A head start on getting smart

Applying topic modeling to transcribed public communications of companies for quicker understanding of need-to-know conversation

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Executive summary

- **Motivation:** Save time, money, effort by programmatically analyzing transcribed materials to understand the most pertinent topics of conversation regarding a company and its circumstances

- **Objective:** Demonstrate that NLP is a viable tool for analyzing company communications via topic modeling

- **Conclusion:** Preliminary topic modeling yields promising results that illuminate focus points over time

Chris Danely (Citi)
Definitely. And I get this question all the time. And by the way, for those of you in the audience, if you do have a question, feel free to e-mail me. Do you think that sort of the severe shortages we are seeing are more of a result of all the COVID issues or do you think that there is something else going on? And are you looking at changing anything long-term for TI to sort of deal with these extreme shortages?

Rich Templeton (TXN CEO)
So, really not, in some ways, looking at doing anything different other than the things that we had planned on doing. And for example, Chris, when Rafael and Dave updated on the capital management call last January or February, we raised the inventory range that we thought was going to be wise just because the longevity and diversity of our parts. And now, it's just a case of us having the capacity to be able to build that inventory back up to that level. So, that's not a new thing. We always thought that was a great thing to do for the long-term to just get – make things more convenient for customers, make supply better, steadier. It's something our customers value and we think we will get rewarded for it.

> **Constructing an NLP pipeline to understand topic trends about a company presents an opportunity to save money and time by illustrating focus points over time**

Methodology

Project workflow →

Data acquisition

Preprocessing

Proper nouns, filler words

Stop words

Numerics

Lemmatization

Analysis

LDA

- **150 documents**
  — Prepared remarks
  — 75 Q&A docs

- **3mm words**
  — Useless proper nouns: Analyst names, company mgmt
  — Numericals: Dollar values, percents – nominally useless for this analysis
  — Financial / technology / industry: **Target terms**
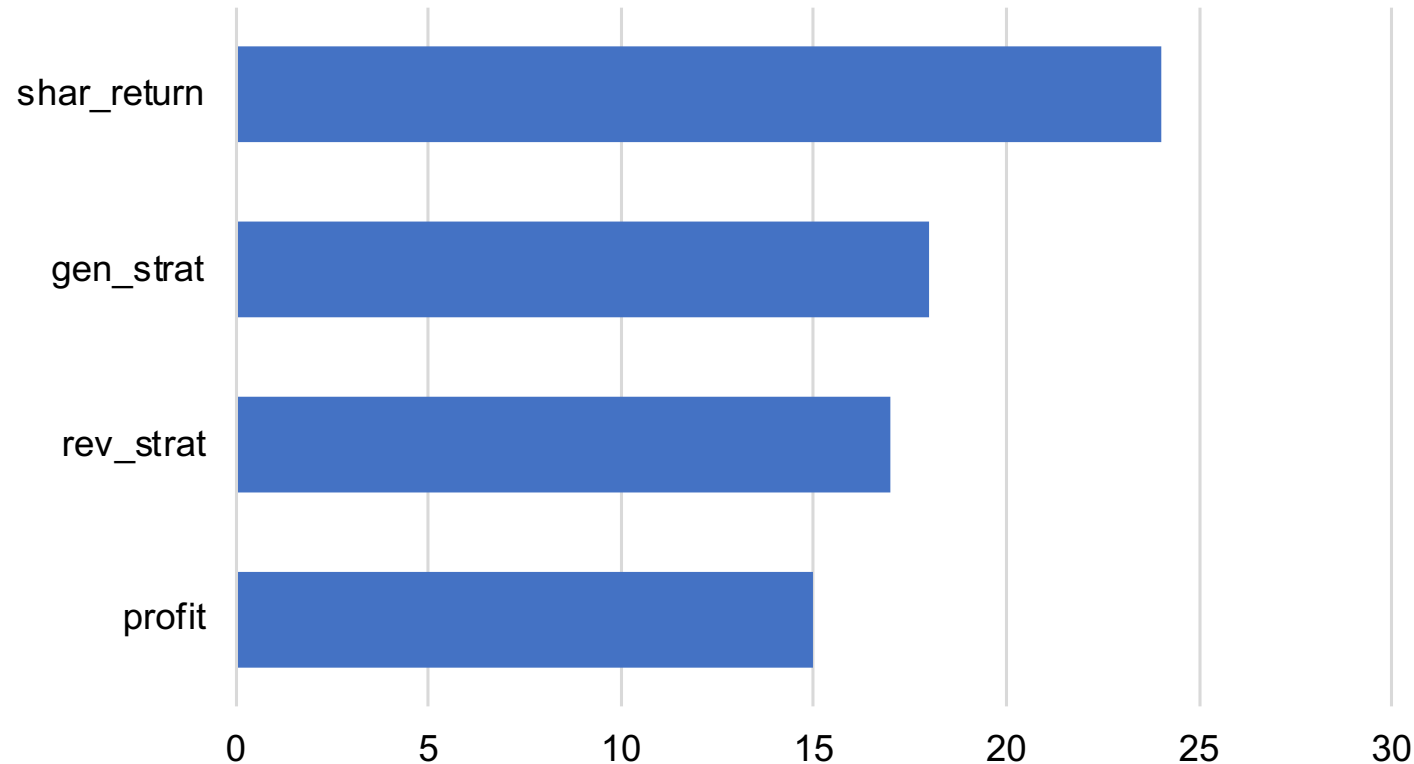
— Volume of data
— 3-5 topics
— Trigrams

Results

All periods, dominant topic count

Shareholder returns
— 'capital mgmt.'
— 'return cashflow'
— 'cash flow growth'

General strategy
— 'competitive advantage'
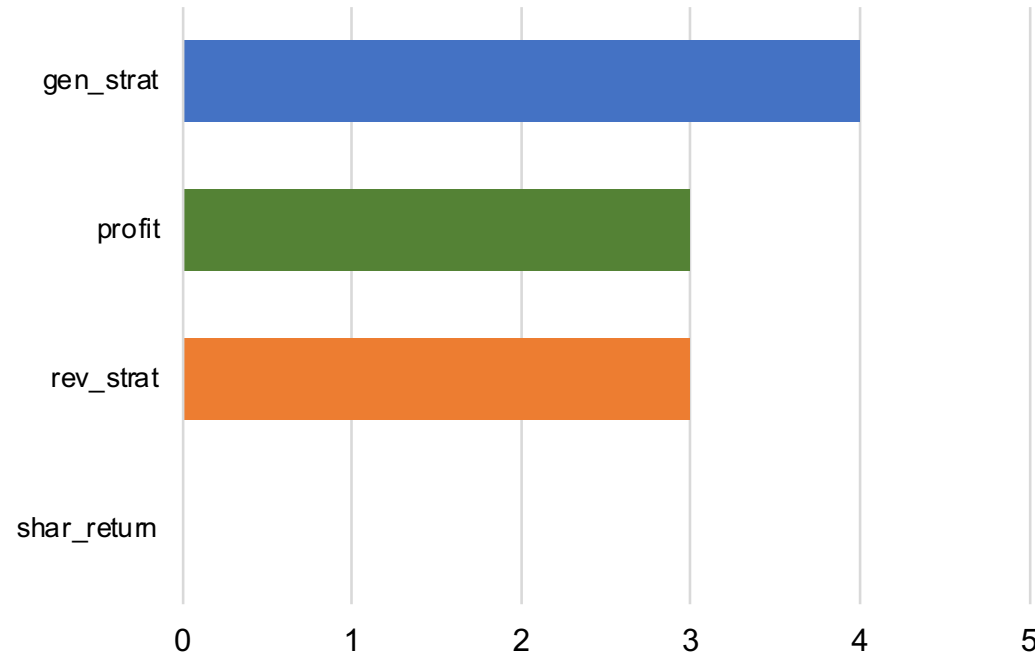— 'legacy segment'
— 'A&T sites'

Revenue strategy
— 'market share gain'
— 'consignment'
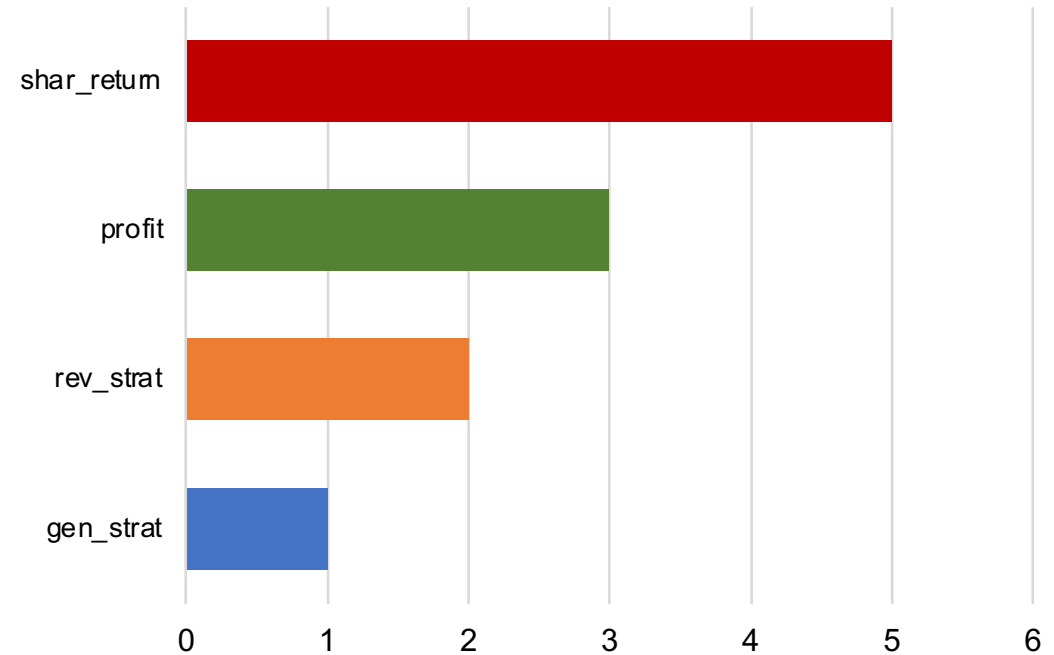— 'meet customer demand'

Profitability
— 'cash flow/sh'
— 'margin'

Conclusions

2010-2011, dominant topic count

2020-2021, dominant topic count

Topic shifts as identified by LDA can help us understand the company/investor narrative over time

Further due diligence/future work

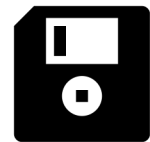**Further preprocessing**
- Identify named entities
- Further trimming of filler/stop words
- Stemming versus lemmatization

Visualizations
- Better illustrate across timeframes
- Incorporate prepared remarks vs Q&A

Incorporate more data
- Stock price pre- and post-earnings
- Multi-company analysis for total industry insight

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Appendix

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LDA fit on qa_1415 -- 3 topics, 100 passes
----------------------------------------------------------------------
Topic 0 ----> revenue, product, wa, business, bit, growth, market, time, thing, embedded
Topic 1 ----> wa, revenue, market, product, margin, embedded, growth, year, customer, business
Topic 2 ----> market, wa, growth, revenue, time, product, ve, industrial, margin, inventory


LDA fit on qa_1617 -- 3 topics, 100 passes
----------------------------------------------------------------------
Topic 0 ----> demand, wondering, basis, advantage, fall, outlook, long, cash, speaker, comparison
Topic 1 ----> wa, revenue, growth, business, market, product, margin, millimeter, continue, time
Topic 2 ----> ve, growth, market, time, customer, continue, share, year, revenue, cash


LDA fit on qa_1819 -- 3 topics, 100 passes
----------------------------------------------------------------------
Topic 0 ----> time, make, thing, business, great, year, market, sure, people, lot
Topic 1 ----> thing, year, market, right, product, analog, customer, ha, make, wa
Topic 2 ----> inventory, wa, revenue, cash, thing, market, customer, growth, time, free


LDA fit on qa_2021 -- 3 topics, 100 passes
----------------------------------------------------------------------
Topic 0 ----> wa, inventory, customer, time, thing, business, right, market, product, term
Topic 1 ----> business, wa, thing, revenue, time, right, term, customer, market, embedded
Topic 2 ----> market, thing, business, year, term, customer, got, inventory, growth, time
```

LDA fit on qa_1415 -- 3 topics, 100 passes

Topic 0 ----> gross margin, embedded processing, cash flow, global gdp, personal electronics, free cash, end market, balance sheet, growth rate, basis point

Topic 1 ----> cash flow, gross margin, free cash, wireless infrastructure, line open, personal electronics, come line, operating margin, analog embedded, wa revenue

Topic 2 ----> embedded processing, gross margin, end market, cash flow, analog embedded, growth rate, wireless infrastructure, free cash, personal electronics, legacy wireless

LDA fit on qa_1617 -- 3 topics, 100 passes

Topic 0 ----> gross margin, free cash, cash flow, share gain, market share, embedded processing, personal electronics, point time, couple year, competitive advantage

Topic 1 ----> lead time, end market, gross margin, broad based, cash flow, industrial automotive, free cash, capital management, revenue growth, personal electronics

Topic 2 ----> gross margin, personal electronics, free cash, cash flow, couple year, industrial automotive, end market, embedded business, analog business, broad based

LDA fit on qa_1819 -- 3 topics, 100 passes

Topic 0 ----> cash flow, free cash, make sure, competitive advantage, industrial automotive, embedded business, wafer start, end market, comms equipment, lead time

Topic 1 ----> free cash, cash flow, industrial automotive, gross margin, flow share, owner company, capital management, personal electronics, lead time, end market

Topic 2 ----> cash flow, free cash, analog embedded, competitive advantage, industrial automotive, long term, end market, gross margin, comms equipment, owner company

LDA fit on qa_2021 -- 3 topics, 100 passes

Topic 0 ----> free cash, cash flow, gross margin, end market, owner company, long term, longer term, balance sheet, capital allocation, right way

Topic 1 ----> personal electronics, competitive advantage, cash flow, free cash, analog embedded, longer term, end market, supply chain, sign stabilization, gross margin

Topic 2 ----> cash flow, free cash, lead time, long term, competitive advantage, end market, act owner, embedded business, short term, flow share

LDA fit on qa_1415 -- 3 topics, 100 passes

Topic 0 ----> free cash flow, come line open, gross margin line, pay benefit increase, personal electronics wa, analog embedded processing, okay come line, gross margin opex, revenue coming industrial, coming industrial automotive

Topic 1 ----> free cash flow, analog embedded processing, yearoveryear growth rate, automation smart grid, medical healthcare fitness, pay benefit increase, factory automation control, debt balance sheet, larger portion total, cash flow margin

Topic 2 ----> free cash flow, analog embedded processing, ing mkm partners, ian ing mkm, market share gain, stock option exercise, inside embedded processing, gross margin bit, wa wireless infrastructure, longterm growth rate

LDA fit on qa_1617 -- 3 topics, 100 passes

Topic 0 ----> free cash flow, cash flow growth, inside personal electronics, higher gross margin, body electronics lighting, cash flow share, increased sector growing, open millimeter capacity, tonight doe today, sector inside automotive

Topic 1 ----> free cash flow, inside personal electronics, trailing month basis, come line ahead, good afternoon guy, continue make investment, advanced driver assist, good afternoon taking, end market provide, ahead line open

Topic 2 ----> free cash flow, personal electronics wa, pay benefit increase, driver gross margin, silicon valley analog, broad based growth, gross margin level, gross profit margin, wa mid teen, couple year depreciation

LDA fit on qa_1819 -- 3 topics, 100 passes

Topic 0 ----> free cash flow, strength business model, economics make sense, flow owner company, cash flow owner, capital management strategy, strengthen competitive advantage, product industrial automotive, high level customer, level customer service

Topic 1 ----> free cash flow, cash flow share, flow owner company, cash flow owner, capital management strategy, return free cash, growth free cash, trailing month basis, flow share growth, analog embedded best

Topic 2 ----> free cash flow, cash flow share, trailing month basis, capital management strategy, high level customer, level customer service, growing free cash, spend lot time, maintain high level, value owner company

LDA fit on qa_2021 -- 3 topics, 100 passes

Topic 0 ----> free cash flow, strengthen competitive advantage, advantage manufacturing technology, competitive advantage manufacturing, cash flow growth, return free cash, cash flow owner, flow owner company, chinese new year, contributor free cash

Topic 1 ----> free cash flow, cash flow share, high single digit, value owner company, start want add, long period time, cash flow owner, flow owner company, low single digit, gross margin wa

Topic 2 ----> free cash flow, cash flow share, level playing field, growth free cash, generated free cash, got want ask, analog embedded business, return free cash, flow owner company, cash flow owner