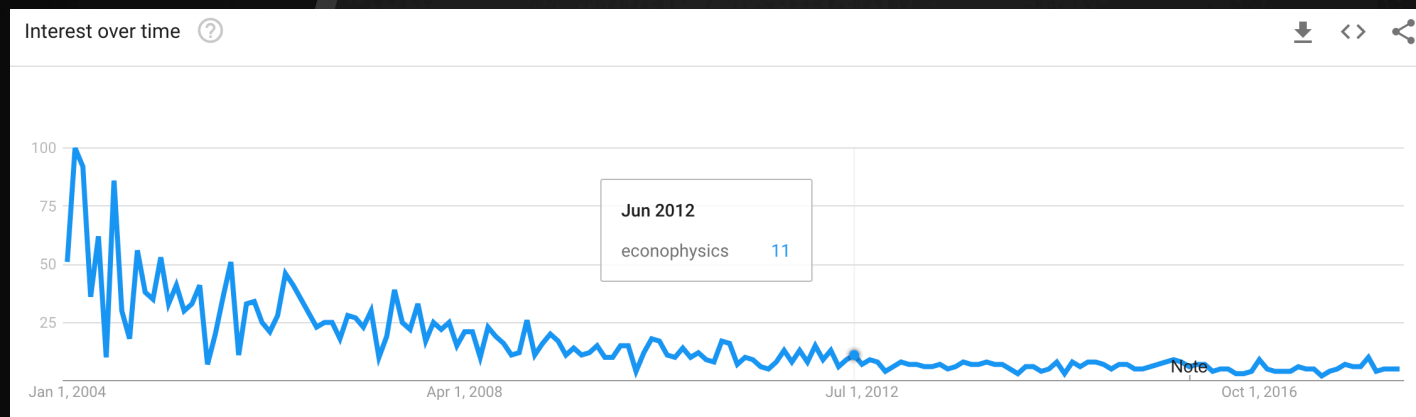


Lessons from a Case Study: Utilizing Google Search Frequency to Compare the Stock Movement Resulting from Data Breaches of Equifax and Facebook

David Zou
PY 538

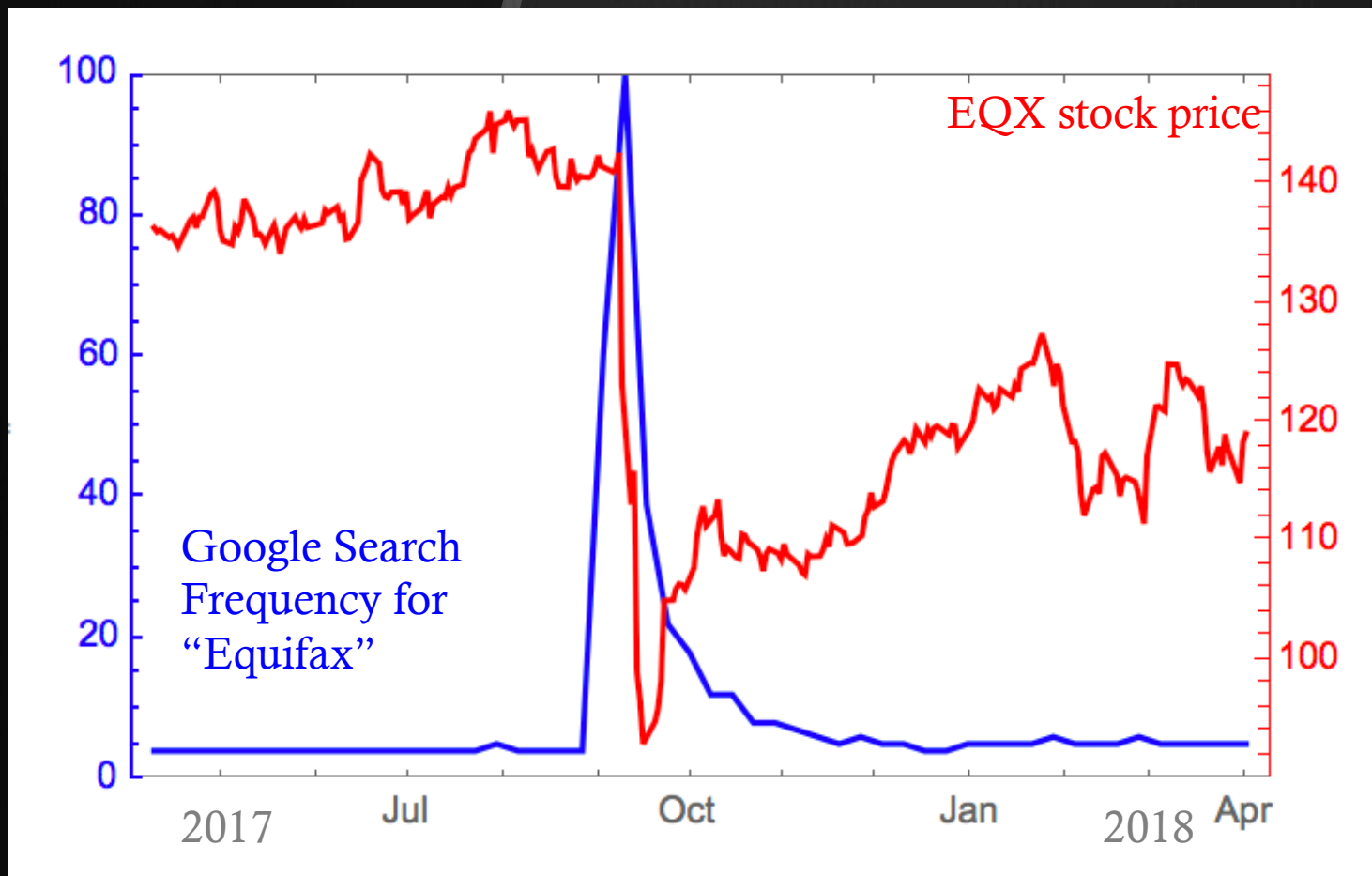
Background: Google Trend

- Google Trends is a free, publically available tool that can be used to track the relative search frequency of a given keyword(s)
- Many studies of shown the predictive power of search trends (including several by our own Professor Stanley)
 - Future orientated inquiries \leftrightarrow higher GDP
 - Increase in financially relevant terms \rightarrow large losses in market
 - Company name \leftrightarrow transaction volume (weekly)



Motivation

- ⦿ Equifax data breach (announced Sept. 7, 2017) (145.5 M affected)
- ⦿ Facebook data breach (May 17, 2018) (87 Million users affected)



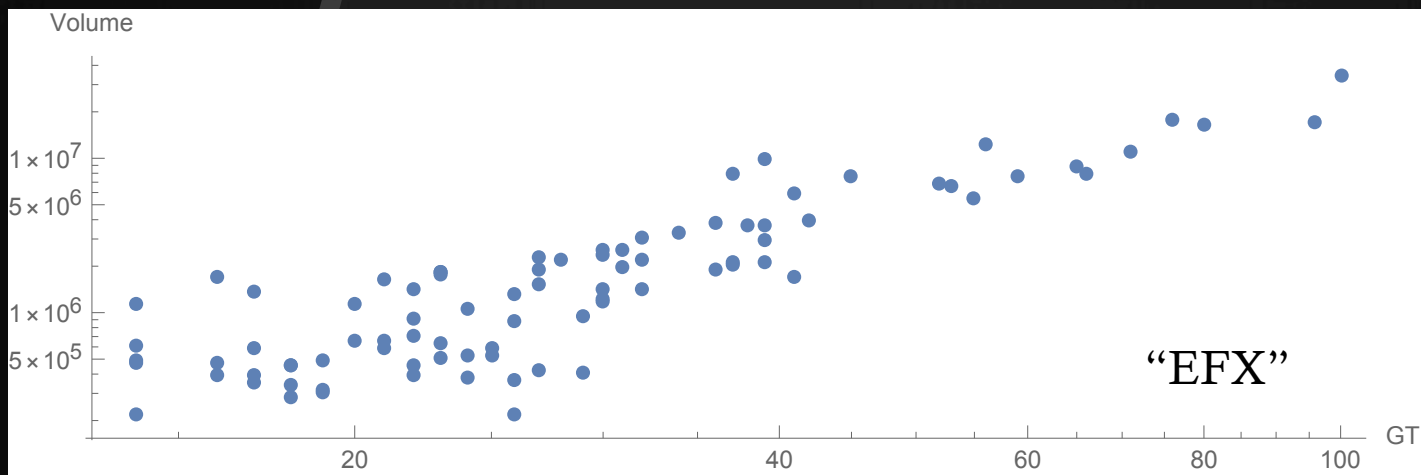
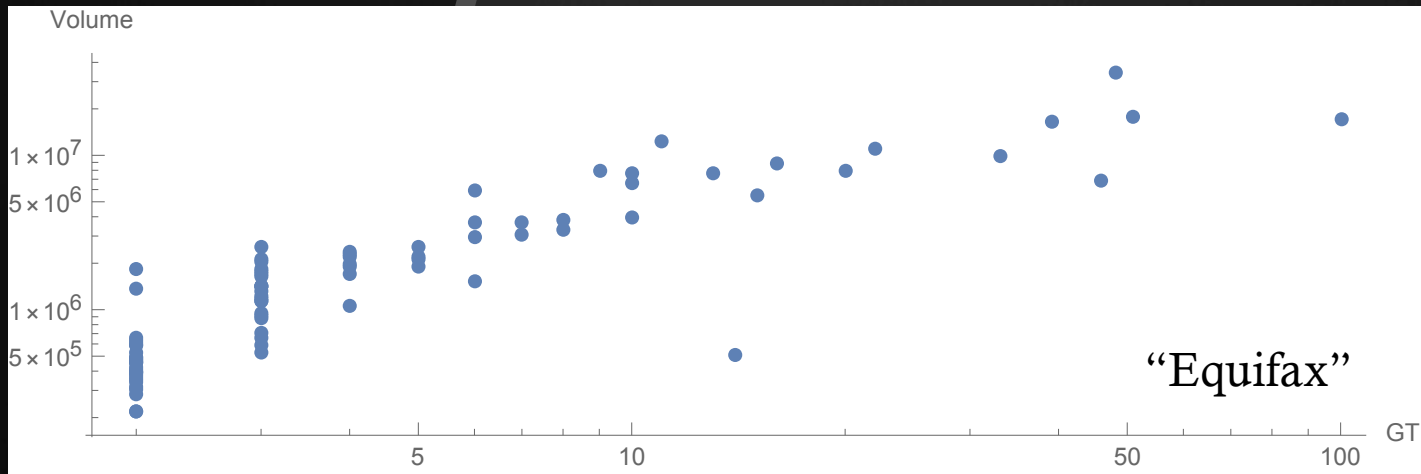
Opening Questions

- Is there a correlation: search volume vs. stock movement?
 - Events that cause price movement → Heighten search interest (both increase and decrease)
 - Data Breaches/Scandals
 - New Product Announcement (e.g. new iPhone)
 - New Leadership
 - Reactions to drastic price movement (feedback loop)
- What features of a company (or stock) might cause this correlation to stronger/weaker?
- What can we learn by exploring specific companies/incidents, e.g. the recent data breaches of Equifax and Facebook



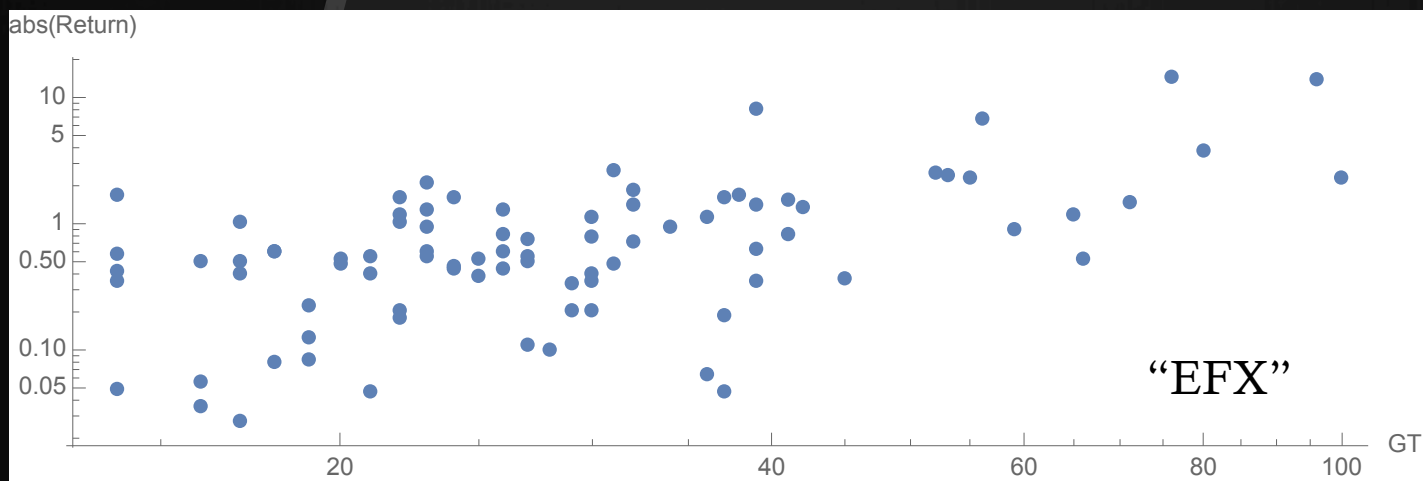
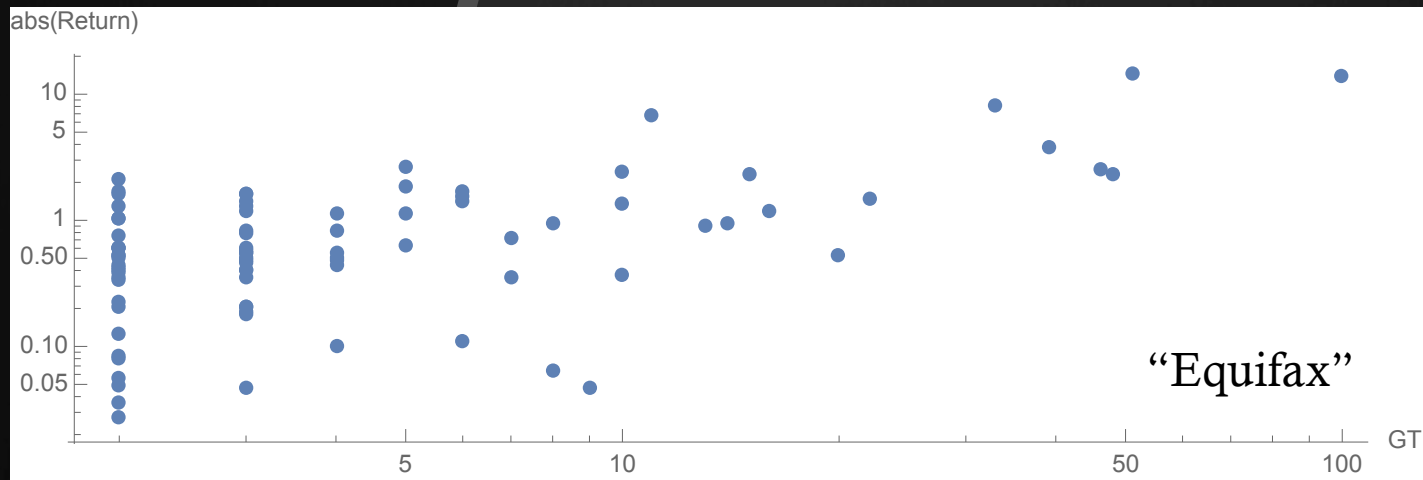
EFX Results: Volume

- Google Trend score vs EFX Volume between (8/1/2017 – 4/3/2018)



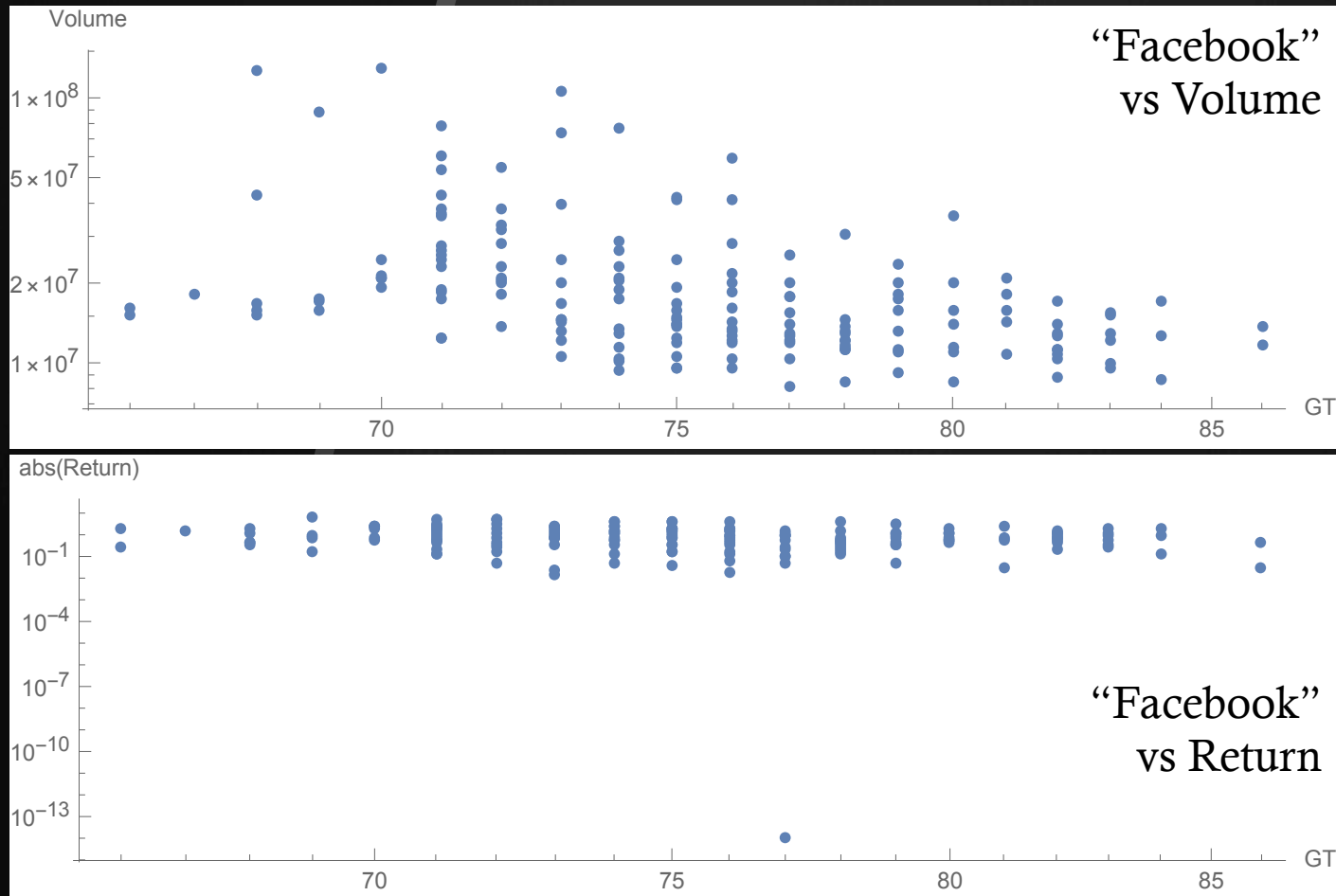
EFX Results: Log Returns

- Google Trend score vs EFX Return between (8/1/2017 – 4/3/2018)



FB Results

- Google Trend score vs FB Volume and Return between (8/1/2017 – 4/3/2018) [data breach announced 3/17/2018]

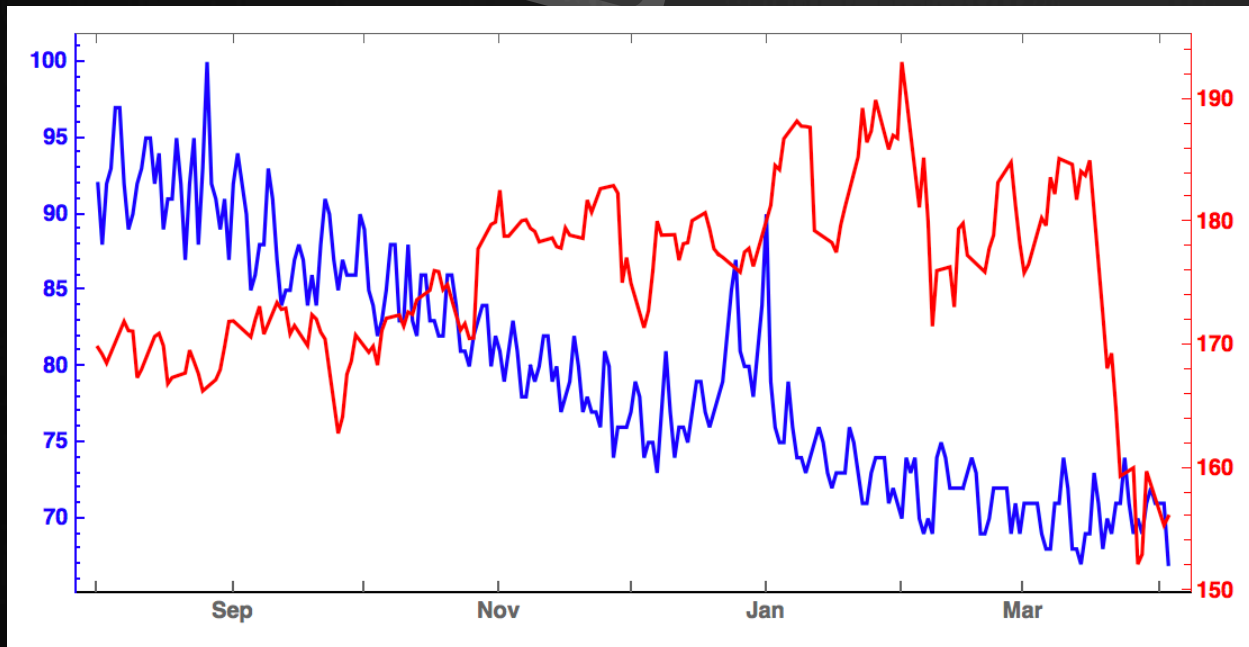


FB Results

- Google Trend score vs FB Volume and Return between (8/1/2017 – 4/3/2018) [data breach announced 3/17/2018]

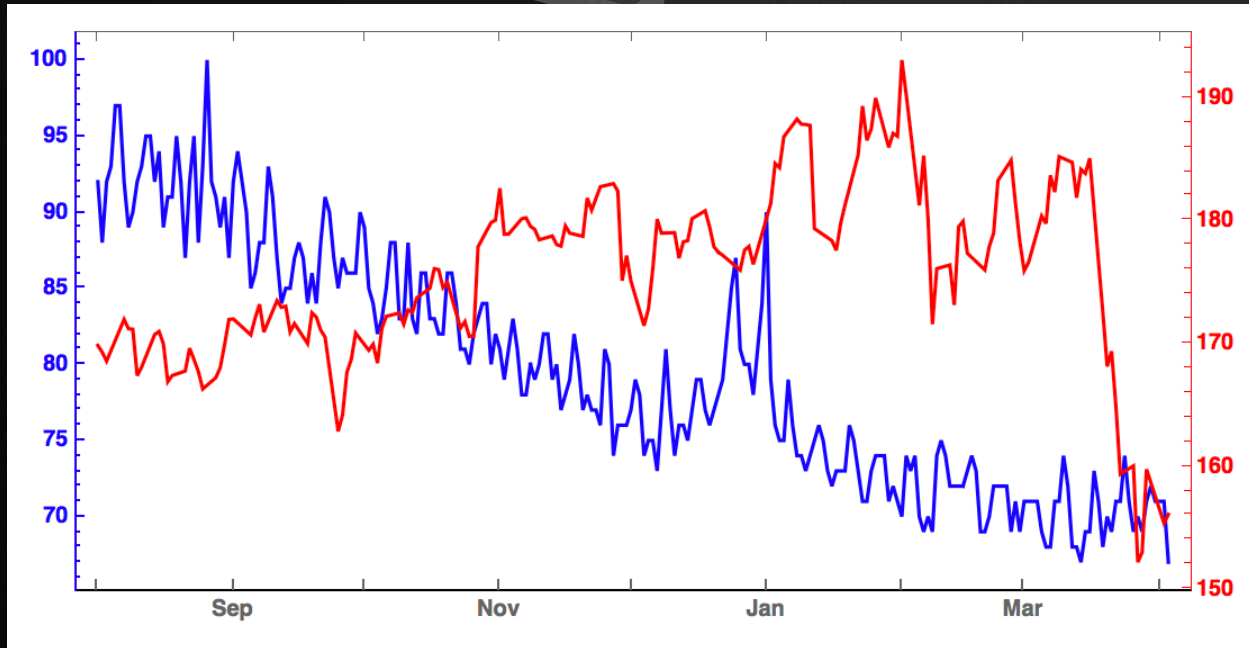


“Facebook” Search Frequency

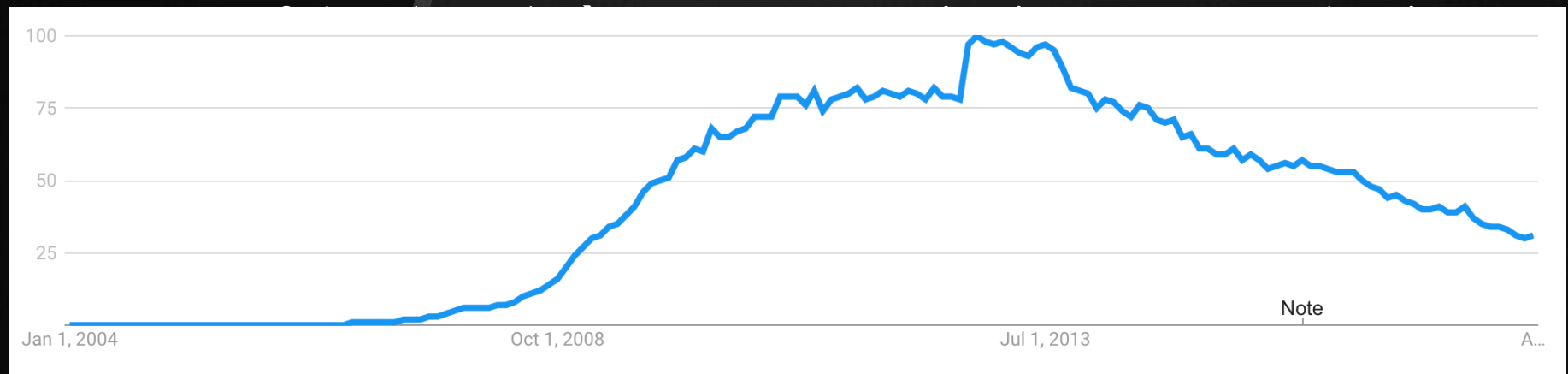


- ⦿ News of data breach → apparent negative impact on stock price
- ⦿ Potential spikes in search frequency overshadowed by normal daily search volume and fluctuations
- ⦿ Significant overall shape/trend in “facebook” search frequency

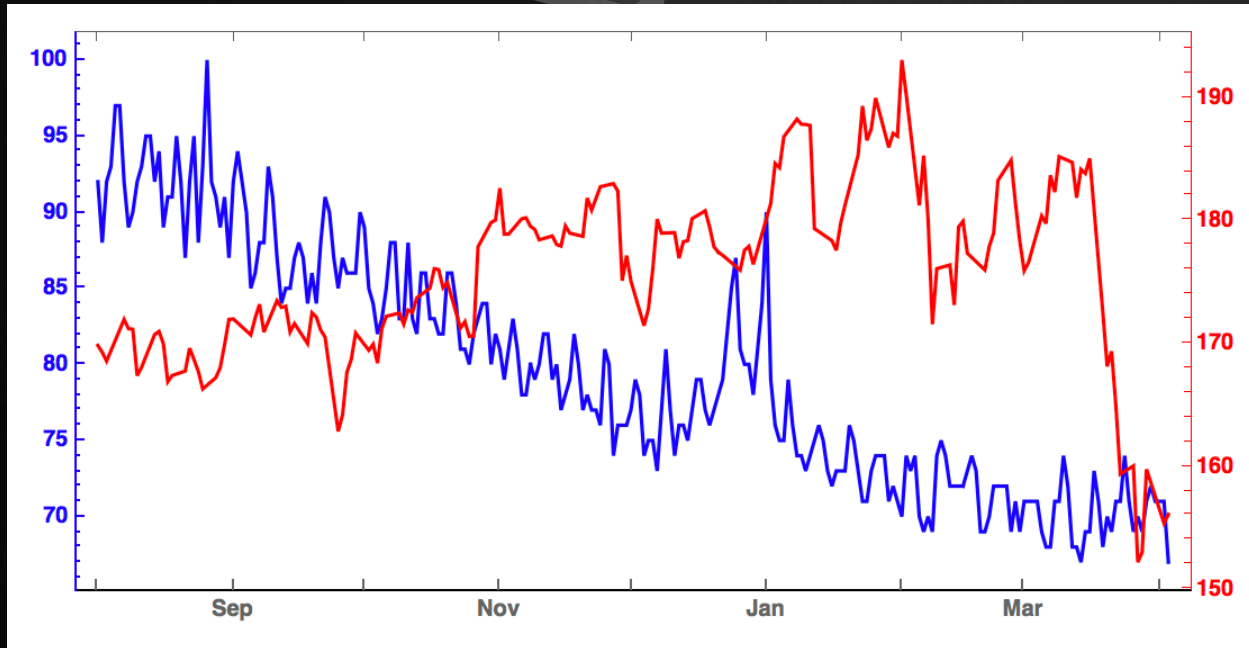
“Facebook” Search Frequency



Keyword	Avg. monthly searches
<u>equifax</u>	368,000
<u>facebook</u>	414,000,000

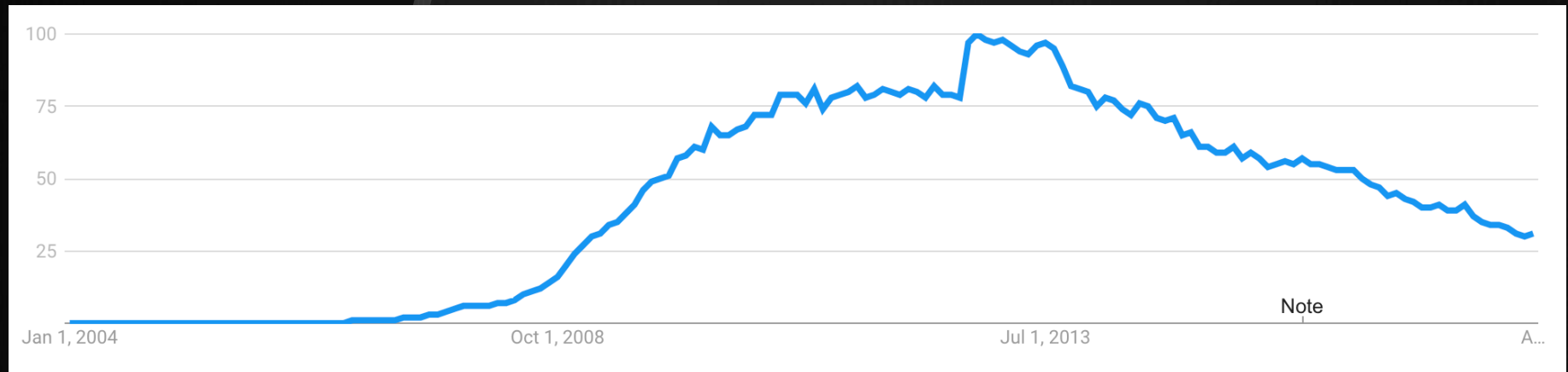


“Facebook” Search Frequency

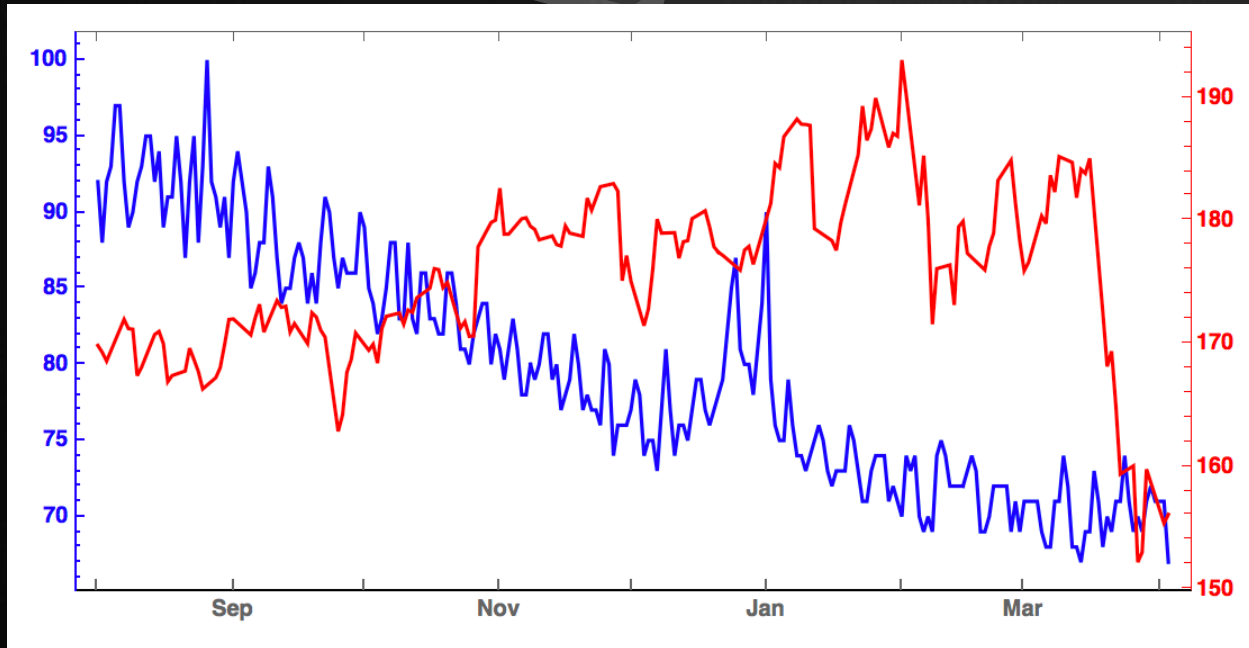


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What if we tried a different keyword?



“Facebook” Search Frequency

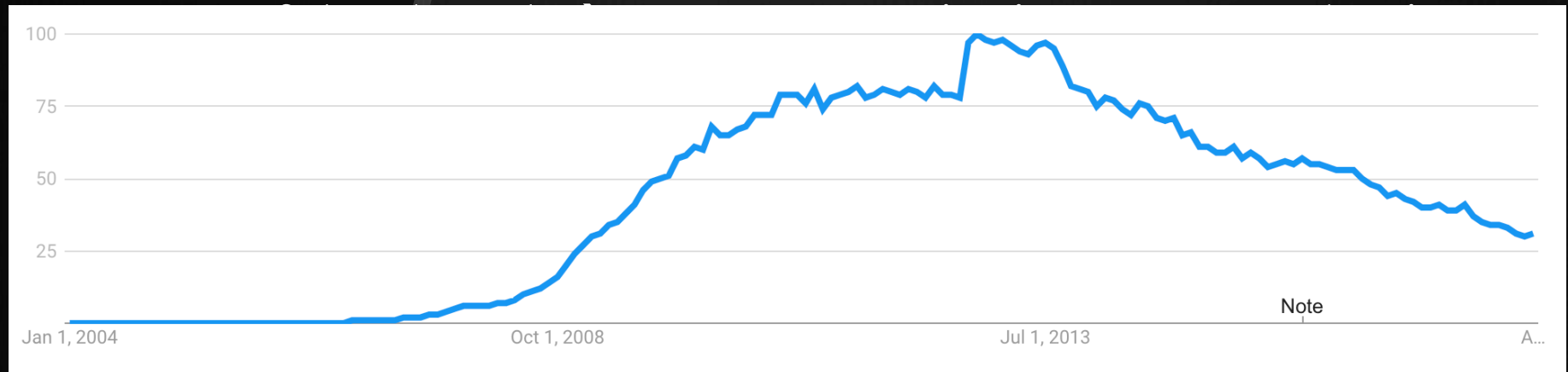


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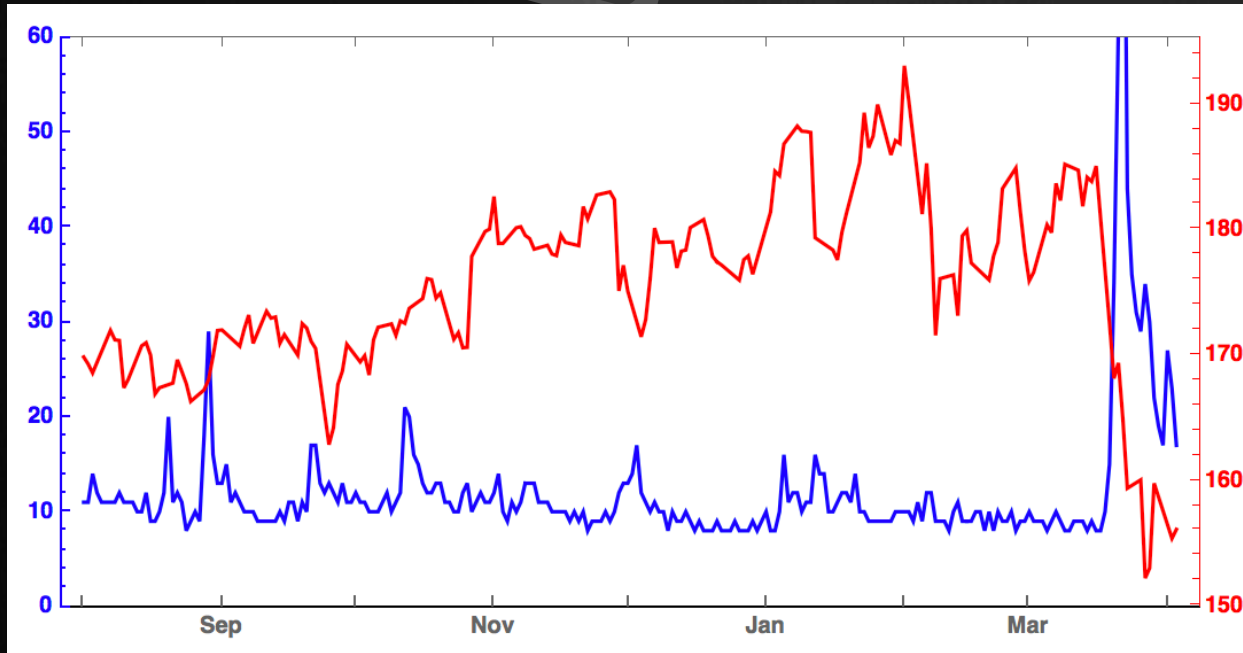
What if we tried a different keyword?

mark zuckerberg 301,000

Co-founder and CEO



“Mark Zuckerberg” Search Frequency



Keyword Avg. monthly searches ▾

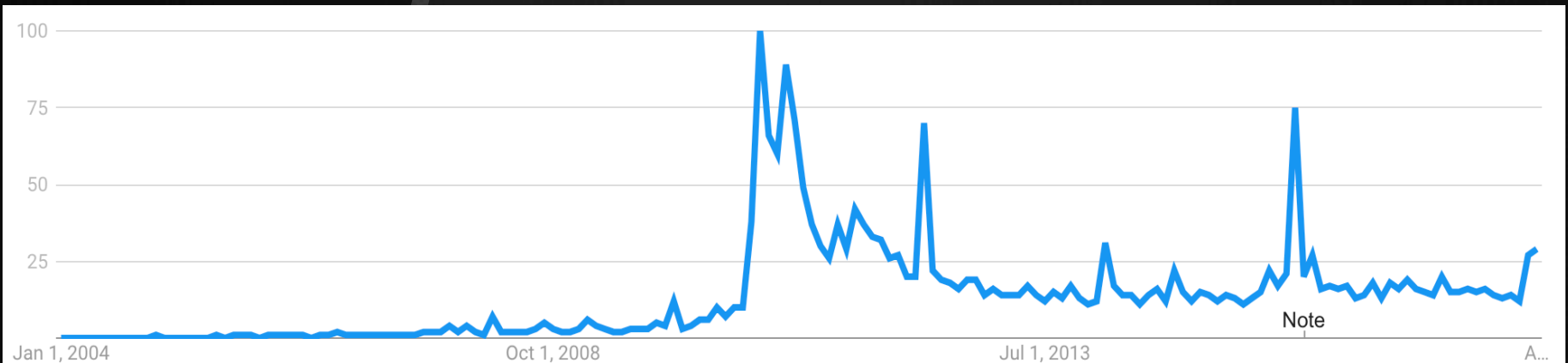
equifax 368,000

facebook 414,000,000

What if we tried a different keyword?

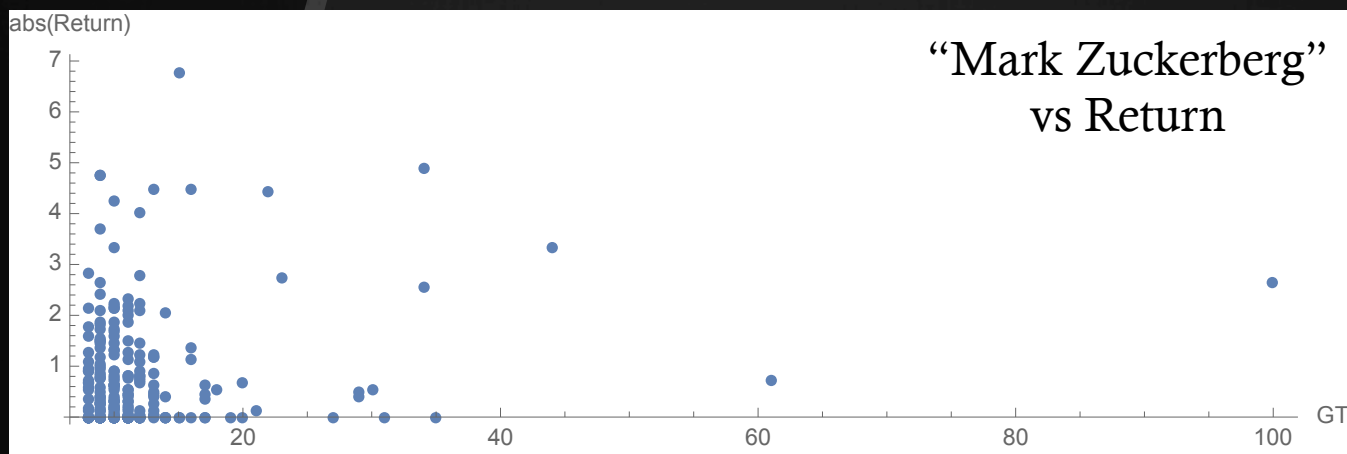
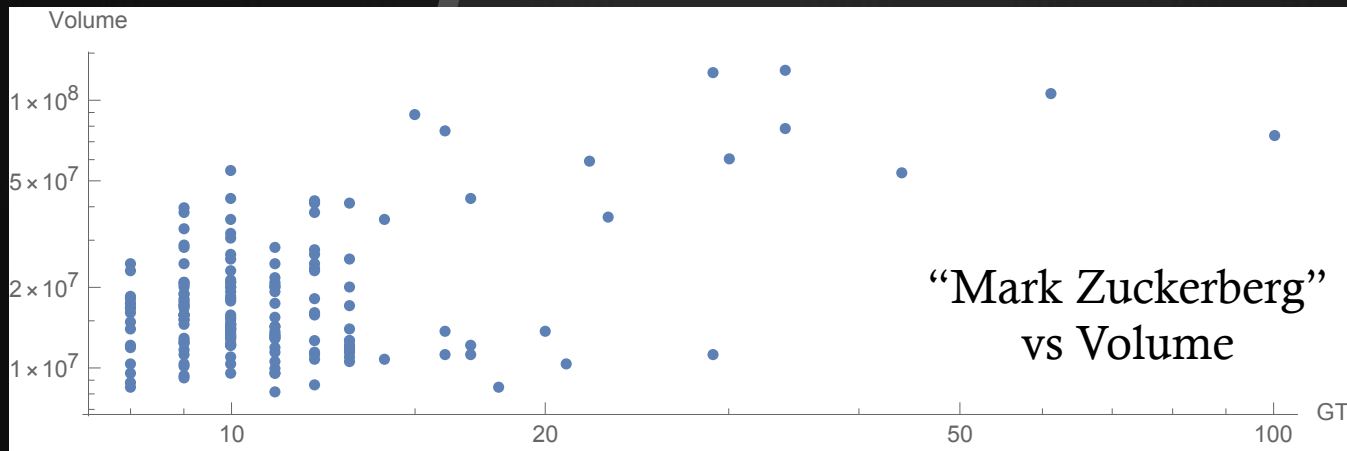
mark zuckerberg 301,000

Co-founder and CEO



FB GT vs Volume and Return

- Google Trend score vs FB Volume and Return between (8/1/2017 – 4/3/2018) [data breach announced 3/17/2018]



Exploring Data Breaches in Other Companies (Ongoing)

Keyword: Avg. monthly searches

yahoo

55,600,000

Data Breaches reported and investigated during the last quarter of 2016



Initial Conclusions

- ❶ Google Trends is proven to be a powerful tool as a representation of market attention
- ❷ Specific case studies may help reveal nuisances in the relationship between stock movement and related search queries
- ❸ Studies that utilize Google Trends (or other search query tools) may benefit from analyzing multiple keywords independently for a given company (rather than taking the total search volume of all these keywords in aggregate)

More Questions/Next Steps

- Is there a “critical” average search frequency?
 - Below “critical” frequency → Correlation with stock movement
 - Above “critical” frequency → No correlation
- Further exploration of general search frequency correlations to stock movement across a more diverse set of companies
- Expand case study to other data breaches and/or other types of search-inducing/price-affecting events
 - Explore other types of keywords (e.g. flagship products)
- Querying Google Trend data can be automated – can we leverage this into an investment strategy?
 - Prediction of magnitude of volatility – Option Straddle?
 - Prediction of price increase/decreased using associated words in search query?

Other Suggestions/Questions?

Motivation

- Equifax data breach (announced Sept. 7, 2017)

