Internet Appendix for: News and Markets in the Time of COVID-19

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- Table A31 details the hypothesis tests from Section 6 of the main paper conducted on the full-sample 24-topic model.

A1 Topic model selection and coherence

Because LDA can yield topic models with identical log likelihoods for a given text corpus (Ke, Montiel Olea, and Nesbit 2021), care must be taken to identify an appropriate topic model and log likelihood cannot be used as a ranking criterion. To select an optimal model, I estimate 10 independent runs for eight different choices of number of topics

(3, 6, 9, ..., 24). This results in 80 topic models estimated using `scikit-learn`'s LDA algorithm. Each estimation starts at a different random seed and ends at a different model estimate. More topics seem preferable to better capture news flow, but at the same time each topic must be sensible.

Newman et al. (2010) show that algorithmic measures of topic *coherence* fit well with human evaluation of topic sensibility. Let $\mathcal{D}^{(r)} \in \mathbb{R}^{72,263 \times 1,000}$ be the subset of the document-term matrix for the present corpus that is restricted to the top 1,000 most frequently occurring words.[1] The cosine similarity of two words i and j is defined as

$$c_{i,j} = \frac{\mathcal{D}_i^{(r)} \cdot \mathcal{D}_j^{(r)}}{\|\mathcal{D}_i^{(r)}\| \|\mathcal{D}_j^{(r)}\|},$$

where $\mathcal{D}_i^{(r)}$ is the i^{th} column of $\mathcal{D}^{(r)}$ and $\|x\|$ is the Euclidean norm of x. $c_{i,j}$ is a number from 0 to 1 and measures the tendency of two words to co-occur. When $c_{i,j} = 1$ then in every document in which i appears, so does j, and in the same relative proportion; and if $c_{i,j}$ is zero, then i and j never appear in the same document. If either i or j is not in the top 1,000 words (which happens very infrequently in the analysis), then $c_{i,j}$ is set to zero.

The coherence of a given topic is then the mean or median of the $\binom{10}{2} = 45$ possible cosine similarities $c_{i,j}$'s among the top 10 words in a topic. High coherence topics contain top words that co-occur frequently in the corpus. Figure A4 shows the mean and median coherence of each of the twelve topics in the model. *credit* and *credit1* are the two highest coherence topics – the top words in each, *fitch*, *rate*, *credit*, *report* – tend to co-occur very frequently. On the other hand, *corp & govt US* is a low coherence topic. Its top words, *compani*, *trump*, *buzz*, *new*, *report*, are less closely related and tend to co-occur much less frequently than the *credit* and *credit1* topics' top words. *health* is a medium coherence topic, whose top words, *case*, *report*, *peopl*, *virus*, co-occur with moderate frequency.

While the mean and median topic coherence are very similar, I chose the median as my base measure because it is less sensitive to extreme pairwise cosine similarities. To rank a given K-topic model, I calculate the average median coherence across the K topics; I refer to this coherence measure as $\mathcal{C}_K$. According to Newman et al. (2010), high-coherence models produce topics which human annotators find most interpretable, thus making coherence an appropriate ranking criterion. There is evidence of a power law between topic model coherence and number of topics. Using the sample through the end

[1] The LDA estimation uses the entire document-term matrix $\mathcal{D}$.

of April, a regression of $\log \mathcal{C}_K$ on $\log K$ (recall there are 10 runs for each K) yields

$$\log \mathcal{C}_K = -0.3967 - 0.2613 \log K + \text{noise}, \tag{A1}$$

where the White standard error of -0.2613 is 0.007 and the adjusted R^2 of the regression is 0.901. Given the high R^2, the quantity $\mathcal{C}_K K^{0.25}$, or the *scaled coherence* of the model, equals a constant times a small error term. Scaled coherence captures the trade-off between a higher number of topics (desirable for finding useful market-topic relationships) and the tendency of model coherence to decrease with the number of topics (undesirable).

Figure A2 summarizes the results of this analysis for the sample through the end of April. It plots the scaled topic coherence of all 10 runs for each K. Except for run 4 in the 9-topic set of models, the highest scaled coherence comes from the 12- and 15-topic runs. The 9-topic run 4 has a high coherence because the model chooses three credit topics instead of the usual two, and credit topics have high coherence. To mitigate the effect of such outlier models, I focus on the second best model run for each K. The winning LDA model based on the second best criterion is run 6 in the 12-topic model, and I use this in the analysis. This model was selected *prior* to running any of the analysis in the paper.

A1.1 Evolution of the narrative

Figure A8 shows that topic incidence has varied meaningfully over the span of the crisis. The news stories in the first few days of the crisis fall into the *health* topic, whose values on January 17th and 20th were 87% and 69% respectively, before falling and staying in the 20% range for the rest of the sample. On January 17th, there was virtually no news coverage of markets, though this quickly changed by the next week, when 17% of all news coverage regarding coronavirus falls into the *markets* topic. There was a spike in news coverage about oil and commodities in early February, and this series then remains in the mid-single digits for the rest of the period. Much of the early news coverage of the pandemic dealt with its effect on currency markets, and the *currency* topic remains in the 5-10% range for the rest of the sample. The share of coverage on the impacts of the coronavirus in Europe remains steady in the 6-8% range throughout the crisis.

Two of the corporate topics exhibit differing trends. The *corp future* topic, which is largely about anticipation of future corporate impacts from the crisis, peaks in the early part of the sample and settles into a level around 10%. The *corp actual* topic, which deals with earnings and with the realized effect of the pandemic on corporations, starts at a very low level, peaks towards the end of March, and then exhibits cyclical variation that tracks the earnings reporting cycle.[2] A relatively low coherence topic (see Section A1) focused on government and corporate interactions during the coronavirus crisis, *corp & govt US* starts at 5% and steadily grows to above 15% of the news share by the end of the sample.

The *sports* topic starts out very low, as most early news coverage of the pandemic does not deal with sports, then has a local peak in mid-March at roughly 9% of the news flow as all major professional sports in the U.S. suspend their seasons, and as talk about postponing the Tokyo Olympics intensifies. Starting from a local low in April, the sports topic continues to grow in prevalence, and oscillates between 5-10% of overall news share for the rest of 2020. The *central bank* topic is almost never mentioned in coronavirus articles at the beginning of the sample, then steadily grows until it represents roughly 12% of news flow by early March, and then trends down towards the 7.5% range at the end of the sample. The two credit topics are also absent in the early crisis news flow and then grow steadily as the profound impact of the pandemic and business restrictions on corporate and consumer credit becomes apparent. In the latter part of the sample the two credit topics, *credit* and *credit1*, represent around 10% of the news flow, though both dip in prevalence towards the end of 2020.

A2 Contemporaneous return equation

A2.1 Derivation of equation (7)

Campbell (1991) shows that security returns h_{t+1} can be approximated as

$$h_{t+1} \approx c + \underbrace{(E_{t+1} - E_t) \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j}}_{\eta_{d,t+1}} - \underbrace{(E_{t+1} - E_t) \sum_{j=1}^{\infty} \rho^j h_{t+1+j}}_{\eta_{r,t+1}}, \tag{A2}$$

where $\rho < 1$ is a constant discounting factor, c equals $E_t h_{t+1}$ which is assumed to be approximately constant, d_t is the time t log dividend, E_t is an expectation taken over the investor's information set, and the change-in-beliefs operator $(E_{t+1} - E_t)X$ is shorthand for $E_{t+1}X - E_tX$. η_d and η_r represent dividend and cash flow news, respectively.

[2]The *corp actual* topic has time series behavior that is similar to the number of articles in the sample that have the word "earning" in their headlines.

As in Campbell (1991), assume an M-dimensional state vector z_t follows a VAR process

$$z_{t+1} = Az_t + \epsilon_{t+1}. \tag{A3}$$

The one-lag specification is without loss of generality since z_t can be augmented with lagged state variables. Let the first two elements of z_t be the dividend growth Δd_t and return h_t, with the remaining elements representing other information useful for forecasting future returns and dividends. The change in beliefs from t to $t+1$ about z_{t+T} is

$$(E_{t+1} - E_t)z_{t+T} = (A^{T-1}z_{t+1} - A^T z_t) = A^{T-1}\epsilon_{t+1}.$$

Therefore h_{t+1} from (A2) can be written as

$$h_{t+1} \approx c + e1^\top \epsilon_{t+1} + e2^\top(\rho A + \rho^2 A^2 + \cdots)\epsilon_{t+1} = c + \left(e1^\top + e2^\top \rho A(I - \rho A)^{-1}\right)\epsilon_{t+1} \tag{A4}$$

where I is the $M \times M$ identity matrix, $e1$ is an $M \times 1$ vector with a 1 in the first element, and zeros in all the others, and $e2$ is an $M \times 1$ vector with a 1 in the first element, -1 in the second, and zeros everywhere else. The linear combination of ϵ_{t+1} in (A4) can be decomposed into a part that loads on w_{t+1}, the information set of the econometrician, and an orthogonal part e_{t+1}. With this, equation (7) follows.

Section A2.2 shows how (A2)–(A4) can be used to calculate a variance decomposition of returns h_{t+1} into $var(\eta_{d,t+1})$, $var(\eta_{r,t+1})$, and a covariance term.

A2.2 Variance decomposition for returns

To understand the drivers of asset class returns, I estimate the Campbell (1991) variance decomposition

$$h_t \approx c + \eta_{d,t} - \eta_{r,t}, \tag{A5}$$

where η_d and η_r are the cash flow and discount rate news respectively. These correspond to the first and second summations in equation (A2). I proxy each asset class return as follows: S&P 500 is represented via a daily total return index, which includes dividends; high-yield is represented via daily returns of the JNK ETF; VXX is an ETF that buys short-term VIX futures and I use it as an investable proxy for the VIX; SHY is an ETF that owns 1-3 year Treasuries and it proxies for GT2; and IEF is an ETF that owns 7-10 year Treasuries and it proxies for GT10. Of the ETFs, the VXX does not pay dividends, while the other three do.

I estimate (A5) using daily returns in the full sample from January 17 to December 31, 2020. For the three ETFs that pay dividends, I approximate those dividends as being zero because, at the daily level, dividends contribute negligibly to return variance. Dividends are exact for the S&P 500 and the VXX analysis. The VAR system in (A3) is estimated using z_t consisting of the one-day lagged asset class return, the one-day lagged dividend yield (for the VXX I use the level of the VIX instead), and the one-day lagged 3-month T-bill rate (for SHY I use the 2-year Treasury yield and for IEF I use the 10-year Treasury yield, instead of the T-bill rate). I also estimate a version of (A3) where z_t additionally includes the one-day lagged news factor, using either the *factor* or *factor_all* version. The news factor is derived from the topic model estimated through the end of April 2020. In all cases, one-day lag refers to the most recent trading day prior to the current one.

Table A18 shows the results of this analysis. Each asset class has three rows of results, corresponding to the z_t specification without news, with *factor*, or with *factor_all*. Following Campbell (1991), standard errors are calculated using the delta method applied to the estimated General Method of Moments coefficient variance-covariance matrix. GMM standard errors are obtained using the gmm package in R.

A3 Robustness checks

This section contains several robustness checks as summarizes in Section 7 of the main paper.

A3.1 Endogeneity of news coverage

A concern about the contemporaneous specification in (8) is that news articles may be written partially in response to market prices. First, many news series explicitly are *not* about financial markets. For example, the *sports* and *health* topics are concerned with issues other than market returns, as evidenced by the headlines in Tables 2 and A1. Another example is *sent_sd* which reflects the dispersion of sentiment across hundreds or thousands of daily articles, most of which are not about market activity. Endogeneity is unlikely to be an issue for these non-market topics. As a robustness check, I rerun the paper's analysis involving (8) but exclude any non-weekend intraday news articles. These are defined as Monday through Friday news stories that come out between 9:30AM and 4PM NY time; I refer to the complement of this set as the *overnight* articles.[3] I recalculate

[3] Barclay and Hendershott (2004) show that after hours trading (from 4-6:30PM and then from 8-9:30AM) contains "less than 1/20 as many trades per unit time" as does trading during regular market

sent, *sent_sd*, *art_count*, *factor*, *factor_all*, and each of the twelve topical sentiment series using overnight articles. The topical sentiment series use the same topic model described in Section 3, which is estimated using all articles in the corpus through April 2020; but the news series in (8) use only overnight articles. The next section shows that using only overnight articles leaves the qualitative results concerning (8) unchanged.

A3.1.1 Results that drop intraday news articles

Figure A8 shows each of the overnight series as orange, dashed lines, with the all-article series shown as blue, solid lines. The overnight versions of the series are very close to the all-article versions; *art_count* is lower for the overnight articles.

Figure A12 shows the structural break tests for the model in (8) that uses overnight news flow only (i.e. that excluded 9:30am–4pm news during trading days). Tables A19 and A20 summarize the results of the model where all news observations when markets are open (i.e. intraday during trading days) are dropped. Tables A21 – A25 show the results of the same contemporaneous specifications for the early subsample of articles that excludes all intraday article. Tables A26 – A30 show the results from the same analysis in the late subsample.

In all cases, the results are qualitatively very similar to those that use the all-article versions of the news series. The small differences that arise likely stem from excluding intraday articles that are informative and not written in response to contemporaneous market returns.

A3.2 Robustness to choice of break dates

The first version of this article was written using data only through April 2020, and used March 15, 2020 as the break date. I have maintained this break date for subsequent revisions. To gauge the sensitivity of results to other choices of break dates, I perform two sets of alternative analyses. First, for each market-news pair, I use the optimal break dates identified in the structural break tests of Section 5, which are summarized in Figure 9 and shown in Tables A4 – A8. The contemporaneous regression results of Tables 3 and 4, as well as the Granger causality networks of Figures 7 and 8 are very similar to those presented here. The results of Panel A of Table 5 are very similar using optimal break dates, but the *Rank* coefficient in the contemporaneous relationship regression (column

hours. This greatly diminishes the probability that overnight news stories are written in response to contemporaneous, overnight market returns.

Cont-e) is no longer significant, though it is still negative.

The optimal break date for each market-news pair ignores the information content of the totality of the break tests, and is subject to unnecessary sampling variation. Using an average of all optimal break dates may yield cleaner results because this smooths out noise at the individual market-news level. Using the full-sample break tests, the average break date across all market-news pairs is March 18, 2020. I rerun the analysis using this break date, instead of March 15, 2020. The results of this analysis are again substantively very similar to the ones presented in the paper. In Panel A of Table 5, the *Hyp* coefficient in column *Rev-e* with *Cont* as a control is no longer significant. However, a regression of the reversal indicator on just the hypersensitivity indicator (*Rev-e* column without the *Cont* control) yields a positive and significant result, as in Panel A of Table 5.

A3.3 Timely identification of structural break

The structural break analysis thus far has used the entire data set through the end of December 2020, with a topic model estimated using articles only through the end of April 2020. Whether or not this break test is a useful real-time tool depends on how quickly it is able to identify regime changes. To check for this, I rerun the break date analysis using data through each month end in 2020, starting in April; each of these tests could have been done in real time. Figure A13 shows the distribution of break dates for each candidate month end. Dots (crosses) in the figure show significant (insignificant) break dates. Regardless of what time period is being used to conduct the analysis, the distribution of break dates across the 90 markets-news pairs is largely the same. Thus the mid-March regime break would have been identified at any time point on or after April 2020, and using subsequent data only confirmed and strengthened the significance of the result. Figure A14 shows the same set of tests but using only news articles up to 9:30AM on each day to calculate the news measures on the right-hand side of (8), as described in Section A3.1. The results are insensitive to this variation.

Using an end-of-April topic model for the entire sample ensures that the tests in this section identify structural changes in the markets-news relationship, and are not being driven by a changing topic model for each month end. However, using a topic model estimated over the entire data set identifies the same mid-March regime breaks as shown in Figure A13 and A14 and also leads to qualitatively similar results to those in Section 4 as discussed in the next section. The next section provides more details.

A3.3.1 Robustness of structural break tests

I examine the end-date sensitivity of the structural break test methodology described in Section 5 of the main paper. Rather than running the structural break test using the full sample, I conduct a series of structural break tests using the sample starting from January 17, 2020 and ending on the each month-end date from April through December of 2020. Figures A13–A16 show the results of this analysis. The x-axis is marked with the end date of the sample for each set of structural break tests. The column corresponding to that test end date shows the break points for the 18 text series for which the test is conducted. Each panel of each figure corresponds to one of the five asset classes. A significant break for a given text–market pair is indicated via a dot, and an insignificant break is indicated via an "x". Inference is conducted using the Andrews (1993, 2003) distribution for the maximal Chow statistic. Each figure corresponds, respectively, to the topic model estimated through: the end of April 2020; the end of April but the tests use text series that exclude intraday articles; the end of December 2020; the end of December but the tests use text series that exclude intraday articles.

For example, in Figure A13, the upper left panel corresponds to the tests for 10-year Treasuries, or GT10. The first x-axis label, of 4/30, indicates that these tests are conducted using the sample from January 17 to April 30, 2020. The second x-axis label, of 5/31, indicates that those break tests were conducted using data through May 31, 2020. In each case for GT10, all breaks occur between March 8th and March 22nd, and all 18 are significant.

A3.4 Sensitivity to choice of topic model

To gauge the sensitivity of the results to a change in the topic model, I use the procedure in Section A1 to estimate an optimal topic model using the full sample through the end of December 2020. The full-sample optimal topic model contains 24 topics, more than the twelve topics of end-of-April model. Figure A3, the full-sample analogue to Figure A2, shows scaled topic coherence by run and topic number. The power law in (A1) is very similar when using the full sample of articles (0.229 vs 0.2613).

Figures A15 (all articles) and A16 (pre-9:30AM articles) show that break date tests for the full-sample topic model also identify a regime break in the middle of March of 2020. Of course, the full-sample topic model would not have been known until the end of 2020, but it gives a similar ex-post range of break date estimates.

Table A31 shows that the results concerning the narrativity and pure information hypotheses, laid out in Section 1.1 and tested in Section 6.1 of the main paper, continue to hold when using the full-sample, 24-topic model.

References

Andrews, D., 1993, "Tests for parameter instability and structural change with unknown change point," *Econometrica*, 61 (4), 821–856.

Andrews, D., 2003, "Tests for parameter instability and structural change with unknown change point: A corrigendum," *Econometrica*, 71 (1), 395–397.

Barclay, M. and T. Hendershott, 2004, "Liquidity externalities and adverse selection: Evidence from trading after hours," *Journal of Finance*, 59 (2), 681–710.

Beeler, J. and J. Campbell, 2012, "The long-run risks model and aggregate asset prices: An empirical assessment," *Critical Finance Review*, 1, 141–182.

Campbell, J., 1991, "A variance decomposition for stock returns," *The Economic Journal*, 101 (405), 157–179.

Ke, S., J.L. Montiel Olea, and J. Nesbit, 2021, "Robust machine learning algorithms for text analysis," working paper.

Loughran, T. and B. McDonald, 2011, "When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks," *Journal of Finance*, 66, 35–65.

Newman, D., J. Han Lau, K. Grieser, and T. Baldwin, 2010, "Automatic evaluation of topic coherence," *Human Language Technologies: The 2010 Annual Conference of the North American Chapter of the ACL*, 100–108.

Distribution of number of articles per weekday hour

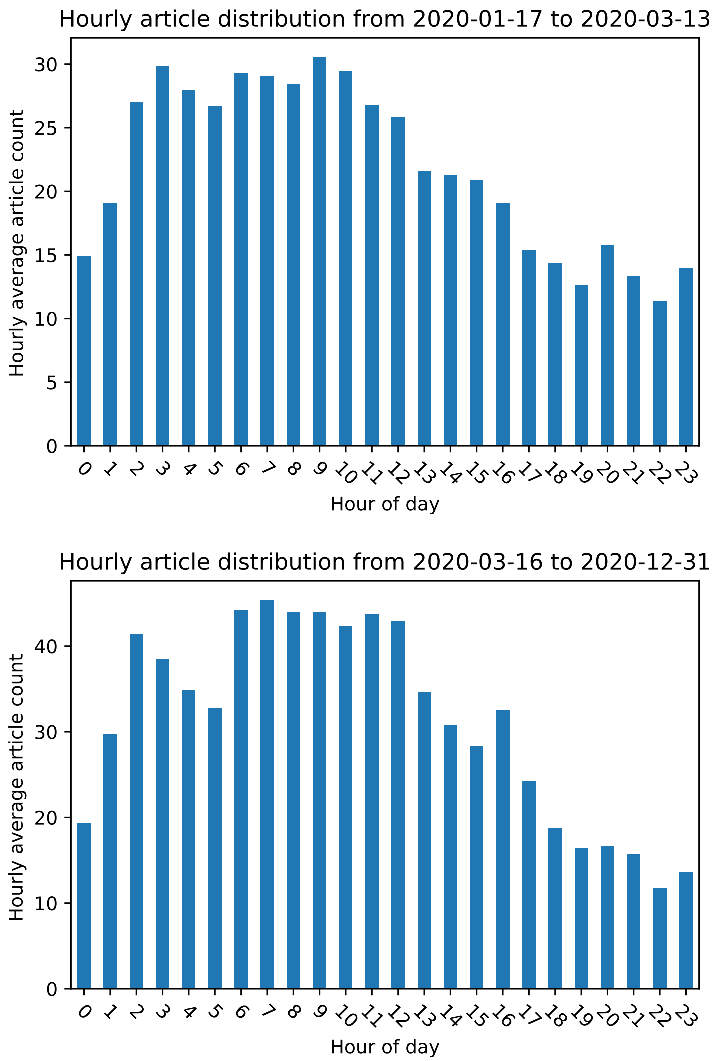


Fig. A1. The top (bottom) panel shows the average number of articles mentioning either "coronavirus" or "COVID-19" that occurred in each hour of weekdays during the early (late) subsamples. Articles that appeared on weekend days are excluded from the analysis.

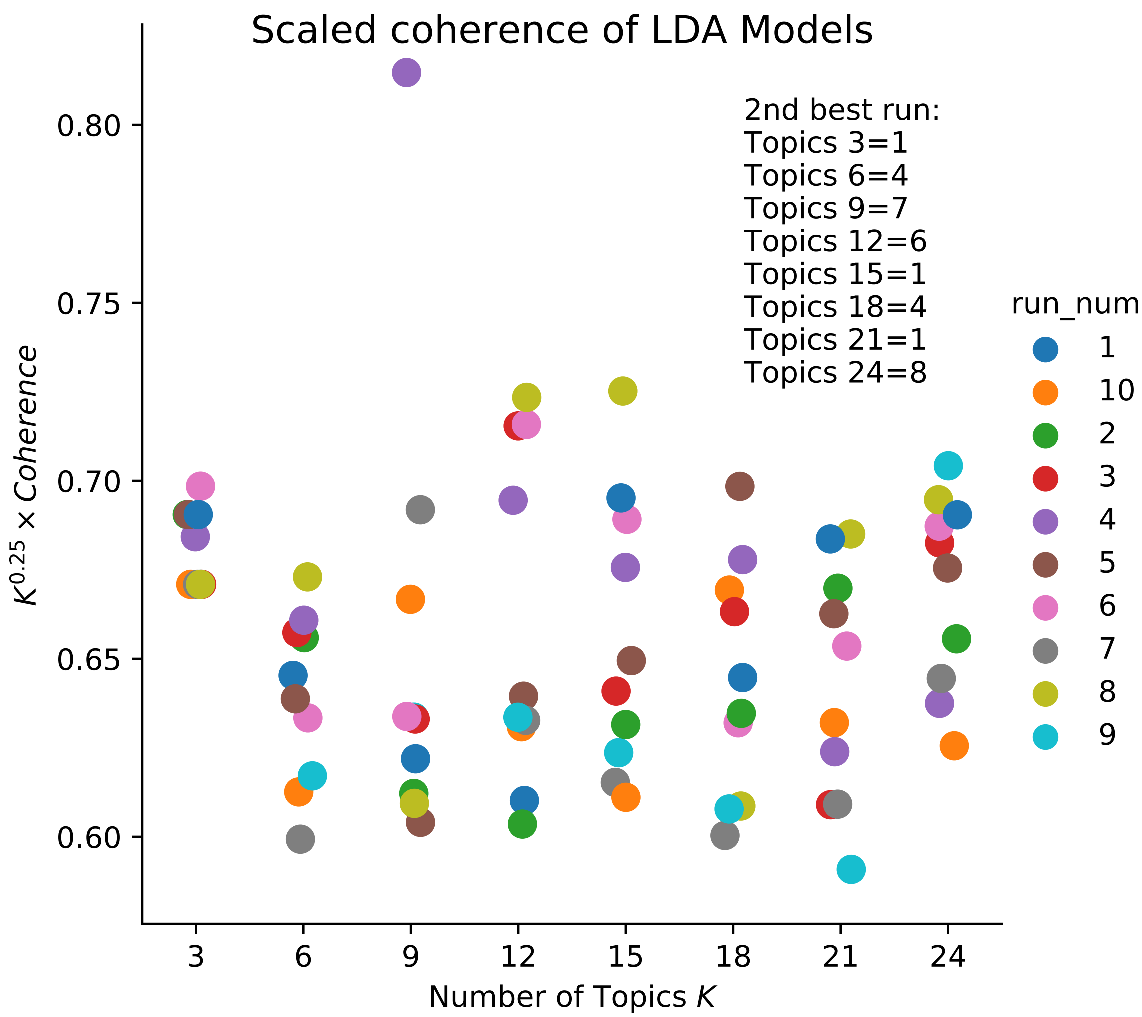


Fig. A2. Each point in the figure represents the scaled average of median coherence across the K topics in a given LDA run, as explained in Section A1. The x-axis shows the number of topics K for a given set of model runs. The y-axis shows the scaled average of the median coherence values for a given LDA run. For each K, ten separate LDAs are run, and each is evaluated based on its scaled coherence. The figure also identifies the run with the second best scaled coherence for each topic number K. The analysis was done using data through the end of April 2020.

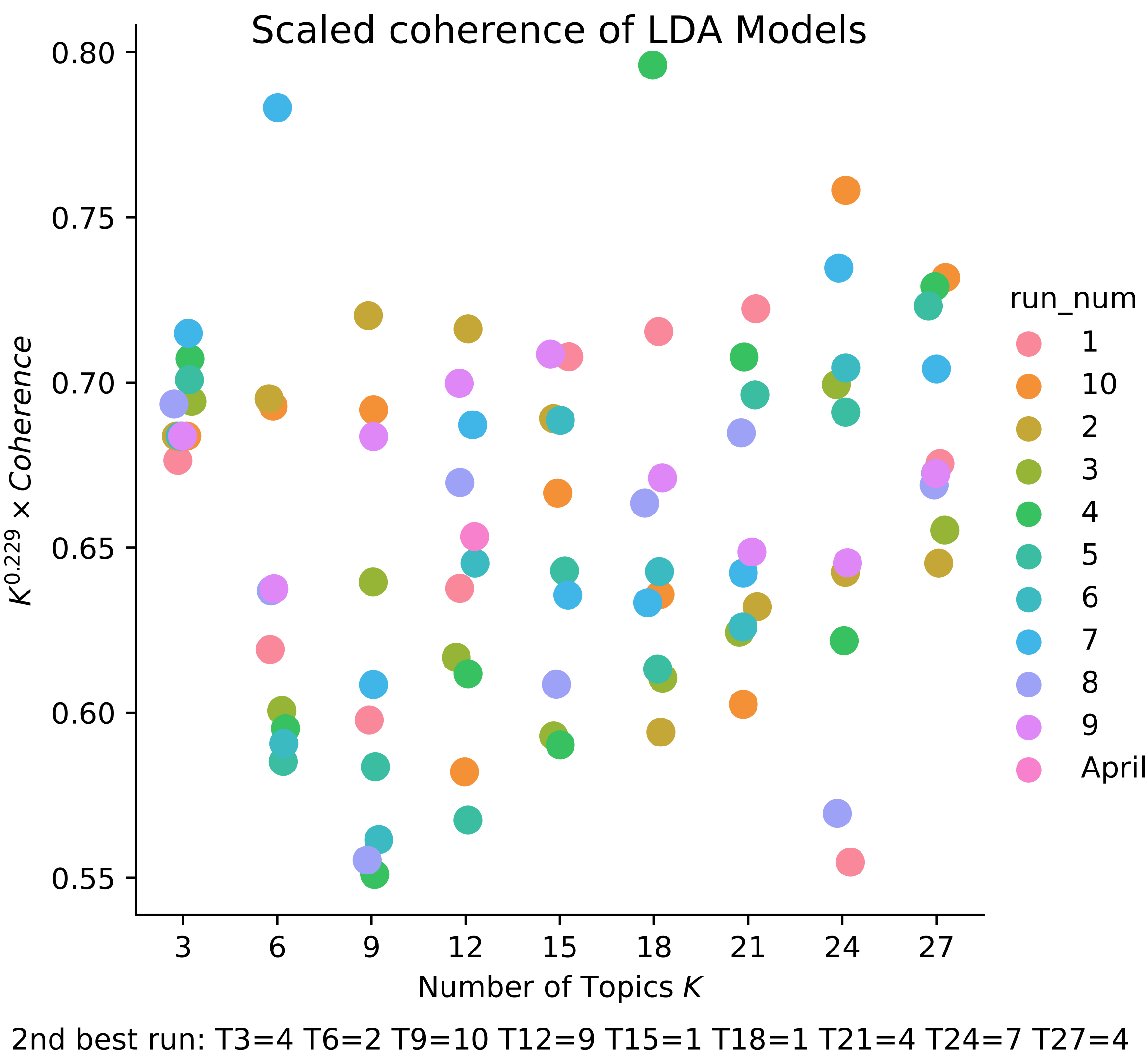


Fig. A3. Each point in the figure represents the scaled average of median coherence across the K topics in a given LDA run, as explained in Section A1. The x-axis shows the number of topics K for a given set of model runs. The y-axis shows the scaled average of the median coherence values for a given LDA run. For each K, ten separate LDAs are run, and each is evaluated based on its scaled coherence. The figure also identifies the run with the second best scaled coherence for each topic number K. The analysis was done using data through the end of December 2020.

Fig. A4. Word clouds describing topics associated with articles that mention "coronavirus" or "COVID-19." Each word cloud is labeled with the topic name, as well as the mean and median coherence for the topic (as described in Section A1). The coherence measures are evaluated using all 189,548 articles in the entire sample. The topic model was selected using data, including the scaled coherence score, only through the end of April 2020.

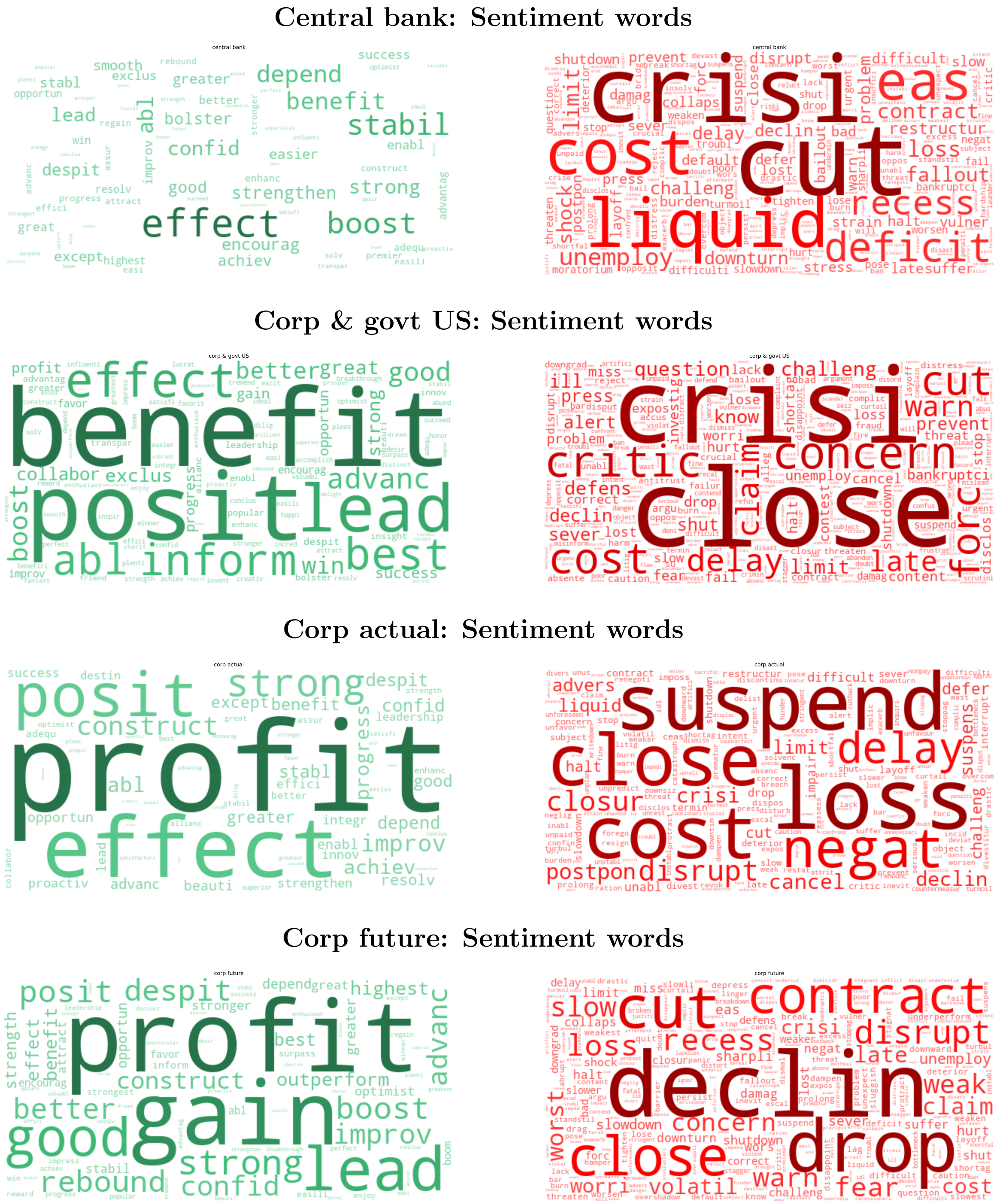
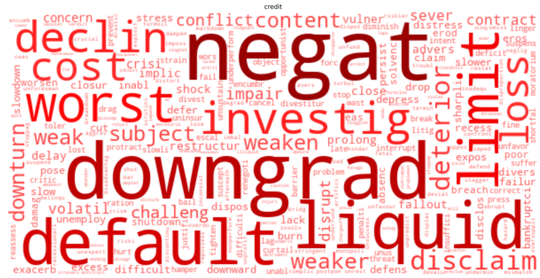
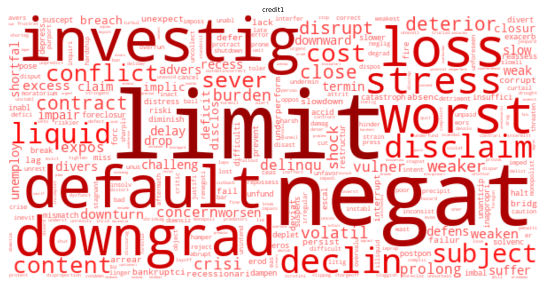


Fig. A5. The sentiment word clouds show the incidence of positive and negative sentiment Loughran and McDonald (2011) words in each of the topics. Larger words indicate higher incidence. The positive and negative words are being shown on the same scale.

Credit: Sentiment words



Credit1: Sentiment words



Currency: Sentiment words

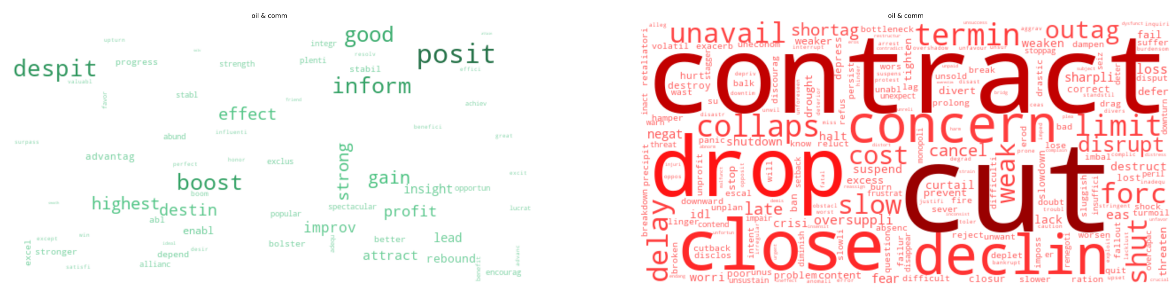
Europe: Sentiment words

Fig. A6. The sentiment word clouds show the incidence of positive and negative sentiment Loughran and McDonald (2011) words in each of the topics. Larger words indicate higher incidence. The positive and negative words are being shown on the same scale.

Health: Sentiment words

Markets: Sentiment words

Oil & comm: Sentiment words



Sports: Sentiment words

Fig. A7. The sentiment word clouds show the incidence of positive and negative sentiment Loughran and McDonald (2011) words in each of the topics. Larger words indicate higher incidence. The positive and negative words are being shown on the same scale.

Text series and coronavirus case counts

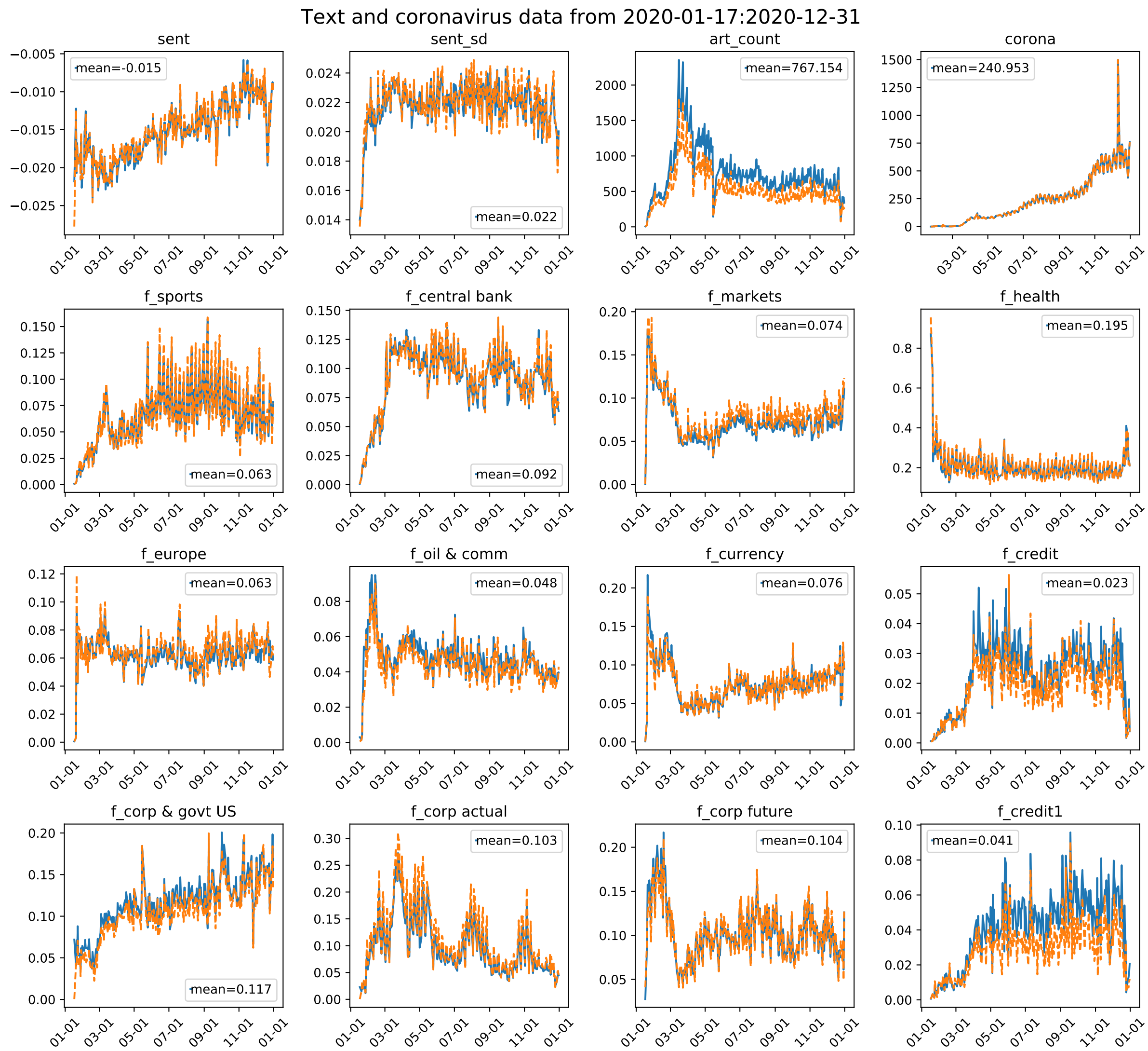


Fig. A8. Summary of sentiment (*sent*), article count (*count*), topic frequencies (marked *f_*) defined in equation (2) of the main paper, and the number of confirmed coronavirus cases (*corona*) measured in thousands. Data are daily. The solid, blue lines show text measures derived from all articles that mention "coronavirus" or "COVID-19." The dashed, orange lines correspond to the same text measures derived after all non-weekend intraday (timestamp from 9:30am–4pm NY time) articles have been removed. Also shown is the mean of the text series derived using all sample articles.

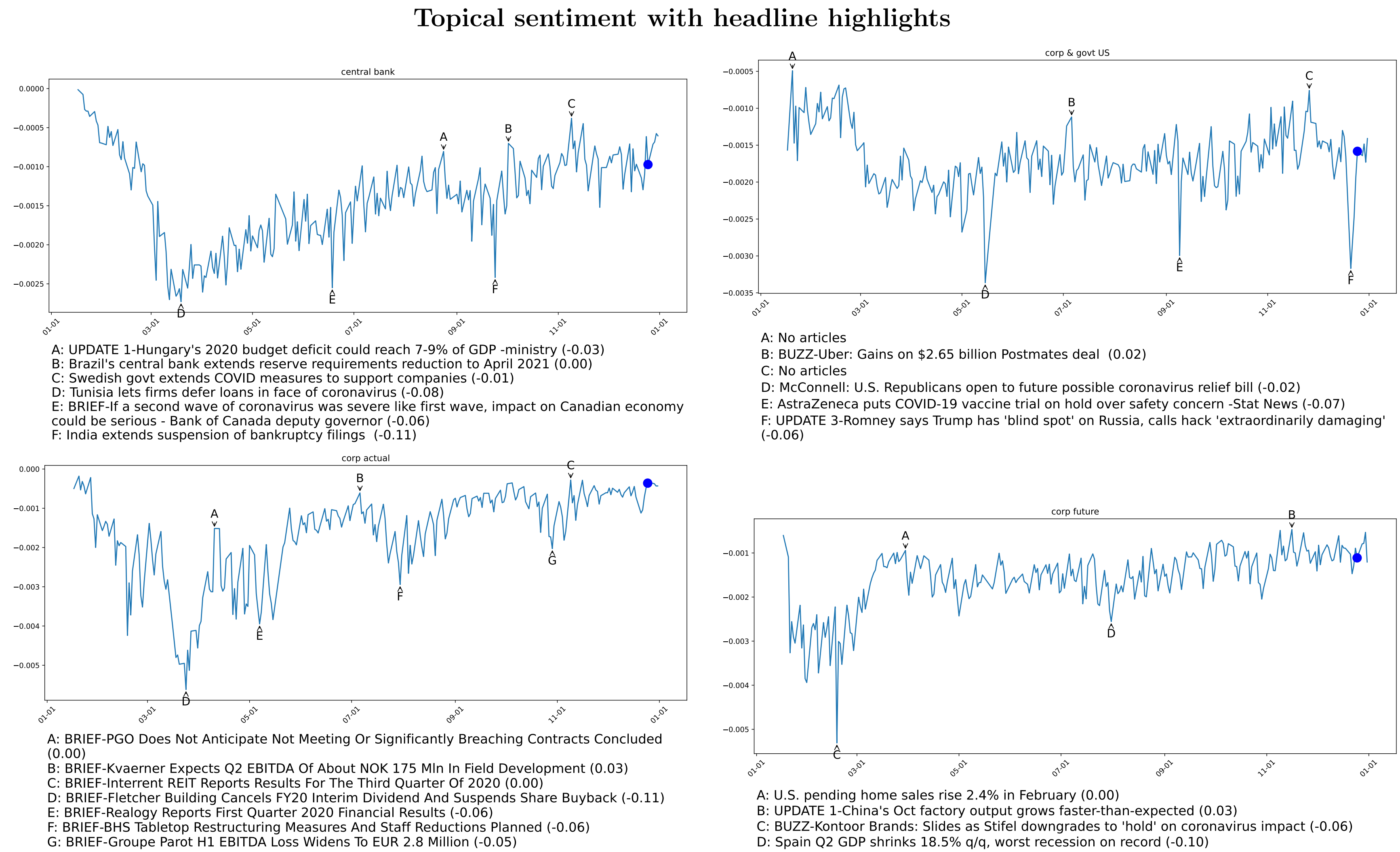


Fig. A9. These panels show the annotated daily topical sentiment from (3). Extreme points are subjectively identified to highlight spikes in each series. Each labeled point for topic k is associated with a headline of an article that has a topic k loading above the 90th percentile across all article-topic observations for topic k and a loading on any other topic $j \neq k$ that is lower than the 80th percentile topic j loading across all article-topic observations. The headline shown for low (high) sentiment points is for the lowest (highest) sentiment article satisfying the 90/80 filter for topic k day t. The blue dot indicates Christmas of 2020, a time of relatively low news coverage. *No articles* means no articles satisfying the 90-80 filter were found on that day.

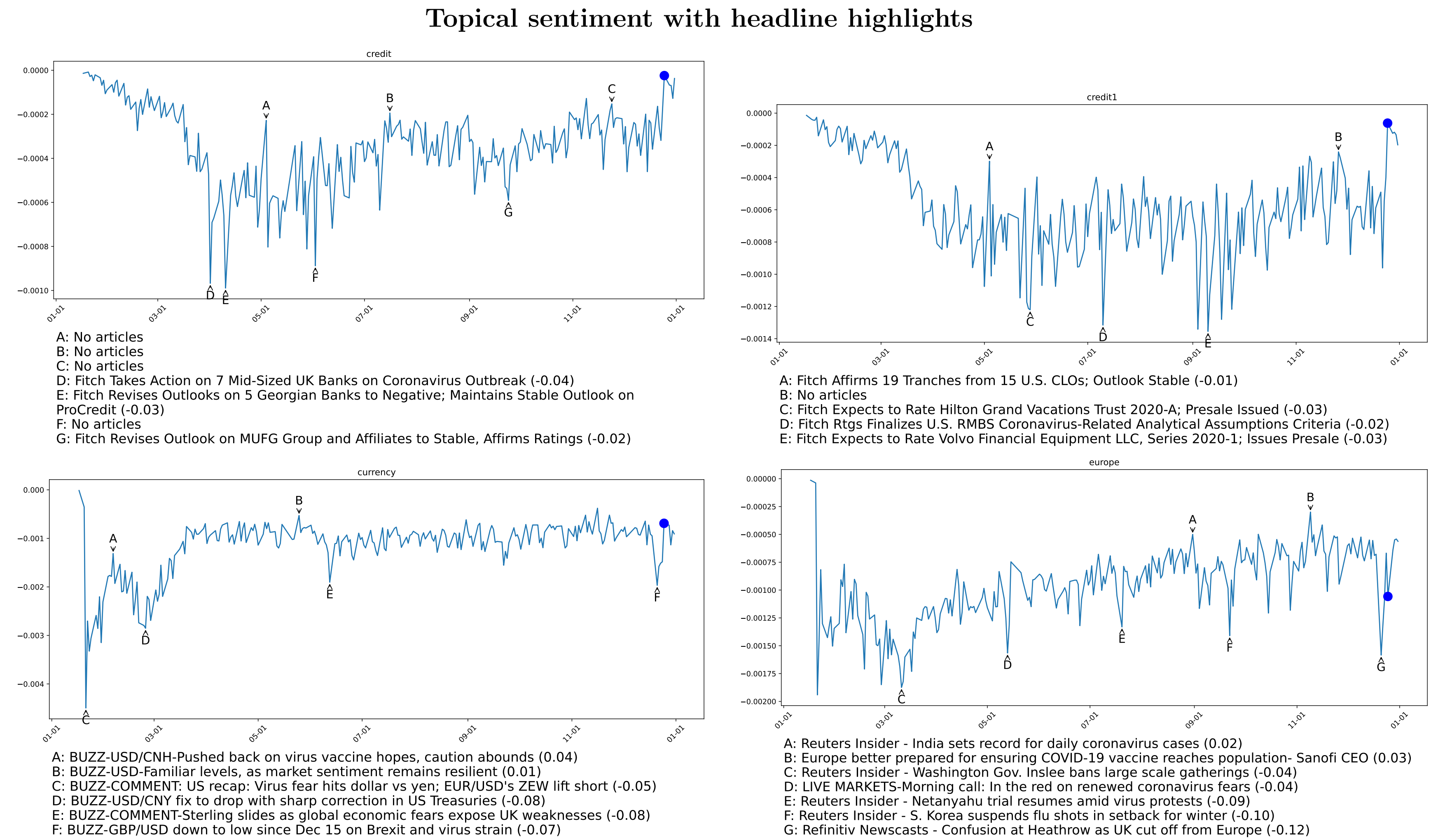


Fig. A10. These panels show the annotated daily topical sentiment from (3). Extreme points are subjectively identified to highlight spikes in each series. Each labeled point for topic k is associated with a headline of an article that has a topic k loading above the 90th percentile across all article-topic observations for topic k and a loading on any other topic $j \neq k$ that is lower than the 80th percentile topic j loading across all article-topic observations. The headline shown for low (high) sentiment points is for the lowest (highest) sentiment article satisfying the 90/80 filter for topic k day t. The blue dot indicates Christmas of 2020, a time of relatively low news coverage. *No articles* means no articles satisfying the 90-80 filter were found on that day.

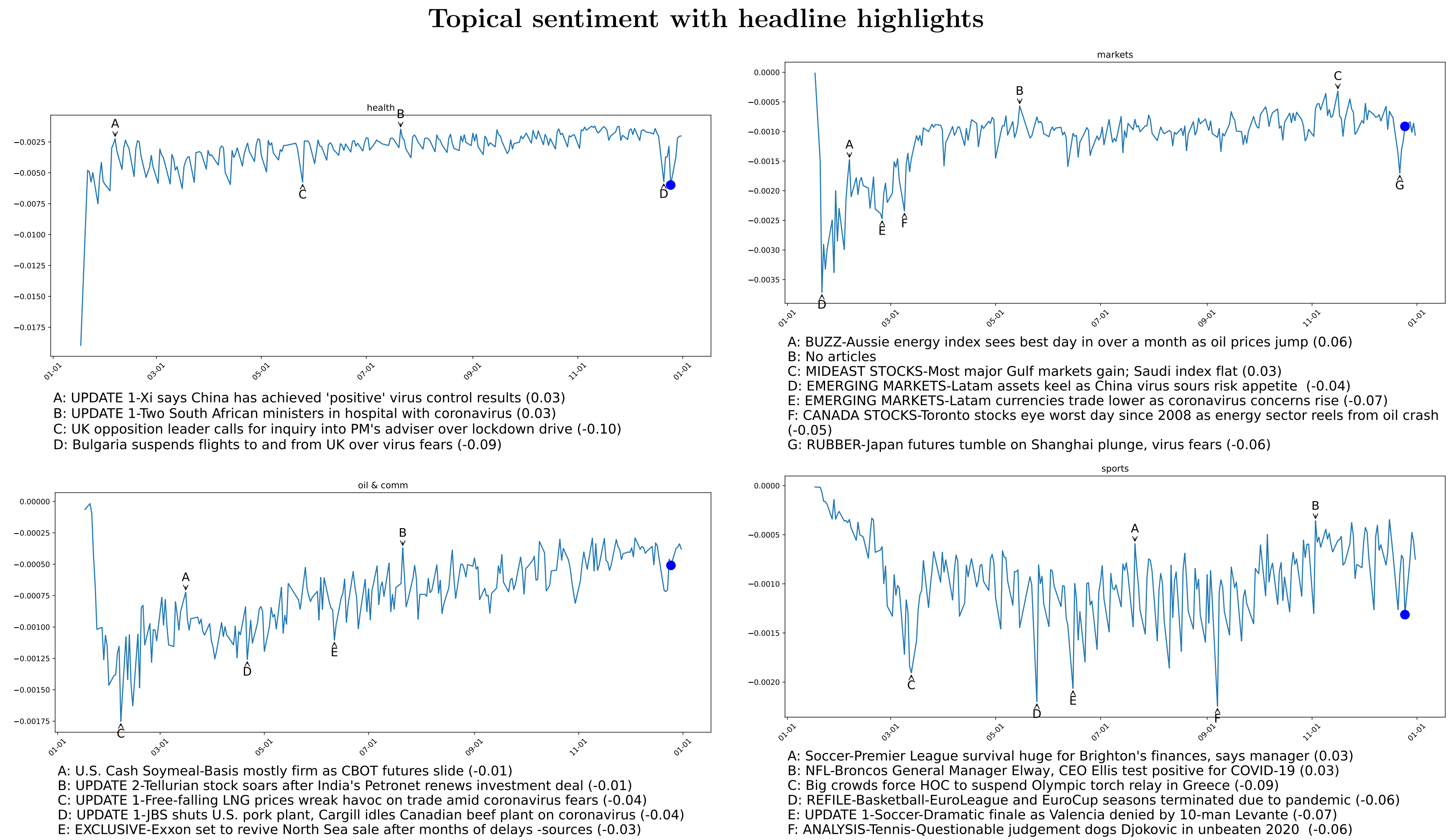


Fig. A11. These panels show the annotated daily topical sentiment from (3). Extreme points are subjectively identified to highlight spikes in each series. Each labeled point for topic k is associated with a headline of an article that has a topic k loading above the 90th percentile across all article-topic observations for topic k and a loading on any other topic $j \neq k$ that is lower than the 80th percentile topic j loading across all article-topic observations. The headline shown for low (high) sentiment points is for the lowest (highest) sentiment article satisfying the 90/80 filter for topic k day t. The blue dot indicates Christmas of 2020, a time of relatively low news coverage. *No articles* means no articles satisfying the 90-80 filter were found on that day.

Break dates excluding intraday articles

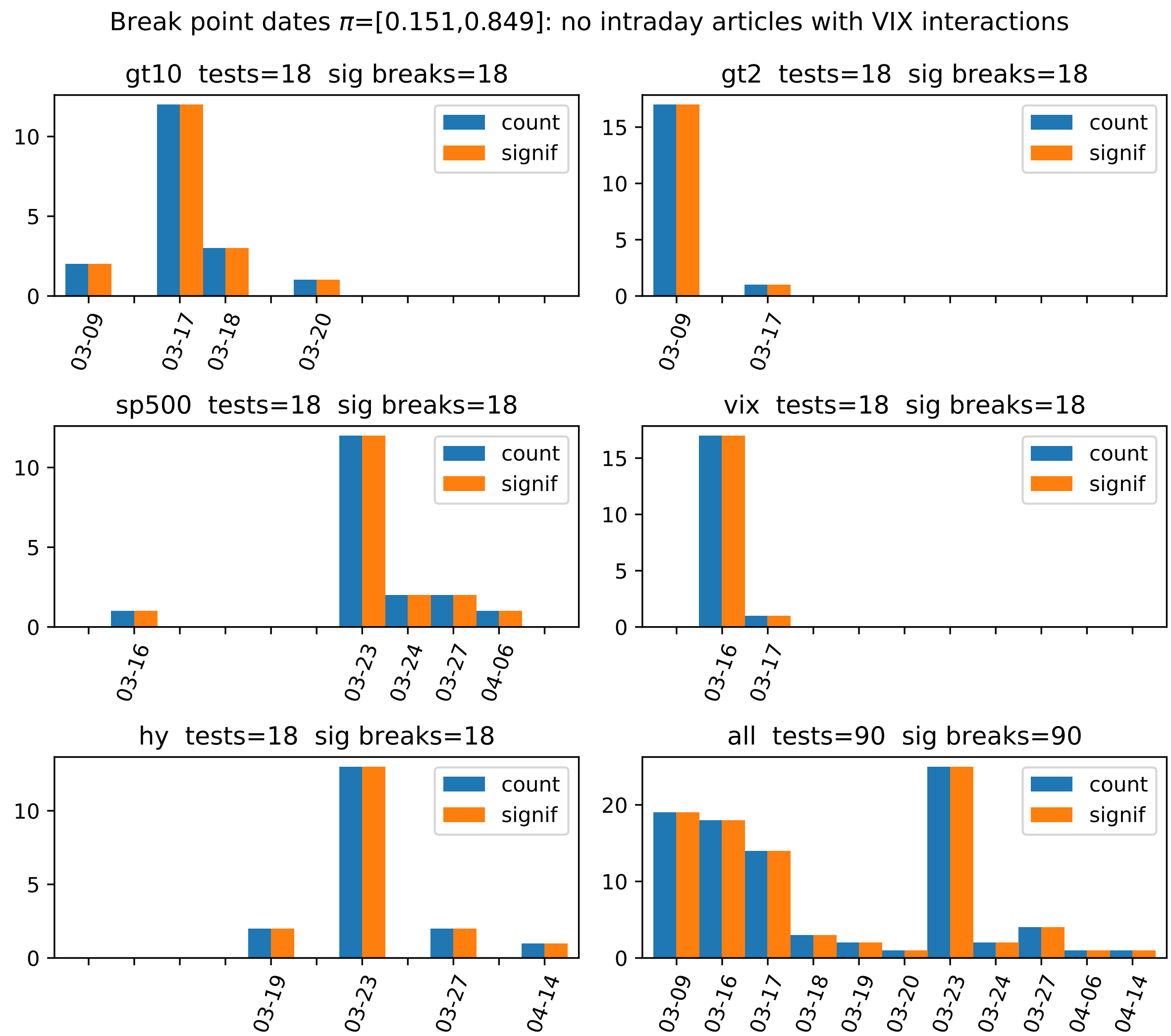


Fig. A12. For each market variable, there are 18 regressions which are tested for a break (twelve topical sentiments, overall sentiment, standard deviation of sentiment, article count, *factor*, *factor_all*, and COVID-19 case counts). The data start on January 17, 2020. The starts show number of break points that are significant at the 10% level or better using the Andrews (2003) distribution for the maximal Chow statistic with $\pi_0 = 0.151$.

Break dates over different testing horizons: April 2020 topic model

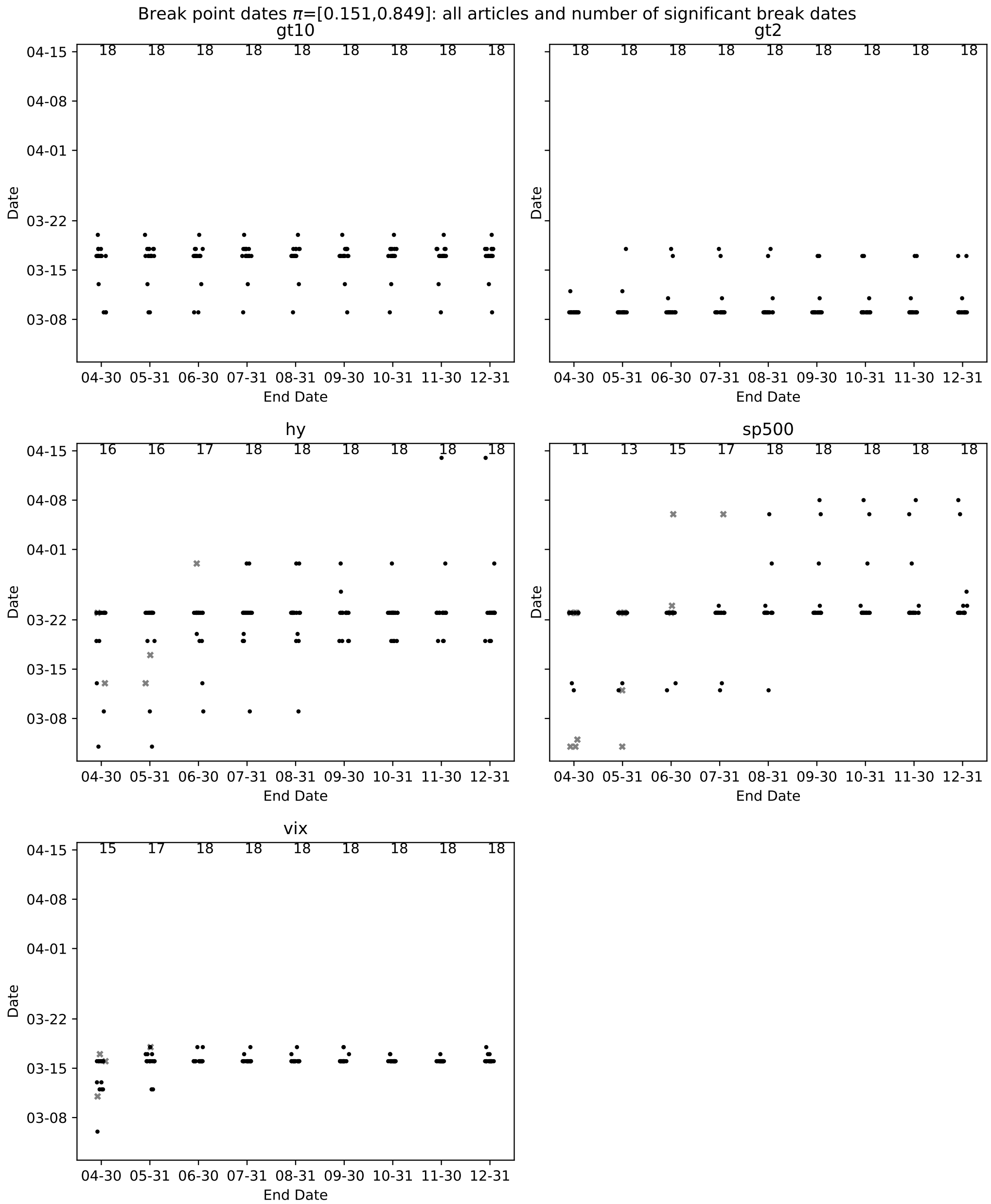


Fig. A13. Figures show the distributions of structural break tests using data up to and including the month shown on the x-axis. Each panel corresponds to one asset class. For each date, the y-axis shows the break date for the asset class for each of 18 right-hand side series (twelve topical sentiments, overall sentiment, standard deviation of sentiment, article count, *factor*, *factor_all*, and COVID-19 case counts). The top row of each panel shows how many tests had a significant break using the Andrews (1993, 2003) maximal chi-squared distribution. Significant break dates are marked with a dot, and insignificant break dates are marked with an "x". The analysis uses the April 2020 topic model.

Break dates over different testing horizons:
April 2020 topic model described in the paper, but excludes intraday articles from the daily news series variables

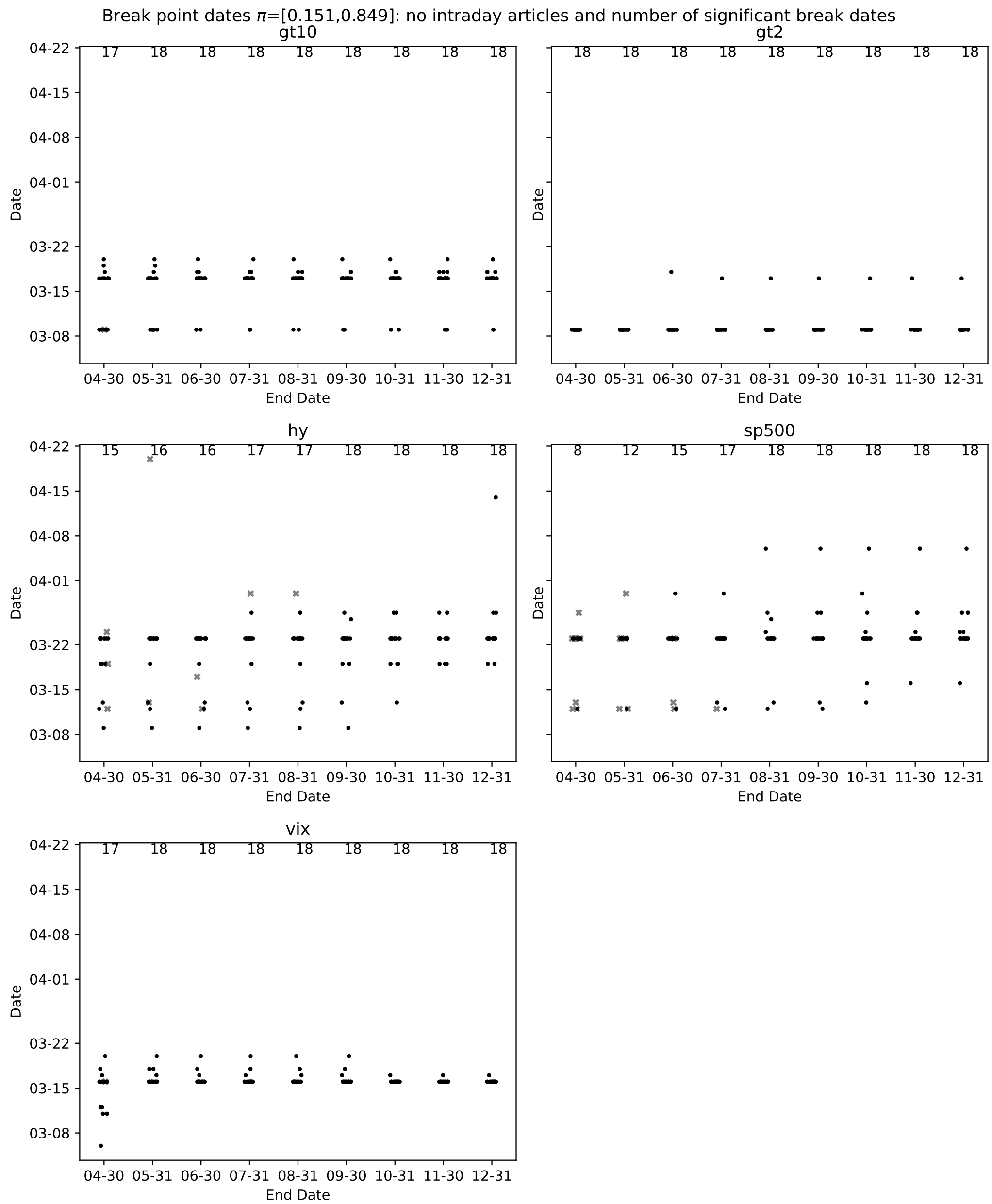


Fig. A14. Figures show the distributions of structural break tests using data up to and including the month shown on the x-axis. Each panel corresponds to one asset class. For each date, the y-axis shows the break date for the asset class for each of 18 right-hand side series (twelve topical sentiments, overall sentiment, standard deviation of sentiment, article count, *factor*, *factor_all*, and COVID-19 case counts). The top row of each panel shows how many tests had a significant break using the Andrews (1993, 2003) maximal chi-squared distribution. Significant break dates are marked with a dot, and insignificant break dates are marked with an "x". The analysis uses the April 2020 topic model described in the paper, but excludes intraday articles from the daily news series variables.

Break dates over different testing horizons: December 2020 topic model

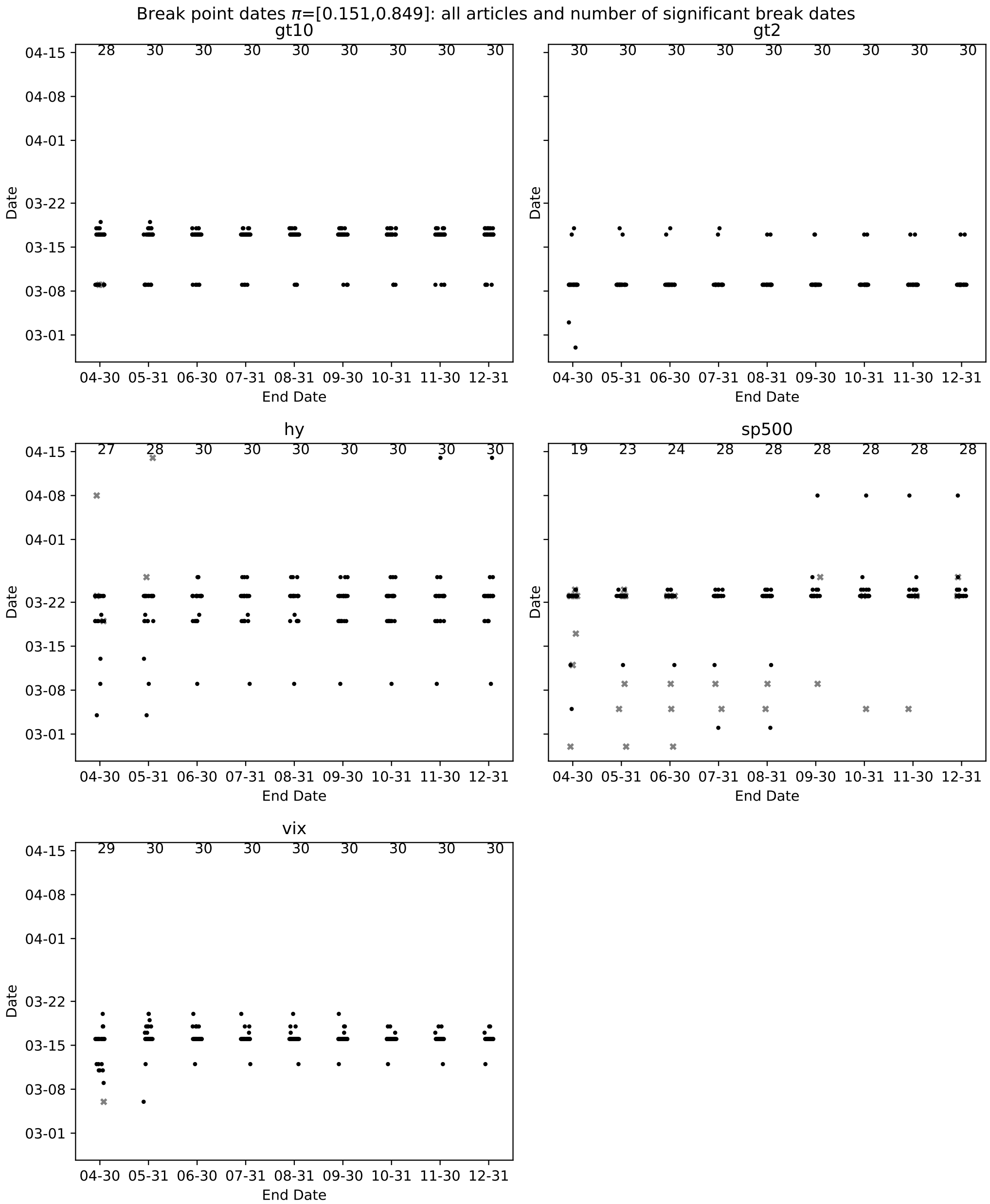


Fig. A15. Figures show the distributions of structural break tests using data up to and including the month shown on the x-axis. Each panel corresponds to one asset class. For each date, the y-axis shows the break date for the asset class for each of 30 right-hand side series (24 topical sentiments, overall sentiment, standard deviation of sentiment, article count, *factor*, *factor_all*, and COVID-19 case counts). The top row of each panel shows how many tests had a significant break using the Andrews (1993, 2003) maximal chi-squared distribution. Significant break dates are marked with a dot, and insignificant break dates are marked with an "x". The analysis uses the December 2020 topic model.

Break dates over different testing horizons: December 2020 topic model described in the paper, but excludes intraday articles from the daily news series variables

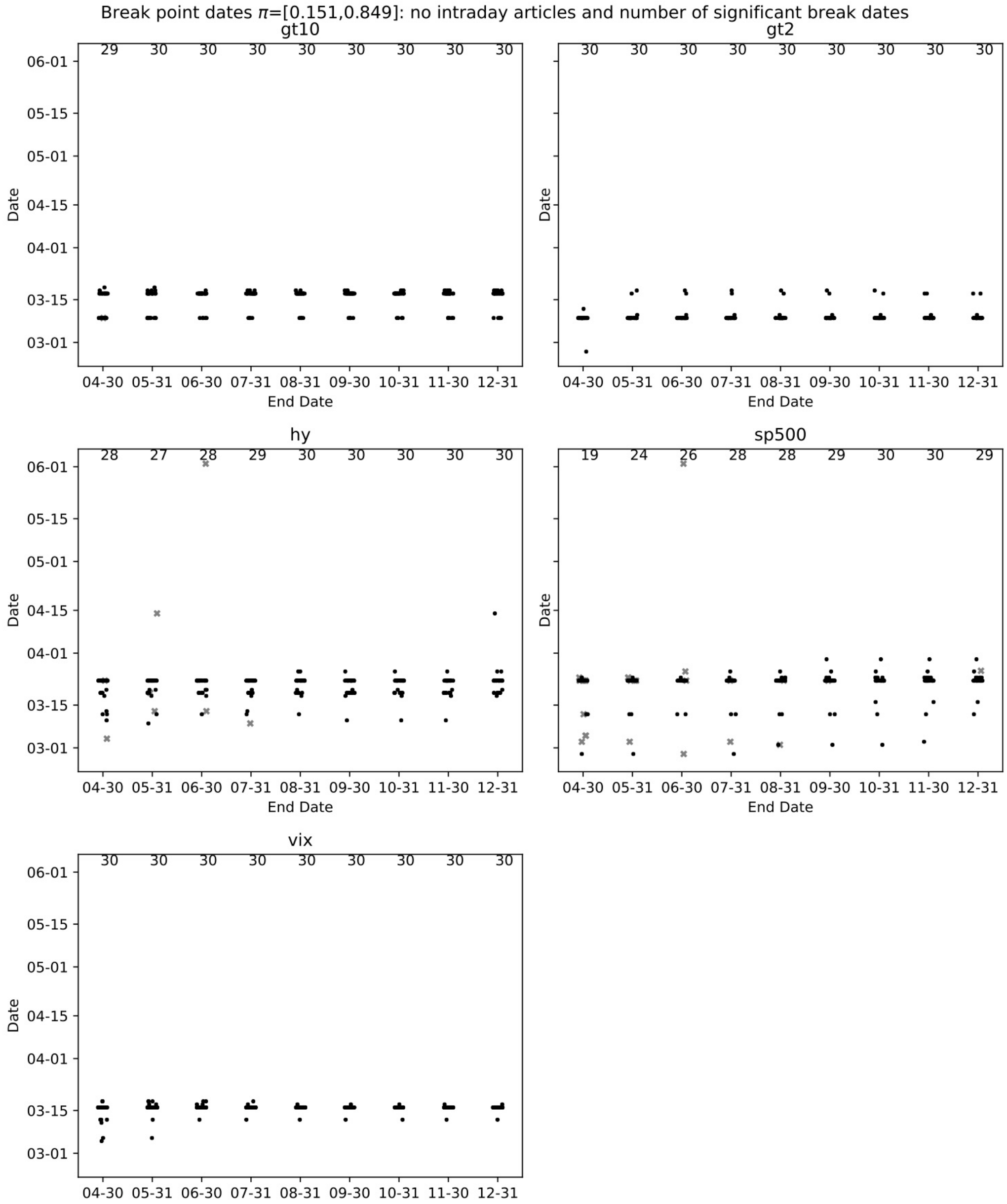


Fig. A16. Figures show the distributions of structural break tests using data up to and including the month shown on the x-axis. Each panel corresponds to one asset class. For each date, the y-axis shows the break date for the asset class for each of 30 right-hand side series (24 topical sentiments, overall sentiment, standard deviation of sentiment, article count, *factor*, *factor_all*, and COVID-19 case counts). The top row of each panel shows how many tests had a significant break using the Andrews (1993, 2003) maximal chi-squared distribution. Significant break dates are marked with a dot, and insignificant break dates are marked with an "x". The analysis uses the December 2020 topic model described in the paper, but excludes intraday articles from the daily news series variables.

Table A1
Headlines of extreme sentiment (negative and positive for each topic) news stories whose weight for topic k is above topic k's 90th percentile value, and whose topic loadings $j \neq k$ are below the 80th percentile for j. The topics are sorted by their narrativity rank given by the residual from the regression in (5). The 1987 and Fed columns show the Euclidean distance from (4) between these two corpora and each topic.

Headlines for representative articles by topic

Label	1987	Fed	Headline	Sent	Date
credit	0.094	0.114	Fitch Takes Actions on Colombian FIs & Related Entities After Sovereign Downgrade	-0.046	04-08
			Fitch Takes Action on 14 Italian Banking Groups On Coronavirus Disruption	-0.042	03-24
			Fitch Takes Actions on 13 Mexican Banks Due to Operating Environment Deterioration	-0.037	04-21
			Fitch Takes Action on 7 Mid-Sized UK Banks on Coronavirus Outbreak	-0.036	04-01
			Fitch Affirms Target at 'A-/F1'; Outlook Stable	0.006	07-17
			Fitch Rates Ardagh Packaging Finance and Ardagh Holdings USA's Senior Secured Bonds 'BB+'	0.008	04-05
			Fitch Rates Texas Instruments' $750 Million of Five-Year Senior Notes 'A+'	0.011	03-03
			Fitch Rates KLA Corp.'s Senior Notes Offering 'BBB+'	0.012	02-19
central bank	0.075	0.106	Insurers warns on forced payouts for uncovered coronavirus losses	-0.169	04-06
			India extends suspension of bankruptcy filings	-0.111	09-24
			IMF tells G20 countries to "keep spending" on COVID-19 crisis	-0.107	11-02
			Hungary govt expands tax relief measures, suspends evictions - PM Orban	-0.103	03-23
			IMF sees good progress in talks with Ukraine on new funding arrangement	0.038	03-26
			Nigeria's Zenith Bank sees 4% rise in profit this year	0.040	09-09
			S.Korea fin min says to boost loans to developing countries fighting coronavirus	0.042	04-26
			IMF's Georgieva says G20 should synchronize investments to achieve faster growth	0.047	11-12
currency	0.064	0.103	BUZZ-Replay-EUR/USD doubts, sterling exposed, yen setback	-0.134	06-24
			RPT-BUZZ-Replay-EUR/USD doubts, sterling exposed, yen setback	-0.126	06-24
			BUZZ-US jobless claims back in focus as warning sign, Philly Fed tumbles	-0.121	03-19
			BUZZ-COMMENT-Euro suppressing factors are now weaker	-0.111	03-05
			REFILE-BUZZ-EUR/USD-Bears maintain their grip despite risk-on	0.047	04-06
			BUZZ-COMMENT-Norwegian crown's popularity could weigh heavy	0.047	12-15
			BUZZ-EUR/USD-Sold on virus led broad risk 'off' USD strength	0.052	12-20
			Turkish lira firms 0.7% to strongest level in a week	0.068	03-25
credit1	0.102	0.120	Fitch Ratings: Comparing CMBS Loan Defaults from the Coronavirus Pandemic to Fitch Expectations	-0.041	07-17
			Fitch Ratings: USPF Housing Defines Coronavirus Scenarios for Loan Program Models	-0.040	04-30
			Fitch Ratings: Comparing Recent Vintage CMBS Loan Defaults to Coronavirus Expectations	-0.039	07-24
			Fitch Ratings: May Sees 3-Year Spike in US CMBS Late Pays; Coronavirus Adds to Special Servicing	-0.038	06-05
			Fitch to Rate BANK 2020-BNK29; Presale Issued	0.016	11-17
			Fitch to Rate BANK 2020-BNK29; Presale Issued	0.016	11-17
			Fitch to Rate BANK 2020-BNK30; Presale Issued	0.019	12-08
			Fitch Assigns Final Ratings to BANK 2020-BNK30	0.019	12-22

Table A1
Headlines of extreme sentiment (negative and positive for each topic) news stories whose weight for topic k is above topic k's 90th percentile value, and whose topic loadings $j \neq k$ are below the 80th percentile for j. The topics are sorted by their narrativity rank given by the residual from the regression in (5). The 1987 and Fed columns show the Euclidean distance from (4) between these two corpora and each topic.

Label	1987	Fed	Headline	Sent	Date
corp future	0.059	0.105	Spain Q2 GDP shrinks 18.5% q/q, worst recession on record	-0.103	07-31
			BUZZ-Hershey: Falls on Q1 profit miss, massive sales decline in China	-0.092	04-23
			U.S. weekly jobless claims surge to a record 3.28 mln as coronavirus spurs mass layoffs	-0.088	03-26
			Hong Kong Q3 GDP down 3.4% y/y, grows 3% q/q	-0.083	10-30
			BUZZ-Broadcom: Mizuho hikes PT on growth prospects	0.058	06-22
			BUZZ-Online retail stocks soar, Etsy leads S&P 500 gains	0.059	12-15
			Australia's Fortescue sees strong steel demand in 2021	0.060	12-08
			BUZZ-Smith & Nephew: Bernstein sees strong recovery, upgrades	0.062	12-18
sports	0.086	0.119	UNODC says to postpone crime congress to be held in Kyoto next month to undetermined date	-0.124	03-20
			Rugby-Champions Cup, Challenge Cup quarter-finals postponed due to coronavirus	-0.119	03-16
			Soccer-Real Madrid's Hazard sidelined with thigh injury	-0.110	11-30
			Olympics-Judo qualifiers scrapped through end-April over coronavirus fears	-0.108	03-09
			Soccer-One positive result at Spurs in latest Premier League COVID-19 tests	0.078	06-03
			Soccer-Four positives in latest Premier League coronavirus tests	0.078	05-27
			Soccer-Five positive in latest Premier League COVID-19 tests	0.091	10-12
			Soccer-Premier League convenes emergency club meeting after Arteta positive test	0.091	03-12
corp & govt US	0.066	0.112	Twitter bans harmful false claims about COVID-19 vaccinations	-0.183	12-16
			McDonald's accused of firing worker who sued over COVID-19 claims - Bloomberg	-0.123	06-19
			U.S. House panel subpoenas acting Homeland Security chief Wolf for next week	-0.112	09-11
			U.S. House Speaker Pelosi calls Trump WHO decision senseless, dangerous	-0.111	04-15
			Pennsylvania Governor Wolf says tested positive for COVID-19	0.056	12-09
			New York coronavirus positive test rate lowest in U.S., governor says	0.057	06-26
			Pelosi says bipartisan talks on COVID-19 relief making 'great progress'	0.062	12-10
			U.S. Representative Joe Cunningham tested positive for coronavirus	0.092	03-27
health	0.082	0.120	Zimbabwe court denies bail to journalist over anti-govt protests	-0.149	08-24
			Zimbabwe police arrest critics ahead of anti-government protests	-0.144	07-20
			Coronavirus crisis delays opening of Netanyahu trial	-0.141	03-15
			Thousands protest against Netanyahu over COVID-19, corruption allegations	-0.140	08-08
			Xi says China will win battle against coronavirus	0.056	03-12
			UK confident of hitting 100,000 COVID-19 daily tests target, Raab says	0.059	04-22
			Britain making good progress with antibody tests - junior minister	0.069	04-27
			PM Johnson fully able to run coronavirus response despite positive test - spokesman	0.070	03-30

Table A1

Headlines of extreme sentiment (negative and positive for each topic) news stories whose weight for topic k is above topic k's 90th percentile value, and whose topic loadings $j \neq k$ are below the 80th percentile for j. The topics are sorted by their narrativity rank given by the residual from the regression in (5). The 1987 and Fed columns show the Euclidean distance from (4) between these two corpora and each topic.

Label	1987	Fed	Headline	Sent	Date
oil & comm	0.091	0.126	UPDATE 1-Iowa crops suffer in most widespread drought since 2013	-0.105	08-28
			UPDATE 1-LNG tanker diverted from China in sign of weaker demand	-0.063	02-04
			RPT-LIVESTOCK-Cattle futures rise as traders hope U.S. slaughterhouses reopen soon	-0.062	04-14
			Venezuela Cardon refinery halts gasoline output after reformer unit goes down, sources say	-0.061	08-30
			CBOT corn rises on strong export demand prospects	0.027	11-16
			Crew on oil ship in Brazil owned by SBM Offshore test positive for coronavirus	0.027	04-09
			CBOT wheat closes firm on strong demand	0.029	03-20
			CBOT soybeans jump on strong exports, record U.S. crush	0.037	11-16
markets	0.064	0.115	Australia shares likely to dip at open, NZ up	-0.080	04-07
			Indian stocks suffer worst day in history as coronavirus shuts businesses, cities	-0.078	03-23
			BUZZ-Australia's mining stocks plunge as virus panic deepens	-0.078	03-12
			Indian stocks off lows after another virus-driven selloff	-0.077	03-19
			CANADA STOCKS-TSX open higher as energy gains on vaccine progress	0.051	11-23
			BUZZ-Aussie energy index sees best day in over a month as oil prices jump	0.061	02-05
			BUZZ-Australian financials extend gains to fifth day on hopes of economic rebound	0.081	11-10
			BUZZ-Aussie financials ride vaccine wave to hit 5-month high	0.084	11-09
europe	0.076	0.121	EU antitrust regulators to allow drugmakers to cooperate in virus fight	-0.122	04-08
			Refinitiv Newscasts - Confusion at Heathrow as UK cut off from Europe	-0.116	12-21
			Reuters Insider - U.S. health experts warn protests may add to virus spread	-0.114	06-01
			Reuters Insider - End of eviction bans could worsen COVID spread	-0.101	07-23
			Reuters Insider - U.S. health chief offers Taiwan 'strong' support	0.041	08-10
			Reuters Insider - WHO sees 'potentially positive data' in treating coronavirus	0.042	05-13
			Refinitiv Newscasts - BioNTech confident vaccine can beat new mutation	0.045	12-22
			Refinitiv Newscasts - BioNTech confident vaccine can beat new mutation	0.046	12-22
corp actual	0.094	0.134	BRIEF-Unima 2000 Says Curent Projects On Schedule, Sees Delays Caused By Disruption Of Delivery Chan, Suspension Of Negotiations	-0.132	03-18
			BRIEF-Tritech Group Updates On Business Disruptions Due To COVID-19	-0.119	04-07
			BRIEF-Vapiano Sees Further Drastic Decline In Sales And Earnings Due To Covid-19 Crisis	-0.115	03-20
			BRIEF-Bauhaus International (Holdings) To Close 8 To 10 Loss-Making Retail Stores In Hong Kong Shortly	-0.114	02-20
			BRIEF-Superior Industries International - All Executives Will Take A 20% Reduction In Base Salary From April 1, 2020 Through May 31, 2020	0.070	04-02
			BRIEF-Purple Innovation Withdraws 2020 Guidance Due To Covid-19 Impact	0.071	03-26
			BRIEF-H2O Innovation Presents Update On COVID-19 And Ensures Continuity Of Its Operations For Its Customers	0.082	03-17
			BRIEF-Inspiration Health Says 15% Rev Growth To £17.8 Mln In FY	0.124	04-21

Table A2
Averages of document-topic distributions (the first twelve rows), sentiment (labeled *sent*), and article counts (labeled *Number*), grouped by time period: *intra* refers to articles that come out from 9:30am–4pm on non-weekend days, and *over* refers to overnight and weekend articles. By construction, the first twelve entries in each column sum to one.

Average document-topic distribution by time-period

bucket	intra	over
sports	0.062	0.063
central bank	0.098	0.099
markets	0.051	0.075
health	0.185	0.192
europe	0.059	0.066
oil & comm	0.056	0.046
currency	0.070	0.069
credit	0.035	0.020
corp & govt US	0.138	0.106
corp actual	0.085	0.136
corp future	0.095	0.098
credit1	0.066	0.029
sent	-0.017	-0.016
Number	56,754	132,794

Table A3

The news series loadings of the full-sample factor ($factor\_all$) as described in Section 4.1 of the paper. The standard errors are clustered by time.

	parameter	tstat
s_credit	-599.723	-1.041
s_markets	-539.742	-1.557
s_corp & govt US	-110.532	-1.080
s_corp actual	-81.327	-0.741
s_credit1	-31.948	-0.118
s_oil & comm	-21.663	-0.067
sent_sd	-16.854	-0.502
art_count	-0.000	-0.566
const	1.057	1.360
s_health	57.559	2.069
s_corp future	68.309	0.386
s_central bank	126.949	0.626
s_sports	127.902	0.778
s_europe	357.505	0.832
s_currency	628.168	1.942

Table A4
Contemporaneous regression of daily changes in S&P 500 index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the S&P 500 index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in S&P 500 index: early subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-23.464***	-0.745***	-0.106	0.761***	0.085***	5.595***	0.521	0.176	2020-04-08
	(-2.71)	(-4.56)	(-0.64)	(5.72)	(4.43)	(4.16)	[0.000]		[74.05***]
sent_sd	-41.755	-0.743**	-0.215	-0.742**	-0.106**	8.795**	0.194	0.061	2020-03-23
	(-1.60)	(-2.27)	(-0.87)	(-2.21)	(-2.24)	(2.24)	[0.032]		[66.60***]
art_count	-3.546	-0.720***	-0.447*	-1.240**	-0.031	1.460***	0.248	0.014	2020-03-23
	(-1.03)	(-2.82)	(-1.93)	(-2.09)	(-1.50)	(2.92)	[0.036]		[59.29***]
s_sports	-3.391	-0.733***	-0.327	0.940**	0.023	0.953***	0.231	0.002	2020-03-23
	(-1.34)	(-3.16)	(-1.42)	(2.54)	(1.17)	(2.81)	[0.001]		[51.52***]
s_markets	-0.774	-0.698***	-0.239	0.857***	0.075***	1.087**	0.324	0.107	2020-03-23
	(-0.15)	(-3.08)	(-0.96)	(3.72)	(4.85)	(2.18)	[0.000]		[53.93***]
s_health	-4.113	-0.693***	-0.321	1.053***	0.104**	1.151**	0.293	0.062	2020-03-24
	(-1.35)	(-2.82)	(-1.33)	(2.58)	(2.41)	(2.10)	[0.048]		[42.53***]
s_europe	-10.194	-0.498***	-0.330	0.985***	0.078*	2.817*	0.390	0.066	2020-03-23
	(-1.03)	(-3.57)	(-1.61)	(5.03)	(1.86)	(1.78)	[0.000]		[41.88***]
s_oil & comm	-29.775***	-0.321*	0.011	0.663***	0.215***	4.728***	0.536	0.415	2020-03-23
	(-4.11)	(-1.94)	(0.06)	(4.05)	(4.83)	(4.53)	[0.000]		[66.74***]
s_currency	2.197	-0.541***	-0.088	0.771**	0.049	0.499	0.238	0.009	2020-03-23
	(0.46)	(-3.31)	(-0.32)	(2.48)	(1.05)	(0.60)	[0.001]		[41.32***]
corona	-3.362	-0.616**	-0.219	-0.006	-0.046**	0.360	0.176	0.063	2020-03-24
	(-1.49)	(-2.50)	(-0.94)	(-0.05)	(-2.32)	(1.07)	[0.005]		[47.55***]
factor	-2.275*	-0.505***	-0.066	0.773***	0.078***	0.481**	0.619	0.147	2020-03-26
	(-1.91)	(-4.59)	(-0.53)	(6.00)	(5.08)	(2.33)	[0.000]		[54.98***]
factor_all	-4.331	-0.472***	-0.086	0.522*	0.063	0.813	0.224	0.019	2020-03-23
	(-1.11)	(-3.06)	(-0.50)	(1.88)	(1.33)	(1.20)	[0.029]		[50.44***]

Table A5

Contemporaneous regression of daily changes in VIX index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the VIX index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in VIX index: early subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	42.398***	-0.768***	-0.206	-0.701***	-0.081***	-5.227***	0.579	0.171	2020-03-16
	(2.84)	(-5.43)	(-1.52)	(-5.22)	(-4.82)	(-4.42)	[0.000]		[148.56***]
sent_sd	84.147**	-0.825***	-0.245	0.857***	0.117***	-9.662***	0.326	0.089	2020-03-16
	(2.23)	(-2.59)	(-1.23)	(2.64)	(3.57)	(-3.62)	[0.001]		[101.03***]
art_count	7.048	-0.787***	-0.577***	1.485***	0.034*	-1.629***	0.416	0.029	2020-03-16
	(1.13)	(-3.25)	(-3.09)	(3.31)	(1.89)	(-3.80)	[0.002]		[95.02***]
s_sports	7.050*	-0.810***	-0.438**	-1.041***	-0.025	-1.003***	0.368	0.014	2020-03-16
	(1.69)	(-3.33)	(-2.18)	(-3.23)	(-1.59)	(-3.30)	[0.001]		[91.72***]
s_markets	0.772	-0.737***	-0.357*	-0.798***	-0.069***	-0.892**	0.393	0.093	2020-03-17
	(0.09)	(-3.44)	(-1.66)	(-3.56)	(-4.93)	(-2.08)	[0.000]		[70.36***]
s_health	8.645**	-0.752***	-0.451**	-1.099***	-0.113***	-1.181***	0.410	0.080	2020-03-16
	(2.18)	(-3.20)	(-2.26)	(-3.38)	(-3.91)	(-3.45)	[0.016]		[106.89***]
s_europe	14.929	-0.563***	-0.347	-0.829***	-0.064	-2.205	0.397	0.037	2020-03-16
	(0.82)	(-3.64)	(-1.62)	(-4.54)	(-1.56)	(-1.45)	[0.000]		[59.38***]
s_oil & comm	50.372***	-0.435***	-0.167	-0.460***	-0.187***	-4.011***	0.526	0.325	2020-03-16
	(3.53)	(-2.60)	(-0.94)	(-2.63)	(-4.05)	(-3.77)	[0.000]		[91.75***]
s_currency	-5.863	-0.621***	-0.216	-0.681**	-0.038	-0.204	0.301	-0.000	2020-03-17
	(-0.83)	(-3.57)	(-0.93)	(-2.15)	(-0.96)	(-0.32)	[0.006]		[53.26***]
corona	6.173	-0.672***	-0.286	-0.001	0.046**	-0.290	0.281	0.071	2020-03-16
	(1.57)	(-2.68)	(-1.47)	(-0.01)	(2.42)	(-0.93)	[0.023]		[92.82***]
factor	2.805	-0.560***	-0.211	-0.705***	-0.066***	-0.285	0.614	0.107	2020-03-18
	(1.23)	(-4.42)	(-1.61)	(-5.21)	(-3.91)	(-1.36)	[0.000]		[97.28***]
factor_all	6.034	-0.547***	-0.204	-0.471*	-0.053	-0.562	0.294	0.010	2020-03-16
	(0.80)	(-3.39)	(-1.23)	(-1.67)	(-1.03)	(-0.81)	[0.044]		[62.17***]

Table A6
Contemporaneous regression of daily changes in US high-yield index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the US high-yield index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in US high-yield index: early subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-9.038***	-0.184	-0.002	0.603***	0.104***	6.551***	0.542	0.272	2020-04-14
	(-5.49)	(-1.13)	(-0.03)	(10.65)	(7.38)	(6.94)	[0.000]		[93.86***]
sent_sd	-19.528**	-0.669	0.063	-1.100**	-0.180***	14.641**	0.329	0.162	2020-03-19
	(-2.57)	(-1.47)	(0.51)	(-2.49)	(-2.59)	(2.57)	[0.011]		[87.92***]
art_count	-1.018	-0.325	-0.265***	-0.792**	-0.045**	1.132*	0.276	0.068	2020-03-23
	(-1.02)	(-1.50)	(-4.09)	(-2.40)	(-2.04)	(1.77)	[0.000]		[77.33***]
s_sports	-0.646	-0.299	-0.154**	0.645**	0.035*	0.663	0.272	0.049	2020-03-23
	(-0.79)	(-1.38)	(-2.08)	(2.46)	(1.66)	(1.24)	[0.001]		[53.23***]
s_markets	-0.555	-0.374*	-0.048	1.079***	0.110***	1.515***	0.538	0.254	2020-03-23
	(-0.66)	(-1.72)	(-0.42)	(5.49)	(5.45)	(3.26)	[0.000]		[79.62***]
s_health	-2.147*	-0.313	-0.117	1.245***	0.171***	1.812**	0.493	0.194	2020-03-19
	(-1.84)	(-1.54)	(-1.19)	(3.80)	(3.18)	(2.40)	[0.000]		[63.43***]
s_europe	-3.948*	-0.146	-0.436***	0.676***	0.101***	2.995**	0.336	0.122	2020-03-23
	(-1.87)	(-0.64)	(-5.68)	(4.40)	(2.99)	(2.20)	[0.000]		[49.35***]
s_oil & comm	-6.551***	0.060	0.126	1.073***	0.223***	4.565***	0.659	0.490	2020-03-23
	(-5.93)	(0.55)	(1.43)	(6.36)	(6.91)	(7.01)	[0.000]		[94.22***]
s_corp & govt US	-0.741	-0.171	-0.194*	0.338**	0.031	0.743	0.178	-0.003	2020-03-23
	(-0.46)	(-0.60)	(-1.67)	(2.01)	(1.26)	(0.72)	[0.040]		[73.92***]
corona	-0.005	-0.244	-0.205***	-0.078	-0.041**	-0.087	0.210	0.045	2020-03-23
	(-0.01)	(-0.94)	(-2.95)	(-0.77)	(-2.12)	(-0.18)	[0.000]		[75.30***]
factor	-0.620**	0.052	-0.049	0.607***	0.101***	0.446***	0.598	0.287	2020-03-30
	(-2.56)	(0.38)	(-0.41)	(5.36)	(6.71)	(2.74)	[0.000]		[56.70***]

Table A7
Contemporaneous regression of daily changes in 2-year Treasury yield on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the 2-year Treasury yield. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in 2-year Treasury yield: early subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-0.597*	-0.050	0.587***	0.616***	0.093**	6.439**	0.229	0.125	2020-03-09
	(-1.76)	(-0.64)	(2.74)	(3.65)	(2.18)	(2.14)	[0.003]		[145.71***]
art_count	0.030	-0.142	0.156	-0.957*	0.017	0.313	0.077	-0.016	2020-03-09
	(0.34)	(-1.08)	(1.08)	(-1.76)	(0.66)	(0.30)	[0.001]		[146.08***]
s_sports	-0.045	-0.167	0.231*	1.129**	-0.006	0.820	0.148	-0.023	2020-03-09
	(-0.64)	(-1.32)	(1.78)	(2.53)	(-0.28)	(1.02)	[0.000]		[143.18***]
s_central bank	0.046	-0.112	0.174	0.615*	-0.029	-0.211	0.046	-0.007	2020-03-09
	(0.53)	(-0.71)	(0.88)	(1.66)	(-0.93)	(-0.25)	[0.236]		[137.91***]
s_markets	-0.187**	-0.141	0.278	0.426*	0.078***	1.714**	0.062	0.094	2020-03-09
	(-2.48)	(-0.87)	(1.55)	(1.82)	(2.90)	(2.57)	[0.000]		[118.78***]
s_oil & comm	-0.388***	0.087	0.375***	0.817***	0.169***	3.776***	0.298	0.328	2020-03-09
	(-4.53)	(0.81)	(2.69)	(4.45)	(5.37)	(5.05)	[0.000]		[138.85***]
s_currency	-0.187***	-0.355***	0.296***	1.262***	0.148***	2.627***	0.458	0.409	2020-03-11
	(-2.79)	(-2.58)	(2.67)	(5.64)	(4.69)	(3.87)	[0.000]		[153.49***]
s_credit	-0.169*	0.113	0.457**	0.576*	0.061*	1.784*	0.083	0.063	2020-03-09
	(-1.94)	(1.28)	(2.04)	(1.94)	(1.78)	(1.87)	[0.326]		[155.44***]
s_corp future	-0.128	-0.171	0.166	0.531**	0.089***	1.292**	0.109	0.124	2020-03-09
	(-1.46)	(-1.01)	(0.90)	(2.46)	(2.72)	(2.17)	[0.045]		[132.62***]
factor	-0.087***	-0.055	0.437***	0.826***	0.081***	0.816***	0.489	0.167	2020-03-17
	(-3.46)	(-0.76)	(2.84)	(6.93)	(4.24)	(3.49)	[0.000]		[190.29***]
factor_all	-0.144***	-0.105	0.364***	0.943***	0.087***	1.515***	0.400	0.086	2020-03-17
	(-2.72)	(-0.88)	(2.76)	(6.57)	(3.03)	(3.02)	[0.000]		[166.12***]

Table A8

Contemporaneous regression of daily changes in 10-year Treasury yield on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the 10-year Treasury yield. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in 10-year Treasury yield: early subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-0.850	-0.060	0.310*	0.574***	0.092*	6.493*	0.137	0.111	2020-03-17
	(-1.44)	(-0.39)	(1.95)	(3.04)	(1.66)	(1.67)	[0.006]		[59.22***]
s_sports	-0.043	-0.176	-0.054	0.891*	-0.015	0.581	0.048	-0.017	2020-03-17
	(-0.38)	(-1.35)	(-0.38)	(1.70)	(-0.58)	(0.61)	[0.185]		[77.30***]
s_markets	-0.393***	-0.408***	-0.016	0.960***	0.139***	3.143***	0.277	0.357	2020-03-17
	(-3.47)	(-3.07)	(-0.12)	(3.90)	(4.52)	(4.03)	[0.000]		[58.01***]
s_health	-0.312	-0.178*	0.070	0.940*	0.141	2.234	0.092	0.114	2020-03-17
	(-1.48)	(-1.87)	(0.70)	(1.83)	(1.48)	(1.48)	[0.075]		[75.34***]
s_oil & comm	-0.742***	0.000	0.181*	1.110***	0.232***	5.292***	0.543	0.623	2020-03-13
	(-6.25)	(0.00)	(1.85)	(6.64)	(8.30)	(7.43)	[0.000]		[56.17***]
s_currency	-0.286***	-0.279**	0.110	1.127***	0.139***	2.693***	0.383	0.404	2020-03-17
	(-3.64)	(-2.33)	(0.79)	(5.50)	(4.43)	(4.47)	[0.000]		[79.99***]
s_corp & govt US	0.422**	-0.171	-0.201	0.153	-0.077**	-2.522*	0.054	0.074	2020-03-20
	(2.07)	(-1.15)	(-1.09)	(0.74)	(-2.21)	(-1.85)	[0.005]		[96.27***]
s_corp future	-0.258**	-0.211	-0.092	0.457***	0.095***	1.661***	0.103	0.184	2020-03-17
	(-2.45)	(-1.42)	(-0.45)	(3.02)	(3.67)	(3.45)	[0.000]		[44.88***]
corona	0.096	-0.238	-0.325	0.426**	0.067**	-1.001**	0.002	0.079	2020-03-18
	(1.44)	(-1.37)	(-1.35)	(2.36)	(2.44)	(-2.11)	[0.132]		[48.72***]
factor	-0.161***	0.008	0.243**	0.725***	0.100***	1.078***	0.398	0.231	2020-03-18
	(-3.94)	(0.06)	(2.03)	(6.30)	(4.48)	(3.67)	[0.000]		[121.30***]
factor_all	-0.177	-0.062	0.111	0.703***	0.065	1.292*	0.137	0.024	2020-03-17
	(-1.63)	(-0.38)	(1.00)	(4.40)	(1.62)	(1.70)	[0.000]		[85.73***]

Table A9
Contemporaneous regression of daily changes in S&P 500 index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the S&P 500 index. The *EV**VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in S&P 500 index: late subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-6.946**	-0.386***	0.201**	0.375***	0.027**	1.884***	0.275	0.044	2020-04-08
	(-2.38)	(-3.70)	(2.16)	(2.89)	(2.40)	(2.76)	[0.000]		[74.05***]
s_central bank	-5.073**	-0.317***	0.257***	0.337***	0.023**	1.333***	0.258	0.033	2020-04-06
	(-2.34)	(-3.39)	(2.69)	(2.63)	(2.26)	(2.67)	[0.001]		[43.78***]
s_markets	-6.951***	-0.390***	0.239***	0.281***	0.031***	1.731***	0.329	0.088	2020-03-23
	(-4.21)	(-3.91)	(2.68)	(4.73)	(5.38)	(5.01)	[0.000]		[53.93***]
s_health	-4.394**	-0.337***	0.216**	0.232**	0.022***	1.084***	0.276	0.049	2020-03-24
	(-2.48)	(-3.85)	(2.36)	(2.35)	(2.72)	(2.68)	[0.000]		[42.53***]
s_europe	-7.495***	-0.412***	0.198**	0.434***	0.033***	1.993***	0.334	0.075	2020-03-23
	(-3.17)	(-3.91)	(2.25)	(4.09)	(3.55)	(3.72)	[0.000]		[41.88***]
s_currency	-2.389	-0.321***	0.264***	0.230***	0.016	0.806	0.238	0.014	2020-03-23
	(-0.93)	(-3.15)	(2.69)	(2.62)	(1.29)	(1.43)	[0.000]		[41.32***]
s_corp future	-2.314	-0.282***	0.265**	0.139**	0.015	0.622	0.217	0.013	2020-03-23
	(-1.07)	(-3.07)	(2.30)	(1.98)	(1.34)	(1.36)	[0.001]		[65.10***]
factor	-0.599	-0.311***	0.235***	0.154***	0.018***	0.143	0.298	0.046	2020-03-26
	(-0.92)	(-3.80)	(2.84)	(2.78)	(3.27)	(1.10)	[0.000]		[54.98***]
factor_all	-0.687	-0.278***	0.249***	0.166**	0.008	0.147	0.231	0.005	2020-03-23
	(-0.91)	(-3.29)	(2.76)	(2.24)	(0.75)	(1.00)	[0.001]		[50.44***]

Table A10

Contemporaneous regression of daily changes in VIX index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the VIX index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in VIX index: late subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent_sd	25.956	-0.308***	0.225*	0.169**	0.018	-4.241	0.230	0.023	2020-03-16
	(1.43)	(-3.71)	(1.66)	(2.02)	(1.52)	(-1.64)	[0.000]		[101.03***]
s_markets	5.019*	-0.338***	0.194	-0.140**	-0.012*	-0.834**	0.218	0.009	2020-03-17
	(1.89)	(-4.46)	(1.52)	(-2.33)	(-1.87)	(-2.37)	[0.000]		[70.36***]
s_europe	7.428*	-0.415***	0.123	-0.330**	-0.019	-1.348**	0.260	0.021	2020-03-16
	(1.76)	(-3.35)	(1.25)	(-2.30)	(-1.54)	(-2.08)	[0.000]		[59.38***]
s_currency	8.073**	-0.370***	0.169	-0.203**	-0.023*	-1.265**	0.246	0.035	2020-03-17
	(2.06)	(-3.95)	(1.53)	(-2.04)	(-1.86)	(-2.30)	[0.000]		[53.26***]
s_corp & govt US	-6.306*	-0.289***	0.204	-0.013	0.016*	0.697	0.206	0.010	2020-03-16
	(-1.79)	(-3.56)	(1.46)	(-0.17)	(1.93)	(1.47)	[0.000]		[80.34***]
corona	2.043**	-0.314***	0.182	-0.230*	-0.018	-0.191*	0.207	0.006	2020-03-16
	(2.18)	(-3.84)	(1.37)	(-1.78)	(-1.51)	(-1.76)	[0.000]		[92.82***]
factor	2.252***	-0.342***	0.124	-0.221**	-0.008	-0.268***	0.259	0.004	2020-03-18
	(2.98)	(-3.61)	(1.43)	(-2.09)	(-0.71)	(-3.06)	[0.000]		[97.28***]
factor_all	2.530***	-0.352***	0.108	-0.242**	-0.007	-0.300***	0.259	0.004	2020-03-16
	(3.43)	(-3.33)	(1.21)	(-2.32)	(-0.73)	(-3.69)	[0.000]		[62.17***]

Table A11

Contemporaneous regression of daily changes in US high-yield index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the US high-yield index. The *EV**VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in US high-yield index: late subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-3.250***	0.113	0.334***	0.472***	0.035***	2.381***	0.351	0.078	2020-04-14
	(-2.96)	(1.54)	(2.84)	(3.60)	(2.98)	(3.32)	[0.000]		[93.86***]
art_count	-0.347	0.196**	0.309***	-0.354*	-0.003	0.485*	0.243	-0.002	2020-03-23
	(-0.84)	(2.50)	(2.67)	(-1.70)	(-0.49)	(1.75)	[0.001]		[77.33***]
s_sports	-2.222***	0.148***	0.306***	0.288***	0.045***	1.399***	0.347	0.109	2020-03-23
	(-3.06)	(2.72)	(2.65)	(4.61)	(3.90)	(3.40)	[0.000]		[53.23***]
s_central bank	-2.133***	0.174***	0.337***	0.444***	0.028**	1.577***	0.321	0.049	2020-03-19
	(-2.59)	(2.63)	(2.70)	(3.55)	(2.45)	(3.02)	[0.000]		[56.90***]
s_markets	-2.844***	0.114**	0.401***	0.249***	0.033***	1.818***	0.346	0.098	2020-03-23
	(-3.30)	(1.97)	(2.67)	(4.60)	(3.91)	(3.83)	[0.000]		[79.62***]
s_health	-1.618***	0.193***	0.349***	0.288***	0.023***	1.136***	0.340	0.058	2020-03-19
	(-3.42)	(3.17)	(2.87)	(3.77)	(4.40)	(3.78)	[0.000]		[63.43***]
s_europe	-2.989***	0.106	0.316**	0.456***	0.037***	2.137***	0.389	0.096	2020-03-23
	(-4.41)	(1.19)	(2.54)	(5.37)	(4.78)	(5.03)	[0.000]		[49.35***]
s_oil & comm	-0.330	0.213***	0.382***	0.203**	0.005	0.403	0.225	-0.002	2020-03-23
	(-0.51)	(3.01)	(2.61)	(2.42)	(0.57)	(1.01)	[0.000]		[94.22***]
s_currency	-2.103***	0.133*	0.327**	0.244***	0.030***	1.408***	0.291	0.058	2020-03-23
	(-2.95)	(1.75)	(2.39)	(4.00)	(3.27)	(3.54)	[0.000]		[55.69***]
s_corp & govt US	-2.406**	0.116	0.355**	0.201***	0.026***	1.563***	0.256	0.031	2020-03-23
	(-2.50)	(1.58)	(2.39)	(3.49)	(2.88)	(2.85)	[0.000]		[73.92***]
s_corp actual	0.228	0.218***	0.361**	0.162*	-0.007	-0.033	0.218	0.002	2020-03-23
	(0.47)	(2.81)	(2.44)	(1.84)	(-0.63)	(-0.12)	[0.001]		[75.35***]
s_corp future	-1.069*	0.200***	0.382**	0.124**	0.018**	0.697**	0.237	0.020	2020-03-23
	(-1.83)	(2.96)	(2.47)	(2.28)	(2.30)	(2.02)	[0.000]		[92.11***]
factor	-0.155	0.135	0.229***	0.209***	0.023***	0.090	0.370	0.069	2020-03-30
	(-0.57)	(1.43)	(2.59)	(4.53)	(3.45)	(0.61)	[0.000]		[56.70***]
factor_all	-0.259	0.173**	0.271***	0.241***	0.014	0.133	0.303	0.023	2020-03-23
	(-0.84)	(1.99)	(2.99)	(4.06)	(1.28)	(0.79)	[0.000]		[50.67***]

Table A12

Contemporaneous regression of daily changes in 2-year Treasury yield on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the 2-year Treasury yield. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in 2-year Treasury yield: late subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-0.028	-0.165	-0.366***	0.089	0.014**	0.581	0.145	0.008	2020-03-09
	(-1.50)	(-0.88)	(-3.57)	(0.97)	(2.12)	(1.35)	[0.000]		[145.71***]
art_count	-0.023*	-0.189	-0.393***	-0.197	-0.015***	0.541	0.190	0.030	2020-03-09
	(-1.95)	(-1.04)	(-3.72)	(-0.93)	(-3.07)	(1.64)	[0.001]		[146.08***]
s_central bank	-0.019	-0.155	-0.347***	0.087	0.013**	0.389	0.146	0.009	2020-03-09
	(-1.35)	(-0.83)	(-3.29)	(0.87)	(2.32)	(1.21)	[0.000]		[137.91***]
s_corp & govt US	0.092***	-0.116	-0.333***	-0.107	-0.026**	-1.747**	0.176	0.038	2020-03-09
	(2.58)	(-0.63)	(-3.11)	(-1.52)	(-2.26)	(-2.56)	[0.002]		[148.57***]
s_corp actual	-0.014	-0.168	-0.377***	0.140	0.014**	0.296	0.169	0.023	2020-03-09
	(-1.30)	(-0.93)	(-3.42)	(1.46)	(2.38)	(1.38)	[0.000]		[136.90***]
corona	0.022***	-0.155	-0.360***	0.123	0.028***	-0.405***	0.161	0.020	2020-03-09
	(2.95)	(-0.83)	(-3.44)	(1.53)	(3.29)	(-3.23)	[0.000]		[136.57***]
factor	0.011**	-0.162	-0.363***	0.147**	0.008	-0.235**	0.179	0.006	2020-03-17
	(2.04)	(-0.86)	(-3.90)	(2.00)	(1.15)	(-2.53)	[0.000]		[190.29***]

Table A13

Contemporaneous regression of daily changes in 10-year Treasury yield on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the 10-year Treasury yield. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in 10-year Treasury yield: late subperiod, VIX interact

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
factor	0.012	-0.118	-0.091	0.119*	-0.003	-0.096	0.017	-0.003	2020-03-18
	(0.82)	(-0.79)	(-0.96)	(1.88)	(-0.44)	(-0.94)	[0.083]		[121.30***]

Table A14

Test of whether the variable in a given row Granger causes the variables in the columns of the table. The table shows c_3 (EV) and c_4 ($EV*VIX$) from the specifications in (10). The c_3 coefficient is normalized to show standard deviation changes in the response variable due to a single standard deviation change in the test variable. c_4 shows changes in c_3 due to a unit change in the VIX. T-statistics are shown in parentheses. The $d\_[market]$ variables refer to daily returns or changes in the particular market series. Standard errors use Newey-West with three lags. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. Data are daily.

Granger causality tests: Text measures to market changes in early subsample

		d_sp500	d_vix	d_hy	d_gt2	d_gt10
sent	EV	-0.129	-0.085	-0.347**	-0.174	-0.218*
	(EV t)	(-0.80)	(-0.53)	(-2.48)	(-1.38)	(-1.66)
	EV*VIX	-0.083***	0.058**	-0.078***	-0.041**	-0.057***
	(EV*VIX t)	(-2.90)	(2.24)	(-3.08)	(-2.38)	(-2.76)
sent_sd	EV	1.137***	-1.098***	1.181***	0.906***	1.231***
	(EV t)	(6.31)	(-5.57)	(3.07)	(3.25)	(3.01)
	EV*VIX	0.175***	-0.169***	0.155***	0.135***	0.174***
	(EV*VIX t)	(5.50)	(-5.49)	(2.82)	(3.45)	(3.27)
art_count	EV	0.648	-0.578*	1.506***	0.192	0.812
	(EV t)	(1.46)	(-1.66)	(3.58)	(0.25)	(1.06)
	EV*VIX	0.046	-0.040*	0.078***	0.053*	0.086***
	(EV*VIX t)	(1.48)	(-1.69)	(3.20)	(1.70)	(2.63)
s_sports	EV	-0.613*	0.355	-1.333***	0.068	-0.364
	(EV t)	(-1.67)	(0.87)	(-3.20)	(0.13)	(-0.69)
	EV*VIX	-0.067**	0.055**	-0.090***	-0.056**	-0.075***
	(EV*VIX t)	(-2.47)	(2.55)	(-4.48)	(-2.19)	(-2.81)
s_central bank	EV	0.096	-0.169	-0.481	0.384	0.284
	(EV t)	(0.19)	(-0.40)	(-1.49)	(0.89)	(0.84)
	EV*VIX	-0.003	-0.003	-0.002	-0.020	-0.039*
	(EV*VIX t)	(-0.15)	(-0.15)	(-0.09)	(-0.94)	(-1.86)
s_markets	EV	-0.253	0.174	-0.442*	-0.892***	-1.077**
	(EV t)	(-1.06)	(0.97)	(-1.78)	(-3.54)	(-2.56)
	EV*VIX	-0.061***	0.054***	-0.078***	-0.108***	-0.133**
	(EV*VIX t)	(-3.08)	(3.48)	(-2.76)	(-3.31)	(-2.44)
s_health	EV	-0.163	0.111	-0.892***	-0.714	-0.834
	(EV t)	(-0.65)	(0.65)	(-3.93)	(-1.43)	(-1.29)
	EV*VIX	-0.097**	0.088***	-0.176***	-0.100	-0.140
	(EV*VIX t)	(-2.06)	(2.71)	(-3.80)	(-1.20)	(-1.31)
s_europe	EV	0.136	-0.306	0.012	-0.295	-0.617**
	(EV t)	(0.29)	(-0.74)	(0.04)	(-1.35)	(-2.14)
	EV*VIX	-0.013	-0.000	0.000	-0.051	-0.114**
	(EV*VIX t)	(-0.33)	(-0.00)	(0.01)	(-1.60)	(-2.06)
s_oil & comm	EV	-0.509	0.345	0.019	-0.808***	-0.863***
	(EV t)	(-1.18)	(1.28)	(0.04)	(-3.20)	(-2.84)
	EV*VIX	-0.050	0.019	0.022	-0.119***	-0.128**
	(EV*VIX t)	(-0.52)	(0.31)	(0.22)	(-2.85)	(-2.42)

Table A14

Test of whether the variable in a given row Granger causes the variables in the columns of the table. The table shows c_3 (EV) and c_4 (EV*VIX) from the specifications in (10). The c_3 coefficient is normalized to show standard deviation changes in the response variable due to a single standard deviation change in the test variable. c_4 shows changes in c_3 due to a unit change in the VIX. T-statistics are shown in parentheses. The d_[*market*] variables refer to daily returns or changes in the particular market series. Standard errors use Newey-West with three lags. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. Data are daily.

Granger causality tests: Text measures to market changes in early subsample

		d_sp500	d_vix	d_hy	d_gt2	d_gt10
s_currency	EV	0.120	-0.190	-0.162	0.420	0.546
	(EV t)	(0.36)	(-0.62)	(-0.49)	(1.02)	(1.52)
	EV*VIX	-0.062	0.050	-0.046	0.046	0.068
	(EV*VIX t)	(-1.46)	(1.28)	(-0.98)	(0.96)	(1.49)
s_credit	EV	0.035	-0.182	-0.006	0.085	0.025
	(EV t)	(0.10)	(-0.61)	(-0.02)	(0.26)	(0.08)
	EV*VIX	-0.014	-0.002	0.010	-0.011	-0.019
	(EV*VIX t)	(-0.33)	(-0.06)	(0.28)	(-0.26)	(-0.43)
s_corp & govt US	EV	0.312	-0.320	0.379*	-0.187	0.118
	(EV t)	(1.15)	(-1.09)	(1.78)	(-0.68)	(0.34)
	EV*VIX	0.035	-0.039	0.051	-0.025	-0.018
	(EV*VIX t)	(0.88)	(-1.00)	(1.61)	(-0.86)	(-0.60)
s_corp actual	EV	0.297**	-0.403**	0.162	0.451	0.269
	(EV t)	(2.51)	(-2.52)	(0.94)	(1.64)	(0.98)
	EV*VIX	0.013	-0.026	0.027	0.042	0.020
	(EV*VIX t)	(0.64)	(-1.30)	(0.99)	(1.03)	(0.43)
s_corp future	EV	0.017	-0.166	0.040	0.308	0.507
	(EV t)	(0.07)	(-0.98)	(0.19)	(1.08)	(1.64)
	EV*VIX	-0.004	-0.001	0.005	0.066	0.104*
	(EV*VIX t)	(-0.10)	(-0.02)	(0.12)	(1.38)	(1.91)
s_credit1	EV	-0.066	0.093	-0.074	0.092	0.122
	(EV t)	(-0.30)	(0.44)	(-0.38)	(0.47)	(0.52)
	EV*VIX	-0.033	0.034	-0.013	-0.002	-0.009
	(EV*VIX t)	(-1.43)	(1.55)	(-0.49)	(-0.09)	(-0.35)
corona	EV	0.868***	-0.823***	0.222*	0.401**	0.505***
	(EV t)	(3.19)	(-2.99)	(1.87)	(2.15)	(3.19)
	EV*VIX	-0.003	0.006	0.029	0.031*	0.065***
	(EV*VIX t)	(-0.13)	(0.40)	(1.51)	(1.81)	(3.14)
factor	EV	-0.117	-0.110	-0.493***	-0.175	-0.368**
	(EV t)	(-0.49)	(-0.41)	(-2.96)	(-0.99)	(-2.22)
	EV*VIX	-0.103***	0.074***	-0.090***	-0.047**	-0.069***
	(EV*VIX t)	(-4.16)	(3.02)	(-3.91)	(-2.34)	(-3.41)
factor_all	EV	-0.058	-0.023	-0.360*	0.262	0.083
	(EV t)	(-0.23)	(-0.09)	(-1.78)	(0.87)	(0.36)
	EV*VIX	-0.104***	0.084**	-0.071**	0.007	-0.015
	(EV*VIX t)	(-2.72)	(2.16)	(-2.36)	(0.20)	(-0.45)

Table A15

Test of whether the variable in a given row Granger causes the variables in the columns of the table. The table shows c_3 (EV) and c_4 (EV*VIX) from the specifications in (10). The c_3 coefficient is normalized to show standard deviation changes in the response variable due to a single standard deviation change in the test variable. c_4 shows changes in c_3 due to a unit change in the VIX. T-statistics are shown in parentheses. The $d\_[market]$ variables refer to daily returns or changes in the particular market series. Standard errors use Newey-West with three lags. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. Data are daily.

Granger causality tests: Market changes to text measures in early subsample

		sent	sent_sd	art_count	s_sports	s_central bank	s_markets	s_health	s_europe	s_oil & comm
d_sp500	EV	0.882***	-0.115	-0.224***	0.292**	0.150	0.515***	0.344***	0.531***	0.013
	(EV t)	(5.22)	(-1.04)	(-3.43)	(2.53)	(1.49)	(2.84)	(2.86)	(2.74)	(0.19)
	EV*VIX	-0.044***	-0.001	0.010**	-0.010	-0.015***	-0.018*	-0.017**	-0.035***	-0.001
	(EV*VIX t)	(-4.76)	(-0.22)	(2.21)	(-1.21)	(-4.00)	(-1.80)	(-2.54)	(-3.60)	(-0.14)
d_vix	EV	-0.788***	0.196*	0.172***	-0.225**	-0.091	-0.537***	-0.256**	-0.470***	-0.098
	(EV t)	(-5.68)	(1.73)	(2.89)	(-1.98)	(-1.20)	(-3.16)	(-2.44)	(-3.25)	(-1.61)
	EV*VIX	0.038***	-0.003	-0.007**	0.007	0.013***	0.019**	0.012**	0.030***	0.004
	(EV*VIX t)	(5.36)	(-0.47)	(-2.05)	(1.09)	(5.53)	(2.22)	(2.30)	(4.27)	(1.02)
d_hy	EV	0.803***	-0.073	-0.332***	0.169	0.026	0.661***	0.354**	0.532**	0.148
	(EV t)	(3.14)	(-0.52)	(-2.70)	(0.82)	(0.29)	(2.87)	(2.27)	(2.48)	(0.94)
	EV*VIX	-0.041***	-0.003	0.012*	-0.009	-0.010**	-0.024**	-0.017**	-0.030***	-0.011
	(EV*VIX t)	(-3.37)	(-0.38)	(1.92)	(-0.94)	(-2.28)	(-2.17)	(-2.44)	(-2.83)	(-1.20)
d_gt2	EV	0.627***	-0.013	-0.165***	0.145**	0.140**	0.344**	0.281***	0.357***	-0.008
	(EV t)	(4.98)	(-0.14)	(-2.58)	(2.00)	(1.99)	(2.53)	(4.36)	(3.28)	(-0.08)
	EV*VIX	-0.039***	-0.008	0.008*	-0.003	-0.010**	-0.022**	-0.018***	-0.032***	-0.003
	(EV*VIX t)	(-4.76)	(-1.32)	(1.85)	(-0.53)	(-2.00)	(-2.53)	(-4.40)	(-4.30)	(-0.54)
d_gt10	EV	0.854***	0.016	-0.148*	0.153*	0.134	0.572***	0.429***	0.436***	0.078
	(EV t)	(5.32)	(0.15)	(-1.96)	(1.81)	(1.45)	(3.90)	(6.22)	(2.71)	(0.75)
	EV*VIX	-0.049***	-0.009	0.006*	-0.006	-0.010**	-0.031***	-0.025***	-0.032***	-0.007
	(EV*VIX t)	(-5.43)	(-1.41)	(1.71)	(-0.99)	(-2.19)	(-4.06)	(-6.78)	(-3.61)	(-1.19)

Table A15

Test of whether the variable in a given row Granger causes the variables in the columns of the table. The table shows c_3 (EV) and c_4 ($EV*VIX$) from the specifications in (10). The c_3 coefficient is normalized to show standard deviation changes in the response variable due to a single standard deviation change in the test variable. c_4 shows changes in c_3 due to a unit change in the VIX. T-statistics are shown in parentheses. The $d\_[market]$ variables refer to daily returns or changes in the particular market series. Standard errors use Newey-West with three lags. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. Data are daily.

Granger causality tests: Market changes to text measures in early subsample

		s_currency	s_credit	s_corp & govt US	s_corp actual	s_corp future	s_credit1	corona	factor	factor_all
d_sp500	EV	0.282***	0.126	0.279**	0.090	0.086	-0.085	0.049	0.527**	0.187
	(EV t)	(2.60)	(1.01)	(2.30)	(0.54)	(0.55)	(-0.37)	(0.38)	(2.52)	(0.83)
	EV*VIX	-0.013**	-0.009	-0.018**	-0.007	-0.002	0.016	-0.007	-0.038***	-0.016
	(EV*VIX t)	(-2.32)	(-1.52)	(-2.56)	(-0.87)	(-0.27)	(1.37)	(-0.88)	(-3.53)	(-1.54)
d_vix	EV	-0.342***	-0.165	-0.256**	-0.049	-0.110	-0.029	-0.048	-0.490***	-0.206
	(EV t)	(-3.67)	(-1.58)	(-2.03)	(-0.42)	(-0.64)	(-0.15)	(-0.42)	(-3.10)	(-0.90)
	EV*VIX	0.015***	0.010**	0.016**	0.005	0.003	-0.011	0.004	0.034***	0.017*
	(EV*VIX t)	(3.69)	(2.10)	(2.37)	(0.94)	(0.37)	(-1.14)	(0.63)	(4.45)	(1.65)
d_hy	EV	0.520**	-0.083	0.132	-0.199	-0.007	-0.174	0.391*	0.567**	0.397
	(EV t)	(2.49)	(-0.54)	(0.67)	(-0.97)	(-0.04)	(-0.66)	(1.74)	(2.18)	(1.35)
	EV*VIX	-0.024***	-0.003	-0.013	0.007	0.001	0.011	-0.023*	-0.036***	-0.027*
	(EV*VIX t)	(-2.63)	(-0.33)	(-1.34)	(0.65)	(0.07)	(0.82)	(-1.71)	(-3.09)	(-1.85)
d_gt2	EV	0.330***	0.046	0.269***	-0.052	0.022	0.054	0.259	0.331**	0.447*
	(EV t)	(2.72)	(0.54)	(3.95)	(-0.45)	(0.24)	(0.54)	(1.56)	(2.17)	(1.78)
	EV*VIX	-0.017**	-0.009*	-0.013**	-0.005	0.001	-0.001	-0.012	-0.025**	-0.025*
	(EV*VIX t)	(-2.43)	(-1.70)	(-2.44)	(-0.71)	(0.09)	(-0.11)	(-1.19)	(-2.37)	(-1.66)
d_gt10	EV	0.507***	0.116	0.230*	-0.142	0.039	0.048	0.205*	0.529***	0.502**
	(EV t)	(4.09)	(1.18)	(1.87)	(-0.92)	(0.31)	(0.34)	(1.93)	(3.32)	(2.17)
	EV*VIX	-0.027***	-0.013**	-0.013*	0.001	-0.001	-0.005	-0.007	-0.035***	-0.030**
	(EV*VIX t)	(-4.25)	(-2.56)	(-1.72)	(0.16)	(-0.12)	(-0.59)	(-1.16)	(-3.80)	(-2.41)

Table A16

Test of whether the variable in a given row Granger causes the variables in the columns of the table. The table shows c_3 (EV) and c_4 ($EV*VIX$) from the specifications in (10). The c_3 coefficient is normalized to show standard deviation changes in the response variable due to a single standard deviation change in the test variable. c_4 shows changes in c_3 due to a unit change in the VIX. T-statistics are shown in parentheses. The $d\_[market]$ variables refer to daily returns or changes in the particular market series. Standard errors use Newey-West with three lags. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. Data are daily.

Granger causality tests: Text measures to market changes in late subsample

		d_sp500	d_vix	d_hy	d_gt2	d_gt10
sent	EV	-0.037	-0.010	-0.015	0.054	-0.013
	(EV t)	(-0.42)	(-0.11)	(-0.19)	(0.66)	(-0.14)
	EV*VIX	-0.005	-0.003	0.004	0.016	0.008
	(EV*VIX t)	(-0.40)	(-0.30)	(0.36)	(1.34)	(0.86)
sent_sd	EV	-0.032	0.088	0.041	0.006	0.080
	(EV t)	(-0.36)	(1.09)	(0.47)	(0.09)	(1.08)
	EV*VIX	0.015	-0.006	0.018	-0.014	-0.008
	(EV*VIX t)	(1.24)	(-0.65)	(1.62)	(-1.50)	(-0.81)
art_count	EV	-0.066	0.175	-0.202	-0.106	-0.058
	(EV t)	(-0.38)	(1.32)	(-0.97)	(-1.29)	(-0.65)
	EV*VIX	0.006	0.005	0.006	-0.010**	-0.009*
	(EV*VIX t)	(0.55)	(0.92)	(0.82)	(-2.09)	(-1.95)
s_sports	EV	-0.149	-0.023	-0.204**	-0.017	-0.057
	(EV t)	(-1.46)	(-0.36)	(-2.42)	(-0.23)	(-0.81)
	EV*VIX	-0.028	0.002	-0.022	0.001	-0.011
	(EV*VIX t)	(-1.38)	(0.27)	(-1.36)	(0.05)	(-0.88)
s_central bank	EV	0.098	-0.031	0.137	0.092	0.072
	(EV t)	(1.00)	(-0.30)	(1.31)	(1.18)	(0.79)
	EV*VIX	0.005	0.002	0.010	0.019	0.012
	(EV*VIX t)	(0.54)	(0.23)	(1.17)	(1.53)	(1.21)
s_markets	EV	-0.013	0.071	0.062	-0.003	-0.003
	(EV t)	(-0.19)	(1.21)	(0.83)	(-0.05)	(-0.04)
	EV*VIX	-0.001	0.010**	0.009	0.002	0.004
	(EV*VIX t)	(-0.07)	(2.11)	(1.24)	(0.15)	(0.35)
s_health	EV	-0.099	-0.040	-0.108*	-0.037	-0.010
	(EV t)	(-0.94)	(-0.55)	(-1.71)	(-0.69)	(-0.18)
	EV*VIX	-0.018	-0.002	-0.003	-0.001	-0.001
	(EV*VIX t)	(-1.16)	(-0.40)	(-0.37)	(-0.15)	(-0.17)
s_europe	EV	0.194**	0.046	0.176*	0.082	0.002
	(EV t)	(2.01)	(0.52)	(1.72)	(1.13)	(0.03)
	EV*VIX	0.015*	0.007	0.025**	0.018	0.006
	(EV*VIX t)	(1.71)	(1.03)	(2.30)	(1.53)	(0.58)
s_oil & comm	EV	-0.023	0.052	0.086	-0.076	-0.101
	(EV t)	(-0.20)	(0.60)	(0.89)	(-0.90)	(-1.20)
	EV*VIX	-0.000	-0.000	0.011	-0.001	-0.006
	(EV*VIX t)	(-0.05)	(-0.04)	(1.41)	(-0.08)	(-0.79)

Table A16

Test of whether the variable in a given row Granger causes the variables in the columns of the table. The table shows c_3 (EV) and c_4 ($EV*VIX$) from the specifications in (10). The c_3 coefficient is normalized to show standard deviation changes in the response variable due to a single standard deviation change in the test variable. c_4 shows changes in c_3 due to a unit change in the VIX. T-statistics are shown in parentheses. The $d\_[market]$ variables refer to daily returns or changes in the particular market series. Standard errors use Newey-West with three lags. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. Data are daily.

Granger causality tests: Text measures to market changes in late subsample

		d_sp500	d_vix	d_hy	d_gt2	d_gt10
s_currency	EV	-0.006	0.054	0.005	0.089	0.060
	(EV t)	(-0.07)	(0.92)	(0.05)	(1.15)	(0.75)
	EV*VIX	0.000	0.010	-0.002	0.021	0.014
	(EV*VIX t)	(0.01)	(1.46)	(-0.12)	(1.25)	(0.83)
s_credit	EV	0.027	-0.077	-0.008	-0.083*	-0.040
	(EV t)	(0.34)	(-1.08)	(-0.11)	(-1.67)	(-0.77)
	EV*VIX	-0.005	0.002	-0.001	-0.010*	-0.005
	(EV*VIX t)	(-0.65)	(0.31)	(-0.13)	(-1.72)	(-1.29)
s_corp & govt US	EV	-0.010	-0.001	-0.023	-0.008	-0.070
	(EV t)	(-0.14)	(-0.02)	(-0.22)	(-0.15)	(-1.14)
	EV*VIX	0.002	-0.010	0.014	0.008	0.001
	(EV*VIX t)	(0.25)	(-1.19)	(1.47)	(0.70)	(0.13)
s_corp actual	EV	-0.002	0.038	0.017	0.091	-0.037
	(EV t)	(-0.02)	(0.40)	(0.15)	(1.24)	(-0.52)
	EV*VIX	0.003	-0.006	-0.000	0.017***	0.011**
	(EV*VIX t)	(0.39)	(-0.84)	(-0.04)	(4.00)	(2.30)
s_corp future	EV	0.014	0.033	0.068	-0.058	-0.073*
	(EV t)	(0.18)	(0.70)	(1.27)	(-1.37)	(-1.81)
	EV*VIX	0.007	0.005	0.019**	-0.005	-0.004
	(EV*VIX t)	(0.53)	(0.83)	(2.35)	(-0.61)	(-0.83)
s_credit1	EV	0.000	-0.037	-0.022	-0.075	-0.063
	(EV t)	(0.00)	(-0.55)	(-0.25)	(-1.43)	(-1.09)
	EV*VIX	-0.001	-0.000	-0.006	-0.017	-0.007
	(EV*VIX t)	(-0.05)	(-0.04)	(-0.28)	(-1.62)	(-0.69)
corona	EV	0.106	-0.128	0.074	0.149*	0.086
	(EV t)	(1.12)	(-1.08)	(0.89)	(1.87)	(0.70)
	EV*VIX	0.011	-0.011	0.006	0.028***	0.016
	(EV*VIX t)	(1.08)	(-1.06)	(0.52)	(3.14)	(1.33)
factor	EV	0.064	-0.038	0.074	0.073*	0.076*
	(EV t)	(0.98)	(-0.67)	(0.62)	(1.67)	(1.71)
	EV*VIX	-0.002	0.004	0.002	0.013	0.010
	(EV*VIX t)	(-0.20)	(0.94)	(0.23)	(1.54)	(1.48)
factor_all	EV	0.049	-0.052	0.014	0.059	0.051
	(EV t)	(0.74)	(-0.79)	(0.12)	(1.16)	(1.09)
	EV*VIX	-0.00548	0.003	-0.002	0.014*	0.008
	(EV*VIX t)	(-0.46)	(0.49)	(-0.18)	(1.87)	(1.18)

Table A17

Test of whether the variable in a given row Granger causes the variables in the columns of the table. The table shows c_3 (EV) and c_4 (EV*VIX) from the specifications in (10). The c_3 coefficient is normalized to show standard deviation changes in the response variable due to a single standard deviation change in the test variable. c_4 shows changes in c_3 due to a unit change in the VIX. T-statistics are shown in parentheses. The $d\_[market]$ variables refer to daily returns or changes in the particular market series. Standard errors use Newey-West with three lags. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. Data are daily.

Granger causality tests: Market changes to text measures in late subsample

		sent	sent_sd	art_count	s_sports	s_central bank	s_markets	s_health	s_europe	s_oil & comm
d_sp500	EV	0.250***	0.072	0.009	0.246***	0.131**	0.477***	0.192**	0.266***	0.125*
	(EV t)	(4.83)	(0.73)	(0.21)	(2.60)	(2.00)	(5.20)	(2.38)	(3.47)	(1.84)
	EV*VIX	-0.005**	-0.004	-0.006***	-0.004	-0.002	-0.013***	-0.001	-0.008***	-0.005*
	(EV*VIX t)	(-2.32)	(-0.95)	(-3.05)	(-1.40)	(-1.05)	(-3.92)	(-0.38)	(-3.08)	(-1.93)
d_vix	EV	-0.248***	-0.080	-0.040	0.052	-0.172***	-0.508***	-0.010	-0.215***	-0.195***
	(EV t)	(-6.08)	(-0.85)	(-1.01)	(0.57)	(-4.09)	(-6.39)	(-0.14)	(-2.98)	(-3.45)
	EV*VIX	0.007***	0.006	0.001	-0.003	0.004**	0.016***	-0.002	0.006*	0.005*
	(EV*VIX t)	(4.18)	(1.39)	(0.32)	(-0.65)	(2.44)	(3.84)	(-0.40)	(1.65)	(1.79)
d_hy	EV	0.001	0.006	0.023	0.187*	-0.104	0.143	0.037	-0.055	-0.028
	(EV t)	(0.02)	(0.07)	(0.34)	(1.94)	(-1.25)	(0.99)	(0.42)	(-0.67)	(-0.40)
	EV*VIX	-0.000	-0.004	-0.004*	-0.006*	0.003	-0.005	-0.002	0.001	0.000
	(EV*VIX t)	(-0.10)	(-1.07)	(-1.79)	(-1.80)	(0.97)	(-0.92)	(-0.88)	(0.29)	(0.05)
d_gt2	EV	0.036	-0.031	0.050	0.150	-0.027	-0.047	0.093	-0.010	0.033
	(EV t)	(0.56)	(-0.22)	(0.73)	(1.10)	(-0.35)	(-0.40)	(1.12)	(-0.10)	(0.45)
	EV*VIX	0.001	0.001	-0.005*	-0.003	0.001	-0.000	0.002	0.000	-0.002
	(EV*VIX t)	(0.25)	(0.13)	(-1.88)	(-0.74)	(0.39)	(-0.07)	(0.80)	(0.16)	(-0.92)
d_gt10	EV	0.093*	0.061	0.082**	0.017	0.020	0.154*	0.052	0.074	0.103*
	(EV t)	(1.76)	(0.70)	(2.38)	(0.15)	(0.40)	(1.74)	(0.73)	(1.09)	(1.86)
	EV*VIX	-0.001	-0.002	-0.007***	0.003	-0.001	-0.005*	0.005*	-0.002	-0.005**
	(EV*VIX t)	(-0.41)	(-0.69)	(-2.88)	(0.81)	(-0.36)	(-1.66)	(1.80)	(-0.90)	(-2.49)

Table A17

Test of whether the variable in a given row Granger causes the variables in the columns of the table. The table shows c_3 (EV) and c_4 ($EV*VIX$) from the specifications in (10). The c_3 coefficient is normalized to show standard deviation changes in the response variable due to a single standard deviation change in the test variable. c_4 shows changes in c_3 due to a unit change in the VIX. T-statistics are shown in parentheses. The $d\_[market]$ variables refer to daily returns or changes in the particular market series. Standard errors use Newey-West with three lags. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. Data are daily.

Granger causality tests: Market changes to text measures in late subsample

		s_currency	s_credit	s_corp & govt US	s_corp actual	s_corp future	s_credit1	corona	factor	factor_all
d_sp500	EV	0.522***	0.159	0.193**	0.005	0.210***	0.282***	-0.004	0.319***	0.243***
	(EV t)	(4.47)	(1.63)	(2.29)	(0.12)	(2.74)	(2.73)	(-0.16)	(4.07)	(2.97)
	EV*VIX	-0.014***	-0.002	-0.002	0.001	-0.007**	-0.008**	0.000	-0.005	-0.005
	(EV*VIX t)	(-3.46)	(-0.50)	(-0.70)	(0.75)	(-2.23)	(-2.29)	(0.21)	(-1.53)	(-1.51)
d_vix	EV	-0.572***	-0.234***	-0.258**	-0.081*	-0.333***	-0.346***	0.010	-0.209***	-0.070
	(EV t)	(-7.93)	(-3.33)	(-2.35)	(-1.79)	(-4.79)	(-3.99)	(0.34)	(-3.04)	(-0.95)
	EV*VIX	0.016***	0.010***	0.007*	0.003	0.015***	0.008**	-0.001	0.007	-0.002
	(EV*VIX t)	(4.76)	(2.77)	(1.77)	(1.62)	(3.15)	(2.00)	(-0.62)	(1.22)	(-0.31)
d_hy	EV	0.268	-0.013	0.136	-0.044	-0.050	0.035	-0.011	0.064	0.119
	(EV t)	(1.60)	(-0.11)	(1.29)	(-0.94)	(-0.56)	(0.20)	(-0.52)	(0.54)	(1.23)
	EV*VIX	-0.007	-0.001	-0.002	0.004***	0.001	-0.002	0.000	0.000	-0.003
	(EV*VIX t)	(-1.33)	(-0.29)	(-0.46)	(3.23)	(0.33)	(-0.28)	(0.57)	(0.01)	(-0.75)
d_gt2	EV	-0.231*	-0.024	0.130	-0.035	0.092	0.013	0.053	-0.109	-0.092
	(EV t)	(-1.82)	(-0.25)	(1.26)	(-0.62)	(0.74)	(0.10)	(1.13)	(-0.99)	(-0.94)
	EV*VIX	0.004	0.001	-0.004	0.001	-0.005	-0.001	-0.002	0.006	0.005
	(EV*VIX t)	(1.01)	(0.20)	(-1.02)	(0.68)	(-1.18)	(-0.27)	(-1.31)	(1.58)	(1.29)
d_gt10	EV	0.138	0.148**	0.190**	-0.022	0.156**	0.103	-0.017	-0.040	-0.055
	(EV t)	(1.26)	(2.22)	(2.22)	(-0.51)	(2.03)	(1.04)	(-0.54)	(-0.54)	(-0.67)
	EV*VIX	-0.006	-0.004	-0.006*	-0.000	-0.008***	-0.004	0.000	0.005	0.004
	(EV*VIX t)	(-1.53)	(-1.43)	(-1.91)	(-0.23)	(-2.76)	(-1.25)	(0.24)	(1.38)	(1.21)

Table A18
Variance decomposition for S&P 500 total return index, and JNK (HY bonds), VXX (VIX futures), SHY (1-3 year Treasuries), and IEF (7-10 year Treasuries) ETFs, which are representative of the asset classes analyzed in the paper. $var(\eta_r)$ and $var(\eta_d)$ represent the variances of discount rate news and of cash flow news, respectively. The *ratio* column shows the ratio of $var(\eta_r)/var(\eta_d)$. Standard errors are shown underneath the variance and covariance estimates. The analysis uses daily returns data from January 17 to December 31, 2020. The η_r and η_d innovations are also daily. The methodology is described in Section A2.2,

data	factor	$var(\eta_r)$	$var(\eta_d)$	ratio	$cov(\eta_r, \eta_d)$
sp	no news	0.00035479	0.00005142	6.899	-0.00002726
		0.00011646	0.00001602		0.00001336
	factor	0.00035231	0.00005109	6.896	-0.00002783
		0.00012424	0.00001596		0.00001248
	factor_all	0.00035268	0.00004971	7.095	-0.00002754
		0.00011656	0.00001718		0.00001473
jnk	no news	0.00009701	0.00001293	7.501	-0.00001066
		0.00003303	0.00000621		0.00000540
	factor	0.00009568	0.00001254	7.632	-0.00001060
		0.00003845	0.00000511		0.00000446
	factor_all	0.00009636	0.00001277	7.548	-0.00001062
		0.00003510	0.00000576		0.00000481
vxx	no news	0.00150844	0.00125905	1.198	-0.00090098
		0.00035611	0.00020099		0.00018091
	factor	0.00153439	0.00126181	1.216	-0.00088596
		0.00040621	0.00022079		0.00020653
	factor_all	0.00152326	0.00126047	1.208	-0.00088774
		0.00036672	0.00021019		0.00018875
shy	no news	0.00000023	0.00000030	0.753	-0.00000018
		0.00000011	0.00000015		0.00000011
	factor	0.00000023	0.00000030	0.768	-0.00000018
		0.00000014	0.00000015		0.00000011
	factor_all	0.00000023	0.00000030	0.766	-0.00000018
		0.00000012	0.00000014		0.00000010
ief	no news	0.00001741	0.00000551	3.160	-0.00000030
		0.00000673	0.00000160		0.00000141
	factor	0.00001738	0.00000540	3.217	-0.00000016
		0.00000700	0.00000160		0.00000100
	factor_all	0.00001762	0.00000532	3.315	-0.00000018
		0.00000721	0.00000164		0.00000114

Table A19

Summary of the contemporaneous and lead-lag results for regressions of daily market returns on text-based series. The column groupings correspond to different market variables, and the rows correspond to the text-based explanatory variables. The first two entries for every market variable show the b_3 (*EV*, for explanatory variable) and b_4 (*EV*VIX*) coefficients in (8) that are significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the market variable. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The last entry for each market variable indicates the the c_3 (*EVl1*) coefficients from (10) that are significant at the 10% level or better. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. The summary statistics underneath the table are: the mean absolute b_3 among significant b_3 coefficients; *Sig* is the number of significant b_3 coefficients; *Jnt sig* (joint significance) is the number of specifications where b_3 and b_4 are both significant; *Hyper* (hypersensitivity) is the number of times that both b_3 and b_4 are significant and have the same sign; *Lead* (lead-lag relationship) is the number of times that c_3 is significant; *Under* (underreaction) is the number of times b_3 and c_3 are both significant and have the same sign; *Over* (overreaction or reversal) is the number of times b_3 and c_3 are both significant have opposite signs; and *Over+Hyper* (overreaction and hypersensitivity) is the number of time b_3 and c_3 have opposite signs while b_3 and b_4 have the same sign.

Summary of analysis for the non-intraday corpus: early (pre-break) subsample

	SP500			VIX			HY			GT2			GT10		
	EV	EV*VIXl1	EVl1	EV	EV*VIXl1	EVl1	EV	EV*VIXl1	EVl1	EV	EV*VIXl1	EVl1	EV	EV*VIXl1	EVl1
sent	0.797***	0.072***		−0.729***	−0.070***		0.569***	0.095***	−0.347**	0.440**					−0.218*
sent_sd			1.137***			−1.098***			1.181***	−0.651*		0.906***			1.231***
factor	0.437***	0.058***		−0.387**	−0.039*		0.387*	0.070*	−0.493***	0.873***	0.086***		0.804***	0.111***	−0.368**
factor_all	0.473*	0.072*		−0.436*			0.413*	0.069**	−0.360*	0.654***			0.496***		
art_count				0.868**		−0.578*	−0.550*	−0.053*	1.506***						
corona		−0.046**	0.868***		0.046**	−0.823***		−0.041**	0.222*			0.401**	0.426**	0.067**	0.505***
sports	0.698*		−0.613*	−0.810**			0.514*		−1.333***	0.973**			0.832*		
central bank														−0.065*	
markets	0.734***	0.087***		−0.669***	−0.081***		1.084***	0.131***	−0.442*			−0.892***		0.129*	−1.077**
health				−1.104**	−0.099***		1.401***	0.162**	−0.892***						
europe	0.755***	0.066*		−0.598***			0.600***	0.090***							−0.617**
oil&comm	0.593***	0.186***		−0.395***	−0.153***		0.854***	0.197***		0.571***	0.139***	−0.808***	0.691***	0.169***	−0.863***
currency	0.789***	0.100*		−0.659**	−0.078*		0.527**	0.070*		0.887***	0.117***		0.769***	0.116***	
credit										0.491*					
corp&govt US									0.379*					−0.086**	
corp actual			0.297**			−0.403**							−0.542*	−0.106**	
corp future										0.381**	0.076**		0.304**	0.080***	
credit1		−0.054**					−0.452**	−0.058**						−0.047**	

Mean $|b_3|$=0.654, Sig=46, Jnt sig=33, Hyper=33, Lead=29, Under=1, Over=13, Over+Hyper=9

Table A20

Summary of the contemporaneous and lead-lag results for regressions of daily market returns on text-based series. The column groupings correspond to different market variables, and the rows correspond to the text-based explanatory variables. The first two entries for every market variable show the b_3 (*EV*, for explanatory variable) and b_4 (*EV*VIX*) coefficients in (8) that are significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the market variable. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The last entry for each market variable indicates the the c_3 (*EVl1*) coefficients from (10) that are significant at the 10% level or better. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively. The summary statistics underneath the table are: the mean absolute b_3 among significant b_3 coefficients; *Sig* is the number of significant b_3 coefficients; *Jnt sig* (joint significance) is the number of specifications where b_3 and b_4 are both significant; *Hyper* (hypersensitivity) is the number of times that both b_3 and b_4 are significant and have the same sign; *Lead* (lead-lag relationship) is the number of times that c_3 is significant; *Under* (underreaction) is the number of times b_3 and c_3 are both significant and have the same sign; *Over* (overreaction or reversal) is the number of times b_3 and c_3 are both significant have opposite signs; and *Over+Hyper* (overreaction and hypersensitivity) is the number of time b_3 and c_3 have opposite signs while b_3 and b_4 have the same sign.

Summary of analysis for the non-intraday corpus: late (post-break) subsample

	SP500			VIX			HY			GT2			GT10		
	EV	EV*VIXl1	EVl1	EV	EV*VIXl1	EVl1	EV	EV*VIXl1	EVl1	EV	EV*VIXl1	EVl1	EV	EV*VIXl1	EVl1
sent	0.324***	0.027**					0.444***	0.039***							
sent_sd				0.120*											
factor	0.125**	0.019**		−0.199*			0.183***	0.023***		0.180**		0.073*	0.129**		0.076*
factor_all	0.133**			−0.221**			0.175***	0.020*		0.142*			0.110*		
art_count							−0.317*				−0.015**				
corona				−0.230*							0.028***	0.149*			
sports							0.202***	0.038***	−0.204**						
central bank	0.293**	0.029***					0.405***	0.037***							
markets	0.250***	0.028***		−0.096*	−0.012**		0.201***	0.030***							
health	0.159*	0.017*					0.224***	0.020***	−0.108*						
europe	0.419***	0.041***	0.194**				0.442***	0.048***	0.176*						
oil&comm							0.172**								
currency	0.186**				−0.023*		0.197***	0.026***							
credit												−0.083*			
corp&govt US					0.015*		0.220***	0.032***		−0.147*	−0.029**				
corp actual															
corp future							0.095*	0.016**							−0.073*
credit1				0.118*											

Mean $|b_3|$=0.214, Sig=32, Jnt sig=19, Hyper=19, Lead=9, Under=4, Over=2, Over+Hyper=2

Table A21

Contemporaneous regression of daily changes in S&P 500 index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the S&P 500 index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in S&P 500 index: early subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-15.077*	-0.846***	-0.234	0.797***	0.072***	4.384***	0.398	0.100	2020-03-16
	(-1.90)	(-4.49)	(-1.14)	(5.35)	(4.19)	(3.99)	[0.000]		[54.88***]
s_sports	-0.108	-0.675***	-0.348	0.698*	0.005	0.312	0.182	-0.028	2020-03-23
	(-0.04)	(-2.90)	(-1.26)	(1.86)	(0.25)	(0.89)	[0.003]		[57.16***]
s_markets	-5.058	-0.746***	-0.218	0.734***	0.087***	1.433***	0.226	0.088	2020-03-23
	(-1.25)	(-2.68)	(-0.82)	(2.84)	(4.08)	(3.14)	[0.012]		[46.94***]
s_europe	-8.045	-0.400**	-0.362	0.755***	0.066*	2.070	0.334	0.056	2020-03-23
	(-0.93)	(-2.36)	(-1.63)	(4.51)	(1.69)	(1.51)	[0.000]		[31.86***]
s_oil & comm	-23.151***	-0.493**	-0.119	0.593***	0.186***	3.691***	0.441	0.336	2020-03-23
	(-4.74)	(-2.40)	(-0.50)	(4.79)	(6.22)	(5.64)	[0.000]		[59.64***]
s_currency	-8.167	-0.483***	0.150	0.789***	0.100*	2.059*	0.320	0.111	2020-03-23
	(-1.21)	(-5.25)	(0.65)	(2.88)	(1.90)	(1.77)	[0.000]		[40.21***]
s_credit1	7.928**	-0.315	-0.292	-0.225	-0.054**	-1.488**	0.151	0.047	2020-03-23
	(2.43)	(-1.53)	(-0.95)	(-1.32)	(-2.31)	(-2.53)	[0.006]		[51.18***]
corona	-3.362	-0.616**	-0.219	-0.006	-0.046**	0.360	0.176	0.063	2020-03-24
	(-1.49)	(-2.50)	(-0.94)	(-0.05)	(-2.32)	(1.07)	[0.005]		[47.55***]
factor	-1.572	-0.354	-0.258	0.437***	0.058***	0.270	0.289	0.059	2020-03-27
	(-1.06)	(-1.61)	(-0.96)	(2.77)	(3.42)	(1.05)	[0.005]		[40.02***]
factor_all	-4.591	-0.303*	-0.132	0.473*	0.072*	0.802	0.265	0.074	2020-03-27
	(-1.36)	(-1.95)	(-0.80)	(1.89)	(1.80)	(1.38)	[0.000]		[51.24***]

Table A22

Contemporaneous regression of daily changes in VIX index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the VIX index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in VIX index: early subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	28.836**	-0.866***	-0.317*	-0.729***	-0.070***	-4.160***	0.469	0.101	2020-03-16
	(2.23)	(-4.72)	(-1.89)	(-4.54)	(-4.33)	(-4.03)	[0.000]		[130.23***]
art_count	5.371	-0.755**	-0.540**	0.868**	0.031	-0.995**	0.314	0.011	2020-03-16
	(0.85)	(-2.54)	(-2.14)	(2.20)	(1.33)	(-2.03)	[0.096]		[87.16***]
s_sports	0.563	-0.766***	-0.476*	-0.810**	-0.007	-0.340	0.313	-0.022	2020-03-16
	(0.13)	(-3.08)	(-1.84)	(-2.41)	(-0.43)	(-1.33)	[0.000]		[85.80***]
s_markets	8.472	-0.777***	-0.330	-0.669***	-0.081***	-1.212***	0.310	0.082	2020-03-17
	(1.29)	(-2.81)	(-1.46)	(-2.72)	(-4.63)	(-4.03)	[0.001]		[63.88***]
s_health	1.581	-0.711***	-0.454*	-1.104**	-0.099***	-0.443*	0.324	0.034	2020-03-16
	(0.36)	(-2.61)	(-1.87)	(-2.24)	(-2.64)	(-1.73)	[0.129]		[101.26***]
s_europe	10.749	-0.481***	-0.380	-0.598***	-0.051	-1.465	0.333	0.022	2020-03-16
	(0.70)	(-2.62)	(-1.62)	(-3.70)	(-1.38)	(-1.16)	[0.000]		[57.85***]
s_oil & comm	36.877***	-0.558***	-0.253	-0.395***	-0.153***	-2.927***	0.424	0.226	2020-03-16
	(4.00)	(-2.60)	(-1.17)	(-2.99)	(-5.07)	(-4.73)	[0.000]		[79.87***]
s_currency	9.996	-0.554***	-0.055	-0.659**	-0.078*	-1.440	0.360	0.075	2020-03-16
	(1.03)	(-5.34)	(-0.29)	(-2.53)	(-1.80)	(-1.59)	[0.000]		[58.95***]
corona	6.173	-0.672***	-0.286	-0.001	0.046**	-0.290	0.281	0.071	2020-03-16
	(1.57)	(-2.68)	(-1.47)	(-0.01)	(2.42)	(-0.93)	[0.023]		[92.82***]
factor	0.790	-0.494**	-0.363	-0.387**	-0.039*	-0.012	0.312	0.015	2020-03-16
	(0.33)	(-2.20)	(-1.40)	(-2.29)	(-1.91)	(-0.05)	[0.060]		[69.45***]
factor_all	6.733	-0.374***	-0.247	-0.436*	-0.061	-0.580	0.312	0.044	2020-03-16
	(1.15)	(-2.70)	(-1.42)	(-1.75)	(-1.52)	(-1.07)	[0.006]		[71.98***]

Table A23
Contemporaneous regression of daily changes in US high-yield index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the US high-yield index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in US high-yield index: early subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-7.452***	-0.299	-0.099	0.569***	0.095***	5.486***	0.438	0.196	2020-04-14
	(-3.70)	(-1.51)	(-1.36)	(7.06)	(5.16)	(4.77)	[0.000]		[73.40***]
art_count	-1.158	-0.362	-0.261***	-0.550*	-0.053*	1.026	0.280	0.084	2020-03-23
	(-1.09)	(-1.53)	(-3.72)	(-1.65)	(-1.91)	(1.37)	[0.007]		[70.75***]
s_sports	-0.034	-0.274	-0.192**	0.514*	0.022	0.228	0.254	0.012	2020-03-23
	(-0.04)	(-1.22)	(-2.28)	(1.83)	(0.96)	(0.38)	[0.029]		[58.34***]
s_markets	-1.687**	-0.471*	-0.000	1.084***	0.131***	1.996***	0.442	0.223	2020-03-23
	(-2.00)	(-1.76)	(-0.00)	(3.90)	(4.07)	(3.48)	[0.000]		[76.63***]
s_health	-0.527	-0.338	-0.171	1.401***	0.162**	0.780	0.422	0.134	2020-03-19
	(-0.51)	(-1.34)	(-1.61)	(2.71)	(2.23)	(1.17)	[0.000]		[68.07***]
s_europe	-2.995*	-0.044	-0.537***	0.600***	0.090***	2.285**	0.330	0.123	2020-03-23
	(-1.88)	(-0.18)	(-5.84)	(3.93)	(3.20)	(2.18)	[0.000]		[45.29***]
s_oil & comm	-5.226***	-0.185	-0.122*	0.854***	0.197***	3.488***	0.598	0.430	2020-03-23
	(-5.12)	(-1.00)	(-1.84)	(4.73)	(5.68)	(5.56)	[0.000]		[93.26***]
s_currency	-1.121	-0.021	-0.009	0.527**	0.070*	1.128	0.259	0.062	2020-03-23
	(-0.95)	(-0.11)	(-0.08)	(2.00)	(1.72)	(1.29)	[0.000]		[58.02***]
s_credit1	2.707**	0.026	-0.441***	-0.452**	-0.058**	-2.051**	0.259	0.071	2020-03-23
	(2.31)	(0.08)	(-2.70)	(-2.17)	(-2.06)	(-2.40)	[0.013]		[98.36***]
corona	-0.005	-0.244	-0.205***	-0.078	-0.041**	-0.087	0.210	0.045	2020-03-23
	(-0.01)	(-0.94)	(-2.95)	(-0.77)	(-2.12)	(-0.18)	[0.000]		[75.30***]
factor	-0.015	0.003	-0.213**	0.387*	0.070*	0.030	0.360	0.126	2020-03-27
	(-0.03)	(0.01)	(-2.15)	(1.67)	(1.86)	(0.09)	[0.003]		[34.03***]
factor_all	-0.497	0.077	-0.327***	0.413*	0.069**	0.359	0.271	0.083	2020-03-27
	(-0.83)	(0.42)	(-3.81)	(1.89)	(2.22)	(0.87)	[0.000]		[41.08***]

Table A24
Contemporaneous regression of daily changes in 2-year Treasury yield on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the 2-year Treasury yield. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in 2-year Treasury yield: early subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-0.478	-0.032	0.502***	0.440**	0.075	4.875	0.075	0.059	2020-03-09
	(-1.31)	(-0.41)	(2.98)	(2.05)	(1.50)	(1.46)	[0.001]		[129.49***]
sent_sd	-0.314	-0.062	0.318*	-0.651*	-0.056	4.934	0.036	0.015	2020-03-09
	(-0.99)	(-0.46)	(1.83)	(-1.77)	(-1.32)	(1.36)	[0.444]		[186.43***]
s_sports	-0.005	-0.173	0.190	0.973**	-0.016	0.405	0.129	-0.010	2020-03-09
	(-0.10)	(-1.39)	(1.19)	(2.49)	(-1.00)	(0.63)	[0.000]		[141.91***]
s_oil & comm	-0.322***	0.088	0.399**	0.571***	0.139***	2.944***	0.147	0.177	2020-03-09
	(-3.70)	(0.79)	(2.07)	(3.08)	(4.38)	(4.00)	[0.001]		[155.97***]
s_currency	-0.223**	-0.200	0.470***	0.887***	0.117***	2.668***	0.314	0.284	2020-03-09
	(-2.38)	(-1.36)	(3.13)	(4.12)	(3.28)	(2.93)	[0.000]		[134.27***]
s_credit	-0.148*	0.145	0.296	0.491*	0.051	1.528*	0.028	0.028	2020-03-09
	(-1.78)	(1.32)	(1.42)	(1.77)	(1.63)	(1.68)	[0.396]		[150.37***]
s_corp future	-0.152*	-0.172	0.189	0.381**	0.076**	1.352**	0.057	0.082	2020-03-09
	(-1.72)	(-1.01)	(1.07)	(1.98)	(2.42)	(2.15)	[0.233]		[135.73***]
factor	-0.085***	-0.011	0.004	0.873***	0.086***	0.756***	0.577	0.214	2020-03-17
	(-5.37)	(-0.13)	(0.03)	(9.48)	(5.55)	(5.64)	[0.000]		[201.68***]
factor_all	-0.056*	0.026	0.243*	0.654***	0.035	0.593**	0.212	0.011	2020-03-09
	(-1.74)	(0.22)	(1.70)	(3.90)	(1.61)	(1.98)	[0.000]		[145.84***]

Table A25

Contemporaneous regression of daily changes in 10-year Treasury yield on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the 10-year Treasury yield. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in 10-year Treasury yield: early subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
s_sports	-0.013	-0.193	-0.084	0.832*	-0.020	0.369	0.052	0.000	2020-03-17
	(-0.14)	(-1.49)	(-0.56)	(1.73)	(-0.92)	(0.47)	[0.144]		[78.63***]
s_central bank	0.200	-0.235	-0.204	-0.075	-0.065*	-1.545	0.032	0.108	2020-03-17
	(1.32)	(-1.23)	(-0.99)	(-0.21)	(-1.77)	(-1.34)	[0.051]		[53.53***]
s_markets	-0.428**	-0.348	0.069	0.723	0.129*	2.982*	0.092	0.172	2020-03-17
	(-2.17)	(-1.56)	(0.57)	(1.50)	(1.91)	(1.92)	[0.034]		[42.97***]
s_oil & comm	-0.554***	-0.066	0.107	0.691***	0.169***	3.680***	0.208	0.290	2020-03-09
	(-3.25)	(-0.61)	(0.69)	(2.61)	(3.49)	(3.14)	[0.000]		[48.60***]
s_currency	-0.357***	-0.137	0.240	0.769***	0.116***	2.821***	0.220	0.275	2020-03-17
	(-3.24)	(-1.01)	(1.61)	(4.21)	(3.80)	(3.83)	[0.002]		[60.37***]
s_corp & govt US	0.413**	-0.151	-0.305	-0.032	-0.086**	-2.741**	0.053	0.119	2020-03-20
	(2.06)	(-1.05)	(-1.22)	(-0.13)	(-2.28)	(-1.97)	[0.002]		[101.46***]
s_corp actual	0.248*	-0.287	-0.116	-0.542*	-0.106**	-2.130**	0.157	0.236	2020-03-18
	(1.81)	(-1.48)	(-0.62)	(-1.66)	(-2.09)	(-1.96)	[0.005]		[71.17***]
s_corp future	-0.282***	-0.224	-0.072	0.304**	0.080***	1.663***	0.032	0.117	2020-03-17
	(-2.63)	(-1.40)	(-0.36)	(2.39)	(3.56)	(3.23)	[0.002]		[40.30***]
s_credit1	0.096	-0.039	-0.183	-0.211	-0.047**	-0.925*	-0.059	0.025	2020-03-18
	(1.38)	(-0.28)	(-0.69)	(-1.23)	(-1.97)	(-1.75)	[0.051]		[42.39***]
corona	0.096	-0.238	-0.325	0.426**	0.067**	-1.001**	0.002	0.079	2020-03-18
	(1.44)	(-1.37)	(-1.35)	(2.36)	(2.44)	(-2.11)	[0.132]		[48.72***]
factor	-0.174***	-0.075	-0.202**	0.804***	0.111***	1.118***	0.614	0.371	2020-03-17
	(-6.45)	(-1.04)	(-2.20)	(8.09)	(7.37)	(6.21)	[0.000]		[153.90***]
factor_all	-0.094	-0.002	-0.021	0.496***	0.029	0.638	0.036	-0.008	2020-03-17
	(-1.22)	(-0.01)	(-0.13)	(3.02)	(0.95)	(1.15)	[0.024]		[73.27***]

Table A26

Contemporaneous regression of daily changes in S&P 500 index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the S&P 500 index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of EV (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in S&P 500 index: late subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-6.921***	-0.390***	0.216**	0.324***	0.027**	1.792***	0.260	0.044	2020-03-16
	(-2.59)	(-3.57)	(2.37)	(2.66)	(2.54)	(2.84)	[0.000]		[54.88***]
s_central bank	-6.347***	-0.329***	0.249***	0.293**	0.029***	1.535***	0.269	0.052	2020-04-06
	(-2.60)	(-3.40)	(2.67)	(2.47)	(2.68)	(2.78)	[0.000]		[43.38***]
s_markets	-5.782***	-0.369***	0.271***	0.250***	0.028***	1.424***	0.309	0.081	2020-03-23
	(-4.14)	(-3.62)	(3.12)	(4.63)	(6.25)	(4.92)	[0.000]		[46.94***]
s_health	-2.982*	-0.320***	0.236**	0.159*	0.017*	0.732*	0.249	0.033	2020-03-23
	(-1.69)	(-3.47)	(2.51)	(1.68)	(1.85)	(1.87)	[0.000]		[41.89***]
s_europe	-9.134***	-0.437***	0.204**	0.419***	0.041***	2.280***	0.334	0.095	2020-03-23
	(-3.33)	(-4.19)	(2.35)	(3.80)	(3.69)	(3.65)	[0.000]		[31.86***]
s_currency	-2.077	-0.302***	0.279***	0.186**	0.015	0.637	0.223	0.012	2020-03-23
	(-1.06)	(-3.02)	(2.78)	(2.18)	(1.33)	(1.48)	[0.000]		[40.21***]
factor	-0.405	-0.290***	0.238***	0.125**	0.019**	0.109	0.307	0.059	2020-03-27
	(-0.70)	(-3.93)	(2.89)	(2.36)	(2.23)	(0.93)	[0.000]		[40.02***]
factor_all	-0.410	-0.269***	0.250***	0.133**	0.013	0.106	0.256	0.025	2020-03-27
	(-0.66)	(-3.71)	(2.83)	(2.25)	(1.18)	(0.84)	[0.000]		[51.24***]

Table A27
Contemporaneous regression of daily changes in VIX index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The EV column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the VIX index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of EV (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in VIX index: late subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent_sd	21.589	-0.313***	0.214	0.120*	0.016	-3.260*	0.213	0.014	2020-03-16
	(1.59)	(-3.68)	(1.56)	(1.65)	(1.53)	(-1.68)	[0.000]		[80.50***]
s_markets	5.298**	-0.331***	0.204	-0.096*	-0.012**	-0.779***	0.211	0.012	2020-03-17
	(2.57)	(-4.24)	(1.57)	(-1.77)	(-2.39)	(-2.87)	[0.000]		[63.88***]
s_currency	7.517**	-0.368***	0.168	-0.161	-0.023*	-1.097**	0.238	0.037	2020-03-16
	(2.37)	(-3.56)	(1.53)	(-1.55)	(-1.86)	(-2.40)	[0.000]		[58.95***]
s_corp & govt US	-4.734	-0.284***	0.211	0.027	0.015*	0.574	0.203	0.009	2020-03-16
	(-1.41)	(-3.54)	(1.48)	(0.37)	(1.76)	(1.27)	[0.000]		[84.64***]
s_credit1	-1.179	-0.297***	0.172	0.118*	0.016	0.213	0.214	0.011	2020-03-16
	(-0.44)	(-3.30)	(1.42)	(1.68)	(1.30)	(0.58)	[0.000]		[66.42***]
corona	2.043**	-0.314***	0.182	-0.230*	-0.018	-0.191*	0.207	0.006	2020-03-16
	(2.18)	(-3.84)	(1.37)	(-1.78)	(-1.51)	(-1.76)	[0.000]		[92.82***]
factor	2.006***	-0.305***	0.148	-0.199*	-0.002	-0.237***	0.234	-0.003	2020-03-16
	(2.95)	(-3.97)	(1.62)	(-1.78)	(-0.21)	(-2.90)	[0.000]		[69.45***]
factor_all	2.046***	-0.316***	0.130	-0.221**	-0.004	-0.244***	0.246	-0.001	2020-03-16
	(3.02)	(-3.76)	(1.46)	(-2.20)	(-0.37)	(-3.05)	[0.000]		[71.98***]

Table A28
Contemporaneous regression of daily changes in US high-yield index on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the US high-yield index. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in US high-yield index: late subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
sent	-3.550***	0.094	0.351***	0.444***	0.039***	2.477***	0.355	0.095	2020-04-14
	(-3.26)	(1.25)	(3.05)	(3.57)	(3.21)	(3.52)	[0.000]		[73.40***]
art_count	-0.418	0.199***	0.311***	-0.317*	-0.005	0.487**	0.248	-0.001	2020-03-23
	(-1.37)	(2.59)	(2.66)	(-1.75)	(-0.91)	(2.22)	[0.001]		[70.75***]
s_sports	-1.634**	0.188***	0.327***	0.202***	0.038***	0.983***	0.295	0.075	2020-03-23
	(-2.40)	(3.24)	(2.65)	(3.13)	(3.04)	(2.59)	[0.000]		[58.34***]
s_central bank	-2.885***	0.157**	0.345***	0.405***	0.037***	1.937***	0.352	0.089	2020-03-19
	(-3.26)	(2.56)	(2.89)	(3.50)	(3.33)	(3.48)	[0.000]		[58.70***]
s_markets	-2.367***	0.136**	0.407***	0.201***	0.030***	1.470***	0.319	0.087	2020-03-23
	(-3.55)	(2.30)	(2.60)	(3.97)	(4.26)	(4.00)	[0.000]		[76.63***]
s_health	-1.226**	0.200***	0.364***	0.224***	0.020***	0.848***	0.323	0.052	2020-03-19
	(-2.48)	(3.15)	(2.95)	(3.23)	(3.51)	(2.84)	[0.000]		[68.07***]
s_europe	-3.945***	0.072	0.333***	0.442***	0.048***	2.608***	0.408	0.140	2020-03-23
	(-4.86)	(0.85)	(2.82)	(5.12)	(5.26)	(5.18)	[0.000]		[45.29***]
s_oil & comm	-0.389	0.215***	0.385***	0.172**	0.005	0.402	0.220	-0.002	2020-03-23
	(-0.62)	(3.19)	(2.60)	(2.13)	(0.64)	(1.02)	[0.000]		[93.26***]
s_currency	-1.611***	0.152*	0.337**	0.197***	0.026***	1.050***	0.270	0.048	2020-03-23
	(-2.69)	(1.83)	(2.44)	(3.01)	(2.70)	(3.07)	[0.000]		[58.02***]
s_corp & govt US	-2.743***	0.122*	0.359**	0.220***	0.032***	1.720***	0.276	0.054	2020-03-23
	(-2.79)	(1.74)	(2.48)	(3.29)	(2.95)	(3.06)	[0.000]		[71.56***]
s_corp future	-0.966*	0.208***	0.375**	0.095*	0.016**	0.603*	0.229	0.016	2020-03-23
	(-1.70)	(3.29)	(2.40)	(1.80)	(2.01)	(1.81)	[0.000]		[91.92***]
factor	-0.090	0.187**	0.230**	0.183***	0.023***	0.058	0.372	0.076	2020-03-27
	(-0.37)	(2.40)	(2.52)	(4.00)	(2.97)	(0.43)	[0.000]		[34.03***]
factor_all	-0.092	0.205***	0.247**	0.175***	0.020*	0.061	0.329	0.056	2020-03-27
	(-0.36)	(2.74)	(2.54)	(3.94)	(1.89)	(0.43)	[0.000]		[41.08***]

Table A29
Contemporaneous regression of daily changes in 2-year Treasury yield on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the 2-year Treasury yield. The *EV**VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in 2-year Treasury yield: late subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
art_count	-0.020	-0.201	-0.403***	-0.184	-0.015**	0.471	0.192	0.028	2020-03-09
	(-1.31)	(-1.05)	(-3.66)	(-0.83)	(-2.19)	(1.15)	[0.005]		[145.29***]
s_corp & govt US	0.091***	-0.107	-0.326***	-0.147*	-0.029**	-1.769***	0.188	0.048	2020-03-09
	(2.65)	(-0.56)	(-3.15)	(-1.92)	(-2.38)	(-2.65)	[0.002]		[145.03***]
corona	0.022***	-0.155	-0.360***	0.123	0.028***	-0.405***	0.161	0.020	2020-03-09
	(2.95)	(-0.83)	(-3.44)	(1.53)	(3.29)	(-3.23)	[0.000]		[136.57***]
factor	0.012**	-0.190	-0.372***	0.180**	0.011	-0.251***	0.207	0.014	2020-03-17
	(2.14)	(-1.00)	(-4.09)	(2.31)	(1.53)	(-2.62)	[0.000]		[201.68***]
factor_all	0.012**	-0.171	-0.362***	0.142*	0.009	-0.248**	0.178	0.008	2020-03-09
	(2.07)	(-0.87)	(-3.80)	(1.73)	(1.05)	(-2.45)	[0.000]		[145.84***]

Table A30

Contemporaneous regression of daily changes in 10-year Treasury yield on text variables and *corona*. Rows correspond to each explanatory variable for which either the b_3 or b_4 coefficient in (8) is significant at the 10% level or better. The *EV* column shows the impact of a one standard deviation change in the explanatory variable in units of standard deviation of the 10-year Treasury yield. The *EV*VIXl1* column shows the impact of a unit increase in VIX^{10} on the value of *EV* (which is in units of standard deviation). The $VIXl1$ column shows the effect of a one standard deviation increase in VIX^{10} in units of standard deviation of the market variable. Numbers in parentheses are t-statitics, and the numbers in square brackets underneath the adjusted R^2s are joint F-tests. Both sets of tests use Newey-West standard errors with 3 lags. The *R2* column shows adjusted R^2s, and *Chg R2* shows the difference in adjusted R^2s between the specification in (8) and a version of (8) which sets $b_4 = 0$. The *Break Date* column shows the structural break date of (8) using the procedure from Section 5, and the maximal Chow statistic is shown in square backets, with siginficance levels obtained from the Andrews (1993, 2003) distribution indicated via the *s. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Contemp. changes in 10-year Treasury yield: late subperiod, VIX interact, drop intra

	const	h_t	h_{t-1}	EV	EV*VIXl1	VIXl1	R2	Chg R2	Break Date
factor	0.012	-0.119	-0.083	0.129**	0.001	-0.097	0.024	-0.005	2020-03-17
	(0.88)	(-0.84)	(-0.88)	(2.27)	(0.20)	(-0.95)	[0.058]		[153.90***]
factor_all	0.013	-0.117	-0.090	0.110*	-0.002	-0.096	0.016	-0.004	2020-03-17
	(0.86)	(-0.78)	(-0.93)	(1.83)	(-0.21)	(-0.93)	[0.055]		[73.27***]

Table A31

This table reports results for the specification in (13), which regresses market-news pair outcomes on a market fixed effect and on the Fed and 1987 narrativity measures for a given topic (defined in Section 3.2). These results use the 24-topic, full-sample model. The left part of the table (-e) corresponds to the early (pre-break) subsample. The right part of the table (-l) corresponds to the late (post-break) subsample. The columns in each panel correspond to the following outcome variables: *Cont* is an indicator variable for whether a given market-news pair exhibits a significant contemporaneous relationship (b_3 from eq. 8 is significant); *Hyp* is an indicator for hypersensitivity(b_3 and b_4 in eq. 8 are both significant and have the same sign); *Rev* is an indicator variable for reversals (b_3 from eq. 8 and c_3 from eq. 10 are significant and have opposite signs); *Grng* is a measure of markets-news Granger connectivity (equal to two if both the news series and the market series Granger cause each other, to one if only one Granger causes the other, and zero otherwise); and *M2T* is set to one if the market series Granger causes the news series. Significance is defined at the 10% level or better. Standard errors are clustered by market. P-values are shown in parentheses. Significance at the 10%, 5%, or 1% levels is indicated via *,**,*** respectively.

Information tests for 24-topic, full-sample model

	Cont-e	Hyp-e	Rev-e	Grng-e	M2T-e	Cont-l	Hyp-l	Rev-l	Grng-l	M2T-l
1987	1.476***	1.069***	-0.017	1.502***	1.546***	0.290	0.093	0.052	0.573*	0.248
	(0.000)	(0.000)	(0.935)	(0.000)	(0.000)	(0.347)	(0.356)	(0.488)	(0.056)	(0.218)
Fed	-0.869***	-0.543**	-0.005	-1.393***	-1.422***	-0.443*	-0.164*	-0.126	-0.343	-0.118
	(0.000)	(0.024)	(0.972)	(0.000)	(0.000)	(0.072)	(0.054)	(0.140)	(0.371)	(0.655)
Hyp			0.144***					0.017		
			(0.000)					(0.716)		
Nobs	120	120	120	120	120	120	120	120	120	120
R2	0.229	0.178	0.079	0.139	0.176	0.031	0.005	0.018	0.031	0.015