Are Uncertain Firms Riskier?

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Fotis Grigoris[‡] Preetesh Kantak[†]

[†]Indiana University, [‡]University of Iowa

NBER Big Data Session (July 2023)

Big Picture: Economic Uncertainty

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(iii) How do firms manage uncertainty risk?

- **Focus on employee consumption of news**
  - Distinct from experimental, survey, financial or real-based measures
  - Complements *production* and *dissemination*-based measures

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- Measure firm-level relative attention to uncertainty

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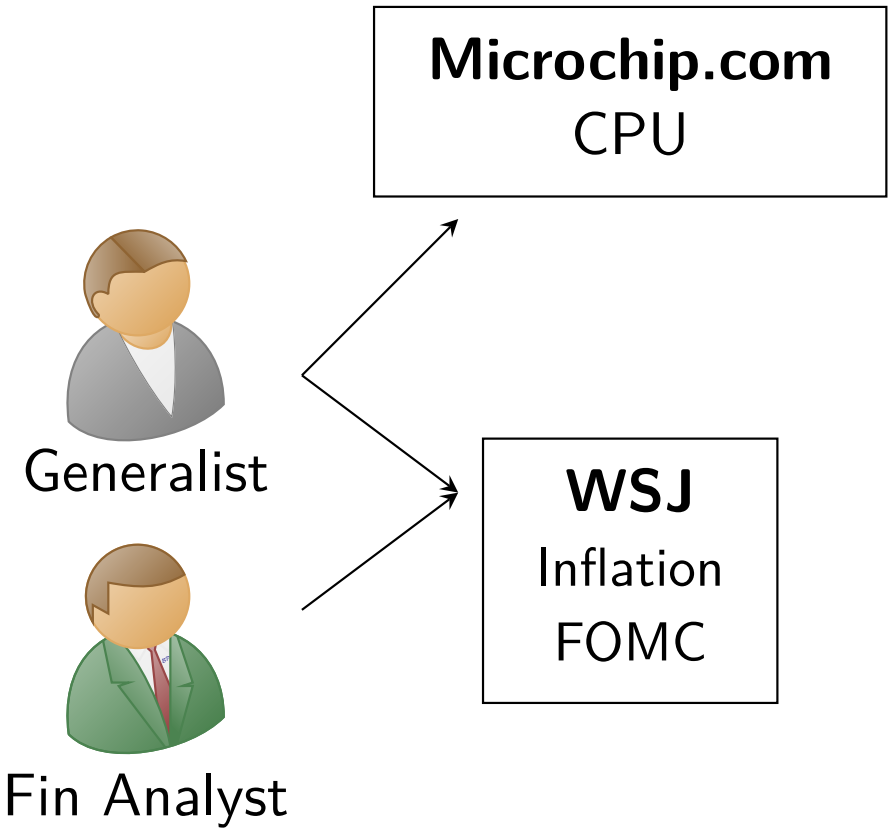
  - **Finding:** Reading more *financial* uncertainty news $\Rightarrow$
    (a) Lower future sales,
    (b) Less investment (lower asset, physical capital and inventory growth),
    (c) Hiring fewer (and/or firing more) workers.

Firm Attention: Motivating Example

Apple Inc.
11/17/2018



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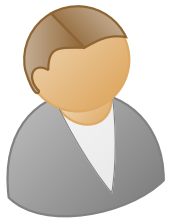
Microchip.com
CPU



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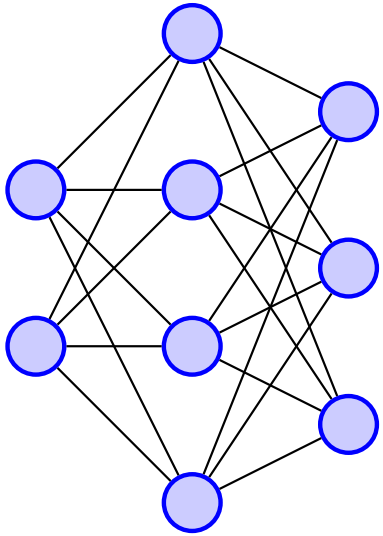

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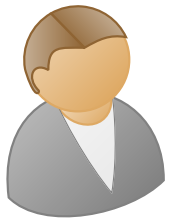

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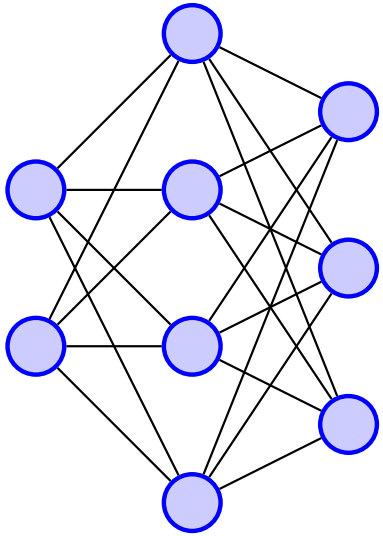

Output data

Date	Domain	Interactions	Topic
11/17/2018	apple.com	230	Inflation
11/17/2018	apple.com	220	FOMC
11/17/2018	apple.com	10	CPU

Measuring Relative Attention to Uncertainty

Use *EPU* corpus for uncertainty topics (Baker et al., 2016)

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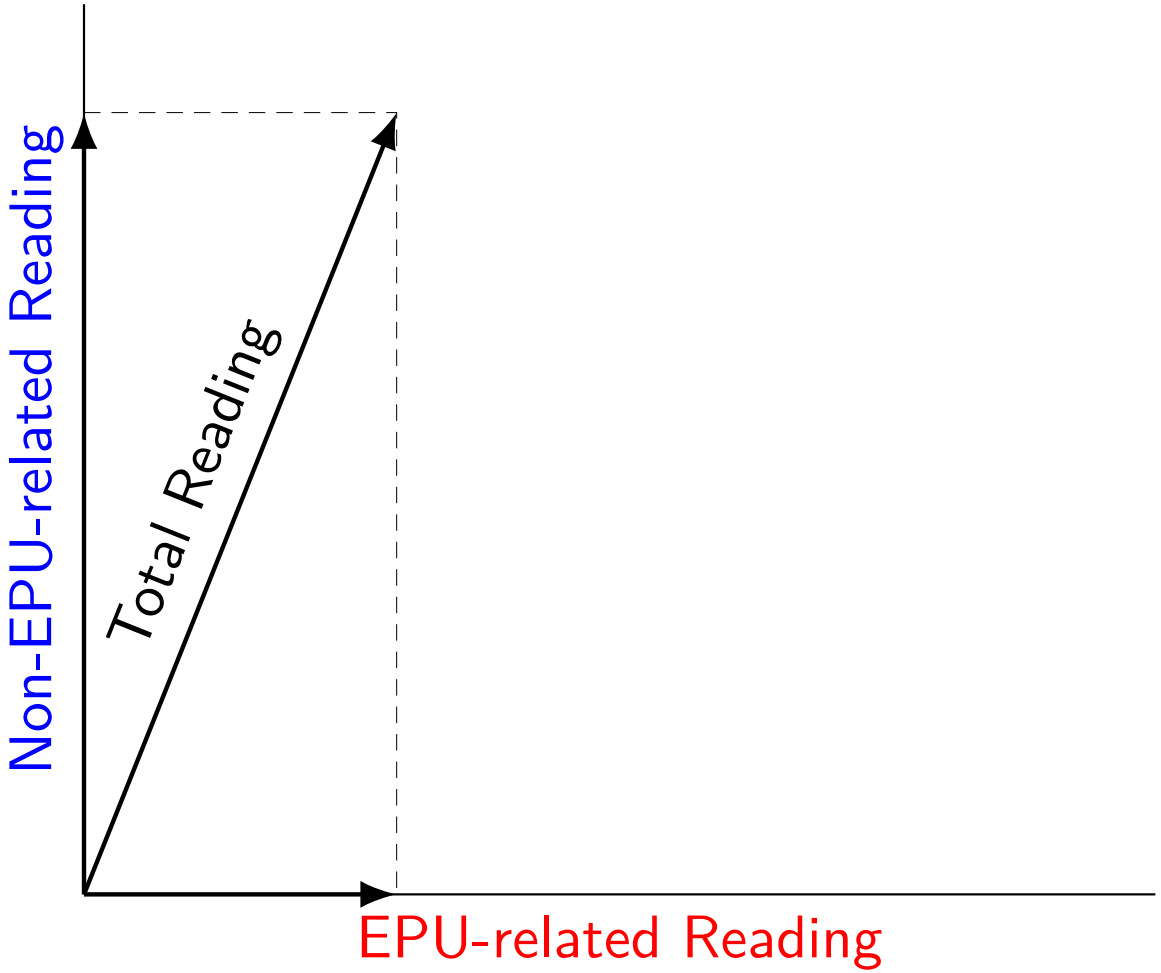

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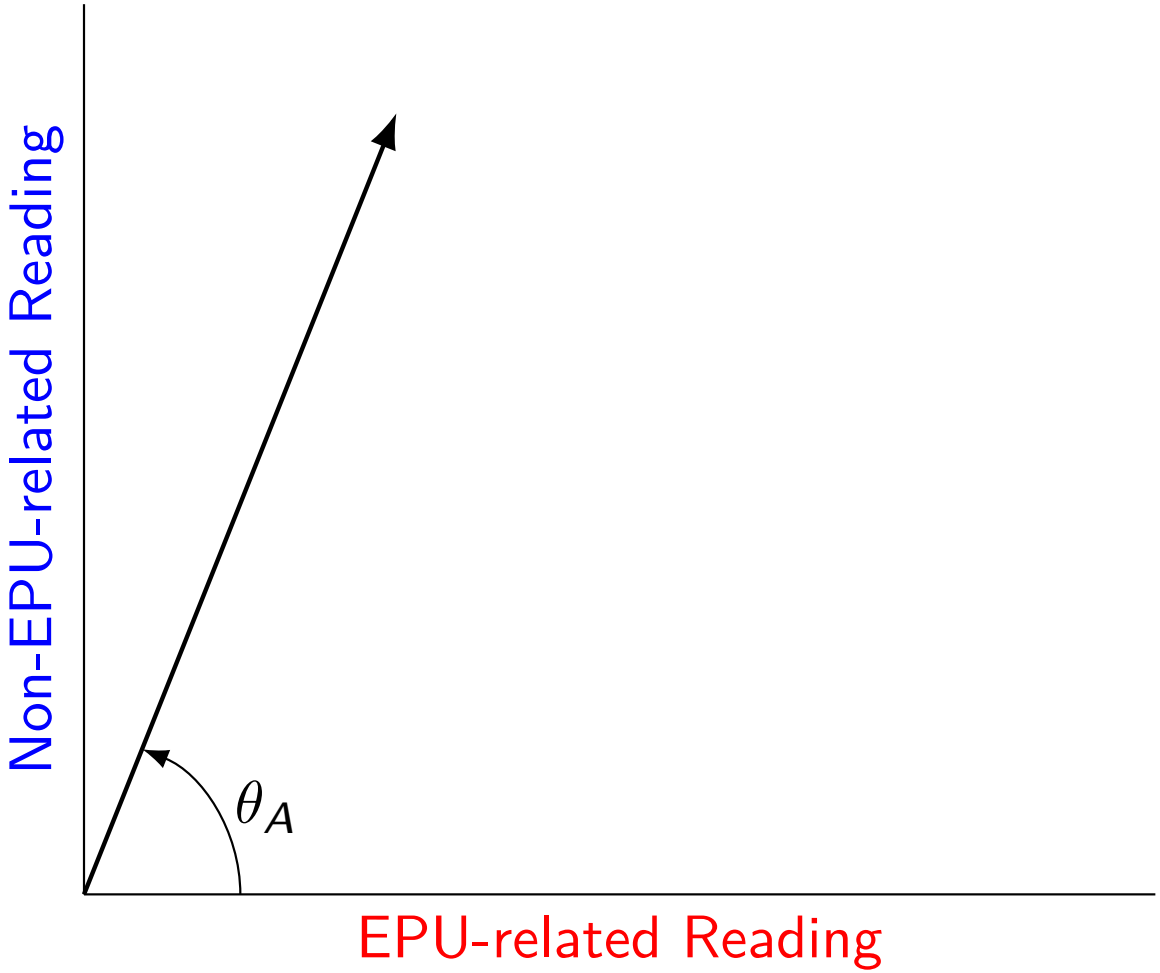

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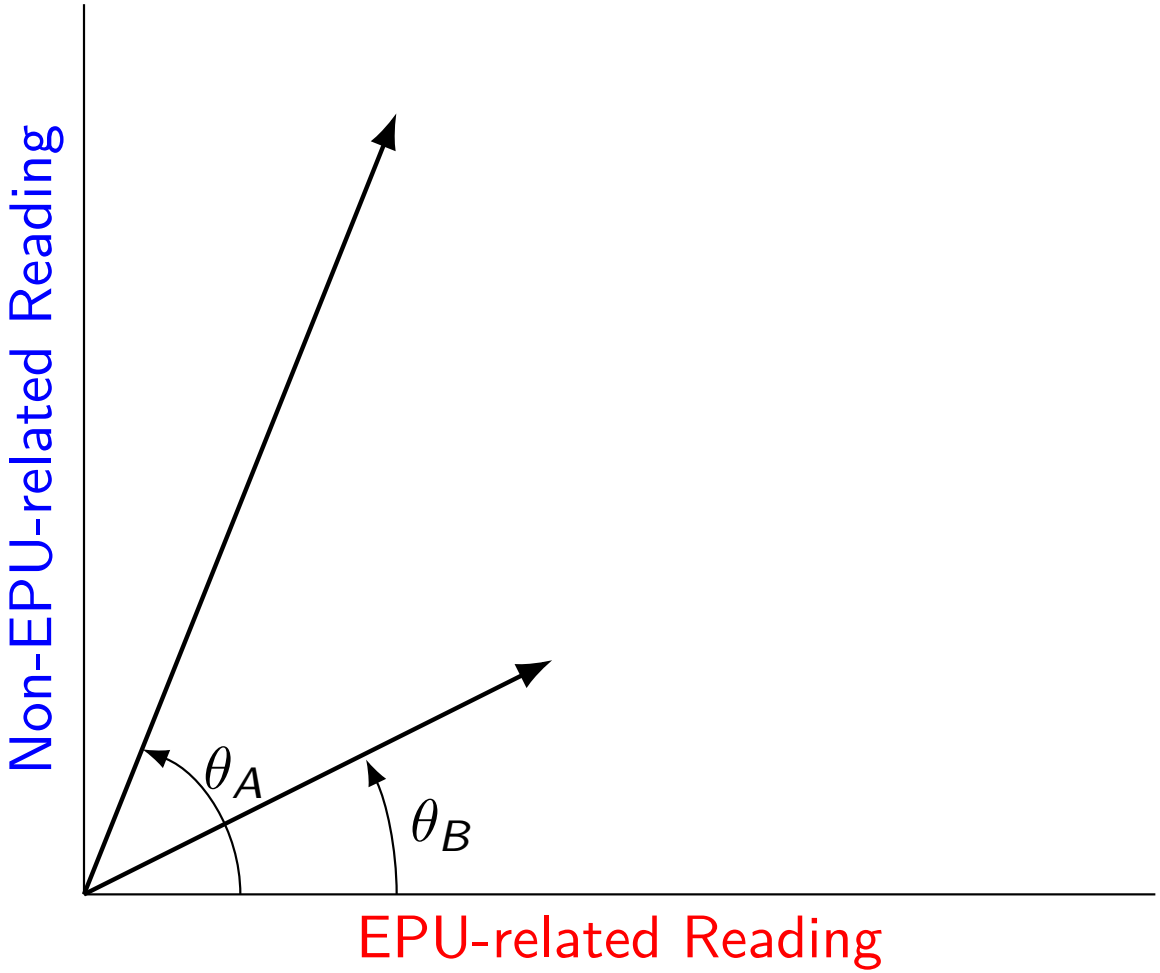

Firm B reads relatively more uncertainty-related news than Firm A

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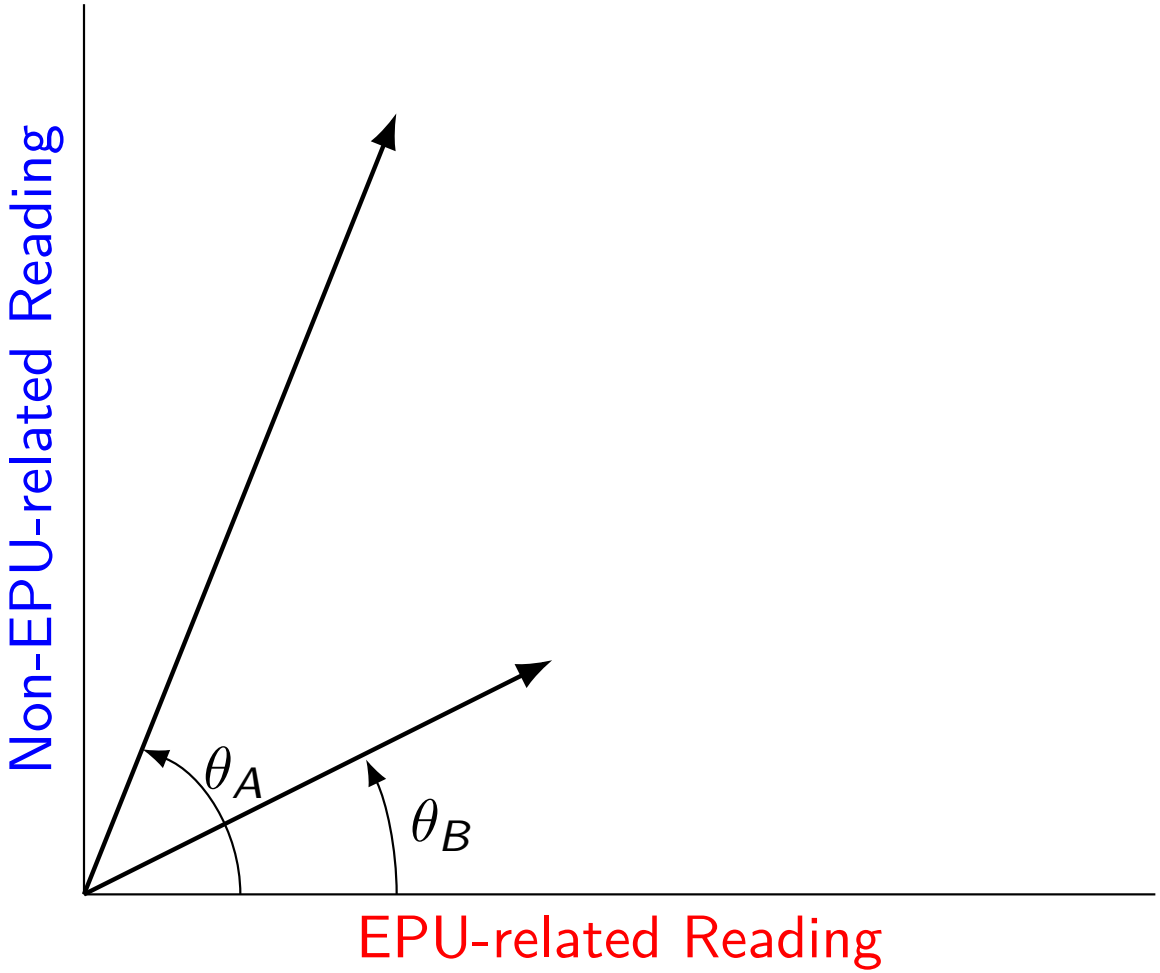

Firm B reads relatively more uncertainty-related news than Firm $A \Rightarrow \cos(\theta_B) >> \cos(\theta_A)$

Identifying Relevant Topics (2)

- Define topic-frequency for firm i and topic j on date t as

$$tf_{i,j,t} = \begin{pmatrix} \text{Fraction of Employees at Firm } i \\ \text{Interacting with Topic } j \text{ at time } t \end{pmatrix}$$

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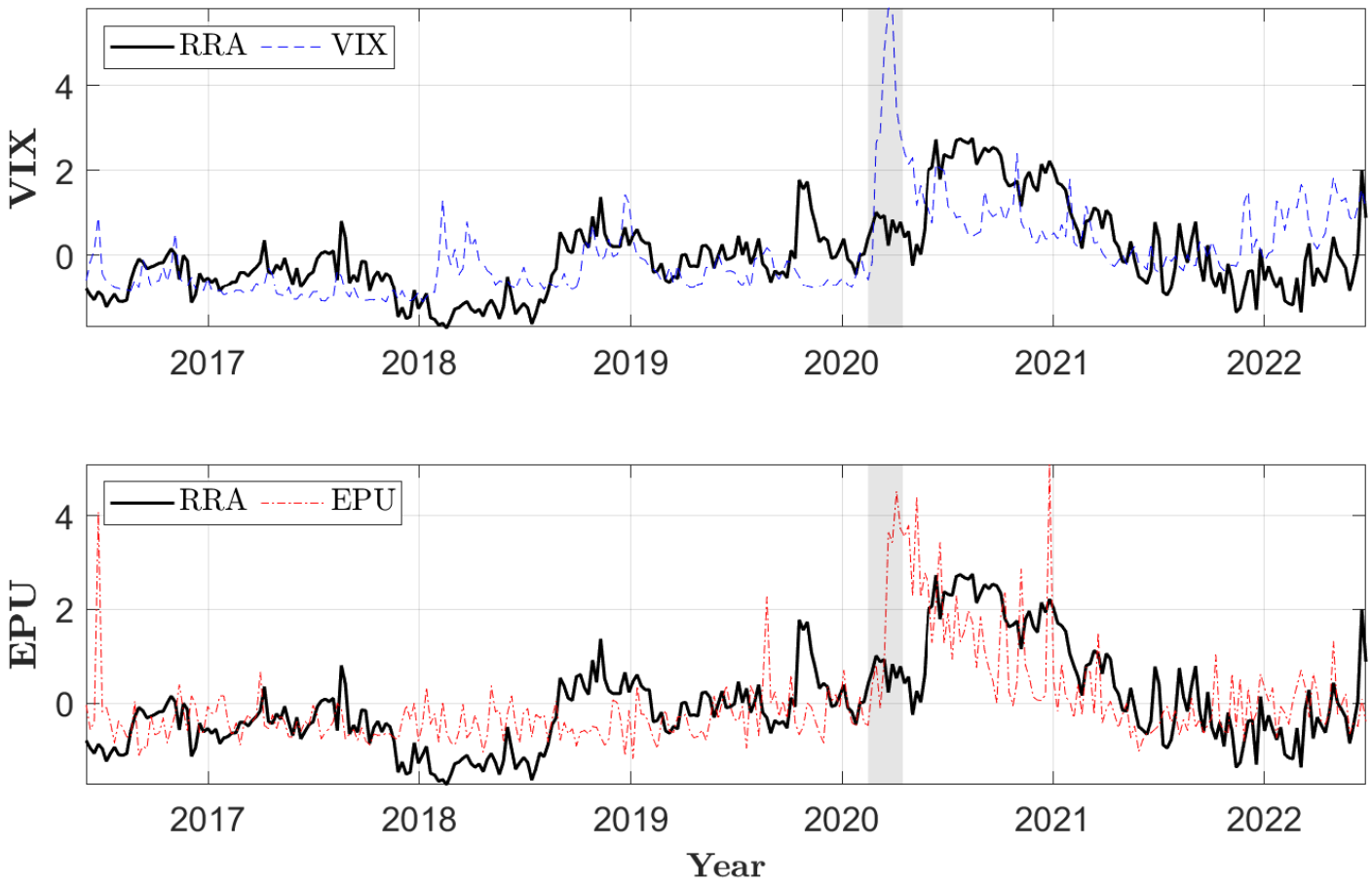
- Stack topic-frequencies, define raw relative attention as

$$RRA_{i,t} = \cos\left(\theta_{i,t}^{raw}\right) = \frac{\boldsymbol{tf}_{i,t}^{Unc} \cdot \boldsymbol{tf}_{i,t}^{Total}}{\|\boldsymbol{tf}_{i,t}^{Unc}\| \times \|\boldsymbol{tf}_{i,t}^{Total}\|}$$

Raw Relative Attention to Uncertainty: the Time-series



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  Reflects both financial and real uncertainty Ludvigson et al.

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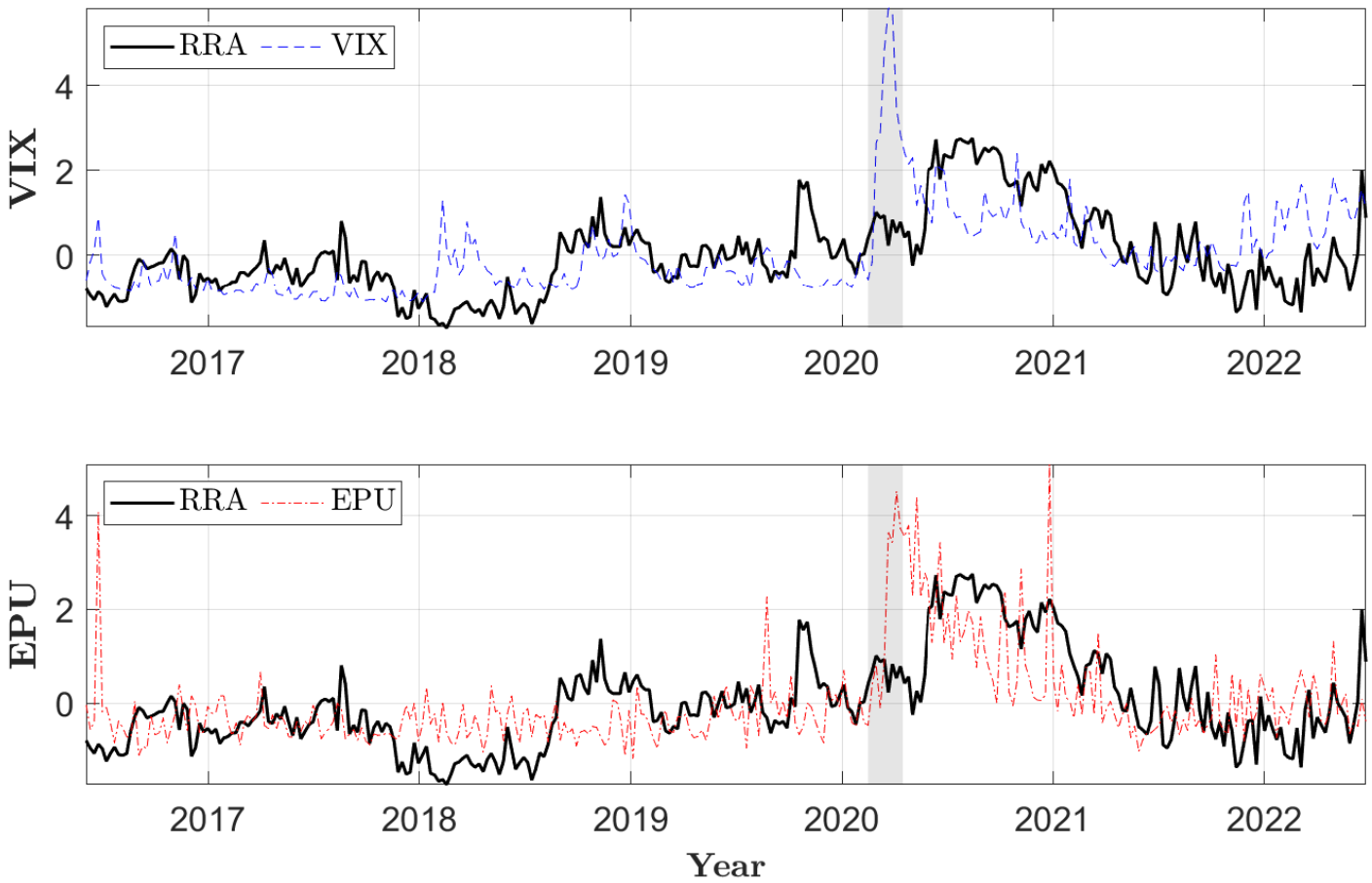

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- But which set of topics most differentiate reading by firms?!?

Weighted Word Cloud Illustration 11/17/2018

Uncertainty

Raw

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- **To answer question:** (Down)Upweight topics most (un)informative in distinguishing reading in cross-section of firm...

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Weighted

- Analog of a tf-idf score, which we call the *tf-iaf* score

"*Topic Frequency-Inverse Aggregate Frequency*"

Weighted Word Cloud Illustration 11/17/2018

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Weighted

- Re-weighted uncertainty topics reflect firm management of uncertainty (compliance / hedging / financial risks)

Relative Attention to Uncertainty: the Cross-section

- The adjusted relative attention of firm i at time t is

$$ARA_{i,t} = \cos\left(\theta_{i,t}^{adj}\right) = \frac{\boldsymbol{tf\text{-}iaf}_{i,t}^{Unc} \cdot \boldsymbol{tf\text{-}iaf}_{i,t}^{Total}}{\|\boldsymbol{tf\text{-}iaf}_{i,t}^{Unc}\| \times \|\boldsymbol{tf\text{-}iaf}_{i,t}^{Total}\|}$$

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  - Map $ARA_{i,t} \in [0, 1]$ at each t (purely cross-sectional)
- An empirical question: Is tilt actually informative of *exposure* to uncertainty? Yes!!

Data

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  - Focus on the period ranging from 2016 to 2022
  - Exclude financial and utilities firms
- 90% of CRSP/Compustat firms matched via their domain
- 95%+ of market capitalization covered

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Low ARA	0.0178	[3.88]	0.0160	[4.07]	0.0214	[3.49]	0.0261	[4.04]
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- Similar results using five or ten portfolios Greater Granularity

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  - $\delta_{k,t}$ are industry and/by date fixed effects

Risk Mitigation (2)

	Hedging Activity			
$ARA_{i,t-1}$	0.3282^{***}	0.3345^{***}	0.3165^{***}	0.2840^{***}
	[4.00]	[4.47]	[4.14]	[3.17]
Observations	10,437	10,437	10,362	6,531
R^2	0.0229	0.1479	0.2040	0.3799
	Compliance Activity			
$ARA_{i,t-1}$	11.1794^{***}	9.4435^{***}	7.6329^{***}	2.0122^{*}
	[4.56]	[3.66]	[3.74]	[1.82]
Observations	23,812	23,812	23,696	16,782
R^2	0.0069	0.1345	0.4266	0.7528
Date FE		+	+	
Industry FE			+	
Date × Industry FE				+
Controls				+

- t-statistics computed using firm and date clustered s.e.

Risk Mitigation (2)

	Hedging Activity			
$ARA_{i,t-1}$	0.3282^{***}	0.3345^{***}	0.3165^{***}	0.2840^{***}
	[4.00]	[4.47]	[4.14]	[3.17]
Observations	10,437	10,437	10,362	6,531
R^2	0.0229	0.1479	0.2040	0.3799
	Compliance Activity			
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- $\uparrow P$ (higher than median hedging) as $ARA_{i,t}$ moves 0th to 100th %

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Controls				+

- t-statistics computed using firm and date clustered s.e.
- ↑ regulatory burden index as $ARA_{i,t}$ moves 0th to 100th %

Cost of Capital (1)

- Are these "priced" risks? Do higher ARA firms have higher $E[R]$?
  - Examine via regression framework:

$$\text{ICC}_{i,k,t} = \delta_{k,t} + \beta ARA_{i,k,t-1} + \boldsymbol{X}'_{i,t-1}\gamma + \varepsilon_{i,k,t}$$

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- Why do we use *ICC* rather than realized returns directly?
  - Short time-series: $\sim +6\%$ long-short spread (statistically weak)
- What characteristics align with *ARA* portfolios?
  - Strong (weak) association with GP and AG (BM and β_m)

Portfolios Decomposition

Cost of Capital (2)

	(1)	(2)	(3)	(4)
$ARA_{i,t-1}$	0.0217***	0.0213***	0.0150***	0.0080***
	[8.02]	[7.88]	[6.97]	[2.82]
Date FE		+	+	
Industry FE			+	
Date × Industry FE				+
Controls				+
Observations	36,573	36,573	36,455	26,823
R^2	0.0103	0.0172	0.0785	0.2469

- t-statistics computed using firm and date clustered s.e.

Cost of Capital (2)

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$ARA_{i,t-1}$	0.0217***	0.0213***	0.0150***	0.0080***
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- $\uparrow$ cost of capital as $ARA_{i,t}$ moves 0th to 100th %

Firm-Level Outcomes: Empirical Design

- $\uparrow$ Cost of Capital implies $\downarrow$ Prospects...

Firm-Level Outcomes: Empirical Design

- ↑ Cost of Capital implies ↓ Prospects...
- Test whether any of this actually matters for firm outcomes:

$$\Delta y_{i,k,t} = \delta_{k,t} + \beta ARA_{i,k,t-1} + \boldsymbol{X}'_{i,t-1}\gamma + \varepsilon_{i,k,t}$$

  - $y_{i,t} \equiv$ real outcome of firm i at time t (e.g., investment, sales, hiring)

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  - $y_{i,t} \equiv$ real outcome of firm i at time t (e.g., investment, sales, hiring)
  - $ARA_{i,t-1}$ captures adjusted relative attention of firm i at time $t-1$
  - $\boldsymbol{X}'_{i,t-1}$ is vector of controls
  - $\delta_{k,t}$ are industry and/by date fixed effects

Firm-Level Outcomes: Investment and Sales

	Asset Growth			
$ARA_{i,t-1}$	-0.0394^{***}	-0.0391^{***}	-0.0266^{***}	-0.0138^{**}
	$[-3.34]$	$[-3.41]$	$[-3.16]$	$[-2.47]$
Observations	52,794	52,794	52,393	33,233
R^2	0.0019	0.0149	0.0208	0.1208
	Sales Growth			
$ARA_{i,t-1}$	-0.1987^{***}	-0.1952^{***}	-0.1390^{***}	-0.0512^{***}
	$[-7.41]$	$[-7.34]$	$[-6.97]$	$[-2.80]$
Observations	48,078	48,078	47,830	33,030
R^2	0.0030	0.0127	0.0367	0.1105
Date FE		+	+	
Industry FE			+	
Date × Industry FE				+
Controls				+

- Relative attention to uncertainty ↑ ⇒ Invest & Sell less

Firm-Level Outcomes: Investment and Sales

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Date FE		+	+	
Industry FE			+	
Date × Industry FE				+
Controls				+

- Relative attention to uncertainty ↑ ⇒ Invest & Sell less
- Also observe reductions in PPENT Growth and INVT Growth

Firm-Level Outcomes: Employment

	(1)	(2)	(3)	(4)
$ARA_{i,t-1}$	-0.1999^{***}	-0.1956^{***}	-0.1726^{***}	-0.0584^{**}
	$[-4.09]$	$[-4.05]$	$[-3.43]$	$[-2.67]$
Date FE		+	+	
Industry FE			+	
Date × Industry FE				+
Controls				+
Observations	10,335	10,335	10,260	6,517
R^2	0.0074	0.0194	0.0287	0.1243

- Attention to uncertainty ↑ ⇒ Hire fewer (fire more?) workers

Conclusion

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  - Higher attention to *financial* uncertainty topics $\Rightarrow$
    1. More exposure to aggregate measures of uncertainty,
    2. Greater effort mitigating risk,
    3. Higher cost-of-capital!

Conclusion

- Employees within firms pay attention to a lot!
- Dissecting attention means understanding distribution of *topics*...
  - Higher attention to *financial* uncertainty topics ⇒
    1. More exposure to aggregate measures of uncertainty,
    2. Greater effort mitigating risk,
    3. Higher cost-of-capital!
  - Higher attention to uncertainty ⇒ lower investment & prospects
    - Effects incremental to relationship with other measures of exposure!!

Reference List I

Baker, S. R., Bloom, N., Davis, S. J., 2016. Measuring economic policy uncertainty. The quarterly journal of economics 131, 1593–1636.

Bali, T. G., Brown, S. J., Tang, Y., 2017. Is economic uncertainty priced in the cross-section of stock returns? Journal of Financial Economics 126, 471–489.

Berger, D., Dew-Becker, I., Giglio, S., 2020. Uncertainty shocks as second-moment news shocks. The Review of Economic Studies 87, 40–76.

Bloom, N., Floetotto, M., Jaimovich, N., Saporta-Eksten, I., Terry, S. J., 2018. Really uncertain business cycles. Econometrica 86, 1031–1065.

Campello, M., Lin, C., Ma, Y., Zou, H., 2011. The real and financial implications of corporate hedging. The journal of finance 66, 1615–1647.

Chinco, A., Hartzmark, S. M., Sussman, A. B., 2022. A new test of risk factor relevance. The Journal of Finance 77, 2183–2238.

Reference List II

Dew-Becker, I., Giglio, S., Le, A., Rodriguez, M., 2017. The price of variance risk. Journal of Financial Economics 123, 225–250.

Gebhardt, W. R., Lee, C. M., Swaminathan, B., 2001. Toward an implied cost of capital. Journal of accounting research 39, 135–176.

Hassan, T. A., Hollander, S., Van Lent, L., Tahoun, A., 2019. Firm-level political risk: Measurement and effects. The Quarterly Journal of Economics 134, 2135–2202.

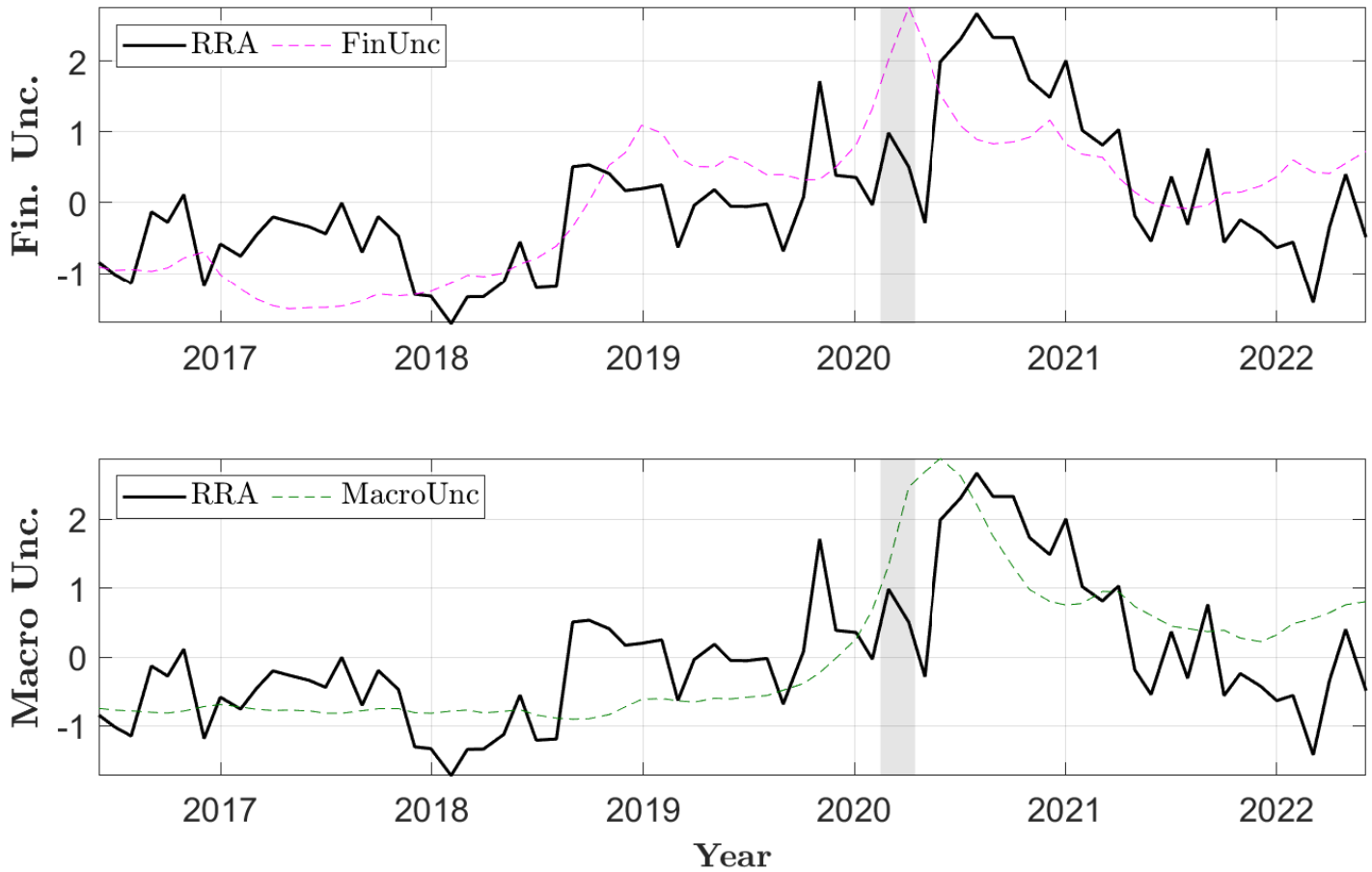
Kalmenovitz, J., 2022. Regulatory intensity and firm-specific exposure. Forthcoming, Review of Financial Studies .

Leary, M. T., Roberts, M. R., 2014. Do peer firms affect corporate financial policy? The Journal of Finance 69, 139–178.

Ludvigson, S. C., Ma, S., Ng, S., 2021. Uncertainty and business cycles: exogenous impulse or endogenous response? American Economic Journal: Macroeconomics 13, 369–410.

Whited, T. M., Wu, G., 2006. Financial constraints risk. The review of financial studies 19, 531–559.

Raw Relative Attention Over Time



Return

Exposure to Uncertainty Placebo

	VIX		EPU		Financial		Macro	
Portfolio	β	t-stat	β	t-stat	β	t-stat	β	t-stat
Low ARA	0.0355	[5.14]	0.0397	[5.13]	0.0443	[4.19]	0.0378	[2.36]
2	0.0359	[4.89]	0.0401	[4.72]	0.0473	[3.59]	0.0461	[2.66]
High ARA	0.0321	[4.64]	0.0366	[4.98]	0.0507	[4.00]	0.0483	[3.55]
High-Low	-0.0034	[-0.62]	-0.0031	[-0.62]	0.0064	[0.61]	0.0105	[1.01]

Return

Exposure to Uncertainty 5 Portfolios

	VIX		EPU		Financial		Macro	
Portfolio	β	t-stat	β	t-stat	β	t-stat	β	t-stat
Low ARA	0.0136	[3.62]	0.0098	[3.44]	0.0161	[3.67]	0.0194	[4.41]
2	0.0218	[3.88]	0.0219	[4.47]	0.0271	[3.49]	0.0327	[3.93]
3	0.0273	[4.10]	0.0293	[5.06]	0.0375	[3.84]	0.0417	[4.02]
4	0.0295	[3.91]	0.0320	[4.87]	0.0425	[3.82]	0.0458	[3.82]
High ARA	0.0290	[3.89]	0.0321	[4.80]	0.0416	[3.87]	0.0477	[3.94]
High-Low	0.0154	[3.30]	0.0223	[5.23]	0.0255	[3.45]	0.0283	[3.18]

Return

3 *ARA* Portfolio Characteristics

	Beta	Market Cap	Book to Market	Gross Profit	Asset Growth
Low ARA	1.0186	3439	0.5110	0.1742	0.3022
2	1.0557	5356	0.5291	0.2425	0.2150
High ARA	1.0628	11978	0.5313	0.2604	0.1453
High-Low	0.0443	8538	0.0203	0.0862	-0.1568
t-stat	[1.48]	[13.22]	[2.32]	[3.49]	[-3.49]

Return

5 *ARA* Portfolio Characteristics

	Beta	Market Cap	Book to Market	Gross Profit	Asset Growth
Low ARA	1.0103	3157	0.5146	0.1588	0.3480
2	1.0336	3960	0.5052	0.2052	0.2380
3	1.0573	5448	0.5279	0.2434	0.2139
4	1.0747	7472	0.5419	0.2702	0.1575
High ARA	1.0525	14584	0.5293	0.2509	0.1472
High-Low	0.0422	11427	0.0147	0.0921	-0.2007
t-stat	[1.25]	[9.51]	[1.23]	[3.20]	[-3.64]

Return

Variance Decomposition of *ARA*

	2-digit NAICS	3-digit NAICS	No Fixed Effect
Sector FE	3.78%	6.82%	
Sector × Date FE	1.32%	2.93%	
Firm-specific	94.89%	90.25%	
Permanent difference across firms, within sector-date	34.01%	30.88%	
Across firm-time residual	60.88%	59.37%	
Characteristics:			
Beta	0.22%	0.22%	0.19%
Size	0.01%	0.01%	8.91%
Book-to-Market	0.04%	0.04%	1.27%
Gross Profitability	0.10%	0.10%	0.29%
Asset Growth	0.01%	0.01%	1.13%
Characteristic Total	0.36%	0.38%	11.78%
Number of Sectors	19	72	

Return

Firm-Level Outcomes: Investment (PPENT growth)

	(1)	(2)	(3)	(4)
$ARA_{i,t-1}$	-0.0979^{***}	-0.0982^{***}	-0.0692^{***}	-0.0459^{*}
	$[-2.72]$	$[-2.94]$	$[-3.14]$	$[-1.89]$
Date FE		+	+	
Industry FE			+	
Date × Industry FE				+
Controls				+
Observations	51,976	51,976	51,634	33,115
R^2	0.0029	0.0877	0.0948	0.2316

Return

Firm-Level Outcomes: Investment (Inventory Growth)

	(1)	(2)	(3)	(4)
$ARA_{i,t-1}$	-0.0457^{***}	-0.0453^{***}	-0.0394^{***}	-0.0202^{***}
	$[-6.16]$	$[-6.18]$	$[-5.60]$	$[-2.93]$
Date FE		+	+	
Industry FE			+	
Date × Industry FE				+
Controls				+
Observations	36,841	36,841	36,718	25,871
R^2	0.0025	0.0161	0.0235	0.1192

Return