Lazy Prices

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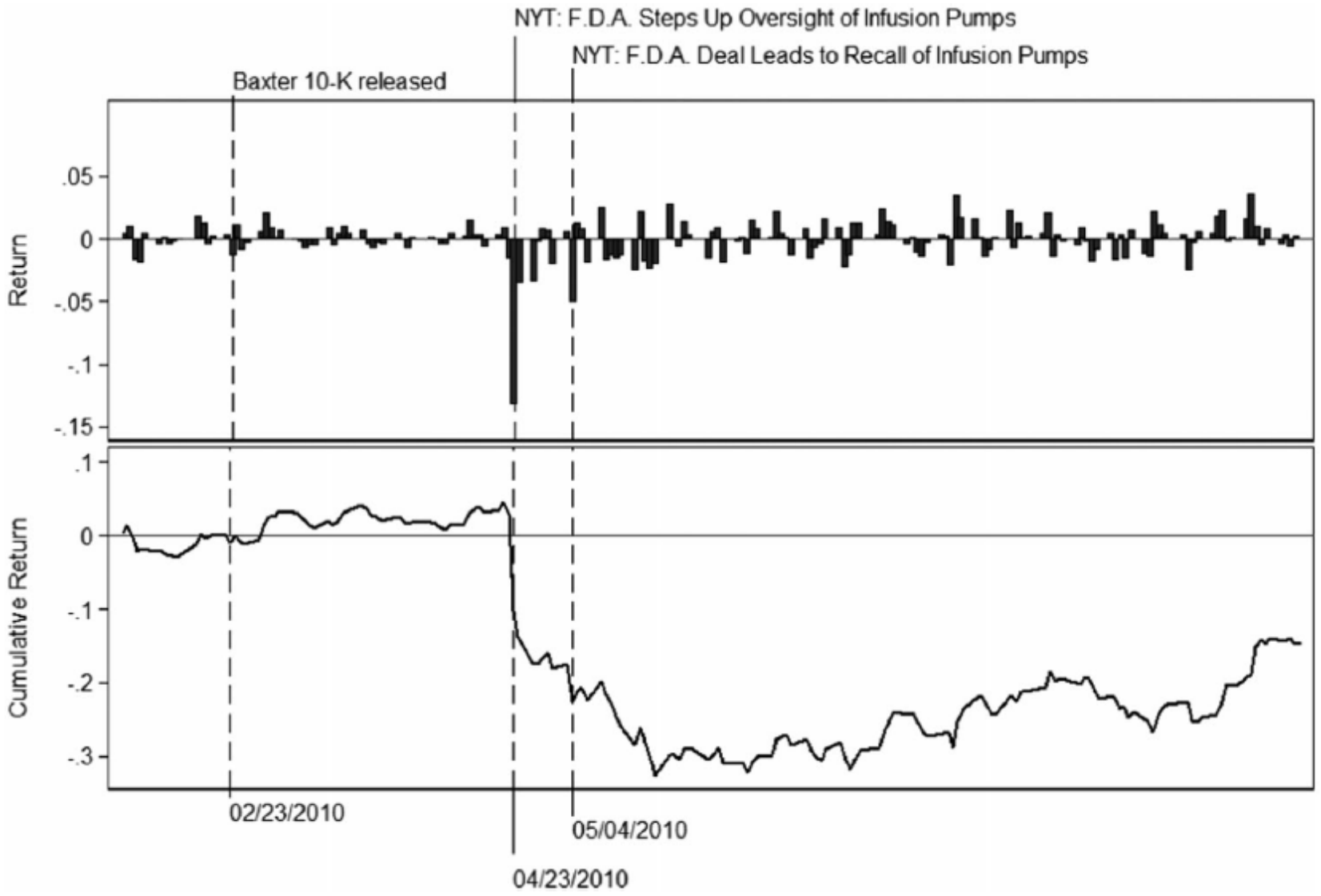
What Is Lazy Prices?



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Backgrounds & Motivation

- Between 1995-2017, the length of 10-Ks and changes to 10-Ks has both grown substantially.
- Prior literature documents that while at one time investors responded contemporaneously to financial statement releases that contained large changes, today, this announcement effect is less pronounced. They concludes that changes have become less informative.

➢ Changes have become less informative, is that right? How investors respond to these changes in information delivery?

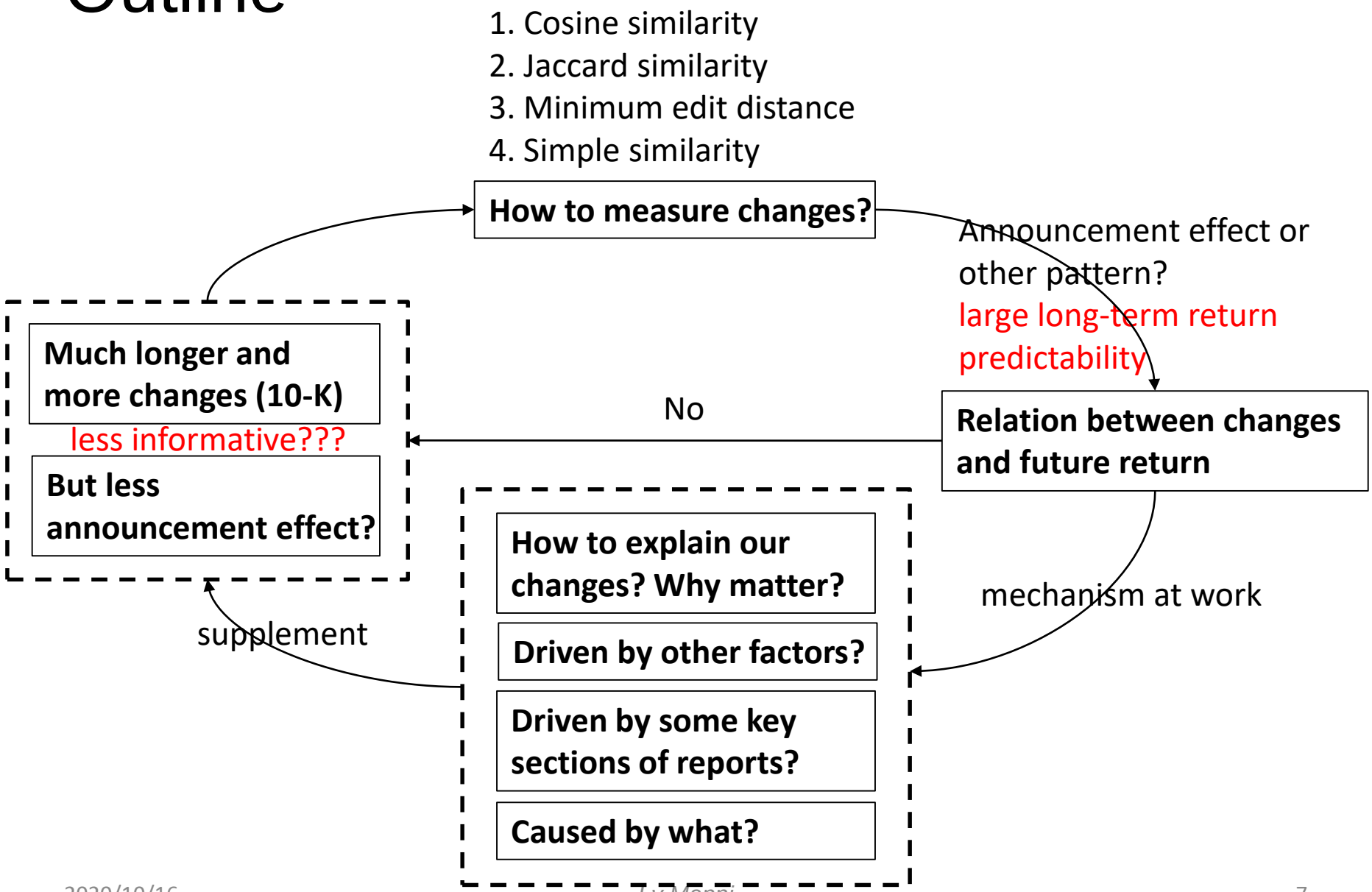
Research Problem

- Have changes to 10-K/10-Q documents become less informative over time?
  - ➢ No, contrarily, our results suggest they contain rich information.
- If no, why we find no significant announcement effect associated with changes to regular filings?
  - ➢ Because investors are initially missing subtle but important signals from annual reports (inattention), leading to a large long-term return predictability.
- Why do these changes matter? Is our change measure a robust indicator?
  - ➢ We explore the mechanism at work. And our change measure remains a large and significant predictor of future returns after a series of robustness test.

Contribution

- Our paper helps found more general evidence on inattention and under-reaction in stock prices by clarifying what it is exactly that investors fail to recognize.
- Our paper show that simple changes in documents contain powerful information that is seemingly being ignored. This insight likely applies more broadly to other forms of firm information.

Outline


1. Cosine similarity
2. Jaccard similarity
3. Minimum edit distance
4. Simple similarity
How to measure changes?
Announcement effect or other pattern?
large long-term return predictability
Relation between changes and future return
No
Much longer and more changes (10-K)
less informative???
But less announcement effect?
supplement
mechanism at work
How to explain our changes? Why matter?
Driven by other factors?
Driven by some key sections of reports?
Caused by what?

Model Design: Data and Measures

- Data:

Main: obtain all complete 10-K, 10-K405, 10-KSB, and 10-Q filings from the SEC's EDGAR website from 1995 to 2014, monthly stock returns from CRSP

Other: firms' book value of equity and earnings per share from Compustat, analyst data from the IBES, and sentiment category identifiers from Loughran and McDonald's (2011) Master Dictionary

- How to measures quarter-on-quarter similarities between 10-Q and 10-K filings?

➢ Similarity Measures: (i) cosine similarity, (ii) Jaccard similarity, (iii) minimum edit distance, and (iv) simple similarity.

Model Design: Similarity Measures

- Simple Example:

D_A: We expect demand to increase.

D_B: We expect worldwide demand to increase.

(i) cosine similarity score

the union $T(D_A, D_B)$ = [we, expect, worldwide, demand, to, increase]

frequency vectors of D_A, D_B: D_A^{TF}= [1, 1, 0, 1, 1, 1], D_B^{TF}= [1, 1, 1, 1, 1, 1]

$$Sim\_Cosine\ (D_A, D_B) = \frac{(1\times1+1\times1+0\times1+1\times1+1\times1+1\times1)}{\left(\sqrt{1^2+1^2+1^2+1^2+1^2}+\sqrt{1^2+1^2+1^2+1^2+1^2+1^2}\right)} = 0.91$$

(ii) the Jaccard similarity measure

$$Sim\_Jaccard(D_A, D_B) = \frac{|D_A^W \cap D_B^W|}{|D_A^W \cup D_B^W|} = \frac{|\{we, expect, demand, to, increase\}|}{|\{we, expect, worldwide, demand, to, increase\}|} = 0.83$$

Model Design: Similarity Measures

- Simple Example:

D_A: We expect demand to increase.

D_B: We expect worldwide demand to increase.

(iii) minimum edit distance: count the smallest number of operations required to transform D_A to D_B → requires adding the word “worldwide”

(iv) simple similarity: identify the additions, deletions and changes by the function *diff* in Unix/Linux, then normalize

$$Sim\_Simple(D_A, D_B) = \frac{c_{max} - c}{c_{max}}$$

$$c = [additions + deletions + changes]/[(Size\ D_A + Size\ D_B)/2]$$

Model Design: Similarity Measures - Summary Statistics

Panel A: Summary Statistics of Document Charateristics

	Count	Mean	*SD*	1%	50%	99%
Document Size—10-K	86,965	44,508.81	36,479	7,573	35,787	180,388
Document Size—10-Q	258,271	15,805.9	20,542.78	1,327	10,674	97,521
Sentiment of Change	345,639	0.07736	0.0179074	0	0.000146	0.003503
Uncertainty of Change	345,639	0.0005234	0.0110212	0	0.0001286	0.0026464
Litigiousness of Change	345,639	0.0009594	0.016019	0	0.0000668	0.0051982
Change CEO	345,639	0.0556158	0.2291785	0	0	1
Change CFO	345,639	0.0242542	0.1538377	0	0	1

Panel B: Summary Statistics of Similarity Measures

	Count	Mean	*SD*	1%	50%	99%
Sim_Cosine	327,130	0.8721032	0.1910398	0.1367042	0.947125	0.9951641
Sim_Jaccard	327,130	0.3948525	0.190596	0.0364943	0.4108108	0.765858
Sim_MinEdit	327,130	0.3763384	0.1714118	0.0516403	0.3927964	0.7649283
Sim_Simple	327,130	0.1464663	0.0927251	0.0427717	0.1171773	0.4283921

Panel C: Correlation

	Sim_Cosine	*Sim_Jaccard*	*Sim_MinEdit*	*Sim_Simple*
Sim_Cosine	1.0000			
Sim_Jaccard	0.6049	1.0000		
Sim_MinEdit	0.5031	0.7921	1.0000	
Sim_Simple	0.2076	0.4815	0.5834	1.0000

Empirical Results: Main Results—Calendar-Time Portfolio Returns

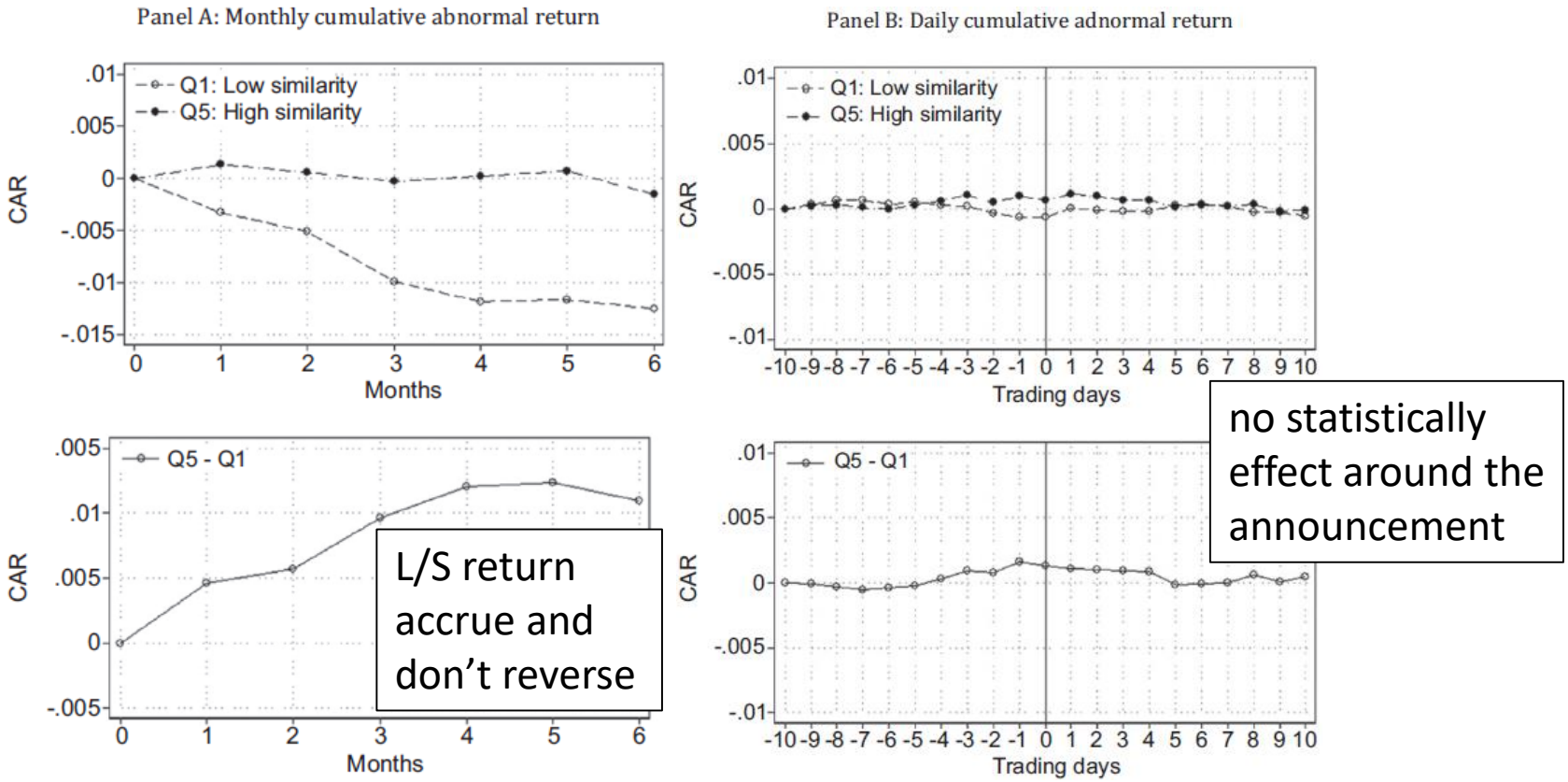
We compute quintiles based on the prior year's distribution of similarity measures. Stocks enter the quintile portfolios in the month after the public release and are held for three months.

Panel A: Equally Weighted

	Sim_Cosine						*Sim_Jaccard*					
	Q1	Q2	Q3	Q4	Q5	Q5 – Q1	Q1	Q2	Q3	Q4	Q5	Q5 – Q1
Excess return	0.63*	0.72*	0.72**	0.85**	0.92***	0.31***	0.59	0.67*	0.69*	0.82**	0.98***	0.38***
	(1.68)	(1.96)	(2.11)	(2.59)	(2.80)	(3.13)	(1.48)	(1.74)	(1.89)	(2.35)	(3.01)	(2.65)
Three-factor alpha	−0.15**	−0.08	−0.05	0.09	0.18***	0.34***	−0.16**	−0.10	−0.06	0.08	0.28***	0.44***
	(−2.19)	(−1.10)	(−0.72)	(1.21)	(2.66)	(4.45)	(−1.99)	(−1.22)	(−0.81)	(1.05)	(3.47)	(4.56)
Five-factor alpha	−0.12*	−0.05	−0.04	0.10	0.21***	0.32***	−0.14*	−0.07	−0.06	0.09	0.28***	0.42***
	(−1.75)	(−0.74)	(−0.53)	(1.29)	(3.28)	(4.21)	(−1.84)	(−0.93)	(−0.86)	(1.19)	(3.57)	(4.31)
	Sim_MinEdit						*Sim_Simple*					
	Q1	Q2	Q3	Q4	Q5	Q5 – Q1	Q1	Q2	Q3	Q4	Q5	Q5 – Q1
Excess return	0.61	0.66*	0.70*	0.86**	0.99***	0.36***	0.72*	0.79**	0.82**	0.90***	0.90***	0.18
	(1.60)	(1.78)	(1.94)	(2.58)	(3.36)	(2.69)	(1.87)	(2.12)	(2.34)	(2.73)	(3.04)	(1.20)
Three-factor alpha	−0.19**	−0.14*	−0.10	0.10	0.30***	0.48***	−0.08	−0.02	0.03	0.14**	0.20**	0.28***
	(−2.56)	(−1.91)	(−1.52)	(1.37)	(4.00)	(5.96)	(−1.09)	(−0.21)	(0.38)	(2.01)	(2.57)	(3.22)
Five-factor alpha	−0.15**	−0.11	−0.08	0.12*	0.30***	0.45***	−0.06	0.03	0.04	0.16**	0.21***	0.27***
	(−2.14)	(−1.59)	(−1.31)	(1.70)	(4.11)	(5.46)	(−0.89)	(0.37)	(0.63)	(2.30)	(2.68)	(3.01)

- Firms that make significant changes to their disclosures in a given year experience lower future returns.

Empirical Results: Event (public release) time returns



- The change behavior has a long-lasting impact on the firm value that does not accrue around the release of reports, but rather gradually through price revelation over time.

Empirical Results: Characteristics of Quintile Portfolios

- A significant portion of return spread comes from the short side raises questions about the composition and characteristics of short side of the L/S portfolio. Does limits of arbitrage exists?

	Q1	Q2	Q3	Q4	Q5
Market Value of Equity	3,507,587	3,219,430	2,829,955	2,504,717	2,464,603
Monthly Turnover	0.0663	0.0850	0.0804	0.0867	0.0706
Shorting Fees (bps)	71.6958	80.6361	92.0500	87.0690	73.5453
Sentiment of Changes	0.0016	0.0008	0.0006	0.0005	0.0004

- There is little evidence that the short side contains an unusual set of firms; if anything, the firms in Q1 appear to be slightly larger and have lower shorting costs.→ No limits of arbitrage.
- The differences in the sentiment of the text seems notable.

Empirical Results: FM Regressions

	Ret											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Sim_Cosine	0.45***	0.31**	0.37**									
	(2.65)	(2.51)	(2.18)									
Sim_Jaccard				0.82***	0.66***	0.59***						
				(3.26)	(3.82)	(3.41)						
Sim_MinEdit							0.54**	0.41***	0.29**			
							(2.54)	(2.78)	(2.00)			
Sim_Simple										0.04**	0.03**	0.03**
										(2.10)	(2.25)	(2.11)
Size		0.00	0.00		0.01	0.01		0.01	0.01		0.01	0.00
		(0.11)	(0.05)		(0.25)	(0.11)		(0.26)	(0.10)		(0.24)	(0.05)
log(BM)		0.17*	0.16*		0.17*	0.16*		0.17*	0.16*		0.17*	0.16*
		(1.89)	(1.71)		(1.88)	(1.70)		(1.90)	(1.72)		(1.87)	(1.70)
Ret(−1,0)		−0.03***	−0.02***		−0.03***	−0.02***		−0.03***	−0.02***		−0.03***	−0.02***
		(−3.93)	(−3.68)		(−3.97)	(−3.70)		(−3.97)	(−3.69)		(−3.99)	(−3.71)
Ret(−12,−1)		0.64**	0.36		0.64**	0.36		0.64**	0.36		0.64**	0.37
		(2.34)	(1.25)		(2.34)	(1.25)		(2.34)	(1.24)		(2.35)	(1.29)
SUE			0.07***			0.07***			0.07***			0.07***
			(6.56)			(6.54)			(6.56)			(6.60)
Cons	0.58	0.58	0.67	0.64	0.46	0.69	0.76**	0.57	0.84	−0.02	−0.02	−0.01
	(1.45)	(0.67)	(0.57)	(1.64)	(0.52)	(0.58)	(1.98)	(0.64)	(0.71)	(−1.31)	(−1.02)	(−0.71)

- Our main result continues to hold when we include a variety of additional return predictors.

Mechanism behind-Explaining Changes

- What factors help explain changes in similarity overtime?

	Sim_Simple				
	(1)	(2)	(3)	(4)	(5)
Sentiment of Change	−2.49***				
	(−37.83)				
Uncertainty of Change		−3.57***			
		(−34.15)			
Litigiousness of Change			−0.12**		
			(−2.11)		
Change CEO				−0.01***	
				(−7.10)	
Change CFO					−0.01***
					(−5.75)

About 86% of changes consist of "negative" sentiment changes

- More changes are associated with more (negative) sentiment, higher uncertainty, more litigiousness, and CEO and CFO changes.
  → The changes behaviors are associated with significant changes in the operations or prospects of the firm.

Mechanism behind-Testing the Changes

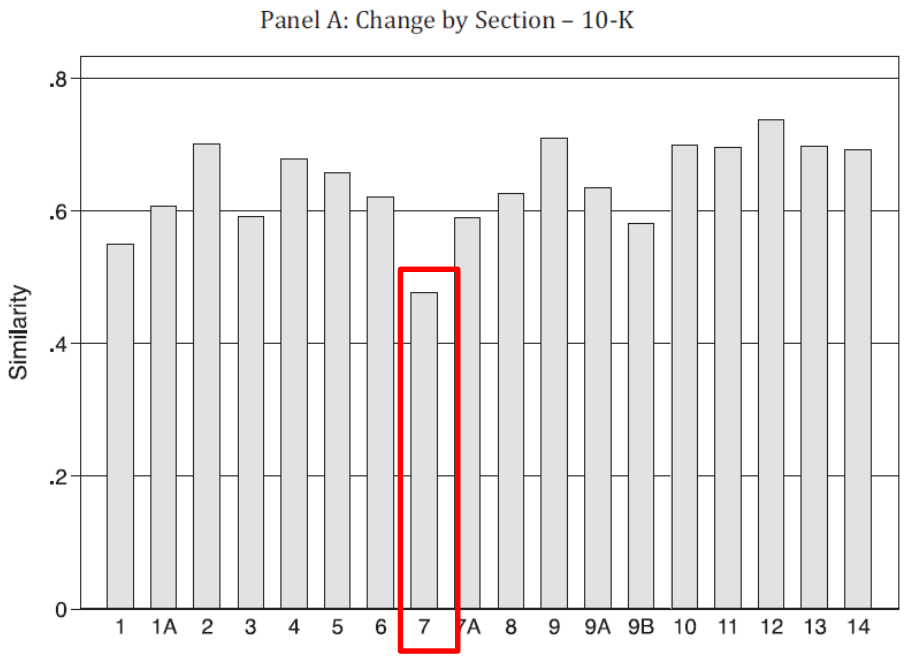
- Are our main results driven by aspects of the filings other than the 'changes'? Low sentiment, the (change of) length of the document?

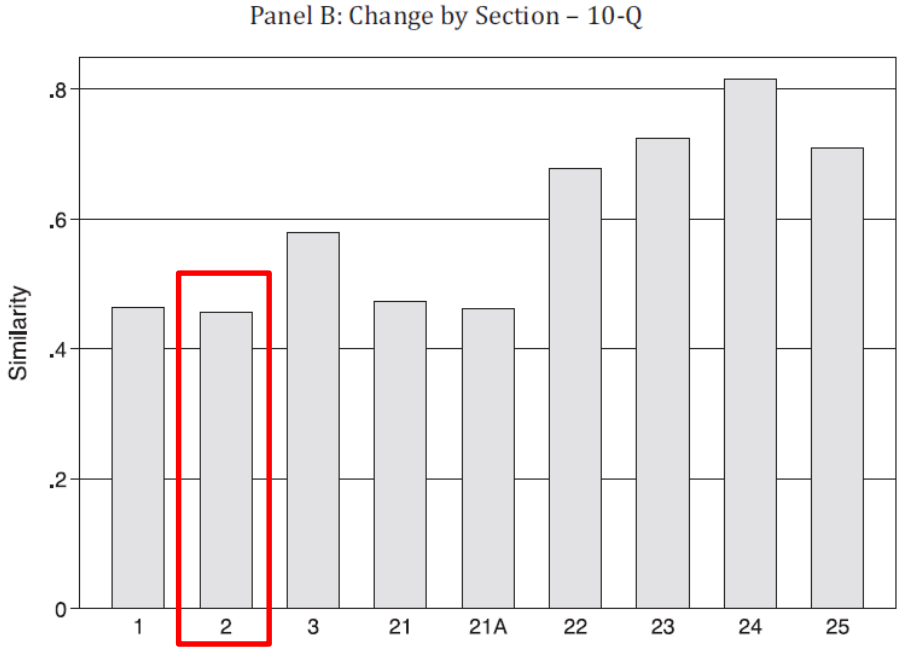
	Ret		
	(1)	(2)	(3)
Sim_Jaccard	0.57***	0.58***	0.58***
	(3.45)	(3.78)	(3.82)
Sentiment of Change is Positive	0.19***	0.21***	0.21***
	(3.85)	(4.21)	(4.33)
Log(Document Size)		0.01	0.03
		(0.65)	(1.40)
Δ Log(Document Size)			−0.41**
			(−2.30)

➢ Even after controlling for the document-level characteristics above, the similarity remains a large and significant predictor of future returns.

Mechanism behind- Similarity in Different Sections

- Which sections of the quarterly and annual reports are associated with the largest decreases in similarity?



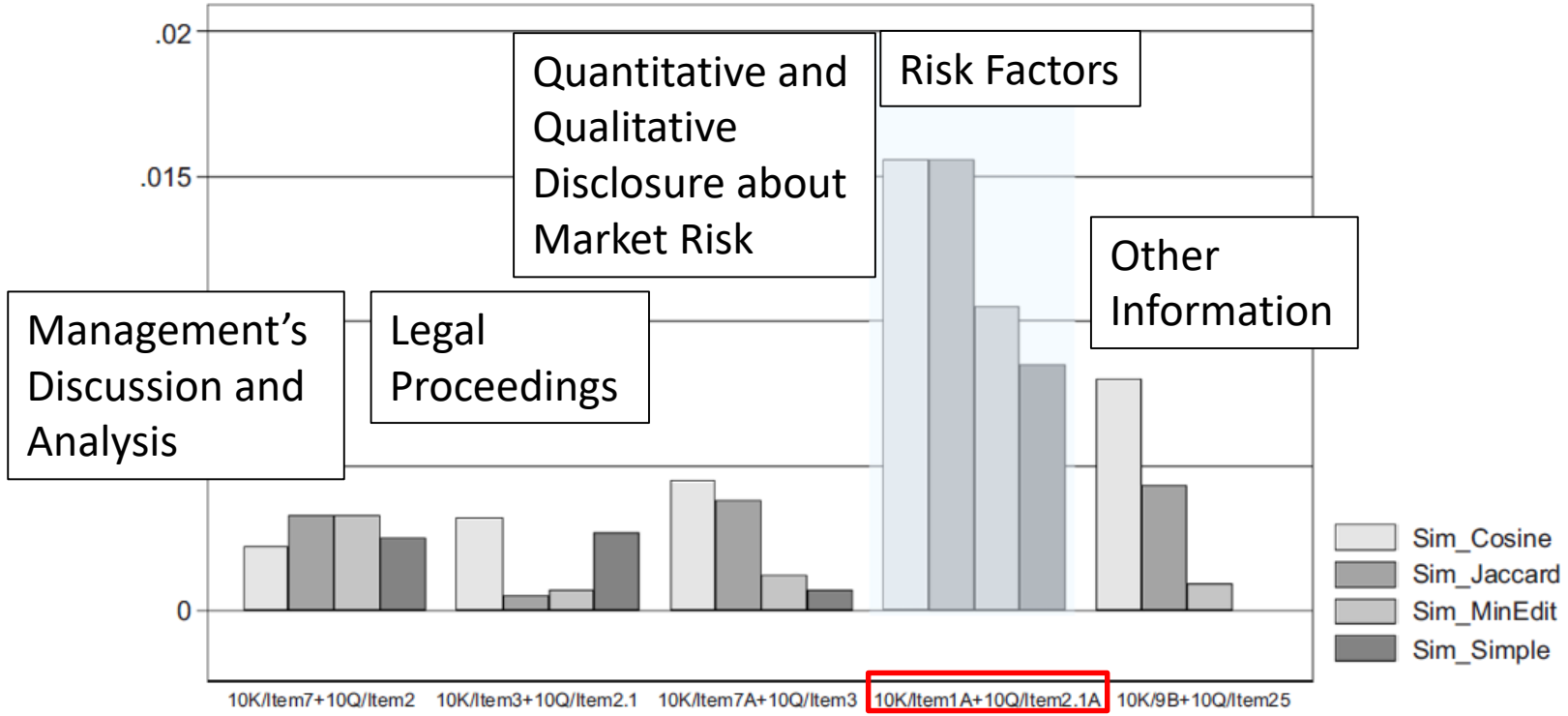


➢ The MD&A section (which management presumably has the most discretion) displays a significantly lower average similarity over the other categories.

Mechanism behind-Return Predictability of Different Sections

- Which common section shows the strongest return predictability?

→ Five-factor alphas for portfolio sort



➢ Changes to some sections may be quite subtle and difficult to detect, even though they may have large implications for future returns.

Mechanism behind - Investor inattention

- Hypothesis: Firms with more ‘attentive’ investors see a more muted return.
- However, how to identify variation in investor attention?

➢ investor attention measure: *IPAccessMultipleYear*

IPAccessMultipleYear is computed as the number of unique IP addresses that access both the current file and the previous year’s file for the same firm (normalized by the total number that access the current file).

Mechanism behind - Investor inattention

- Hypothesis: Firms with more 'attentive' investors see a more muted return.
- FM regressions of stock returns on our similarity measures plus interactions of these similarity measures with investor attention measure *IPAccessMultipleYear*

	Dependent Variable: Return							
	Sim_Cosine		*Sim_Jaccard*		*Sim_MinEdit*		*Sim_Simple*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Similarity	0.44**	0.42**	0.78***	0.84***	0.65***	0.73***	0.06**	0.06**
	(2.56)	(2.37)	(2.90)	(3.08)	(2.70)	(2.94)	(2.13)	(2.30)
IPAccessMultipleYear × *Similarity*		−0.27		−0.84**		−0.79*		−0.10**
		(−0.65)		(−2.08)		(−1.73)		(−2.05)
IPAccessMultipleYear		0.11		0.15		0.11		0.08**
		(0.31)		(0.86)		(0.50)		(2.05)

➢ Our primary return predictability results are driven primarily by investor inattention.

Mechanism behind - Investor inattention

- Furthermore, to dig even deeper into the nature of investor inattention, we isolate firms that make comparative statements in the text of their filings and compare them to firms that do not.

Panel A: Alphas across Firms Making (Not Making) Explicit Comparison Statements in Year-over-Year Documents

Explicit Comparative Statements	Five-Factor Alpha, Jaccard Similarity					
	Q1	Q2	Q3	Q4	Q5	Q 5 – Q1
Yes	0.22	−0.24	−0.06	0.22	0.31	0.09
	(1.04)	(−0.84)	(−0.29)	(1.11)	(1.54)	(0.34)
	Q1	Q2	Q3	Q4	Q5	Q 5 – Q1
No	−0.36***	−0.07	−0.07	0.06	0.17	0.53***
	(−3.39)	(−0.57)	(−0.59)	(0.55)	(1.57)	(3.51)

➢ Our primary return predictability results are driven by the firms who do not make explicit textual comparisons.

Mechanism behind – Change and future operating performance

	Oibdpq/L1atq				*Niq/L1atq*				*Saleq/L1atq*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Sim_Cosine	0.50*				0.48				0.01*			
	(1.96)				(1.44)				(1.95)			
Sim_Jaccard		0.68***				0.89***				0.01***		
		(10.68)				(10.48)				(7.83)		
Sim_MinEdit			0.65***				0.75***				0.02***	
			(12.48)				(10.89)				(14.48)	
Sim_Simple				0.51***				0.71***				0.01***
				(7.80)				(8.41)				(6.85)

- All four similarity measures significantly predict these three measures of operating performance (profitability, operating profitability, and sales).
- The return effect that we identify are associated with fundamental changes in performance.

Mechanism behind – various additional tests

- Double-sorts of our portfolio tests, first sorted by sentiment, uncertainty, and litigiousness → results remains
- Drop all years associated with special events (e.g., M&As, joint ventures, divestitures, or strategic alliances) → results remains
- Examine whether document changes predict other types of changes → decreases in similarity predict increases in the number of future 8-Ks, increases in future short interest, negative future earnings surprises, and increases in the number of future bankruptcies
- Examine whether textual similarity is related to the life cycle of the firm → firms increasingly modify their financial disclosures as they mature

Mechanism behind – Robustness Checks

- Rerun the FM regressions from after including additional firm-level characteristics.
- Test whether our results concentrate in any specific industry.
- Test whether our results are affected by including so-called “stop words” or by our particular filtering of the SEC filings.

➢ Our results indicate that subtle changes in firms’ reporting behavior have substantial predictability for future returns in a manner that has not previously been documented.

Conclusion

- We find simple change is a powerful and robust indicator of future firm performance (stock price and operating performance), overthrow the prior conclusion that changes have become less informative.
- The abnormal returns continue to accrue for a long time (up to 18 months) instead of have a initial reaction, consistent with a setting in which investors are inattentive to the rich information, true fundamental changes to firms are gradually incorporated into asset prices 12 to 18 months after the change.
- Importantly, these return patterns hold for the entire universe of publicly traded firms and are unlikely to be driven by limits to arbitrage.

Reflection

- Classic measures, and normal procedure of textual analysis in finance and accounting area + Meaningful research problem and attractive results
- Simple changes in documents may contain powerful information that is seemingly being ignored. Applies more broadly to other forms of firm information?