

# On Narrative ~~Economics~~ Finance: Three Applications using Earnings Conference Calls

**Stephan Hollander**  
Tilburg University

INQUIRE Seminar, May 15, 2020

# Road-Map

Three papers using techniques from computational linguistics to measure “stories” (borrowing Robert Shiller’s language) corporate executives tell in earnings conference calls about the economy

- **Firm-Level Political Risk: Measurement and Effects**, joint with Tarek A. Hassan (Boston University, NBER, CEPR), Laurence van Lent (Frankfurt School of Finance and Management), and Ahmed Tahoun (London Business School)
- **The Global Impact of Brexit Uncertainty**, joint with same co-authors
- **Firm-Level Exposure to Epidemic Diseases: Covid-19, SARS, and H1N1**, joint with same co-authors

# Earnings Conference Calls

- Earnings-related event; e.g. T-Mobile's IR page <https://investor.t-mobile.com/investors/default.aspx>
- Typically four calls per year (webcast video or audio), right after earnings releases
- Management presentation followed by Q&A with firm's analysts (0-70 questions, average duration 45 minutes)
- Transcripts e.g. via <https://seekingalpha.com/>, Refinitiv EIKON database

# Firm-Level Political Risk: Measurement and Effects

**Tarek A. Hassan**

Boston University, NBER, and CEPR

**Stephan Hollander**

Tilburg University

**Laurence van Lent**

Frankfurt School of Finance and Management

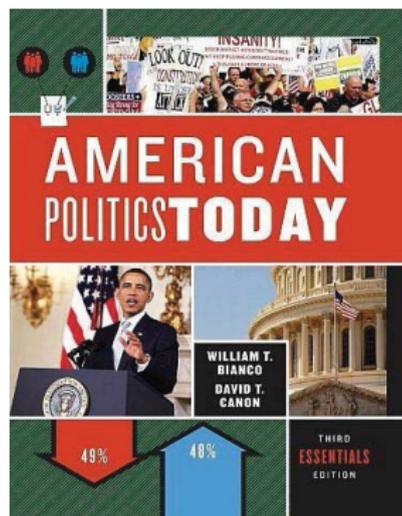
**Ahmed Tahoun**

London Business School

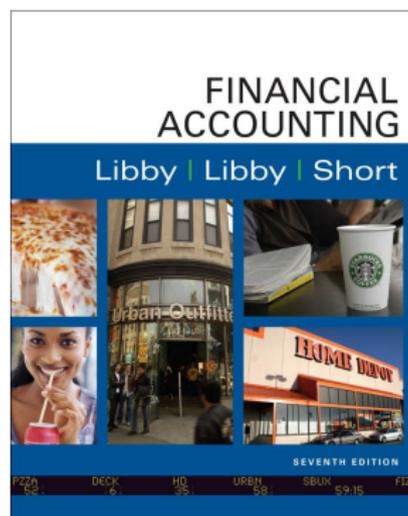
# Training Libraries

Extract bigrams from training libraries indicative of discussion of political topics,  $\mathbb{P}$ , and non-political topics  $\mathbb{N}$

## Political, $\mathbb{P}$



## Non-political, $\mathbb{N}$



# Training Libraries (C'd)

Supplement with political vs non-political articles from major U.S. newspapers

The screenshot displays the Factiva search interface within a web browser. The browser's address bar shows the URL [https://global.factiva.com/ha/default.aspx#/?78\\_suid=1404301123141608527570154258143](https://global.factiva.com/ha/default.aspx#/?78_suid=1404301123141608527570154258143). The Factiva logo and navigation menu (Home, Search, Alerts, News Pages, Companies/Markets) are visible at the top. The search bar contains the text "Search DATE: 01/01/2004 to 31/01/2004 SOURCE: The New York Times Or USA To... MORE". Below the search bar, the "Free Text Search" section is active, with a search form and a "Search" button. The "Date" filter is set to "01 / 01 / 2004" to "31 / 01 / 2004". The "Source" filter is set to "The New York Times", "USA Today", "The Wall Street Journal", and "The Washington Post". The "Subject" filter is set to "Domestic Politics". The "Language" filter is set to "English". The "More Options" section is also visible. At the bottom of the page, the search results are sorted by "Most recent first" and the "Deduplicates" option is set to "Off". The Windows taskbar at the bottom shows the system clock as 1:38 PM on 7/2/2014.

# Measure of Overall Political Risk

Count the number of occurrences of (exclusively) political bigrams in conjunction with a synonym for risk or uncertainty and divide by the total number of bigrams in the transcript:

$$\mathbf{PRisk}_{it} = \frac{1}{\mathbf{B}_{it}} \sum_b^{\mathbf{B}_{it}} \{ \mathbf{1}[\mathbf{b} \in \mathbb{P} \setminus \mathbb{N}] \times \mathbf{1}[|\mathbf{b} - \mathbf{r}| < \mathbf{10}] \times \mathbf{f}_{\mathbf{b}, \mathbb{P}} / \mathbf{B}_{\mathbb{P}} \},$$

where  $r$  is the position of the nearest synonym of risk or uncertainty and  $b = 0, 1, \dots, B_{it}$  are the bigrams contained in call of firm  $i$  at time  $t$

Application of  $tf \times idf$ : capturing how important a bigram is to a document, offset by number of documents in corpus containing that word

# Validation

Validate measurement and economic content of  $PRisk_{it}$  in five steps:

1.  $PRisk_{it}$  correctly identifies conversations about risks associated with political topics
2. Varies intuitively over time and across sectors 
3. Has economic content: associated with outcomes—e.g., stock return volatility, employment, investment, lobbying, donations—in a way that is highly indicative of reactions to political risk
4. News about mean versus variance:  $PSentiment_{it}$
5. Falsification exercises using  $Risk_{it}$  and  $NPRisk_{it}$

# Measuring Topic-Specific Political Risk

Share of the conversation centering on risks associated with political topic  $T$ , calculated as the weighted number of bigrams in  $\mathbb{P}_T$  but not the non-political library,  $\mathbb{N}$ , used in conjunction with a discussion of political risk:

$$\mathbf{PRisk}_{it}^T = \frac{\sum_{\mathbf{b}} \mathbf{B}_{it} \left( \mathbf{1}[\mathbf{b} \in \mathbb{P}_T \setminus \mathbb{N}] \times \mathbf{1}[|\mathbf{b} - \mathbf{p}| < 10] \times \frac{f_{\mathbf{p}, \mathbb{P}}}{\mathbf{B}_{\mathbb{P}}} \times \frac{f_{\mathbf{b}, \mathbb{P}_T}}{\mathbf{B}_{\mathbb{P}_T}} \log(\mathbf{Z}/f_{\mathbf{b}, \mathbf{Z}}) \right)}{\mathbf{B}_{it}}$$

where  $p$  is the position of the nearest bigram in our measure of overall political risk, that is, a political but not non-political bigram that is also near to a synonym for risk and uncertainty — the nearest bigram for which  $\mathbf{1}[b \in \mathbb{P} \setminus \mathbb{N}] \times \mathbf{1}[|b - r| < 10] > 0$ . Both bigrams ( $p$  and  $b$ ) are weighted with their term frequencies and inverse document frequencies

# Screenshot OnTheIssues.org

The screenshot shows the OnTheIssues.org website. At the top, there is a navigation bar with tabs for HOME, ISSUES, CANDIDATES, RECENT, GRID, ARCHIVE, SENATE, HOUSE, QUIZZES, CABINET, GOVERNOR, COURT, and FAB. Below this is a blue bar with sub-tabs for Abortion, Civil Rights, Crime, Drugs, Education, Gun Control, Health Care, Tax Reform, and War & Peace. The main content area is titled "Political Leaders on the Issues" and contains a grid of links to various issues. A red box highlights this grid. To the left of the grid is a sidebar with a search bar and a list of issues. Below the grid is a list of instructions for navigating the site.

Political Leaders' views on the Issue... X +

ontheissues.org/Issues.htm

OnTheIssues  
Every Political Leader on Every Issue

HOME ISSUES CANDIDATES RECENT GRID ARCHIVE SENATE HOUSE QUIZZES CABINET GOVERNOR COURT FAB

Abortion Civil Rights Crime Drugs Education Gun Control Health Care Tax Reform War & Peace

Google Search  
The Web  
OnTheIssues.org

**Issues**  
Abortion  
Budget & Economy  
Civil Rights  
Corporations  
Crime  
Drugs  
Education  
Energy & Oil  
Environment  
Families & Children  
Foreign Policy  
Free Trade  
Government Reform  
Gun Control  
Health Care  
Homeland Security  
Immigration

**Political Leaders on the Issues**  
Click on a topic »

<b>International Issues</b> <a href="#">Foreign Policy</a> <a href="#">Homeland Security</a> <a href="#">War &amp; Peace</a> <a href="#">Free Trade</a> <a href="#">Immigration</a> <a href="#">Energy &amp; Oil</a>	<b>Domestic Issues</b> <a href="#">Gun Control</a> <a href="#">Crime</a> <a href="#">Drugs</a> <a href="#">Civil Rights</a> <a href="#">Jobs</a> <a href="#">Environment</a>	<b>Economic Issues</b> <a href="#">Budget &amp; Economy</a> <a href="#">Government Reform</a> <a href="#">Tax Reform</a> <a href="#">Social Security</a> <a href="#">Welfare &amp; Poverty</a> <a href="#">Technology &amp; Infrastructure</a>	<b>Social Issues</b> <a href="#">Education</a> <a href="#">Health Care</a> <a href="#">Abortion</a> <a href="#">Families &amp; Children</a> <a href="#">Corporations</a> <a href="#">Principles &amp; Values</a>
--	--	--	--

- Click on a topic above for background on that issue. Each page then links to political leaders' views on that issue.
- Click on a topic in the blue bar above, or in the alphabetical list to the left, for pages listing headlines for elected officials and popular candidates and opinion leaders. Each section has links for "full quotes" for each summary headline.
- Political leaders' views are organized by "Topics in the News" immediately below. Use those to find topics and navigate to the main issue pages. If you have trouble finding a topic, try the Search at the upper left.
- For Congressional leaders' views on an issue, click on the [Senate](#) or [House](#) tab above, then select the Senator or Representative, then click on the issue from the top of their page.
- For other appointed officials, follow the same process with the [Cabinet](#) or [Supreme Court](#) tab above,
- Each section includes some past officeholders and current challengers for upcoming elections, such as on the [Governor](#) page.

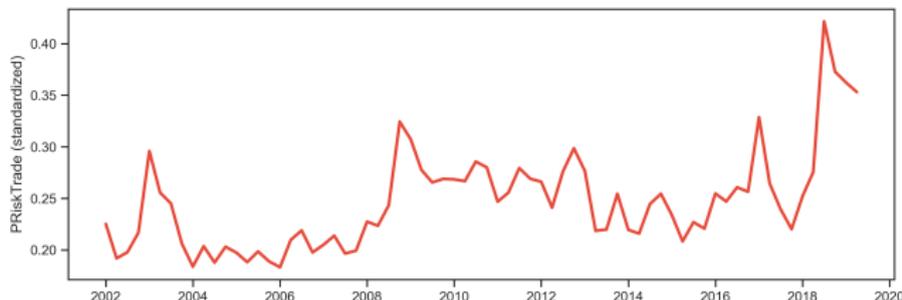
Navigation icons: back, forward, search, etc.

# Key Findings

- We introduce a simple firm-quarter level measure of political risk
- Firm-level variation in political risk is associated with lower hiring and investment, but higher expenditures on lobbying and donations to politicians
- Large amount of variation in political risk at the firm level rather than at aggregate or industry level
- Dispersion of firm-level political risk increases when aggregate political risk is high
- Firms that devote more time discussing risks associated with a particular political topic increase lobbying on that topic, but not on other topics, in the following quarter (i.e., actively manage political risk)

# Updated Data

- From 2002-Q1 onwards, covering U.S.-based and international firms hosting English-language earnings calls, available at [www.firmlevelrisk.com](http://www.firmlevelrisk.com)
- Discussion of trade policy risk in earnings conference calls (*Wall Street Journal* October 13, 2019):



- Follow-up research on tax policy uncertainty (TPU) around Tax Cuts and Jobs Act (TCJA) in 2017, joint with John Gallemore, Martin Jacob, and Xiang Zheng

# The Global Impact of Brexit Uncertainty

**Tarek A. Hassan**

Boston University, NBER and CEPR

**Stephan Hollander**

Tilburg University

**Laurence van Lent**

Frankfurt School of Finance and Management

**Ahmed Tahoun**

London Business School

# Measurement

$$\mathbf{BrexitExposure}_{it} = \frac{1}{\mathbf{B}_{it}} \sum_{b=1}^{\mathbf{B}_{it}} \mathbf{1}[\mathbf{b} = \mathbf{Brexit}],$$

where  $b = 0, 1, \dots, \mathbf{B}_{it}$  are the words contained in call of firm  $i$  at time  $t$

$$\mathbf{BrexitRisk}_{it} = \frac{1}{\mathbf{B}_{it}} \sum_{b=1}^{\mathbf{B}_{it}} \{ \mathbf{1}[\mathbf{b} = \mathbf{Brexit}] \times \mathbf{1}[|\mathbf{b} - \mathbf{r}| < \mathbf{10}] \},$$

where  $r$  is the position of the nearest synonym of risk or uncertainty

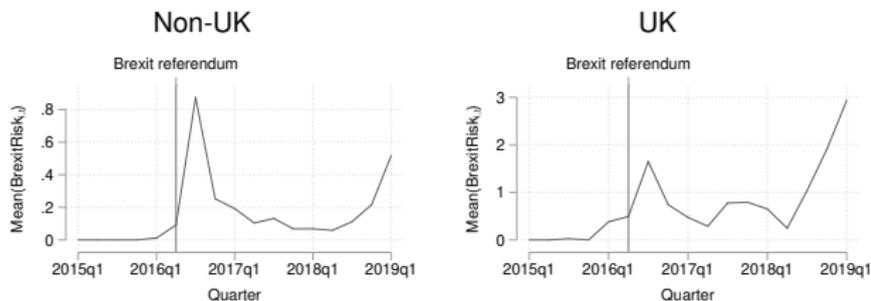
$$\mathbf{BrexitSentiment}_{it} = \frac{1}{\mathbf{B}_{it}} \sum_{b=1}^{\mathbf{B}_{it}} \left\{ \mathbf{1}[\mathbf{b} = \mathbf{Brexit}] \times \left( \sum_{c=b-10}^{b+10} \mathbf{S}(c) \right) \right\},$$

where  $S$  assigns sentiment (Loughran and McDonald 2011) to each  $c$

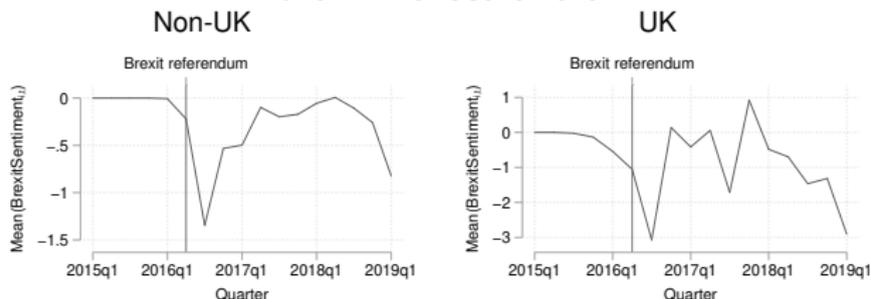
$$S(c) = \begin{cases} +1 & \text{if } c \in \mathbb{S}^+ \\ -1 & \text{if } c \in \mathbb{S}^- \\ 0 & \text{otherwise} \end{cases}$$

# Time Series of *BrexitRisk* and *BrexitSentiment*

Panel A: Brexit risk

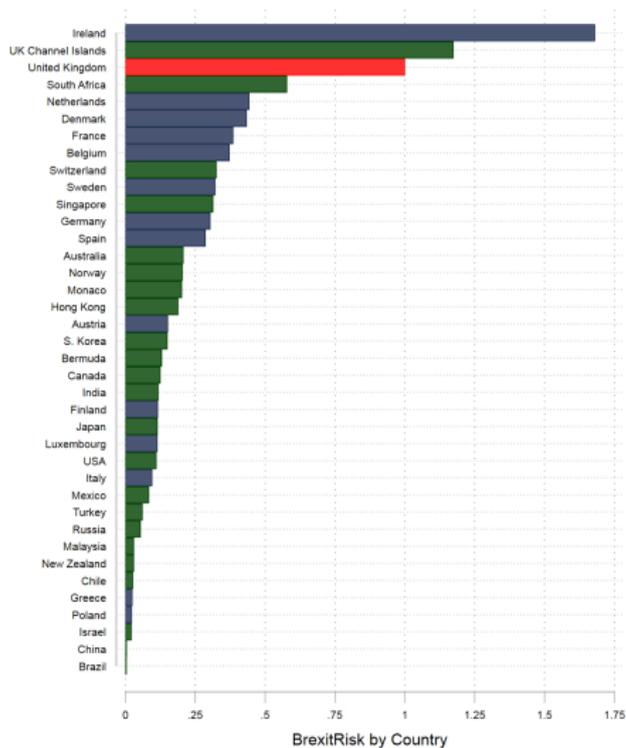


Panel B: Brexit sentiment



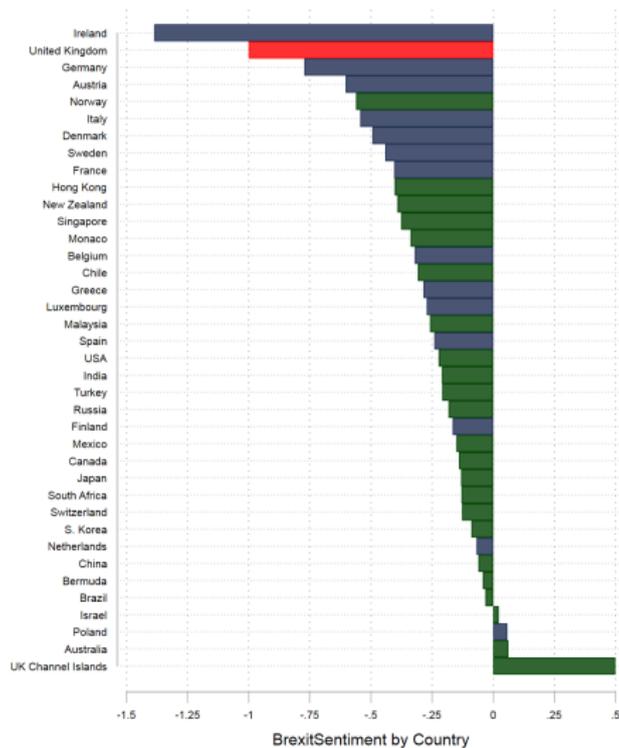
Notes:  $\overline{\text{BrexitRisk}}_{i,t}$  is normalized using the average  $\overline{\text{BrexitRisk}}_{i,t}$  of UK-headquartered firms 2016-19;  $\overline{\text{BrexitSentiment}}_{i,t}$  is normalized using the average  $|\overline{\text{BrexitSentiment}}_{i,t}|$  of UK-headquartered firms 2016-19. The Brexit referendum line indicates the quarter when the referendum took place (2016q2).

# Mean *BrexitRisk* by Country



Notes: Countries with zero  $BrexitRisk_C$  or countries for which we have fewer than five headquartered firms are excluded.

# Mean *BrexitSentiment* by Country



Notes:  $\text{BrexitSentiment}_c$  for the UK Channel Islands has a value of +2 but is truncated at 0.5 for visual clarity.

# Firm-Level Exposure to Epidemic Diseases: Covid-19, SARS, and H1N1

**Tarek A. Hassan**

Boston University, NBER and CEPR

**Stephan Hollander**

Tilburg University

**Laurence van Lent**

Frankfurt School of Finance and Management

**Ahmed Tahoun**

London Business School

# Caveats

- Very (!) preliminary and work in progress
- Paper written at early stages of Covid-19 outbreak
- Continuously harvesting newly available transcripts and updating measures
- Data (*Covid19Exposure*, *Covid19Sentiment*, *Covid19Risk*) publicly available at [firmlevelrisk.com](http://firmlevelrisk.com)
- Neither I, nor any of my co-authors, is an epidemiologist
  - We're (just) economists trying to capture firms' Covid-19 exposure, hoping to spur data-based policy responses

# What We Do

- Develop **text-based measures of costs, benefits, and risks** listed firms around the globe associate with Covid-19 and other epidemic diseases during Q1-2002 to Q1-2020
  - English-language transcripts of earnings conference calls for approx. 12K firms headquartered in +80 countries
  - SARS (2003), H1N1 (2009), MERS (2012), Ebola (2014), Zika (2015)
- Identify Covid-19 related concerns (and opportunities, if any) over time, conducting **in-depth content analysis**
  - E.g., demand collapse, supply chain disruption, financing issues
- Test whether *Covid19Exposure*, *Covid19Sentiment*, *Covid19Risk* are **priced by the stock market**

# Uncertainty, Uncertainty, Uncertainty

**“It’s all about uncertainty”**—Randy Frederick, Vice President of Trading and Derivatives of Schwab Center for Financial Research (*WSJ*, September 27, 2019)

- Numerous corporate “headaches,” including trade treats, [politics](#) (e.g., elections, govt shutdown; Hassan, Hollander, van Lent, and Tahoun 2019), [Brexit](#) (Hassan et al. 2020), climate change, et cetera
- This paper: [Covid-19](#) induced uncertainty for listed firms around the globe

# Newspaper Quotes

ECONOMY | U.S. ECONOMY

## Fear of Coronavirus, Rather Than Virus Itself, Hits Economies

Estimates of the epidemic's impact on the global economy are largely educated guesses

*Wall Street Journal* Feb 24, 2020

Business

## U.S. markets fall sharply as rampant volatility takes hold

*Washington Post* Mar 18, 2020

CFO JOURNAL

## Johnson & Johnson CFO Warns Coronavirus Uncertainty to Make Guidance '100% Precisely Wrong'

Conveying the degree of variability in guidance is important, J&J CFO Joseph Wolk says

*Wall Street Journal* Mar 23, 2020

# Uncertainty, Uncertainty, Uncertainty

**“It’s all about uncertainty”**—Randy Frederick, Vice President of Trading and Derivatives of Schwab Center for Financial Research (*WSJ*, September 27, 2019)

- Numerous corporate “headaches,” including trade treats, politics (e.g., elections, govt shutdown; Hassan, Hollander, van Lent, and Tahoun 2019), Brexit (Hassan et al. 2020), climate change, et cetera
- This paper: Covid-19 induced uncertainty for listed firms around the globe

## **It’s not all about uncertainty**

- Next to uncertainty ([second moment](#)), Hassan et al. 2019 underscore the importance of capturing the [first moment](#): expectations about the mean of firms’ fortunes

# Covid-19 and Corporate Resilience

- An emerging literature studies **macroeconomic** impact of the Covid-19 outbreak and policy responses to mitigate it, showing large shocks to supply, demand, and financing
  - E.g., Eichenbaum, Rebelo, and Trabandt 2020; Gourinchas 2020
- At the **microeconomic** (i.e., firm) level, however, these shocks may manifest in different ways: varying exposure magnitude, significance, and sign (“winners” vs losers)
- Prior epidemic experiences need careful calibration against the unique features of today’s challenge (e.g., lock-down, travel restrictions, emergency relief)
  - Existing models and policy remedies might not apply (e.g., Adda 2016; Barro et al. 2020)

# Covid-19 and Corporate Resilience (C'd)

- In an effort to aid data-based policy responses, we construct a **time-varying, firm-level measure** of exposure to epidemic diseases
  - Having a deeper understanding of the various ways in which epidemics affect firms, is a sound starting point for developing effective government and/or corporate intervention policies
- We find that firms which **previously experienced an epidemic disease** generally have **more positive sentiment**; i.e., their expectations about how the disease will affect their future cash flows are more positive than firms without such experience
- These more optimistic expectations are also reflected in **asset pricing tests**: short- and long-window stock returns

# Empirical Setting

- From the Refinitiv EIKON database we collect the complete set (+300K) of English-language transcripts from Q1-2002 to Q1-2020 for 11,943 firms headquartered in 84 countries
- We obtain financial statement data from Compustat NA (US firms) and Global (non-US), stock returns from CRSP (US firms) and Refinitiv Datastream (non-US), operational headquarters from Refinitiv Datastream

# Measuring Firm-Level Exposure to Epidemic Diseases

- **DiseaseExposure** $_{it}^d = \frac{1}{B_{it}} \sum_{b=1}^{B_{it}} \mathbf{1}[b = \mathbf{Disease}_d]$

where  $b = 0, 1, \dots, B_{it}$  represents the words contained in the transcript of firm  $i$  in quarter  $t$

- First, obtain list of pandemic/epidemic diseases 2002-onwards of interest to investors (thus eliminating e.g. Chikungunya [2019] and Monkeypox [2018] outbreak) from `WHO.int`
  - SARS, H1N1, MERS, Ebola, Zika, and Covid-19
- Second, identify most common synonym of each disease from online resources/newspaper articles
- Third, perform human audit of transcripts to verify we're using the right disease words (e.g., "Malaysian Emergency Response Services 999")

# Disease Words

## Appendix Table 2

SARS	MERS	Ebola
'sars' 'severe acute respiratory syndrome'	'merscov' 'middle east respiratory syndrome' 'mers'	'ebola'
H1N1	Zika	Covid-19
'hn*' 'swine flu' 'ahn'	'zika'	'sarscov' 'coronavirus' 'corona virus' 'ncov' 'covid'

\*) In pre-processing the transcripts, we removed (among others) all numerical characteristics

# Measuring Firm-Level Exposure to Epidemic Diseases

- $\text{DiseaseRisk}_{it}^d = \frac{1}{B_{it}} \sum_{b=1}^{B_{it}} \{ \mathbf{1}[b = \text{Disease}_d] \times \mathbf{1}[|b - r| < 10] \}$

where  $r$  is the position of the nearest synonym of “risk” or “uncertainty” (Oxford English Dictionary)

- ⚠ A major challenge for any text-based risk measure is that innovations to the variance of shocks are likely correlated with innovations to the conditional mean

For example, a firm receives news that government X considers a full lockdown simultaneously learns that it faces a lower mean (e.g., possible collapse of demand) and higher variance (its impact and duration are uncertain)

# Measuring Firm-Level Exposure to Epidemic Diseases

- **DiseaseSentiment**<sub>it</sub><sup>d</sup> =

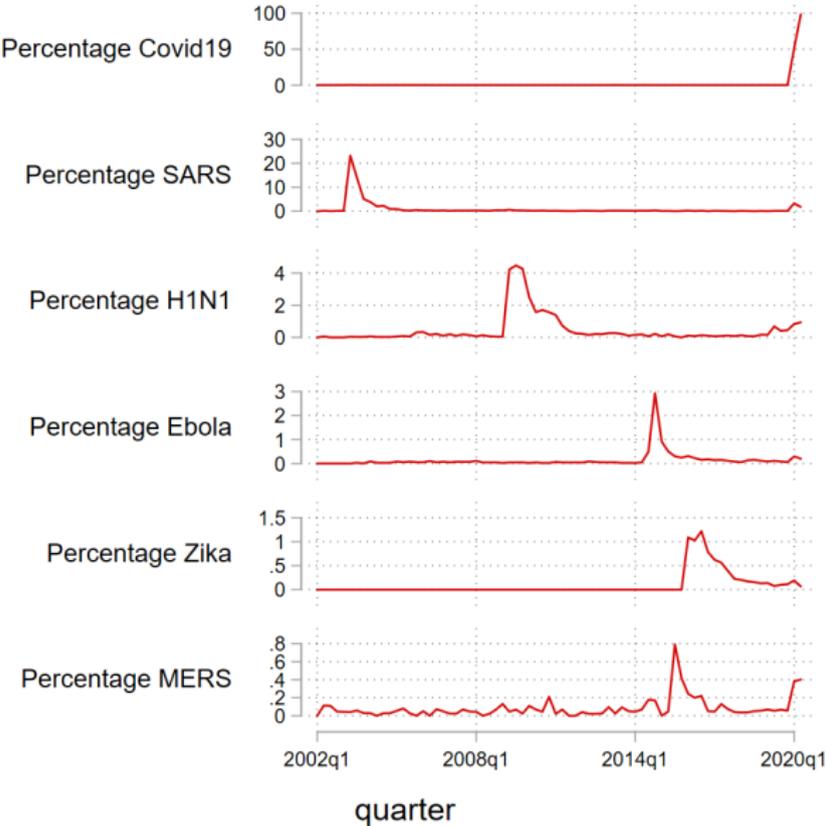
$$\frac{1}{B_{it}} \sum_{b=1}^{B_{it}} \left\{ \mathbf{1}[b = \mathbf{Disease}_d] \times \left( \sum_{c=b-10}^{b+10} \mathbf{S}(c) \right) \right\}$$

where  $S$  assigns sentiment (using Loughran and McDonald 2011's dictionary) to each  $c$ :

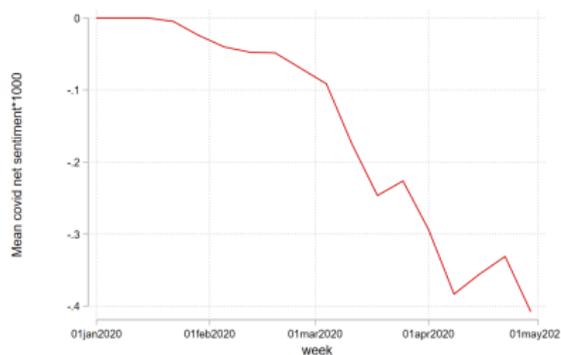
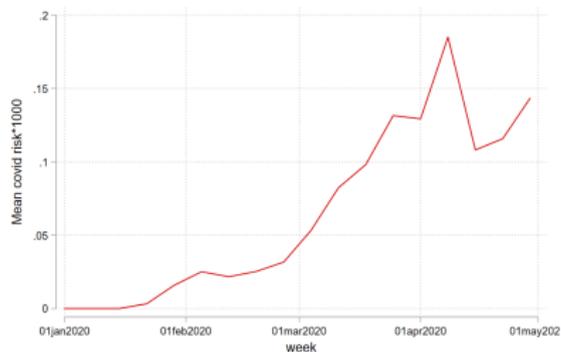
$$S(c) = \begin{cases} +1 & \text{if } c \in \mathbb{S}^+ \\ -1 & \text{if } c \in \mathbb{S}^- \\ 0 & \text{otherwise} \end{cases}$$

- Descriptive stats show disease-related discussions are dominated by negative tone words; hence, we bifurcate *DiseaseSentiment* into *DiseaseNegativeSentiment* and *DiseasePositiveSentiment*

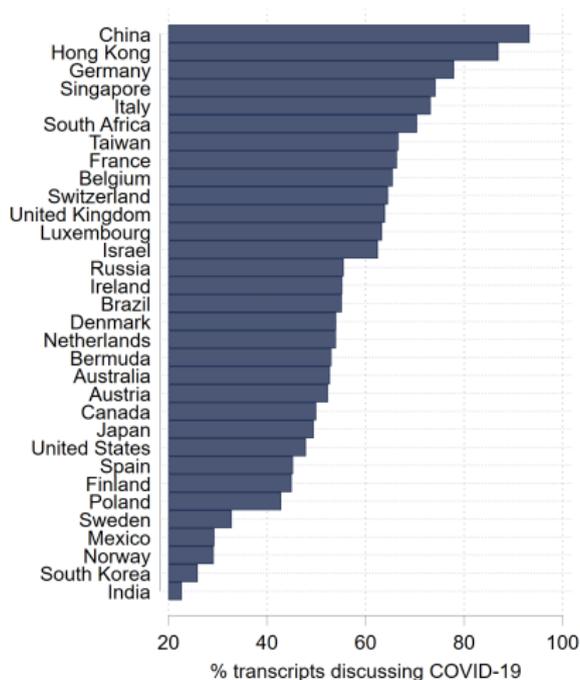
# Descriptive Evidence: Time-Series



# Weekly Average Covid-19 Risk and Net Sentiment

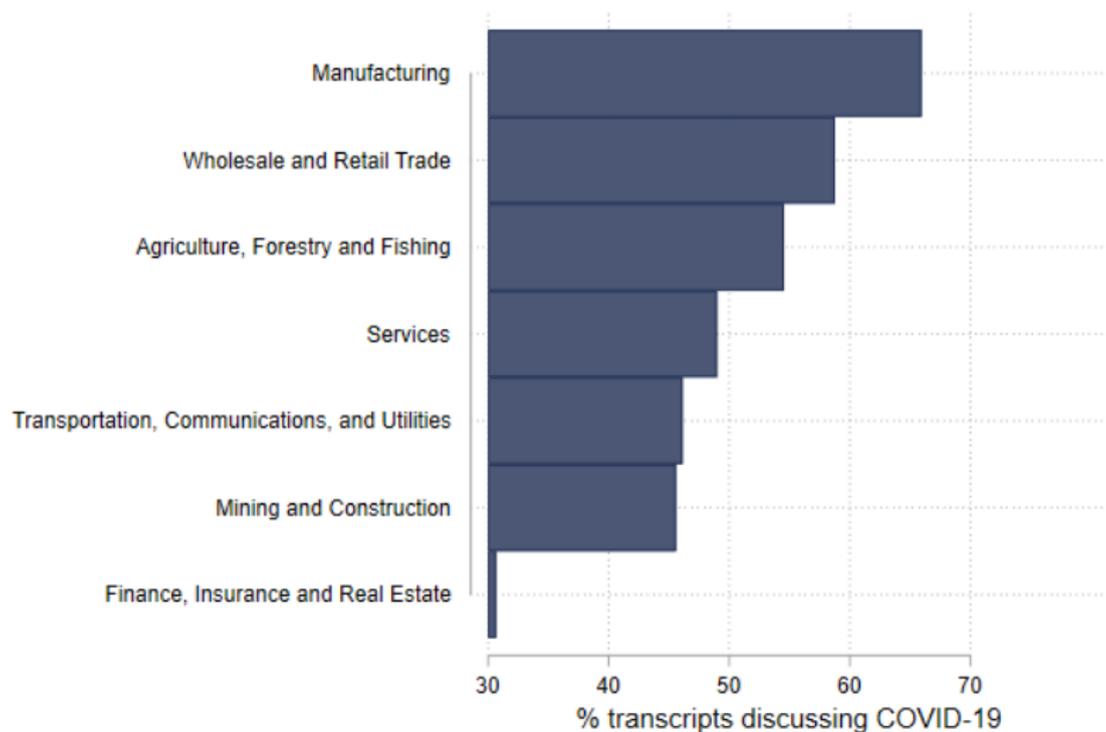


# Percentage Calls Discussing Covid-19 by Country



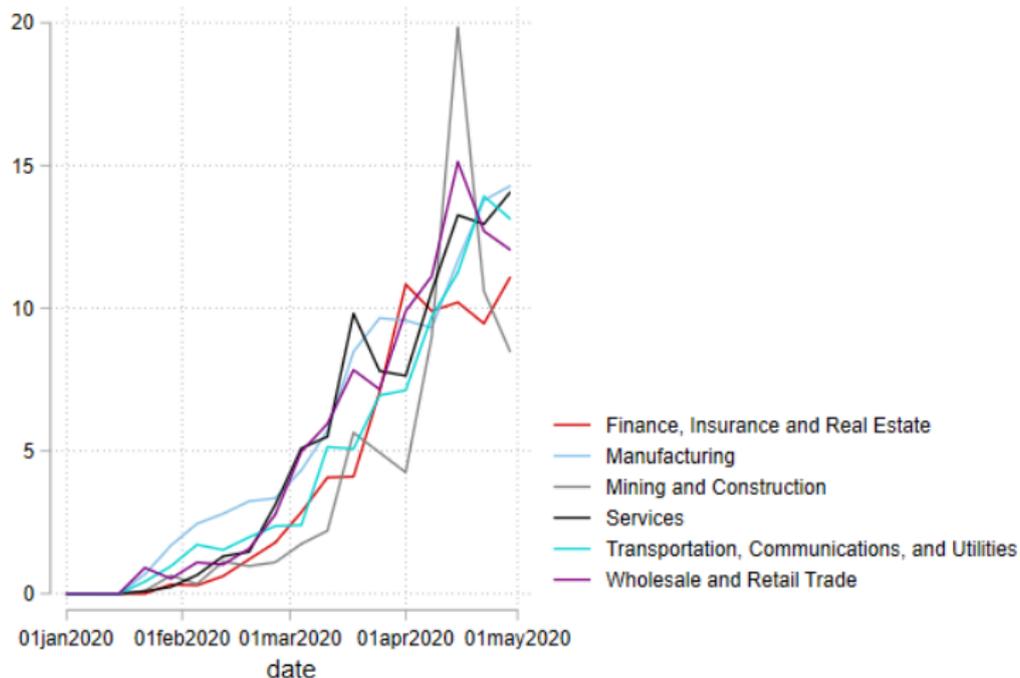
*Notes:* This figure shows the percentage of earnings calls discussing Covid-19 by country held through April 30, 2020. We only include countries for which the total number of earnings call transcripts held in 2020 (till April 30, 2020) per country  $\geq 25$ . Pharmaceuticals (SIC = 2834) and healthcare firms (2-digit SIC = 80) are excluded

# Percentage Calls Discussing Covid-19 by Industry



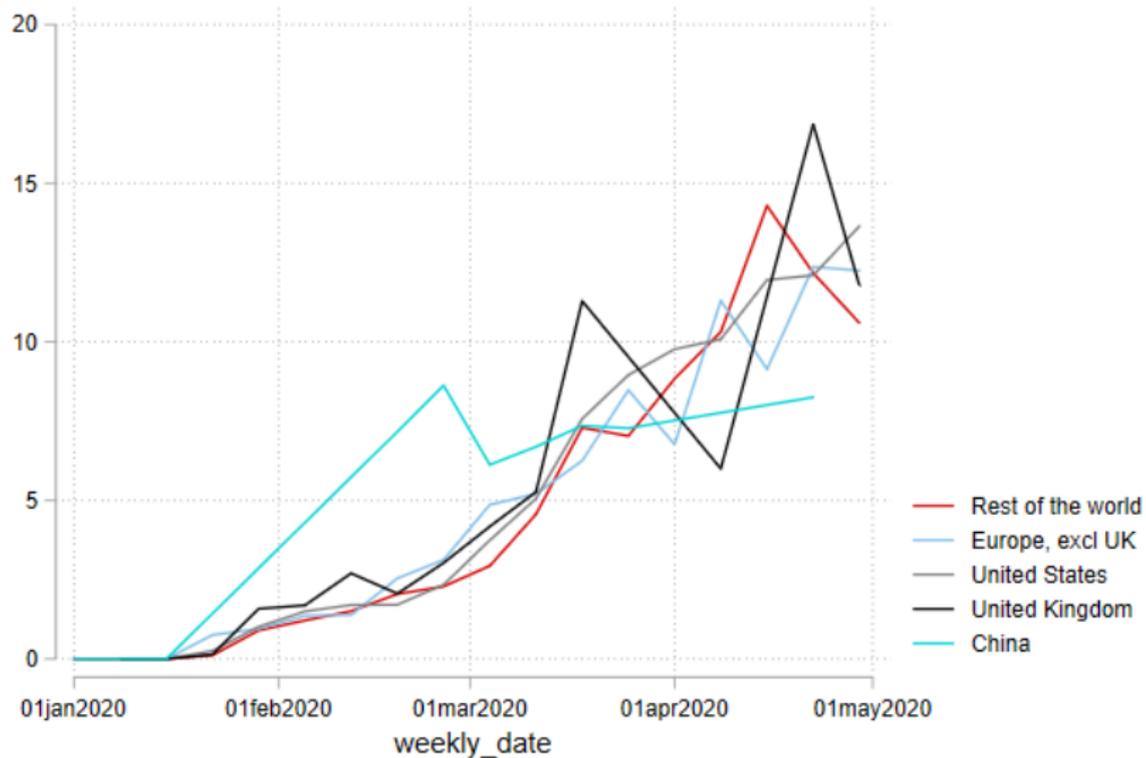
This figure shows the percentage of earnings calls held through April 30, 2020 discussing Covid-19 by industry (one-digit SIC).  
Pharmaceuticals (SIC = 2834), healthcare firms (2-digit SIC = 80), and SIC  $\geq$  9900 ("Nonclassifiable") are excluded

# Weekly Average Covid-19 Mentions: by Industry

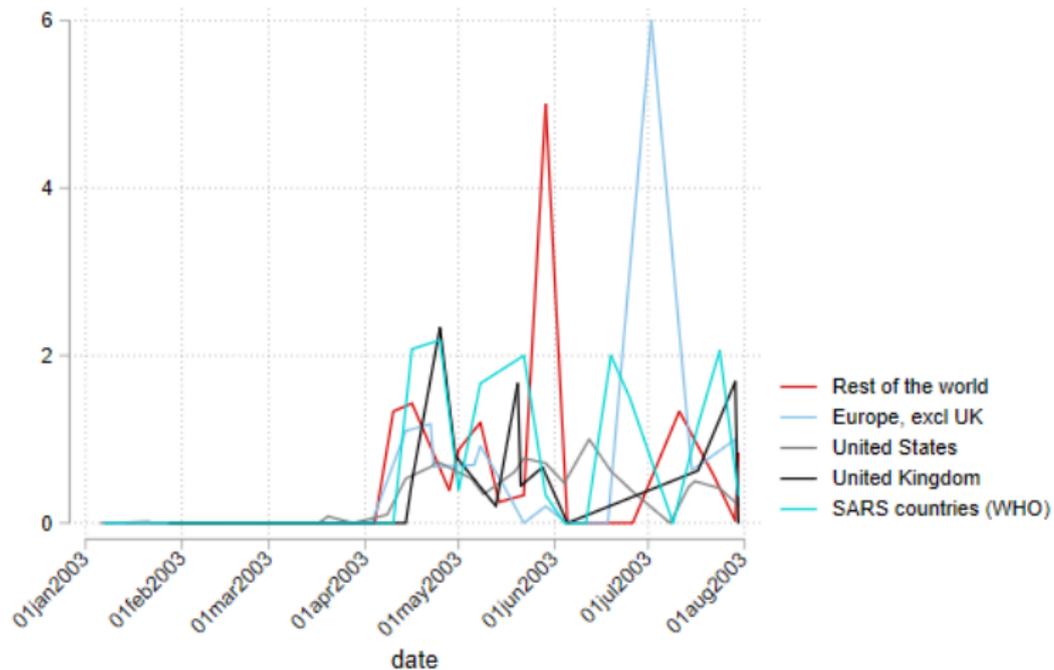


Notes: This figure shows the percentage of earnings calls held through April 30, 2020 discussing Covid-19 by industry (one-digit SIC). Pharmaceuticals (SIC = 2834), healthcare firms (2-digit SIC = 80), and SIC  $\geq$  9900 ("Nonclassifiable") are excluded

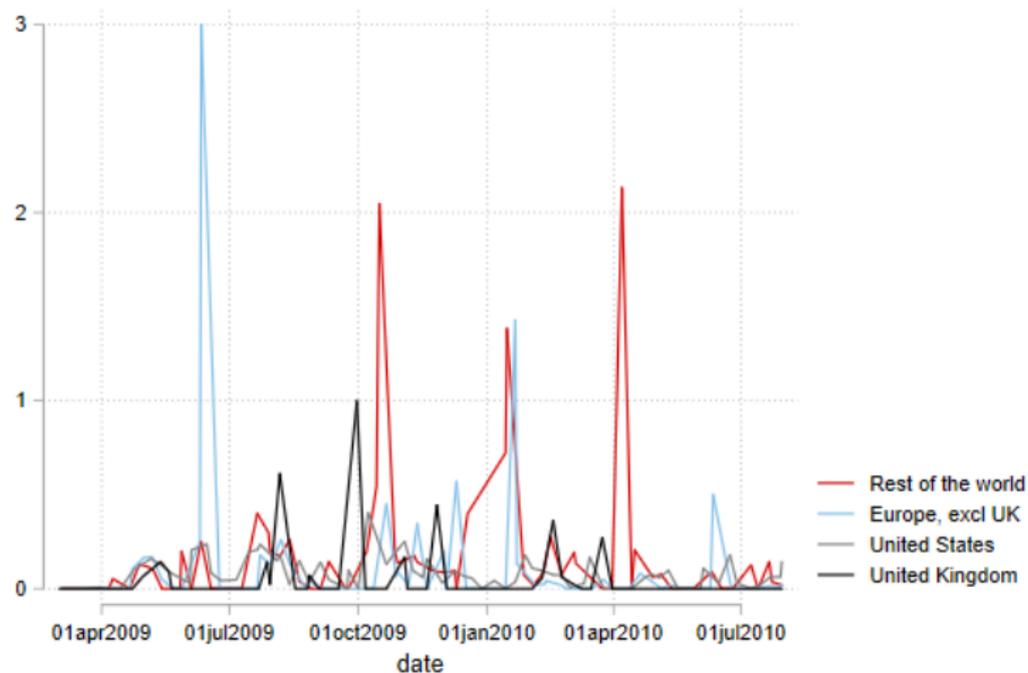
# Covid-19 Weekly: Jan 1 to Apr 30, 2020



# SARS Weekly: Jan 1 to Jul 31, 2003



# H1N1 Weekly: Mar 1, 2009 to Jul 31, 2010



# Extensive or Early Covid-19 Discussion

Company name	Call date	<i>Covid19 Exposure</i>	Country
Panel A: Top-10 firms with highest <i>Covid19Exposure</i>			
Abercrombie & Fitch	04-Mar-2020	0.31	United States
Biomerieux SA	26-Feb-2020	0.30	France
Crocs Inc	27-Feb-2020	0.29	United States
Advanced Energy Industries Inc	18-Feb-2020	0.28	United States
PPD Inc	05-Mar-2020	0.27	United States
Wolverine World Wide Inc	25-Feb-2020	0.27	United States
Descartes Systems Group Inc	04-Mar-2020	0.26	Canada
Agilent Technologies Inc	18-Feb-2020	0.25	United States
Watts Water Technologies Inc	11-Feb-2020	0.25	United States
Matson Inc	25-Feb-2020	0.24	United States
Panel B: Top-10 firms with highest <i>Covid19Exposure</i> in January			
United Airlines Holdings Inc	22-Jan-2020	0.03	United States
Vinda Intl Hldgs Ltd	22-Jan-2020	0.01	Hong Kong
Keppel Corporation Ltd	23-Jan-2020	0.01	Singapore
Avnet Inc	23-Jan-2020	0.01	United States
American Airlines Group Inc	23-Jan-2020	0.01	United States
SThree	27-Jan-2020	0.01	United States
Dr Reddy's Laboratories Ltd	27-Jan-2020	0.01	India
Sanmina Corp	27-Jan-2020	0.02	United States
Perkinelmer Inc	27-Jan-2020	0.05	United States
Whirlpool Corp	28-Jan-2020	0.02	United States

*Notes:* Panel A lists firms with the highest *Covid19Exposure* ( $\times 1000$ ). Only observations for which length > the sample mean are included. Panel B lists the first ten firms discussing Covid-19 in earnings calls held in 2020.

# Content Analysis

- Probing deeper into underlying concerns about how a disease impacts firms' policies and performance
- Focusing on Covid-19, we identify all transcripts mentioning at least one Covid-19 word
- There are +10K Covid-19 “snippets”; i.e., excerpts +/-10 words around a Covid-19 word
- Of these, we randomly draw 367 transcripts: spread across the months January, February, March, and April 2020
- We read all snippets in each transcript within this random sample, and identify which of the following Covid-19 related issues (next slide) is discussed

# Content Analysis (C'd)

- Pre-defined issues: (1) supply chain disruption, (2) fall in demand, (3) employee welfare/labor market, (4) production capacity reduction and/or retail store closures, (5) increased uncertainty, (6) financial market/financing concerns
- Similarly, some managers indicate that the coronavirus (1) had no impact (yet), (2) creates market opportunities for the firm
- In approx. 13 percent of the transcripts, the coronavirus is mentioned in a snippet but we are not able to specify the concern

Fluence Corp. Ltd., February 2, 2020

“[A]ll of us around the world follow the dynamic situation regarding the outbreak of the coronavirus in China (...) [and we are] monitoring any impact it may have on our business”

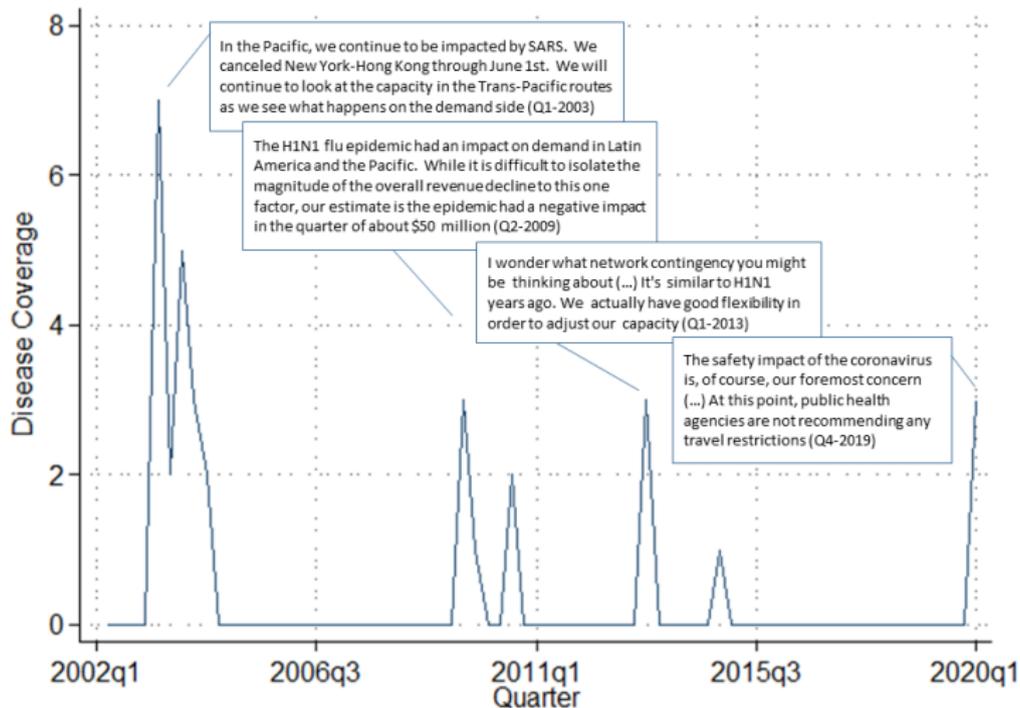
# Covid-19 Concerns and Opportunities

Category	Perc.	Transcript excerpt
Negative demand shock	45.73	the waterborne coatings tied especially to container shipping containers is still off because of the trade war now because the <b>coronavirus</b> is exacerbating that situation so demand is relatively soft in china epichlorohydrin specifically i dont know george if you have (Q4-2019 Hexion Inc, March 3, 2020)
Increased uncertainties	39.38	not a crystal ball to predict to what duration and to what extent important markets will be affected by the <b>coronavirus</b> we have to deal with the fact that our business has been already affected significantly in china to a lesser (Q4-2019 Hugo Boss AG, March 5, 2020)
Supply chain disruption	26.00	been getting these questions im sure others have as well anything we should be concerned or thinking about around the <b>coronavirus</b> impact on potentially supplies of strips cuffs or devices no we have a varied supply chain across the world and (Q4-2019 Livongo Health Inc, March 2, 2020)
Production capacity reduction/retail store closures	23.04	i turn it over to john i want to take a minute to talk about the recent outbreak of the <b>coronavirus</b> in china similar to other companies that operate in the region we are keeping our factory shut down week longer (Q4-2019 Knowles Corp, February 4, 2020)
Concerns about employee welfare and labor market	21.18	the economy was trending in a positive direction and seemed to be better until the most recent macro event the <b>coronavirus</b> briefly dxp was developing programs to help keep our employees safe as possible therefore keeping our customers exposure to a (Q4-2019 DXP Enterprises Inc, March 6, 2020)
Financial market/financing concerns	14.08	lower it is important to reiterate that the thirdparty price used is not necessarily our expectation with respect to the <b>coronavirus</b> that its having a significant global impact on everything from travel to supply chain to the financial market we are (Q4-2019 IDH Finance PLC, March 5, 2020)
No impact	11.35	a very little amount thats happening in asia in january we didnt see an impact to our business because of <b>coronavirus</b> we did see slight softness in hong kong and australia but youre talking about since asia is a relatively small (Q4-2019 WEX Inc, February 13, 2020)
Market opportunities	13.05	i think theres ways to look at this first is the chinese people as a result of this kind of <b>coronavirus</b> they might actually heighten or elevate the trust to reliability to japan or the japanese products so including that that (Q4-2019 Shiseido Co Ltd, February 6, 2020)

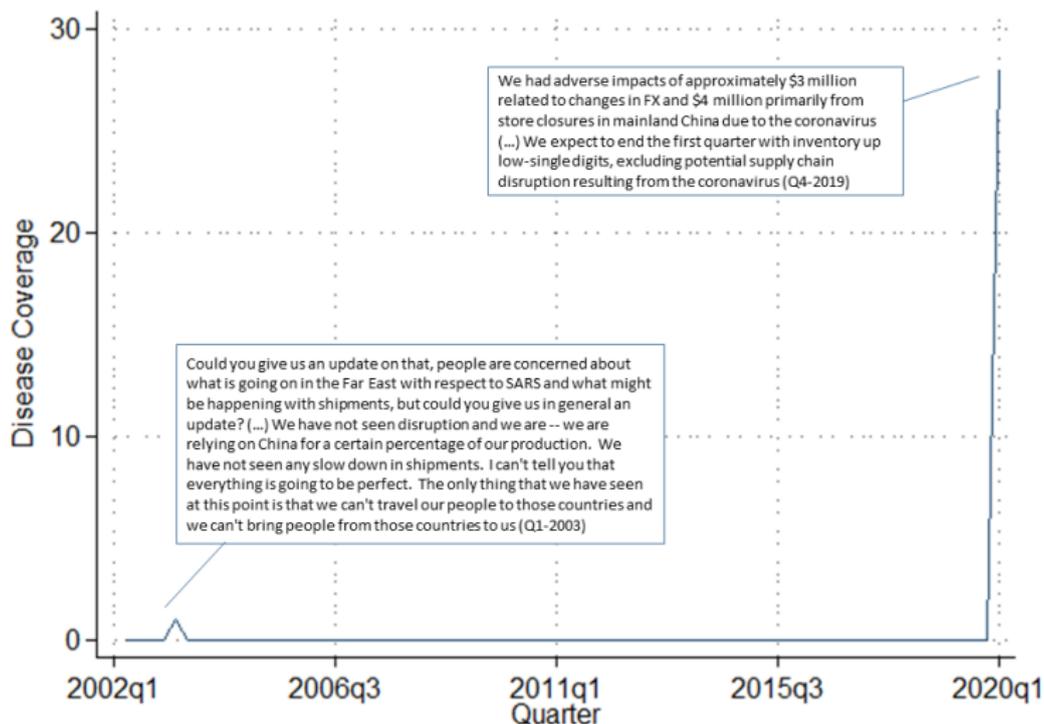
# Covid-19 Concerns and Opportunities: by Month

	2020			
	Jan	Feb	Mar	April
Negative demand shock	42.42	37.31	51.95	51.25
Increased uncertainties	18.18	29.85	53.25	56.25
Supply chain disruption	12.12	35.82	28.57	27.50
Production capacity reductions/retail store closure	12.12	22.39	21.43	36.25
Concerns about employee welfare and labor market	15.15	10.45	26.62	32.50
Financial markets/financing concerns	1.52	2.99	15.58	36.25
No impact	6.06	14.93	18.18	6.25
Market opportunities	7.58	10.45	11.69	22.5

# Case Studies: United Airlines



# Case Studies: Abercrombie & Fitch



# Firm-Level Resilience to Epidemic Diseases

**Do firms' expectations regarding their first moment exposures to epidemic diseases vary predictably in the cross-section?**

$$\begin{aligned} Covid19NegativeSentiment_i &= \delta_c + \delta_s + \beta PriorEpid_i \\ &+ \theta_{it} Covid19Exposure_i + Z_i' \nu + \epsilon_i \end{aligned}$$

where *PriorEpid* is the scaled (by the length of the transcript) count of the SARS and H1N1 synonyms (measured at the peak of their outbreaks in 2003 and 2009, respectively),  $Z$  contains the natural logarithm of firm  $i$ 's (one year) lagged assets and stock return beta (S&P500 index),  $\delta_c$  ( $\delta_s$ ) represent headquarters country (two-digit SIC) fixed effects

We drop firms in the healthcare industry and pharmaceuticals as their circumstances during a public health crisis are plausibly different in manifold ways from all other companies

# Summary Statistics

	All firms			US firms		Non-US firms		Total
	Mean	Median	SD	Mean	SD	Mean	SD	N
Panel A: Covid19 variables								
Covid19NegativeSentiment	0.069	0.000	0.187	0.068	0.195	0.070	0.175	3,392
Covid19NetSentiment	-0.040	0.000	0.164	-0.040	0.168	-0.042	0.158	3,392
Covid19Exposure	0.246	0.000	0.455	0.240	0.461	0.256	0.446	3,392
Covid19Risk	0.022	0.000	0.084	0.020	0.081	0.025	0.088	3,392
PriorEpid	0.865	0.000	4.044	1.129	4.746	0.487	2.697	3,392
Panel B: Other epidemic variables								
Sars03Exposure	0.046	0.000	0.199	0.040	0.172	0.074	0.288	11,550
H1N1Exposure	0.017	0.000	0.153	0.015	0.142	0.019	0.173	17,687
Panel C: Firm specific variables								
Total assets, log	8.418	8.297	2.126	8.031	1.874	8.990	2.337	3,351
Market beta	0.661	0.636	0.428	0.870	0.365	0.361	0.321	3,046

*Notes:* This table shows the mean, median, standard deviation, and the number of firms for the variables used in the subsequent analysis. Columns 1 to 3 refer to the sample of all firms, Columns 4 and 5 to the sample of US firms, and Columns 6 and 7 to the sample of non-US firms. Covid19NegativeSentiment, Covid19NetSentiment, Covid19Exposure, and Covid19Risk are calculated, as defined in the paper and multiplied by 1,000. All Covid19 variables are calculated using firms' transcripts from the first quarter in 2020. PriorEpid is the sum of SARSExposure (measured for calls held in 2003) and H1N1Exposure (measured for calls held in 2009) by firm, multiplied by 1,000. Total assets per 2019 year-end are obtained from Compustat. Market beta is calculated by regressing daily returns in 2018 for firm  $i$  on the SP500 index.

# Prior Exposure and *Covid19NegativeSentiment*

Sample	(1) Full	(2) Full	(3) US
<i>Covid19NegativeSentiment</i>			
PriorEpid		-0.00162** (0.000769)	-0.00204** (0.000874)
Covid19Exposure	0.280*** (0.0154)	0.281*** (0.0156)	0.273*** (0.0212)
Total assets, log	-0.00141 (0.00142)	-0.000699 (0.00145)	-0.00112 (0.00204)
Market beta	-0.0212** (0.0102)	-0.0216** (0.0102)	-0.0286** (0.0133)
Constant	0.0254** (0.0121)	0.0208* (0.0122)	0.0374** (0.0150)
Observations	3,000	3,000	1,786
R-squared	0.517	0.518	0.512
Country FE	YES	YES	NO
Industry FE	YES	YES	YES

This table reports estimates from a regression of *Covid19NegativeSentiment* on an index for prior experience with H1N1 or Ebola (*PriorEpid*), with robust standard errors. *PriorEpid* is the sum of the number of times SARS (H1N1) is mentioned in firm i's earnings calls held in 2003 (2009), scaled by the number of words in the transcript. Columns 1 and 2 use the full sample; column 3 includes only US firms. All specifications include sector fixed effects (two-digit SIC) and, where appropriate, country fixed effects. \*\*\*, \*\*, \* represent statistical significance at the 1, 10, and 5 percent level, respectively.

# Prior Exposure: *Covid19Exposure*, *Covid19Risk*

VARIABLES	(1) Full	(2) US	(3) Full	(4) US
PriorEpid	0.00729** (0.00309)	0.00692* (0.00364)	0.000311 (0.000363)	0.000216 (0.000392)
Total assets, log	0.00383 (0.00465)	0.00259 (0.00603)	0.000225 (0.000928)	-0.000939 (0.00106)
Market beta	0.0528* (0.0284)	0.0130 (0.0369)	0.000904 (0.00585)	-0.00132 (0.00730)
Constant	0.172*** (0.0399)	0.199*** (0.0482)	0.0195** (0.00804)	0.0291*** (0.00945)
Observations	3,000	1,786	3,000	1,786
R-squared	0.224	0.230	0.099	0.124
Country FE	YES	NO	YES	NO
Industry FE	YES	YES	YES	YES

This table reports estimates from a regression of *Covid19Exposure* (Columns 1-2) and *Covid19Risk* (Columns 3-4) as the dependent variable, with robust standard errors. *PriorEpid* is the sum of the number of times SARS (H1N1) is mentioned in firm i's earnings calls held in 2003 (2009), scaled by the number of words in the transcript. Columns 1 and 3 use the full sample; columns 2 and 4 include only US firms. All specifications include sector fixed effects (two-digit SIC) and, where appropriate, country fixed effects. \*\*\*, \*\*, \* represent statistical significance at the 1, 10, and 5 percent level, respectively

## Is Covid19X Priced?

**After showing that Covid-19 discussions in earnings calls are more positive for firms which previously experienced an epidemic disease, we next ask whether this sentiment and Covid19Risk are priced?**

$$Ret_i = \alpha_0 + \delta_j + \delta_c + \beta Covid19X_i + Z_i' \nu + \epsilon_i$$

where  $Ret$  is either the cumulative return over a three-day (-1,1) window around the date of the earnings call or the “quarter to date” cumulative return starting on Jan 1 and ending on Mar 15, 2020

- Standard asset-pricing models suggest change in stock price occurs when investors, on aggregate, revise beliefs regarding (a) expected future cash flows and/or (b) expected discount rate
- Thus, a more positive sentiment regarding an epidemic disease should be associated with an increase in stock returns
- Similarly, higher perceived epidemic risk is expected to be negatively associated with the selfsame

# Covid-19 Exposure and Short-Window Returns

Sample	(1) Full	(2) Full	(3) Full	(4) Full	(5) US	(6) US	(7) US	(8) US
	<i>Returns[-1,+1]</i>							
<i>Covid19Exposure</i>	-2.543*** (0.598)					-2.789*** (0.846)		
<i>Covid19NegativeSentiment</i>		-4.553*** (1.615)		-4.282*** (1.618)		-4.864** (2.399)		-4.652* (2.404)
<i>Covid19PositiveStatement</i>		-1.606 (3.591)		-1.120 (3.671)		-3.100 (4.680)		-2.631 (4.877)
<i>Covid19Risk</i>			-5.842** (2.273)	-2.700 (2.449)			-6.405** (2.923)	-2.051 (3.345)
Market beta	-0.398 (0.896)	-0.611 (0.897)	-0.608 (0.901)	-0.612 (0.898)	-1.206 (1.126)	-1.473 (1.122)	-1.347 (1.128)	-1.463 (1.125)
Total assets, log	0.217* (0.132)	0.203 (0.132)	0.193 (0.132)	0.199 (0.132)	0.364** (0.173)	0.354** (0.173)	0.342** (0.172)	0.350** (0.174)
Constant	-1.799 (1.245)	-1.798 (1.248)	-1.958 (1.245)	-1.731 (1.251)	-2.795* (1.553)	-2.717* (1.567)	-3.027* (1.554)	-2.675* (1.571)
Observations	1,654	1,654	1,654	1,654	1,031	1,031	1,031	1,031
R-squared	0.097	0.093	0.086	0.094	0.107	0.106	0.097	0.106
Country FE	YES	YES	YES	YES	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES

*Notes:* This table reports estimates from a regression using cumulative stock returns (-1,+1) around earnings call date as the dependent variable, with robust standard errors. Columns 1-4 use the full sample; columns 5-8 includes only US firms. All specifications include sector fixed effects (two-digit SIC) and, where appropriate, country fixed effects. \*\*\*, \*\*, \* represent statistical significance at the 1, 10, and 5 percent level, respectively.

# Covid-19 Exposure and Long-Window Returns

Sample	(1) Full	(2) Full	(3) Full	(4) Full	(5) US	(6) US	(7) US	(8) US
<i>Returns in 2020Q1</i>								
<i>Covid19Exposure</i>	-5.445*** (1.446)				-4.365** (2.121)			
<i>Covid19NegativeSentiment</i>		-12.29*** (4.002)		-10.80*** (4.078)		-7.608 (5.694)		-5.895 (5.903)
<i>Covid19PositiveSentiment</i>		-0.178 (7.224)		1.936 (7.309)		-3.333 (9.777)		-0.713 (9.858)
<i>Covid19Risk</i>			-20.62*** (5.886)	-14.12** (6.257)			-20.08** (7.885)	-15.35* (8.635)
Market beta	-8.352*** (2.929)	-8.826*** (2.975)	-8.735*** (2.942)	-8.839*** (2.973)	-10.14*** (3.885)	-10.50*** (4.002)	-10.20*** (3.908)	-10.41*** (4.010)
Total assets, log	0.852** (0.369)	0.819** (0.370)	0.826** (0.370)	0.817** (0.370)	1.346*** (0.500)	1.331*** (0.500)	1.303*** (0.501)	1.307*** (0.501)
Constant	-29.87*** (4.092)	-29.75*** (4.101)	-30.28*** (4.067)	-29.57*** (4.103)	-31.39*** (5.862)	-31.38*** (5.888)	-31.63*** (5.799)	-31.14*** (5.890)
Observations	2,230	2,230	2,230	2,230	1,331	1,331	1,331	1,331
R-squared	0.211	0.211	0.209	0.212	0.204	0.203	0.203	0.204
Country FE	YES	YES	YES	YES	NO	NO	NO	NO
Industry FE	YES							

*Notes:* This table reports estimates from a regression using cumulative stock returns (Jan 1–Mar 15, 2020) as the dependent variable, with robust standard errors. Columns 1–4 use the full sample; columns 5–8 includes only US firms. All specifications include sector fixed effects (two-digit SIC) and, where appropriate, country fixed effects. \*\*\*, \*\*, \* represent statistical significance at the 1, 10, and 5 percent level, respectively.

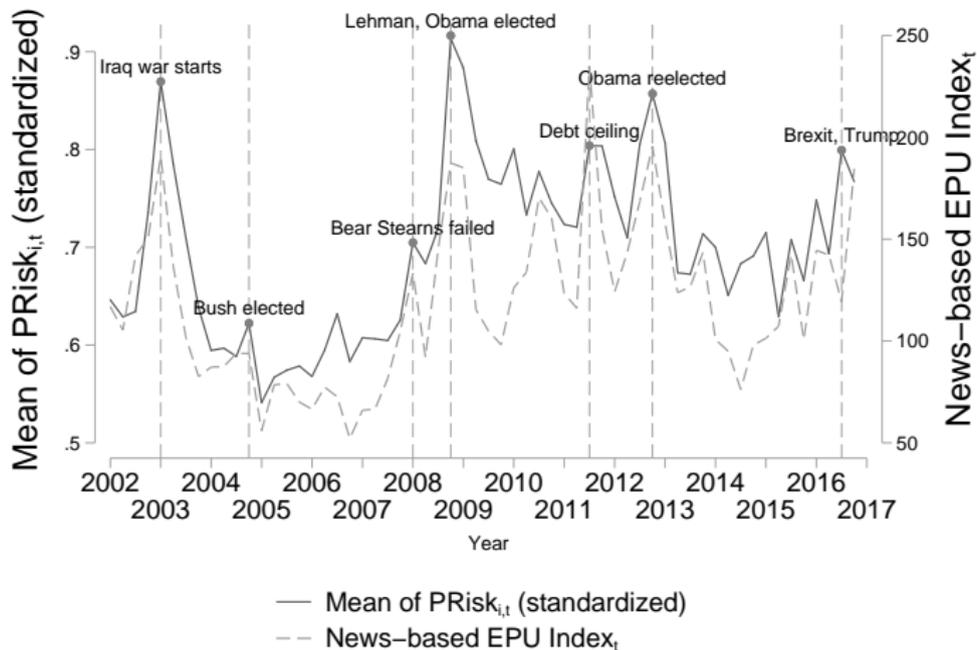
# Conclusion

- In this paper, we provide measures of **individual firms' exposure—including risk, sentiment—to epidemic diseases** from 2002 onwards, including the current Covid-19 pandemic
- For a sample of global firms (approx. 12K, headquartered in +80 countries), based on transcripts of their quarterly earnings conference calls, we also extract information about the **nature of managers' corona-related concerns** (and opportunities, if any)
  - Early-stage concerns relate to collapse of demand, increased uncertainty, disruption in supply chains, capacity reductions, closures, and employee welfare
- We find some evidence that firms with **prior SARS or H1N1 experience have more positive expectations** about their ability to deal with the coronavirus outbreak

Thank you for your attention!



# Mean of $PRisk_{i,t}$ across Firms



Correlation with BBD newspaper-based measure = 0.82 [▶ back](#)