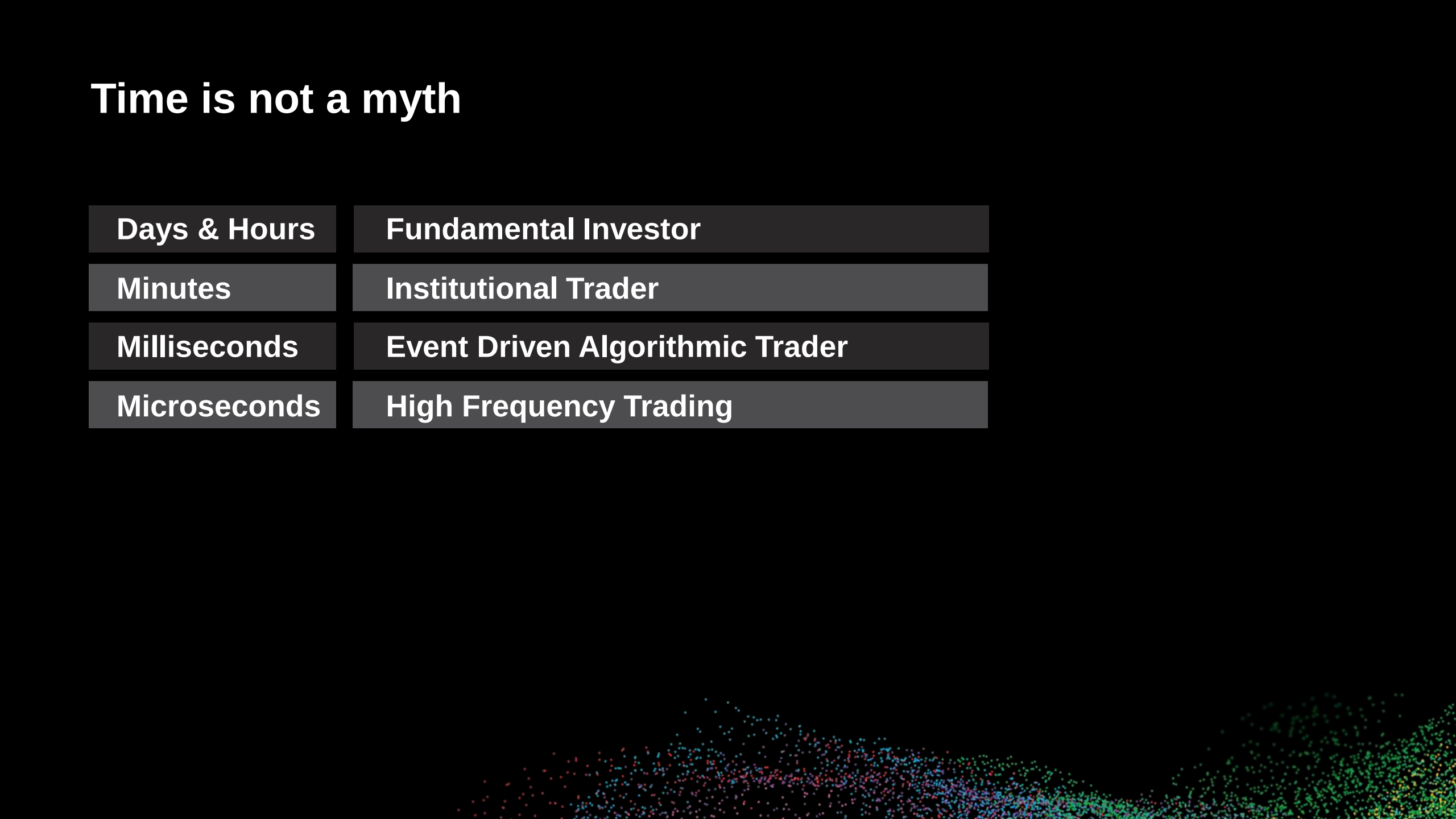
Human Language Technology, not Renaissance Technologies





Time is not a myth

Days & Hours	Fundamental Investor
Minutes	Institutional Trader
Milliseconds	Event Driven Algorithmic Trader
Microseconds	High Frequency Trading



Detection

New text arrives

Extraction

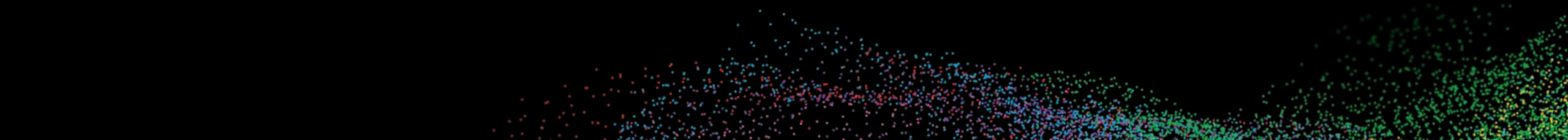
Extract structured data from text

Interpretation

Relate new data to existing data

Presentation

Inform the user on what happened



Detection

Extraction

Interpretation

Presentation

Document ingest and search

Twitter: Ranking financial tweets

[Ceccarelli, Nidito, Osborne 2016]

A disaster in the White House is huge

Over $136 billion was wiped out in minutes

Credibility

Twitter: Geolocation credibility

[Preotiuc-Pietro, Guntuku, Ungar 2017]
[Preotiuc-Pietro, Liu, Hopkins, Ungar 2017]
[Giorgi, Preoţiuc-Pietro, Buffone, Rieman, Ungar Schwartz 2018]
[Dredze, Osborne, Kambadur 2016]

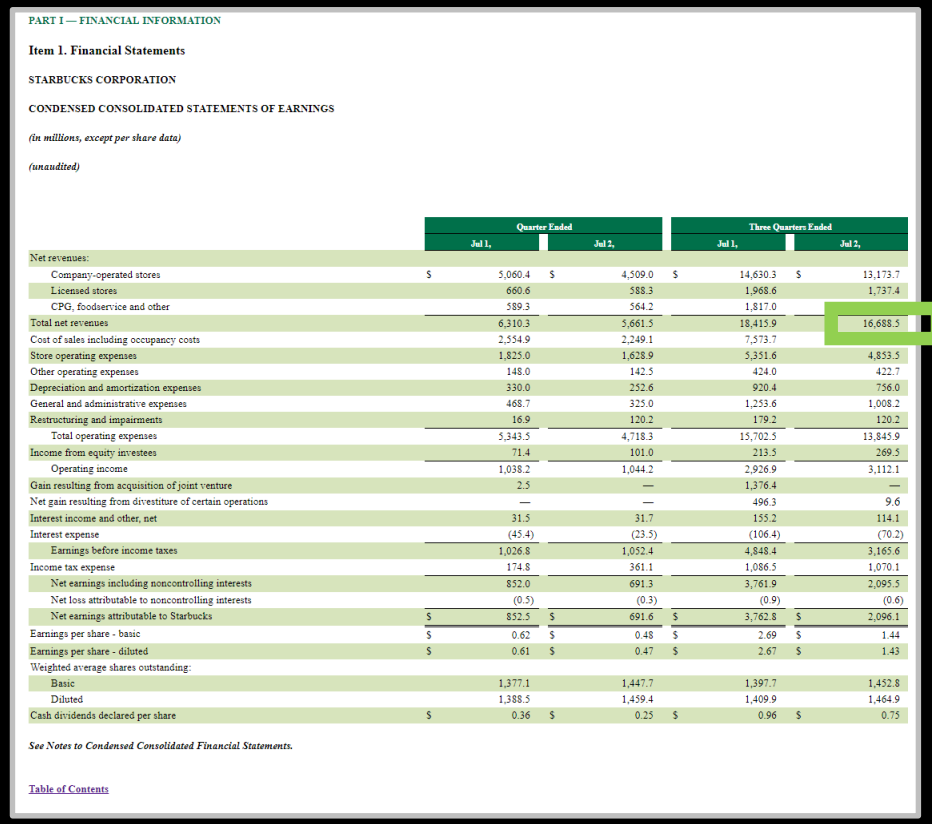
Detection

Extraction

Interpretation

Presentation

Extraction from natural documents



PART I — FINANCIAL INFORMATION

Item 1. Financial Statements

STARBUCKS CORPORATION

CONDENSED CONSOLIDATED STATEMENTS OF EARNINGS

(in millions, except per share data)

(unaudited)

	Quarter Ended		Three Quarters Ended	
	Jul 1,	Jul 2,	Jul 1,	Jul 2,
Net revenues:				
Company-operated stores	$ 5,060.4	$ 4,509.0	$ 14,630.3	$ 13,173.7
Licensed stores	660.6	588.3	1,968.6	1,737.4
CPG, foodservice and other	589.3	564.2	1,817.0	
Total net revenues	6,310.3	5,661.5	18,415.9	16,688.5
Cost of sales including occupancy costs	2,554.9	2,249.1	7,573.7	
Store operating expenses	1,825.0	1,628.9	5,351.6	4,853.5
Other operating expenses	148.0	142.5	424.0	422.7
Depreciation and amortization expenses	330.0	252.6	920.4	756.0
General and administrative expenses	468.7	325.0	1,253.6	1,008.2
Restructuring and impairments	16.9	120.2	179.2	120.2
Total operating expenses	5,343.5	4,718.3	15,702.5	13,845.9
Income from equity investees	71.4	101.0	213.5	269.5
Operating income	1,038.2	1,044.2	2,926.9	3,112.1
Gain resulting from acquisition of joint venture	2.5	—	1,376.4	—
Net gain resulting from divestiture of certain operations	—	—	496.3	9.6
Interest income and other, net	31.5	31.7	155.2	114.1
Interest expense	(45.4)	(23.5)	(106.4)	(70.2)
Earnings before income taxes	1,026.8	1,052.4	4,848.4	3,165.6
Income tax expense	174.8	361.1	1,086.5	1,070.1
Net earnings including noncontrolling interests	852.0	691.3	3,761.9	2,095.5
Net loss attributable to noncontrolling interests	(0.5)	(0.3)	(0.9)	(0.6)
Net earnings attributable to Starbucks	$ 852.5	$ 691.6	$ 3,762.8	$ 2,096.1
Earnings per share - basic	$ 0.62	$ 0.48	$ 2.69	$ 1.44
Earnings per share - diluted	$ 0.61	$ 0.47	$ 2.67	$ 1.43
Weighted average shares outstanding:				
Basic	1,377.1	1,447.7	1,397.7	1,452.8
Diluted	1,388.5	1,459.4	1,409.9	1,464.9
Cash dividends declared per share	$ 0.36	$ 0.25	$ 0.96	$ 0.75

See Notes to Condensed Consolidated Financial Statements.

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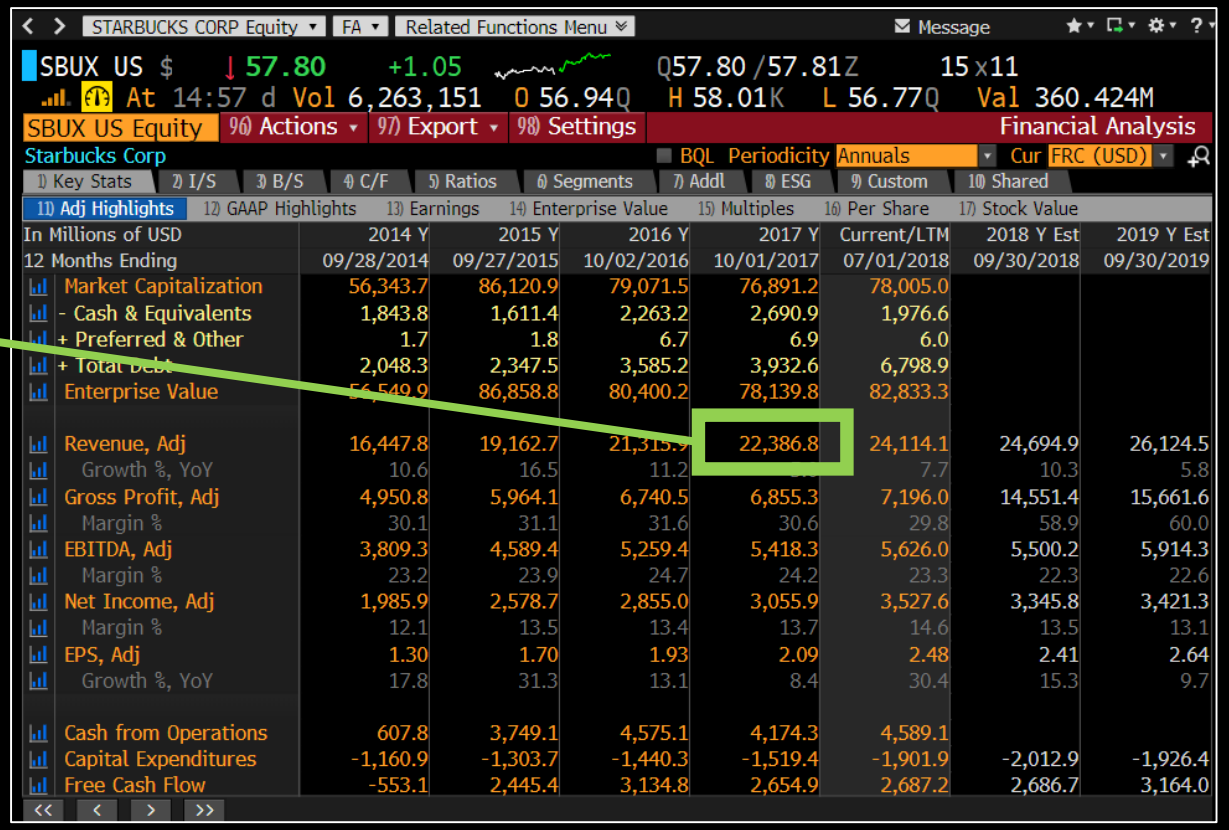


STARBUCKS CORP Equity ▾ | FA ▾ | Related Functions Menu ▾ | Message

SBUX US $ 57.80 +1.05 Q57.80 /57.81Z 15 x11

At 14:57 d Vol 6,263,151 O 56.94Q H 58.01K L 56.77Q Val 360.424M

SBUX US Equity | 96) Actions ▾ | 97) Export ▾ | 98) Settings | Financial Analysis

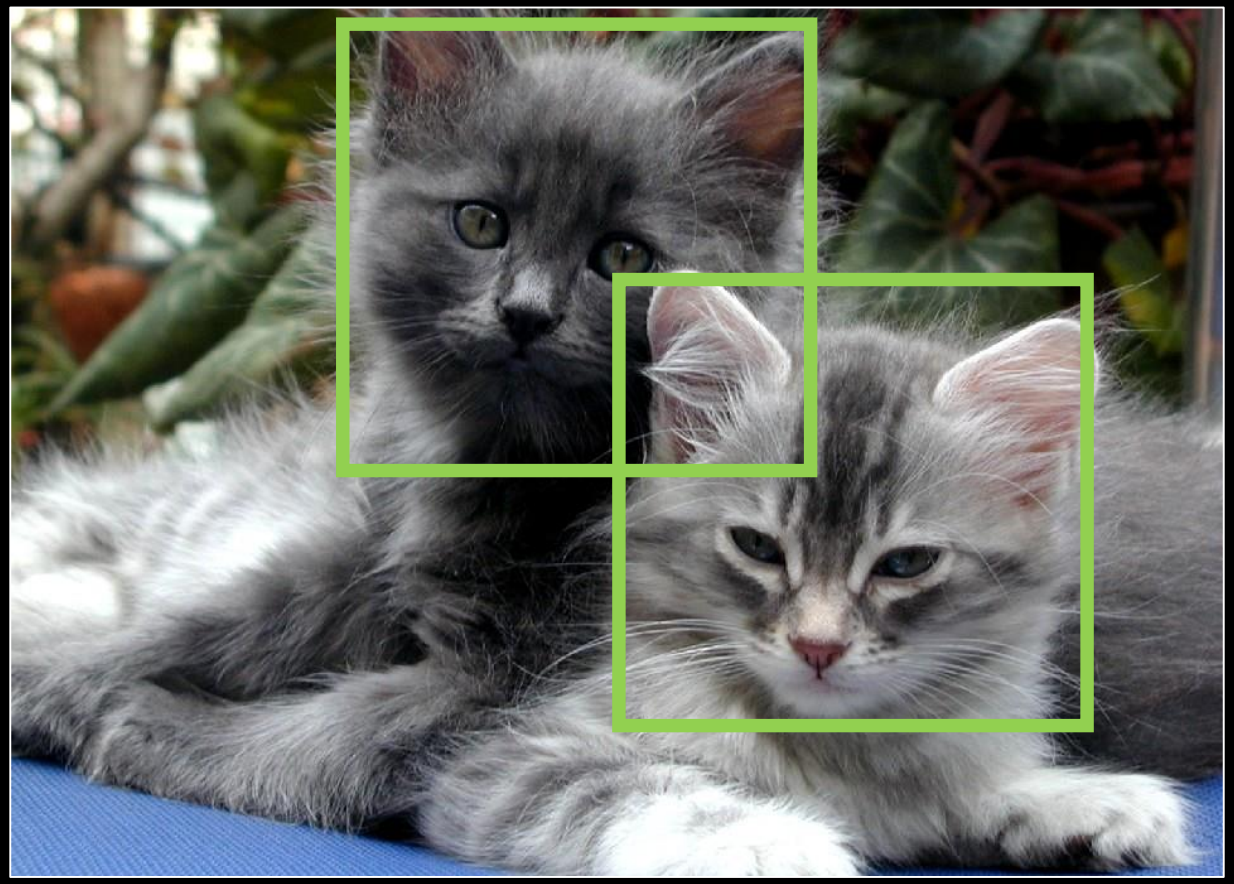
Starbucks Corp | BQL Periodicity Annuals | Cur FRC (USD)

1) Key Stats | 2) I/S | 3) B/S | 4) C/F | 5) Ratios | 6) Segments | 7) Addl | 8) ESG | 9) Custom | 10) Shared

11) Adj Highlights | 12) GAAP Highlights | 13) Earnings | 14) Enterprise Value | 15) Multiples | 16) Per Share | 17) Stock Value

In Millions of USD 12 Months Ending	2014 Y 09/28/2014	2015 Y 09/27/2015	2016 Y 10/02/2016	2017 Y 10/01/2017	Current/LTM 07/01/2018	2018 Y Est 09/30/2018	2019 Y Est 09/30/2019
Market Capitalization	56,343.7	86,120.9	79,071.5	76,891.2	78,005.0		
- Cash & Equivalents	1,843.8	1,611.4	2,263.2	2,690.9	1,976.6		
+ Preferred & Other	1.7	1.8	6.7	6.9	6.0		
+ Total Debt	2,048.3	2,347.5	3,585.2	3,932.6	6,798.9		
Enterprise Value	56,549.9	86,858.8	80,400.2	78,139.8	82,833.3		
Revenue, Adj	16,447.8	19,162.7	21,315.9	22,386.8	24,114.1	24,694.9	26,124.5
Growth %, YoY	10.6	16.5	11.2		7.7	10.3	5.8
Gross Profit, Adj	4,950.8	5,964.1	6,740.5	6,855.3	7,196.0	14,551.4	15,661.6
Margin %	30.1	31.1	31.6	30.6	29.8	58.9	60.0
EBITDA, Adj	3,809.3	4,589.4	5,259.4	5,418.3	5,626.0	5,500.2	5,914.3
Margin %	23.2	23.9	24.7	24.2	23.3	22.3	22.6
Net Income, Adj	1,985.9	2,578.7	2,855.0	3,055.9	3,527.6	3,345.8	3,421.3
Margin %	12.1	13.5	13.4	13.7	14.6	13.5	13.1
EPS, Adj	1.30	1.70	1.93	2.09	2.48	2.41	2.64
Growth %, YoY	17.8	31.3	13.1	8.4	30.4	15.3	9.7
Cash from Operations	607.8	3,749.1	4,575.1	4,174.3	4,589.1		
Capital Expenditures	-1,160.9	-1,303.7	-1,440.3	-1,519.4	-1,901.9	-2,012.9	-1,926.4
Free Cash Flow	-553.1	2,445.4	3,134.8	2,654.9	2,687.2	2,686.7	3,164.0

Cats all the way down



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Other operating expenses	148.0	142.5	424.0	422.7
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Net gain resulting from divestiture of certain operations	—	—	496.3	9.6
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Basic	1,377.1	1,447.7	1,397.7	1,452.8
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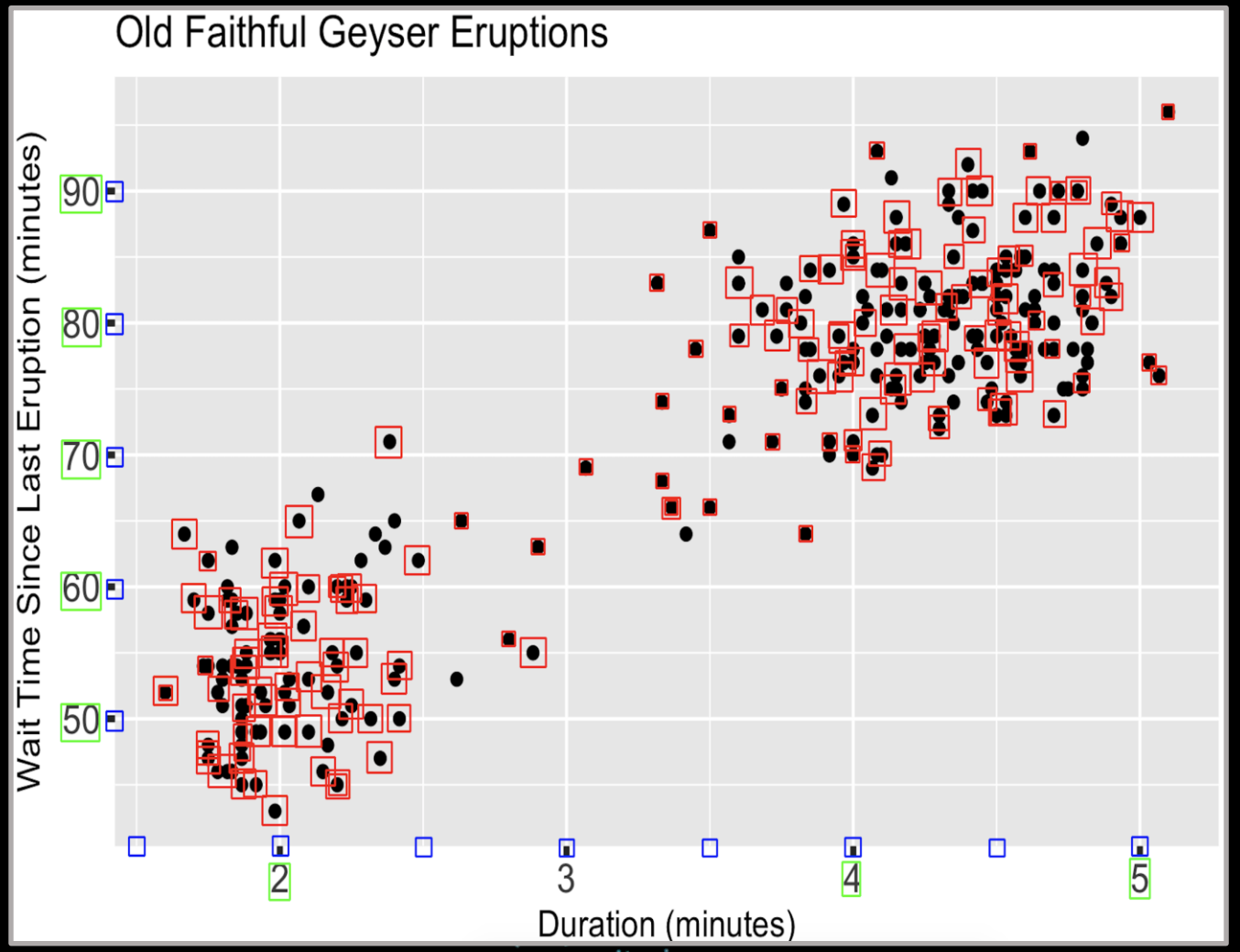
Scatteract

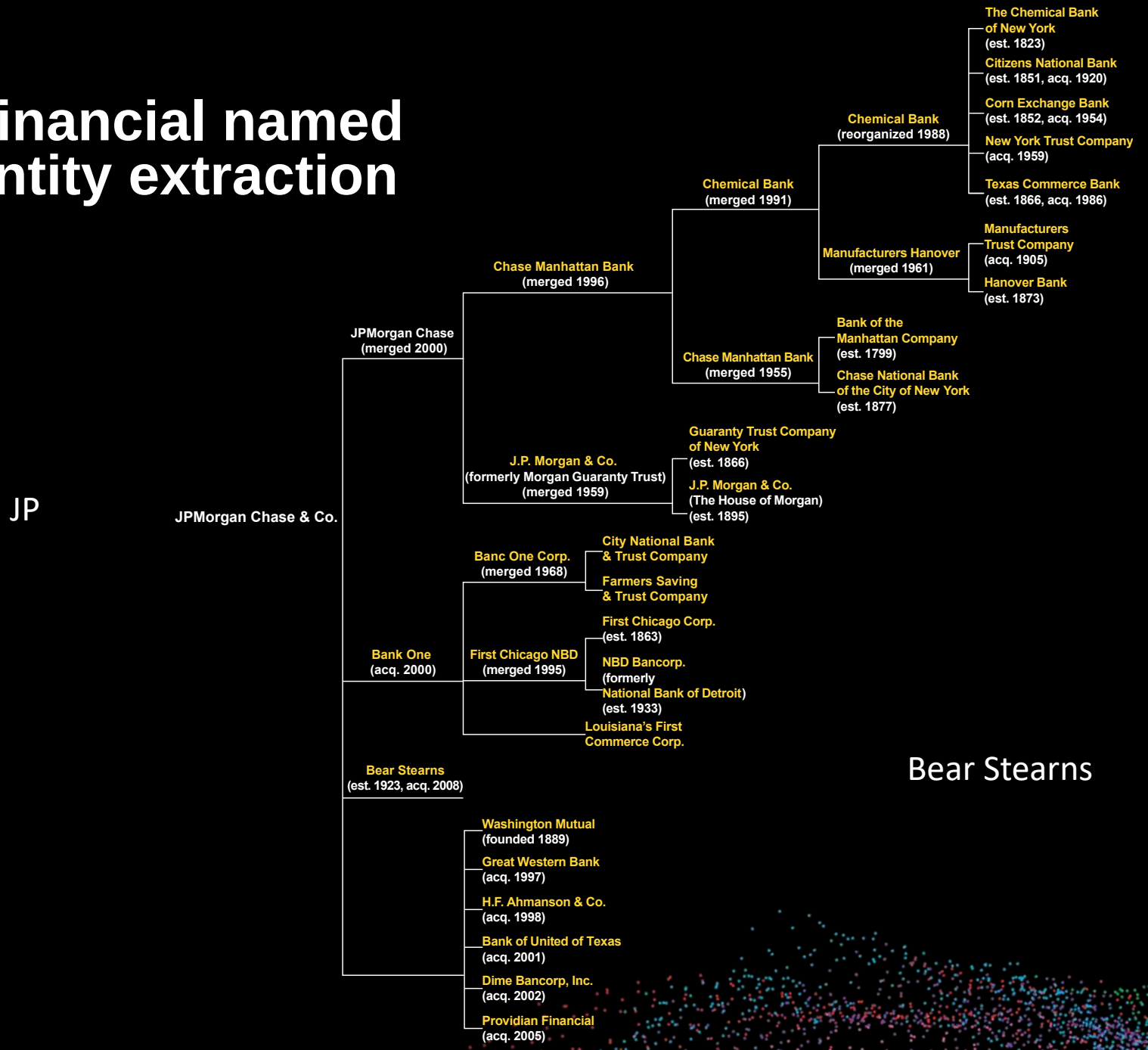


[Cliche, Rosenberg, Madeka, Yee 2017]

How Bill O’Reilly leaving Fox fired up O’Reilly Auto Parts stock

[Yang, Irsoy, Rahman 2018]
[Tsai, Roth 2018]

Financial named entity extraction



More data, more distant supervision for fact extraction

Starbucks reports **2017** fourth-quarter and three-month trailing results

Three-month trailing results
Three-month trailing net revenue of $16,688.53

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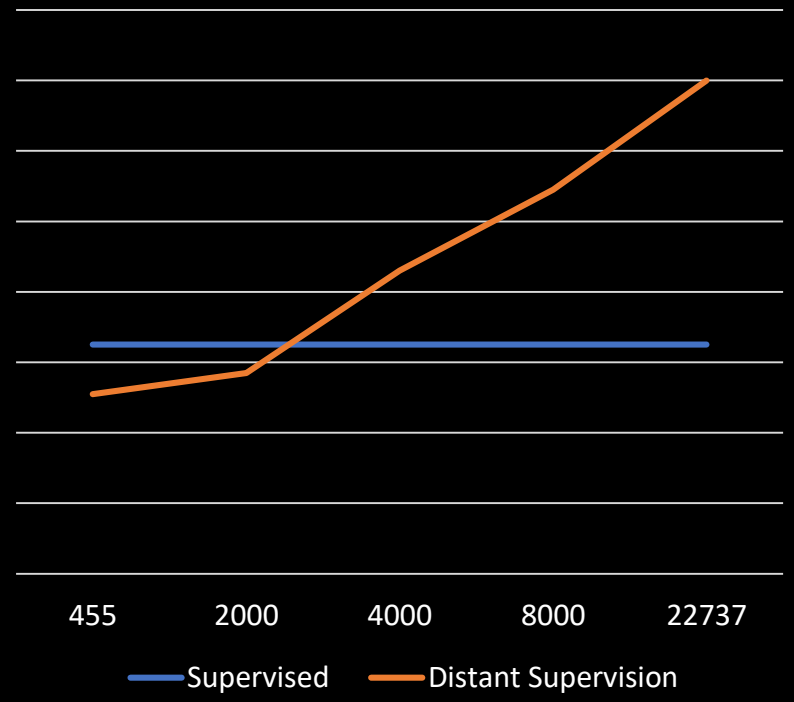


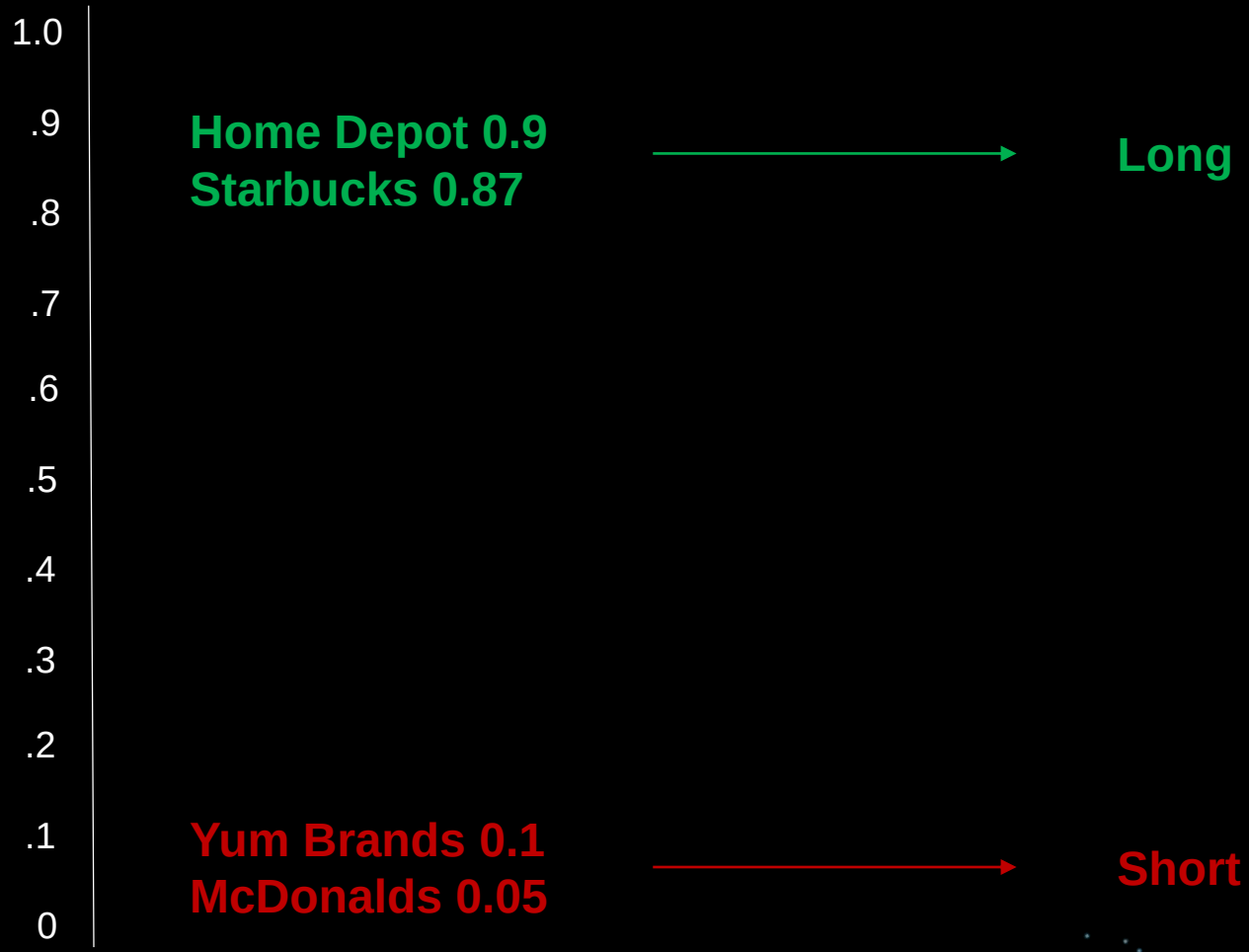
[Meerkamp, Zhou, 2017]

Detection
Extraction
Interpretation
Presentation

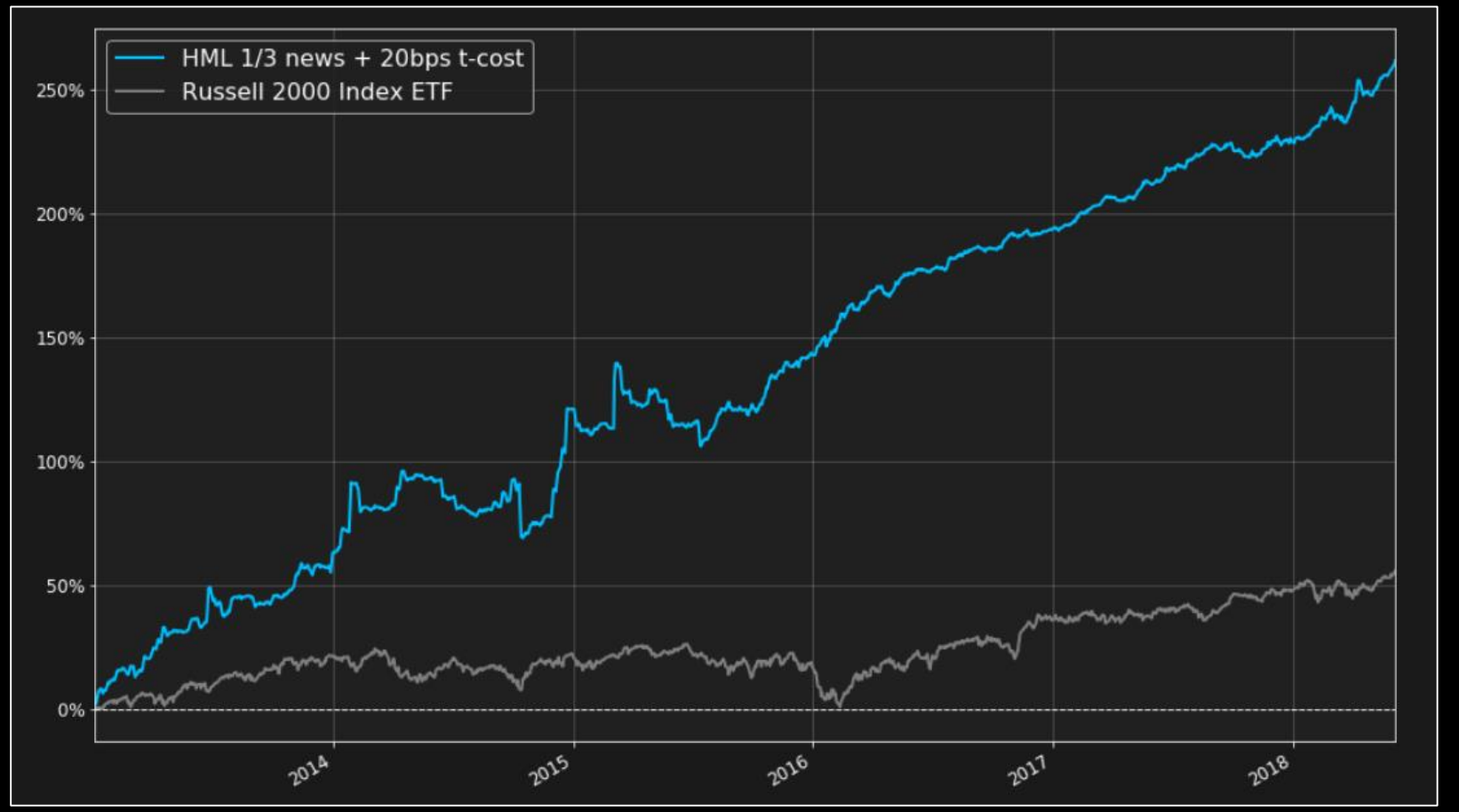
Sanford Bernstein's Toni Sacconaghi: "And so where specifically will you be in terms of capital requirements?"

Musk "Excuse me. Next. Boring, bonehead questions are not cool. Next?"

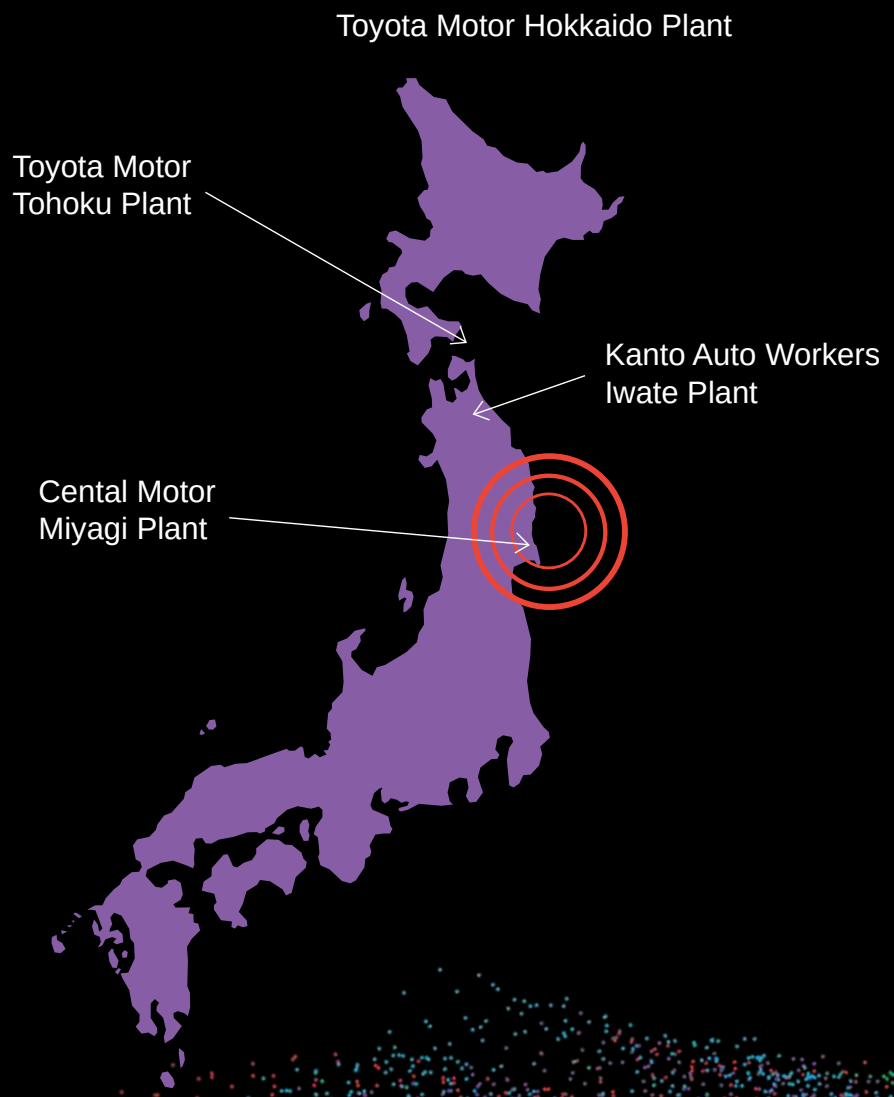
Constructing portfolio from a statistic: factor loading



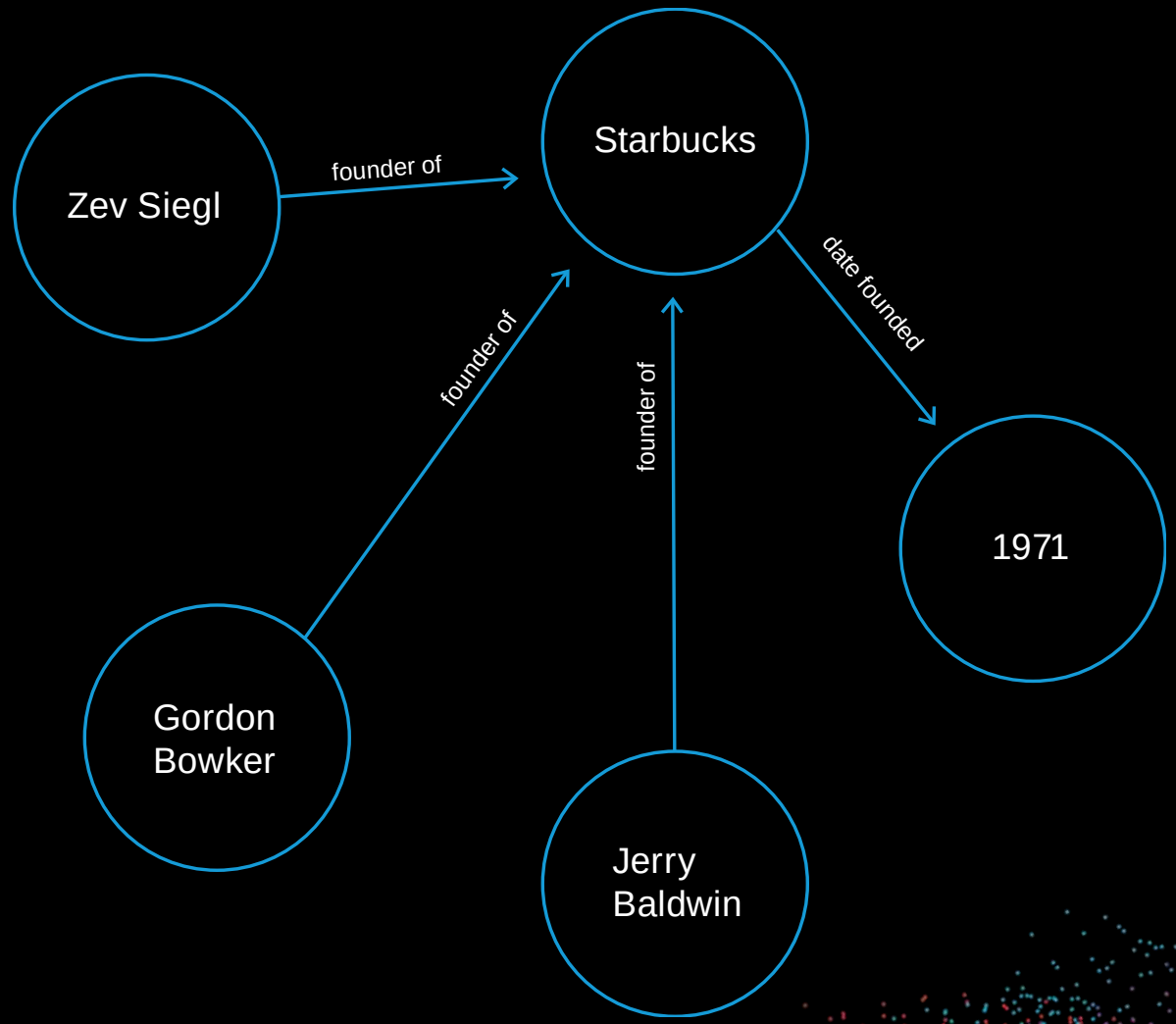
Sentiment Alpha: Russell 2000



March 11, 2011: Earthquake in Japan



Explaining Knowledge Graph relationships



“In **1971**, **Siegl**, **Bowker** and **Baldwin** established the **Starbucks** Coffee Company.”

[Stefanoni, Motik, Kostylev 2018]
[Abujabal, Roy, Yahya 2018]
[Voskarides, Meij, Reinanda, Khaitan, Osborne, Stefanoni, Kambadur, Rijke, 2018]
[Voskarides, Meij, Rijke 2017]

Detection

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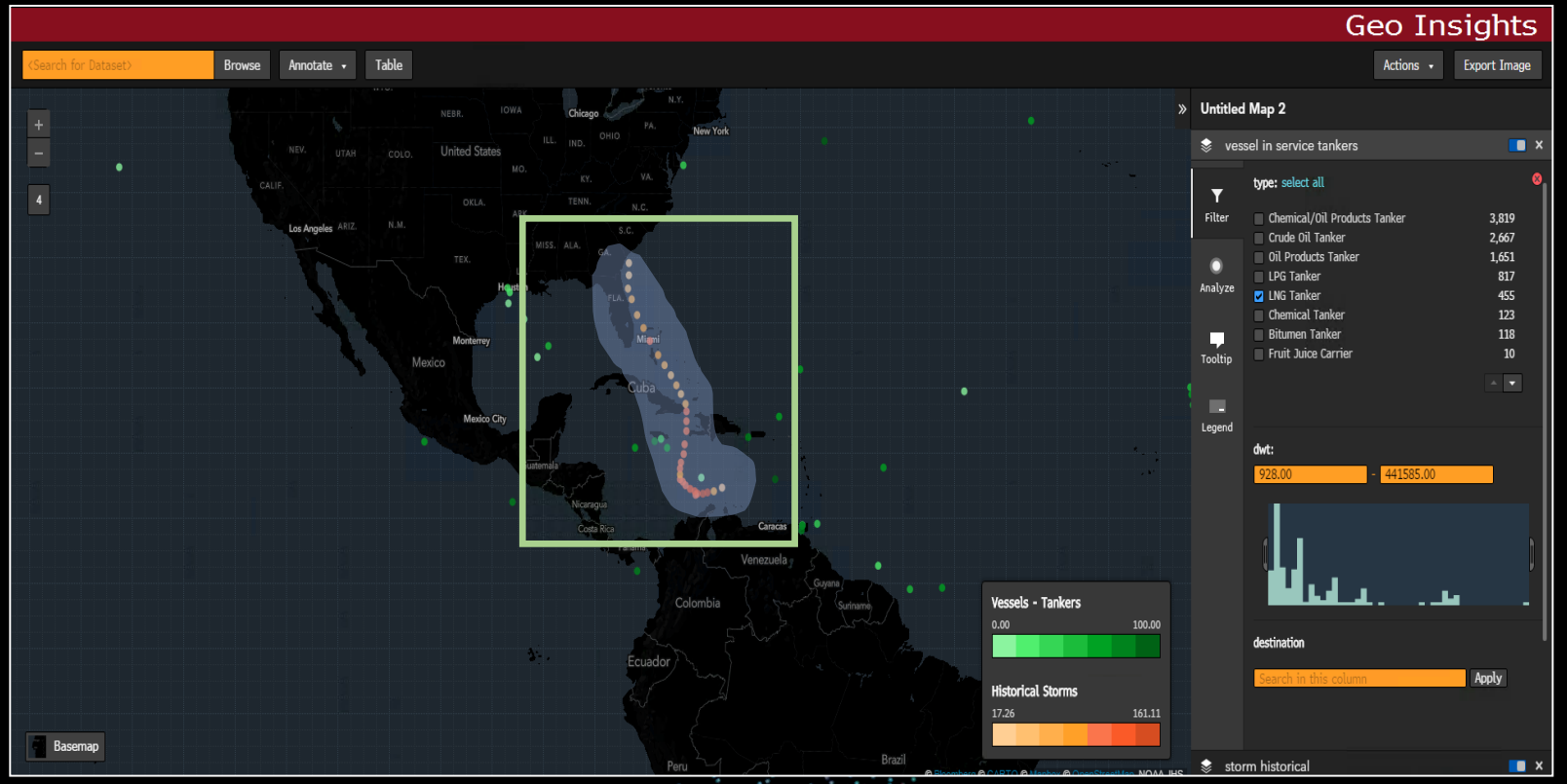


Automated news

Starbucks Shares Fall After Chain's U.S. Sales Disappoint Again

By Leslie Patton

DEEP ECO: Starbucks Pressured, Industry Sales Slowest in 8 Yrs

By Bloomberg Automation | Feedback?

(Bloomberg) -- Starbucks Corp.'s revenue may be pressured after a U.S. Census Bureau report showed limited-service eating places nominal retail sales fell 0.1 percent in November, the first decrease in eight years.

- The monthly report may provide an indication of the performance of companies in the industry Bloomberg classifies as limited service restaurants; Starbucks gets 89 percent of its revenue from this industry.
- Analysts estimate the company's revenue will rise 8.2 percent in the current fiscal quarter.
- This retail sales index was up 1 percent in the first two months of the company's current fiscal quarter.
- Starbucks' first quarter started on Oct. 2, 2017.
- In the past six years, Starbucks' revenue has had a 0.7 correlation with this index, according to data compiled by Bloomberg.

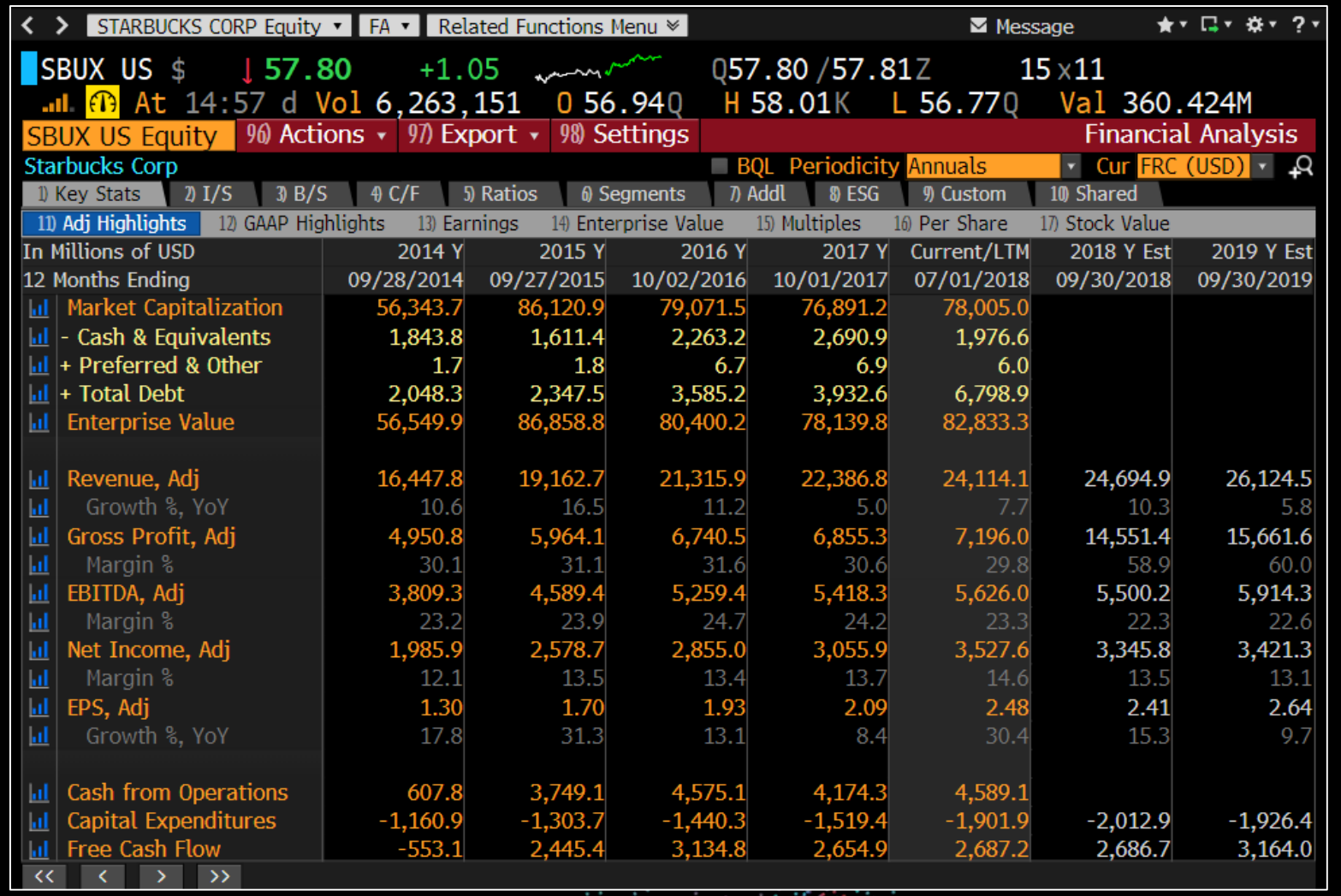
SBUX US Equity
Graphic Dashboard»

1M Imp Vol 3M
28.07

Top Contacts
Bijan Segha...
Nimish Patel
Joanna Fowl...
Steven Wats...
Gregg E Irel...

News on demand

NL QA / structured extraction from databases



STARBUCKS CORP Equity | FA | Related Functions Menu | Message

SBUX US $ ↓ 57.80 +1.05 Q57.80 /57.81Z 15 x11

At 14:57 d Vol 6,263,151 O 56.94Q H 58.01K L 56.77Q Val 360.424M

SBUX US Equity | 96) Actions | 97) Export | 98) Settings | Financial Analysis

Starbucks Corp | BQL | Periodicity Annuals | Cur FRC (USD)

1) Key Stats | 2) I/S | 3) B/S | 4) C/F | 5) Ratios | 6) Segments | 7) Addl | 8) ESG | 9) Custom | 10) Shared

11) Adj Highlights | 12) GAAP Highlights | 13) Earnings | 14) Enterprise Value | 15) Multiples | 16) Per Share | 17) Stock Value

In Millions of USD	2014 Y	2015 Y	2016 Y	2017 Y	Current/LTM	2018 Y Est	2019 Y Est
12 Months Ending	09/28/2014	09/27/2015	10/02/2016	10/01/2017	07/01/2018	09/30/2018	09/30/2019
Market Capitalization	56,343.7	86,120.9	79,071.5	76,891.2	78,005.0		
- Cash & Equivalents	1,843.8	1,611.4	2,263.2	2,690.9	1,976.6		
+ Preferred & Other	1.7	1.8	6.7	6.9	6.0		
+ Total Debt	2,048.3	2,347.5	3,585.2	3,932.6	6,798.9		
Enterprise Value	56,549.9	86,858.8	80,400.2	78,139.8	82,833.3		
Revenue, Adj	16,447.8	19,162.7	21,315.9	22,386.8	24,114.1	24,694.9	26,124.5
Growth %, YoY	10.6	16.5	11.2	5.0	7.7	10.3	5.8
Gross Profit, Adj	4,950.8	5,964.1	6,740.5	6,855.3	7,196.0	14,551.4	15,661.6
Margin %	30.1	31.1	31.6	30.6	29.8	58.9	60.0
EBITDA, Adj	3,809.3	4,589.4	5,259.4	5,418.3	5,626.0	5,500.2	5,914.3
Margin %	23.2	23.9	24.7	24.2	23.3	22.3	22.6
Net Income, Adj	1,985.9	2,578.7	2,855.0	3,055.9	3,527.6	3,345.8	3,421.3
Margin %	12.1	13.5	13.4	13.7	14.6	13.5	13.1
EPS, Adj	1.30	1.70	1.93	2.09	2.48	2.41	2.64
Growth %, YoY	17.8	31.3	13.1	8.4	30.4	15.3	9.7
Cash from Operations	607.8	3,749.1	4,575.1	4,174.3	4,589.1		
Capital Expenditures	-1,160.9	-1,303.7	-1,440.3	-1,519.4	-1,901.9	-2,012.9	-1,926.4
Free Cash Flow	-553.1	2,445.4	3,134.8	2,654.9	2,687.2	2,686.7	3,164.0

[Arkoudas, Yahya 2018]

Detection

News classification and ranking

Topic identification

Twitter user demographics

Twitter geolocation

Extraction

Natural document understanding

Chart understanding

Information extraction

Distant supervision

Interpretation

Event studies

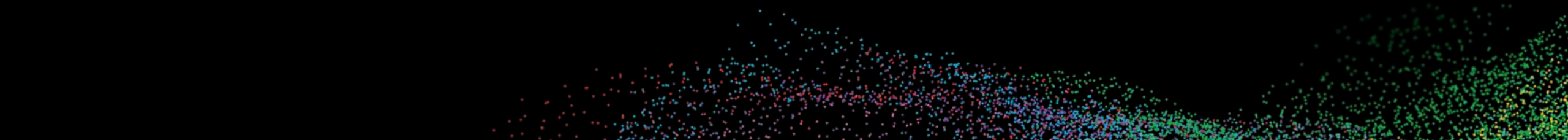
Signal construction

Knowledge graph inference

Presentation

Natural language generation

NL interfaces to databases



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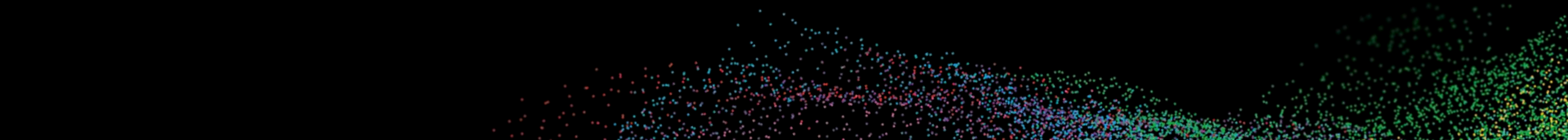
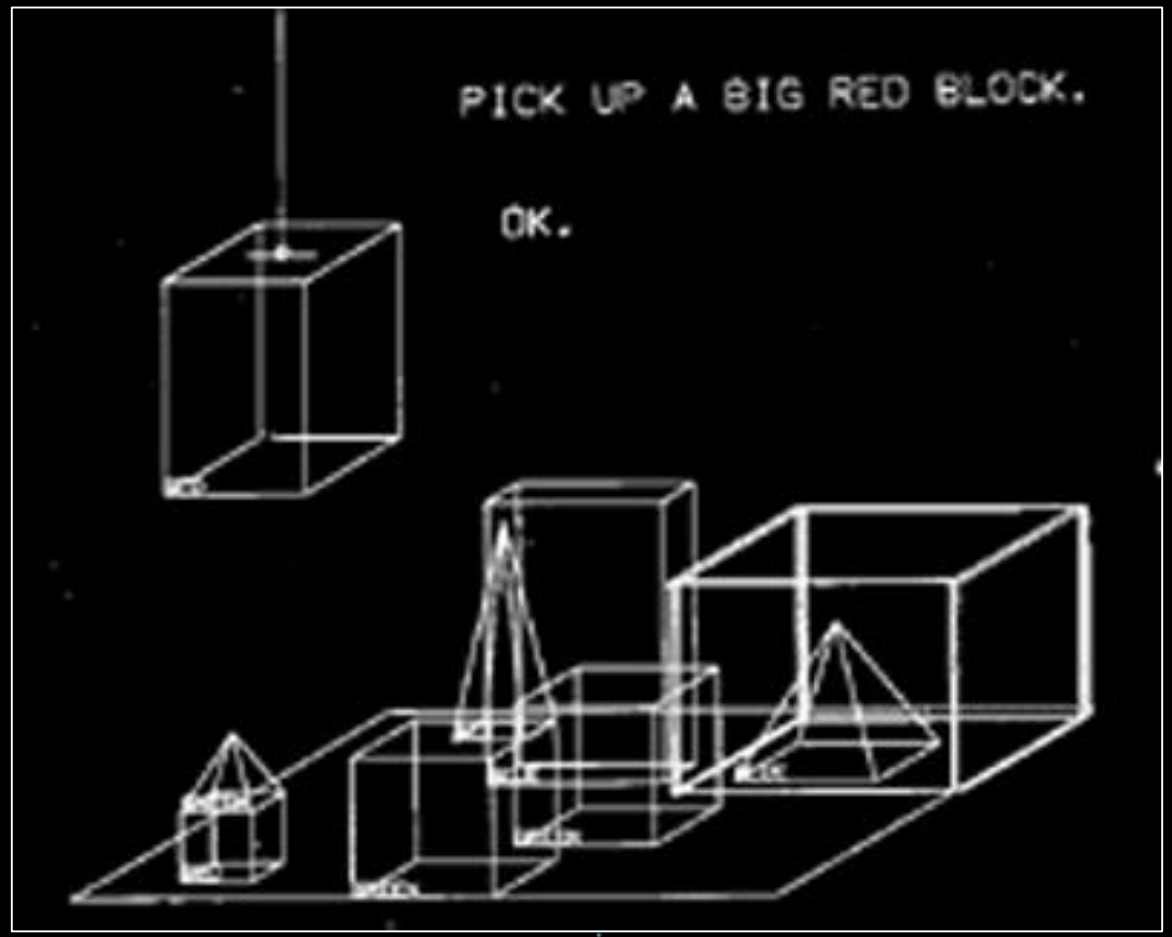
Precision



We’re not in BlocksWorld anymore



Lynette Hirschman on Reading comprehension

“A system has learned from a text if, by reading the text, it is able to answer questions it would not have been able to answer before having access to it.”

More Info:

https://www.TechAtBloomberg.com/NLP

Thank You!

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