Media Attention, Macroeconomic Fundamentals, and Stock Market Activity

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Abstract

We create daily indices of media attention to macroeconomic fundamentals including unemployment, output growth, inflation, monetary policy, exchange rates, and oil prices. The measures are imperfectly correlated, showing time-varying attention to different economic risks at a variety of frequencies. Economic announcements drive short-term movements, and we identify the types of announcements that receive the most attention. Lower-frequency shifts in attention strongly relate to macroeconomic fundamentals. Controlling for economic announcements, attention is linked to variations in stock market implied volatility and trading volume.

Keywords: Media attention, Macroeconomic fundamentals, Stock market, Textual analysis.

JEL Classification: G12, E20.

1 Introduction

Economic conditions influence the opportunities available to households, businesses, and governments, providing motivation for individual decision-makers to learn about the state of the economy. Scheduled macroeconomic announcements, for example regarding output, employment, and inflation, provide one way of learning about the aggregate economy. Numerous studies have verified the importance of scheduled macroeconomic announcements by their impacts on financial markets (see Andersen et al., 2003, 2007). But learning about the macroeconomy may occur through additional channels other than macroeconomic announcements.

Intuition suggests that the financial news media could play an important role in the transmission and interpretation of relevant information. Prior studies have shown a variety of ways in which news media impact financial markets. For example, individual-stock attention relates to subsequent returns as well as the holdings of different types of investors (Fang and Peress, 2014); aggregate news sentiment predicts aggregate stock returns (Tetlock, 2007); and the volume and type of news relates to volatility at the individual stock and aggregate level (Antweiler and Frank, 2004; Da et al., 2011).

Our study focuses on media attention to macroeconomic fundamentals. We conjecture that attention relates to learning, and that financial news media play multiple roles in helping their readers to learn about the macroeconomy. One basic function is to factually report publicly available information and to disseminate the results of regularly scheduled news announcements. This function in isolation would suggest that the attention of financial news media should closely follow the schedule of public announcements. News media also engage in more nuanced activities, however: discerning the information that is most relevant to their readers, helping to interpret publicly available information, and engaging in costly research that may help to provide timely information to readers. For example, when financial journalists interpret recent employment situation announcements, they often discuss its implications to financial markets and infer future actions

by the Federal Reserve.[1] These functions suggest that the allocation of financial news media attention to different macroeconomic fundamentals could be informative about the concerns of readers.

In this paper we create indices of attention to nine separate categories of macroeconomic fundamentals: credit ratings, aggregate output or gross domestic product ("GDP"), the housing market, inflation, interest rates, monetary policy, oil, the U.S. dollar, and unemployment. We create lists of search words that capture attention to each of these fundamentals. For example, to capture attention to U.S. output growth, we use the following set of words: gross domestic product, GDP, gross national product, and GNP. We count the number of articles in the Wall Street Journal (1984-2014) and New York Times (1980-2014) that include any of these search terms. Scaling by the total number of articles published gives us a measure of relative attention to each macroeconomic fundamental.

These indices show interesting empirical properties. We first address comovement in attention, and show that the indices are not driven by a single factor. They are imperfectly correlated, and over time attention shifts across inflation, employment, monetary policy, and the other fundamentals. If these shifts in attention reflect changes in investor concerns, then only in very special cases could efforts to price assets reduce to a single factor representation of risk.

We next address the duration of cycles in attention. For the macroeconomic fundamentals we consider, the attention indices are stationary, but persistent. The conservative Bayesian Information Criterion suggests at most four lags in a monthly autoregression framework. However, when we aggregate the attention indices over different window lengths, similar to the MIDAS framework of Ghysels et al. (2006), we find that most of the series show evidence of cycles at multiple frequencies, ranging from as short as one day to as long as one year. These aspects of attention are consistent with fractal behavior over a range of frequencies, producing a slow decay in autocorrelations over a range of lags

[1]See Appendix A for sample of news articles.

that is often associated with long-memory. These patterns in attention are properties also observed in aggregate stock market volume and volatility in prior literature (see Andersen et al., 2001; Bollerslev and Mikkelsen, 1996).

We next seek to relate attention to movements in economic fundamentals. We associate each of the attention indices with a related macroeconomic variable, and, where possible, at least one scheduled announcement. As expected, high frequency variations in attention do relate to scheduled news announcements, and we document which announcements have the most impact on attention. Lower frequency movements in attention relate to movements in economic fundamentals. We decompose each of the economic series (e.g., unemployment, inflation) into simple moving averages over different window sizes. Attention relates to variations and squared variations in shorter-horizon simple moving averages of fundamentals relative to longer-horizon moving averages. All significant squared terms on variations are positive, consistent with the idea that changes in fundamentals lead to increased attention. The directional effect of signed changes in fundamentals on attention is generally also consistent with intuition. For example, increases in unemployment increase attention, and decreases in house prices increase attention.

In some cases the relation between attention and fundamentals is very strong. For example, over 50% of the variation in our employment attention index is explained by unemployment fundamentals, and the comovement is strong enough to be apparent in a simple plot (see Figure 1). We also document differences between the WSJ and NYT in the strength of the relation between their attention indices and fundamentals.

We further show that news media attention to macroeconomic fundamentals relates to measures of daily stock market activity. Controlling for macroeconomic announcements, increases in attention correlate with higher aggregate volume and higher aggregate volatility.

Finally, we investigate how media attention to unemployment might act as a leading indicator to predict the "surprise" in the announced unemployment rate. Increasing media

attention to unemployment leading to up to the employment announcement predicts the surprise in the unemployment rate.

2 Related Literature

This paper contributes to three strands of literature. First, it relates to literature linking news to asset prices. Several studies provide theoretical foundations including Detemple (1986), Veronesi (1999, 2000), Calvet and Fisher (2007), David and Veronesi (2013), and Andrei and Hasler (2014). The empirical literature connecting news to stock returns has grown rapidly. Fang and Peress (2009) examine the cross-sectional relation between mass media coverage of firms and the firms stock returns and find that firms with low media coverage earn a higher stock returns. Solomon (2012) shows that investor relation firms influence corporate client's news by generating more media coverage of positive news, which in turn influences investor expectations of future profitability. News media also impact the holdings and trading behaviors of different types of investors (Fang and Peress, 2014; Peress, 2014).

Building on recent advances in textual analysis, other studies distill information from news sources and test their impact on financial markets. Antweiler and Frank (2004) extract information from Yahoo! Finance message boards and find that message volume helps to predict market volatility. Tetlock (2007) shows that the number of negative words in the Wall Street Journal column "Abreast of the Market" predicts the returns of the Dow Jones Industrial Average (DJIA) the following day. Garcia (2013) further documents that the link between media content and the DJIA returns is concentrated in time of recessions. Several studies create direct measures of stock-specific investor attention using search frequency in Google and find investor attention positively predicts stock prices (Da et al. (2011, 2014)). Baker et al. (2015) measure economic policy uncertainty using, in part, newspaper articles mentioning policy uncertainty. Their economic policy uncertainty

(EPU) index relatedsto the performance of the general economy and to implied volatility (e.g. VIX). Our paper extends this line of research by creating measures of media attention to macroeconomic fundamentals, and relating these to macroeconomic fundamentals and stock market activity.

A second line of literature relates macroeconomic announcements (e.g. unemployment reports) to financial markets. It was long debated in the literature whether macroeconomic factors impact financial assets. Chen et al. (1986) document that macro variables such as inflation innovations, industrial production, and interest rate spreads are important factors to price assets. However, efforts to use macroeconomic factors to explain asset returns have met with only limited success (Schwert, 1981; Pearce and Roley, 1983; Cutler et al., 1989; Chan et al., 1998). Several studies find that macro risks matter for stock market if we consider the business cycle (McQueen and Roley, 1993; Boyd et al., 2005) and the non-linear and time-varying impact of macroeconomic risks (Flannery and Protopapadakis, 2002). Andersen et al. (2003, 2007) show that indeed macroeconomic announcements have an impact on financial assets, but at high-frequency (e.g. five minutes). Gilbert (2011) documents that macro announcements revisions also have strong relation with the stock market index. Savor and Wilson (2013) find that 60 percent of the cumulative annual equity risk premium is earned on three announcement days (i.e. FOMC, unemployment, and inflation announcements). Lucca and Moench (2015) document that since 1994 stock returns have averaged about 0.5 percent in the 24 hours leading to a FOMC announcement. Cieslak et al. (2015) show that the average market risk premium follows a bi-weekly pattern over the FOMC meeting cycle. We show that high-frequency movements in media attention are linked to macroeconomic announcements, while lower-frequency fluctuations are linked to the fundamentals contained in the reports.

A final branch of the literature relates the macroeconomy to stock market activity. For example, Beber et al. (2011) show that aggregate portfolio rebalancing across equity

sectors is consistent with sector rotations that seek to exploit perceived differences in the relative performance of each sectors at different stages of the business cycle. Their results also indicate that sectoral order flow has predictor power for the evolution of the economy suggesting that order flow contains information that is not revealed in price changes. We complement these results by investigating media attention as a potential link between the macroeconomy and trading activity.

3 Macroeconomic Attention Indices

We create indices of news-media attention to the following macroeconomic risks: output growth, inflation, employment, interest rates, monetary policy, housing, credit conditions, oil, and the US dollar. For each fundamental, we create a list of words and phrases that if used in a newspaper article indicate attention to the fundamental. Our list of search terms for each fundamental is provided in Table 1. In choosing the set of search terms, we aim to be objectively reasonable, and we explore the information provided by this approach. Other researchers might choose other related search terms, and we anticipate that future research will explore other approaches to identifying attention to macroeconomic fundamentals.

We apply our searches to the Wall Street Journal (WSJ) and New York Times (NYT). These publications cover general news, economic news, and financial news, and have been used in numerous prior studies. We use two different publications to provide a sense of the robustness of our results and also to illuminate differences in attention across outlets with different audiences. WSJ is generally regarded as having a tighter focus on the economy and financial markets as well as a more conservative editorial slant, while NYT provides broader coverage of general news and has a more politically liberal reputation. We choose not to use a broader set of publications primarily to keep our empirical analysis tightly organized. If time-varying attention to macroeconomic fundamentals is important, we

believe it should be identified in these two major newspapers. For the NYT, our sample period is June 1, 1980 to April 30, 2015. For the WSJ, our sample period is January 1, 1984 to April 30, 2015. During these sample periods broad digital coverage of the publications is available. We consider only the newspaper print editions.

3.1 Construction of the Attention Indices

Each day in our sample period, we count the number of articles in each publication that satisfy our search criteria for each macro fundamental. This provides a daily count $N_{p,f,t}$, where p indexes the publication (WSJ or NYT) of articles showing some form of attention to each fundamental f. We normalize these counts by dividing by the average number of articles per day $\hat{N}_{p,t}$ for publication p during the calendar month including observation t. Our "unadjusted" media attention index for each individual publication p is:

$$\text{MAI-}p\text{U}_{f,t} = \frac{N_{p,f,t}}{\hat{N}_{p,t}}. \tag{1}$$

The unadjusted attention indices measure the percentage of articles on a given day that have content related to the macroeconomic fundamental of interest.

We define related measures that are demeaned, or alternatively demeaned and standardized. Let $\mu_{p,f}$ and $\sigma_{p,f}$ denote respectively the time-series means and standard deviations of the daily unadjusted attention indices MAI-p$U_{f,t}$. The demeaned measures are denoted

$$\text{MAI-}p\text{D}_{f,t} = \text{MAI-}p\text{U}_{f,t} - \mu_{p,f},$$

and the standardized measures are denoted

$$\text{MAI-}p_{f,t} = \text{MAI-}p\text{D}_{f,t}/\sigma_{p,f}.$$

We also define two composite indexes of attention. The first composite index, denoted C1, is an average of the demeaned NYT and WSJ indices in time periods when both are

available, and the NYT index only in the 1980-1984 period:

$$\text{MAI-C1}_{ft} = \begin{cases} (\text{MAI-WD}_{ft} + \text{MAI-ND}_{ft})/2 & \text{from 1984-2014,} \\ \text{MAI-ND}_{ft} & \text{from 1980-1983.} \end{cases} \tag{2}$$

Demeaning the individual publication indices before averaging ensures that we will not induce a level effect driven simply by the change in composition that occurs in 1984 when the WSJ data becomes available.

The second composite index, denoted C2, is an average of the standardized NYT and WSJ indices when both are available:

$$\text{MAI-C2}_{ft} = \begin{cases} (\text{MAI-W}_{ft} + \text{MAI-N}_{ft})/2 & \text{from 1984-2014,} \\ \text{MAI-N}_{ft} & \text{from 1980-1983.} \end{cases} \tag{3}$$

Standardizing ensures that both publications contribute equally to the variation of C2. While the weighting of the two composite indices is different, neither is superior in any sense. The publication with more variation in its own attention index will be weighted more heavily in C1 relative to C2. If one believes that greater variation in attention over time reflects more information, then the weighting of C1 may be preferred to C2.

All of our indices build on simple counts of the number of articles related to a macroeconomic fundamental, as a proportion of all articles. Many elaborations of this approach are possible, for example weighting articles by their number of words, or attempting to measure the intensity of relevance rather than a simple binary coding. We take a basic approach for simplicity, and expect other measurement methods to be explored in future work. We finally note that the indices measure attention only, and do not attempt to distinguish other possible article attributes such as positive versus negative sentiment.

3.2 Empirical Properties of the Attention Indices

Table 3, Panel A provides summary statistics for the unadjusted daily attention indices for both NYT and WSJ. For the WSJ, the attention index means range from a low of

about 0.5% of articles for credit to a high of over 2% for inflation and oil. NYT coverage of macroeconomic fundamentals is uniformly lower as a proportion of all coverage. The NYT index means have a lowest value of 0.08% for US Dollar coverage, and the highest index means are inflation (0.91%), unemployment (0.81%), and oil (0.76%). Consistent with the higher mean attention levels in the WSJ, the standard deviation of attention is also uniformly higher for the WSJ than the NYT. This implies that the weight of the WSJ in the composite indices C1 will be higher than in the composite indices C2.

Table 3, Panel A also provides index means by day of the week. The Saturday edition of WSJ generally has less coverage of macro fundamentals than other days of the week. For NYT, the Saturday edition appears to have roughly similar content to other days, while the large Sunday edition offers more coverage than other days. While the effects of weekend news coverage are interesting and potentially important, for simplicity in the remainder of our analysis we discard all non-trading days (weekends and holidays). To account for potential day-of-the weak seasonalities in news coverage, all of our empirical results use day-of-the-week dummy variables.

Table 3, Panel B shows summary statistics for monthly unadjusted attention indices. These are created by averaging within each calendar month, over all trading days, the daily index values within the month. Our daily indices scale by average number of articles per month, hence the denominator is identical for all trading days within the month. Therefore taking an average of index values for days within the month gives the same outcome as constructing the index directly from monthly counts. Panel B shows modest seasonalities in coverage of fundamentals by calendar month, and in the remainder of our analysis all regressions use calendar month dummies.

Figure 1 plots our attention indices. For reference, each attention index is associated with a series of macroeconomic fundamentals that seems relevant. For example, the output growth attention index is plotted on the same axes with the log quarter-to-quarter growth in real GDP. The full list of attention indices versus the associated macroeconomic

fundamentals plotted in Figure 1 is given in Table 2. Statistical analysis of the relation between attention and fundamentals will be carried out in Section 4.

We now emphasize several empirical properties that are broadly evident across the attention indices, and include in the Appendix an accounting of specific events that drive major fluctuations in the indices. The first general property we note is that the indices do not appear to be driven by a single factor. The indices look imperfectly correlated, and over time attention focuses on different fundamentals. Second, attention appears to be highly persistent. All of the series show fluctuations that last over periods at least as long as several years, including both gradual trends and sharp changes. Third, the indices also show cycles at a range of higher frequencies, including short bursts of attention. The high persistence and presence of multiple apparent frequencies suggests the possibility of long-memory and/or fractal aspects to attention. Finally, attention seems to be at least loosely related to underlying fundamentals. This is seen most clearly in the plot for employment, where broad patterns in attention seem to match closely with the level of the unemployment rate. We investigate each of these aspects of the plots in subsequent statistical analyses.

Table 3 shows daily (Panel A) and monthly (Panel B) correlations among the composite attention indices MAI-C2, as well as correlations with other series of interest: implied volatility (VXO) from the Chicago Board Options Exchange (CBOE)[2], economic policy uncertainty (EPU) from Baker et al. (2015)[3], detrended S&P 500 trade volume (Volume) from the Center for Research in Security Prices (CRSP), and lagged values of the VXO and Volume. The results confirm the imperfect correlation of the attention indices. In daily data, the highest inter-MAI correlations MAI are between monetary and inflation (0.56), monetary and interest rates (0.56), oil and inflation (0.39), and inflation and interest rates (0.34). Not all correlations are positive. For example, in monthly data the MAI for GDP and inflation are negatively correlated (-0.09). We also are interested in

[2]Data source: https://www.cboe.com/micro/vix/historical.aspx.
[3]The data is available at http://www.policyuncertainty.com/.

correlations between the attention indices and other variables. In the monthly data, the highest correlations with EPU are unemployment (0.42), credit rating (0.34), and GDP (0.22). The highest correlations with VXO are U.S. Dollar (0.42), credit rating (0.30), and unemployment (0.29).

To address stationarity, we estimate AR(p) models for each attention index. Following Campbell and Yogo (2006), we use the lag length that minimized the Bayesian information criteria (BIC). The minimum BIC for all of our MAI occurs at four lags or less. Table 4 shows these AR estimates, controlling for monthly fixed-effects. The Table also reports Dickey-Fuller p-values for the null hypothesis that each series has a unit root. The DF statistics reject the presence of unit roots.

To further explore time-series dependence in the data, Figure 2 shows autocorrelation plots of each composite series MAI-C2 for lag lengths from 1 to 250 trading days. We plot the autocorrelations for residuals after controlling for day-of-the-week dummies and month-of-the-year dummies. The plots show very slow decay in this range of frequencies, and the autocorrelations are significantly larger than zero at 250 lags for all series. Several of the autocorrelation plots show apparent cycles in dependence. For example, GDP shows strong increases in correlations at each monthly interval. Other series (housing, US Dollar) have increases in autocorrelations at weekly intervals. These cycles are consistent with the importance of periodic news announcements.

To account for potential long-memory dependence as well as multiple cycles in news variation, we use regressions that aggregate the attention indices over different horizons similarly to MIDAS regression (see Ghysels et al., 2006). Specifically, we construct simple moving averages of the attention indices over window sizes of 1 day, 5 days, 21 days (monthly), 62 days (quarterly), and 250 days (annual), and 1000 days (business cycle).

Panel B of Table 4 shows results of regressing each attention index on lagged simple moving averages of its own history, for the full set of different window sizes. All of the series show persistence at multiple frequencies, with the majority having significant positive

persistence in daily, weekly, monthly, quarterly, and annual-length moving averages in the multiple regression framework. One exception is credit rating attention, which does not show significant persistence beyond monthly horizons. A separate monthly cycle is not present in GDP attention, although it does show significant persistence at all other cycle lengths between daily and annual. This result seems intuitive given the quarterly reporting cycle for GDP growth. These results are consistent with slow, approximately hyperbolic decay in the persistence of attention to each of the fundamental factors. The presence of multiple frequencies in attention to financial news are also broadly consistent with the motivation and theoretical framework in Calvet and Fisher (2007). We next determine whether the fluctuations of the individual attention indices can be related to macroeconomic fundamentals.

4 Attention and Macroeconomic Fundamentals

Intuition suggests that high frequency fluctuations in attention could be driven by economic announcements, while lower frequency variations might be related to movements in economic fundamentals. We test these ideas.

4.1 Macroeconomic Announcements

Prior literature has established links between economic announcements and stock market returns and volatility (Andersen et al., 2003, 2007). We now investigate the relationship between macroeconomic announcements and media attention. Attention could be limited to simply reporting on announcements. Alternatively, attention might be high in advance of announcements as news media strive to anticipate the content of announcements, or to put the potential outcomes of an announcement into a broader context for the benefit of their readers.

Cross-sectionally, our analysis can tell us which types of announcements have the

largest impacts on media attention. If the media play an important role in the transmission of economic news, then understanding the allocation of media resources to covering different types of announcements should be informative about which announcement matters most to readers.

The economic announcements we consider are: consumer price index (CPI), employment situation, FOMC announcement, gross domestic product (GDP), and the producer price index (PPI). The announcement dates span the entire sample length of our indices. The CPI, PPI, and employment situation announcement dates are from the Bureau of Labor Statistics, the GDP dates are from the Bureau of Economic Analysis, and FOMC announcement dates are the Federal Reserve Board (see Table 2). Media attention can be influenced by multiple announcements, hence we study the most intuitive links between the media attention indices and macroeconomic announcements as shown in Table 2. The general specification to study the impact of macro announcements to our daily media attention indices is:

$$\text{MAI-C2d}_{f,t} = \alpha + \sum_{\tau=-4}^{\tau=4} \beta_\tau Ann_{j,\tau} + \epsilon_t \tag{4}$$

where $\text{MAI-C2d}_{f,t}$ is the composite index C2 detrended by its own 60-day simple moving average. The variable $Ann_{j,t}$ is equal to 1 if there is an announcement on day-t, 0 otherwise. Since the model specification contains many variables we show the regression coefficients, β_τ and the 95 percent confidence intervals in Figure 3. In Panel A, the results indicate that inflation MAI is at its highest one day after the CPI announcements. We also find an increase in media attention to inflation on days leading to the announcement. CPI announcements also draw attention in other indices, such as monetary and oil, with smaller effects for oil. PPI announcements have similar impacts (Panel B), but the coefficient magnitudes are smaller.

For unemployment announcements (Panel C), media attention increases two days in advance of the announcement, spikes on the announcement day, and remains high for two

days after the announcement. Unemployment announcements do not impact other MAI, such as inflation and monetary.

FOMC announcements (Panel D) naturally impact the attention index associated with monetary policy. However, we find that these effects are concentrated after 1994 when the FOMC started disclosing policy actions on the second day of the FOMC meeting.

Lastly, Panel E shows that GDP announcements have modest impacts on the GDP MAI. Only the final GDP announcement produces a statistically significant increase in media attention on the announcement day.

4.2 Macroeconomic Fundamentals

Beyond the link between economic announcements and daily spikes in attention, what accounts for the lower frequency fluctuations in the various MAI observed in Figure 1. The figures suggest slow variation in attention to different fundamentals that could reflect changing economic conditions.

Prior literature has attempted to establish links between macroeconomic variables and financial market variables such as volatility (e.g., Schwert (1989)). We expect that media attention connects economic news with financial markets, serving an intermediary function. A benefit of measuring media attention is that we can measure not just aggregate interest in financial and economic news, we can also tell what writers are talking about. Hence the low frequency variations in our different MAI should pick up changing patterns in concerns for different macroeconomic fundamentals.

To study how variations in macroeconomic fundamentals impact media attention, we decompose the macro variables into detrended moving averages over different window sizes. That is, given a particular macroeconomic fundamental F_t (e.g., unemployment rate, change in log CPI, change in log house price index), we can decompose the funda-

mental into a set of detrended moving averages:

$$F_t \equiv (F_t - \overline{F}_{t,t-2}) + (\overline{F}_{t,t-2} - \overline{F}_{t,t-11}) + (\overline{F}_{t,t-11} - \overline{F}_{t,t-47}) + \overline{F}_{t,t-47}, \tag{5}$$

where $\overline{F}_{t,t-k}$ is the simple moving average of the fundamental from $t-k$ to t. The components on the right hand side of the equation, each in parentheses, are detrended moving averages over window sizes that are expanding approximately geometrically. These could be capable of capturing the low-frequency patterns in autocorrelations documented for the attention indices in Table 4. We regress the monthly attention indices on these detrended moving averages and their squared values:

$$\begin{aligned} MAI_{f,t} = \alpha &+ \beta_1(F_t - F_{t,t-2}) + \beta_2(F_t - F_{t,t-2})^2 + \\ &\beta_3(F_{t,t-2} - F_{t,t-11}) + \beta_4(F_{t,t-2} - F_{t,t-11})^2 + \\ &\beta_5(F_{t,t-11} - F_{t,t-47}) + \beta_6(F_{t,t-11} - F_{t,t-47})^2 + \epsilon_t. \end{aligned} \tag{6}$$

Table 7 reports results for regression (6). Several general patterns emerge from the analysis. First, monthly attention varies with movements in macro fundamentals. For the WSJ indices (Panel A), NYT indices (Panel B), and both composite indices (Panels C and D), adjusted R^2 range from 0 to over 50%, with most of the regressions having at least one significant coefficient on fundamentals. Second, the squared terms are generally important in these regressions, and almost all of the significant squared terms are positive, consistent with the idea that attention rises when economic fundamentals depart from recently observed values. Third, the directional terms generally have the sign that economic intuition would suggest: Attention to credit rises when relative credit spreads rise; attention to housing rises when house prices fall; attention to unemployment rises when unemployment increases. Fourth, the importance of the different frequencies varies across fundamentals, but all show up significantly for some series. The intermediate cycle (three month relative to twelve month moving average) and the low frequency cycle (twelve month moving average relative to 48 month moving average) alternate between being the most important for explaining movements in attention.

We also see interesting differences across the WSJ and NYT attention indices. In general, the R^2 for the WSJ attention indices are higher than for the NYT. One notable exception is unemployment. More than 50% of the variation of the NYT attention index is explained by movements in the unemployment rate, consistent with the very strong comovement apparent in Figure 1. The R^2 for the WSJ attention index is much lower, at 32%. Examining the plot of the WSJ attention index for unemployment against the unemployment rate indicates a quite different pattern before the financial crisis. Prior to the financial crisis, WSJ attention to unemployment appears to move inversely with the unemployment rate, opposite to the NYT. Following the financial crisis, the WSJ attention index for unemployment moves with the unemployment rate, similar to the NYT. This is consistent with the idea that the readership and editorial policy of the NYT have been more consistently focused on unemployment than the WSJ over time; however, following the financial crisis the WSJ became more attentive to unemployment in a manner similar to NYT.

Consistent with this idea of different focuses and audiences between the NYT and WSJ, we also see a difference in how inflation impacts attention. An increase in inflation tends to raise attention to inflation at the WSJ, but reduces attention in the NYT. This is again consistent with the idea that the WSJ tends to be more hawkish on inflation than the NYT, due to differences in editorial policy and catering to different clienteles of readers.

5 Attention and Stock Market Activity

Beber et al. (2011) conjecture that market participants are continually digesting news about the macroeconomy, which impacts their preferences, expectations, and risk tolerances. As a result, macroeconomic news induce them to trade. The authors show that market trade volume segmented by economic sectors contain important macroeconomic

information and in turn predict important macroeconomic announcements.

We study the link between daily macroeconomic media attention and stock market activity. Let $Vlmd_t$ be the logarithm of aggregate trade volume of S&P 500 firms, detrended by its own 60-day moving average, following Tetlock (2007). We run the regression:

$$Vlmd_t = \alpha_f + \beta_f MAI_{5-20,f,t} + \gamma_f Ann_t + \delta_f Ann_t * MAI_{5-20,f,t} + \epsilon_{f,t}, \tag{7}$$

where $MAI_{5-20,t}$ is the difference between the five-day and twenty-day moving average of $MAI - C2_{f,t}$. $Ann_{j,t}$ is equal to 1 if there is an announcement on day-t.[4].

We report the results in Table 6. For almost all fundamentals, rising attention is associated with an increase in market volume. For most MAI, the effect is significant at the 1% level. For the GDP and USD MAI the relationship is significant at the 10% level. When we include macro announcements in the regressions, many of the announcements have significant impacts on volume, but the inclusion of these variables does not alter inferences about the importance of attention. Interaction terms do not have a consistent sign, and do not alter inference about the effects of attention or announcements on trading volume.

Another way to look at the impact of media attention on stock market activity is to investigate the relationship between media attention and implied volatility, measured by the VXO index, which is available beginning in 1986. We implement the following regression for each attention index:

$$VXO_t = \alpha_f + \beta_f MAI_{20-250,f,t} + \gamma_f Ann_t + \delta_f Ann_t * MAI_{f,20-250,t} + \epsilon_{f,t} \tag{8}$$

We report the results in Table 7. An increase in media attention on interest rates, GDP, unemployment, credit ratings and USD positively relates to an increase in implied volatility. The R^2 are highest for unemployment (15%) and GDP (8%). Results are similar if we detrend VXO using a 250-day moving average. Thus, controlling for macroeconomic

[4]To simplify the analysis, we do not differentiate between all GDP announcements (advance, preliminary, and final).

announcements, increases in attention precede increases in both aggregate volume and volatility.

6 Attention and Unemployment Announcements

Given the links between media attention and macroeconomic fundamentals, it is natural to consider whether media attention might help to predict surprises in macroeconomic variables. We turn to this question, focusing on the ability of the unemployment attention indices to predict surprises in the unemployment announcement. Our decision to focus on unemployment is partly motivated by the plots in Figure 1 which suggest that the unemployment attention indices might act as a leading indicator, and partly motivated by findings in prior literature that the unemployment report is important for stock market returns (Boyd et al., 2005).

We construct measures of "surprises" in the monthly employment report in four ways. First, we consider a simple random walk model of unemployment, under which the prediction for the following month's unemployment rate is the prior month's unemployment rate, and the surprise is defined as the change in unemployment. Second, we use rolling estimations of univariate ARMA models at each date in our sample to construct a one month ahead forecast of the unemployment rate. We use the BIC criteria to choose the best fitting ARMA model from January 1970 to month t, and then use this model to forecast unemployment in month $t+1$. Third, we use the regression model of Boyd et al. (2005) to generate the unemployment forecasts. The authors' forecasting model uses information from related macroeconomic variables, including industrial production, T-bill rate, corporate bond yield spreads, and past unemployment rate. Finally, we use the Bloomberg consensus forecast, available starting in 1997. For the ARMA, Boyd et al. (2005), and Bloomberg forecasts, the surprise is calculated as the difference between the actual unemployment rate and unemployment forecasts. The date of reference for the

actual unemployment rate is the release date of the employment situation announcement made by the U.S. Bureau of Labor Statistics.

For predictor variables, we carry out separate analyses using detrended levels of the WSJ, NYT, and the two composite attention indices. Specifically, to capture very short run movements, we use the difference between the 5-day simple moving average and the 20-day simple moving average of the attention indices (MAI_{5-20}). To capture a range of other movements, we similarly calculate 5-, 20-, and 60-day moving averages detrended by the 252-day moving average (i.e., MAI_{5-252}, MAI_{20-252}, MAI_{60-252}). Following Boyd et al. (2005), we also interact each of the predictor variables with NBER recession dummies. Since the NBER dummies are not known in advance, regressions using these interactions are not predictive. Boyd et al. (2005) hypothesize that "bad news" for unemployment means different things in expansions and contractions, and the interaction variables allow us to see whether the predictive ability of attention, if it exists, concentrates in contractions.

Table 8 shows that the detrended unemployment attention variables are significantly related to surprises in the unemployment report, and that the interaction variables are often important. Under the random walk model, three of the four detrended versions of both the WSJ (Panel A) and NYT (Panel B) attention index positively predict future surprises in unemployment, and all variables are significant when interacted with the NBER recession dummies. Hence, increases in media attention to unemployment positively predict future changes in unemployment, and this relationship is strong during recessions. Changes in media attention retain the ability to explain future changes in employment relative to ARMA forecasts, the Boyd et al. (2005) regression model, and even the Bloomberg consensus forecast. For example, two of the four detrended WSJ variables predict the Bloomberg surprise at the 10% level, and three of the four variables are significant in interactions with the NBER surprise.

Figure 4 shows graphically how attention changes before and after unemployment

surprises. There are twelve panels, corresponding to all combinations of the main three unemployment surprises, and the four unemployment attention indices. For each unemployment surprise, we separate the data into three equal-sized bins of small, medium, and large surprises. We then plot in event time the average attention over a period one year prior to the surprise, out to one year subsequent to the surprise. The results show similar patterns. When the unemployment surprise is particularly low, on average attention to unemployment in the media has been declining over the past year, and continues to decline over the following year. Conversely, when the unemployment surprise is large and positive, on average attention has been increasing over the prior year, and continues to increase over the following year. When the unemployment surprise is in the middle tercile, on average attention is approximately flat over the prior and following years, and at a lower level than for large positive or negative surprises. These findings are consistent with the regression results, and confirm that attention moves both before and after changes in reported fundamentals.

It is natural to think that if changing attention to unemployment predicts unemployment announcement surprises, then it may also predict market returns on the day of the employment announcement. This topic relates to prior research by Boyd et al. (2005), who show that unemployment surprises generally relate positively to market returns on the announcement date, but the relationship turns negative during NBER recessions. In Table 9, we revisit their results using the four different measures of market surprise defined previously, and adding measures of media attention as explanatory variables.

The first column of Table 9 shows results with only the variables used by Boyd et al. (2005). For all definitions of the unemployment surprise, the signs of the coefficient estimates are consistent with their results: unemployment surprises positively relate to market returns, but the relationship turns negative in recessions. For the surprise variable used in their study (Panel C), both the surprise and the interaction term are significant at the 10% level.

The remaining columns of Table 9 consider as explanatory variables, separately and with the Boyd et al. variables as controls, measures of changes in attention. The short-horizon trend in attention (5-day minus 20-day moving average) is positive and significant at the 5% level in all specifications, and remains significant with the Boyd et al. variables as controls. The medium-horizon attention trend (20-day minus 250-day moving average), positively relates to the market return, but is not significant independently. However, interacted with the NBER recession dummy, the coefficients are uniformly positive and significant. The sign is opposite to the coefficient on the surprise itself interacted with the NBER recession dummy.

It is important to distinguish between the trend in attention, which reflects anticipation, and the surprise itself, which reflects a realization. Consistent with the results of Boyd et al. (2005), during a recession a higher realization of unemployment on the announcement date leads to lower market returns. We add to this that rising attention before the announcement date tends to be associated with higher market returns on the announcement date, as uncertainty is resolved. These results are robust across all four definitions of the unemployment surprise.

7 Conclusion

We build indices of media attention to macroeconomic fundamentals based on news articles from WSJ and NYT. These indices display several interesting empirical properties. First, the indices are imperfectly correlated, and over time attention focuses on different fundamentals. Second, attention appears to be highly persistent. Finally, both graphical and statistical evidence show that attention seems to be related to underlying fundamentals. We use these new indices to examine the impact of media attention to stock market activities and find they have material effects on market trade volume and implied volatility.

Our paper is an early effort in the growing literature documenting the empirical importance of media in economics. Several lines of future work look promising. Most relevant to our work, time-varying attention to different macroeconomic fundamentals in the news media suggests the possibility of time-varying investor concerns. In the spirit of Merton (1980) Intertemporal Capital Asset Pricing Model, such concerns could be related to time-variation in the risks or risk premia associated with different types of macroeconomic fundamentals. Measures like ours of media attention to macro fundamentals could provide good instruments for time-varying risks or risk premia in asset pricing models with multiple macroeconomic risk factors. Moreover, our media attention indices do not only captures formal macroeconomic announcements, but also may reflect some other information such as informal communication from the Fed. Therefore, our indices may shed some lights on the interesting facts documented in Cieslak et al. (2015) about the importance of informal information coming from the Federal Reserve.

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Figure 1: Media Attention and Macroeconomic Fundamentals

This figure shows the monthly media attention indices for the Wall Street Journal (MAI-WU), the New York Times (MAI-NU), the demeaned composite index (MAI-C1), and the demeaned and standardized composite index (MAI-C2) against related macroeconomic fundamentals described in Table 2. The blue line represents a particular media attention index (MAI) (y-axis) and the red dotted line (secondary-y axis) is the related macroeconomic fundamental. The units are in percentage. The gray vertical bars are NBER recessions.

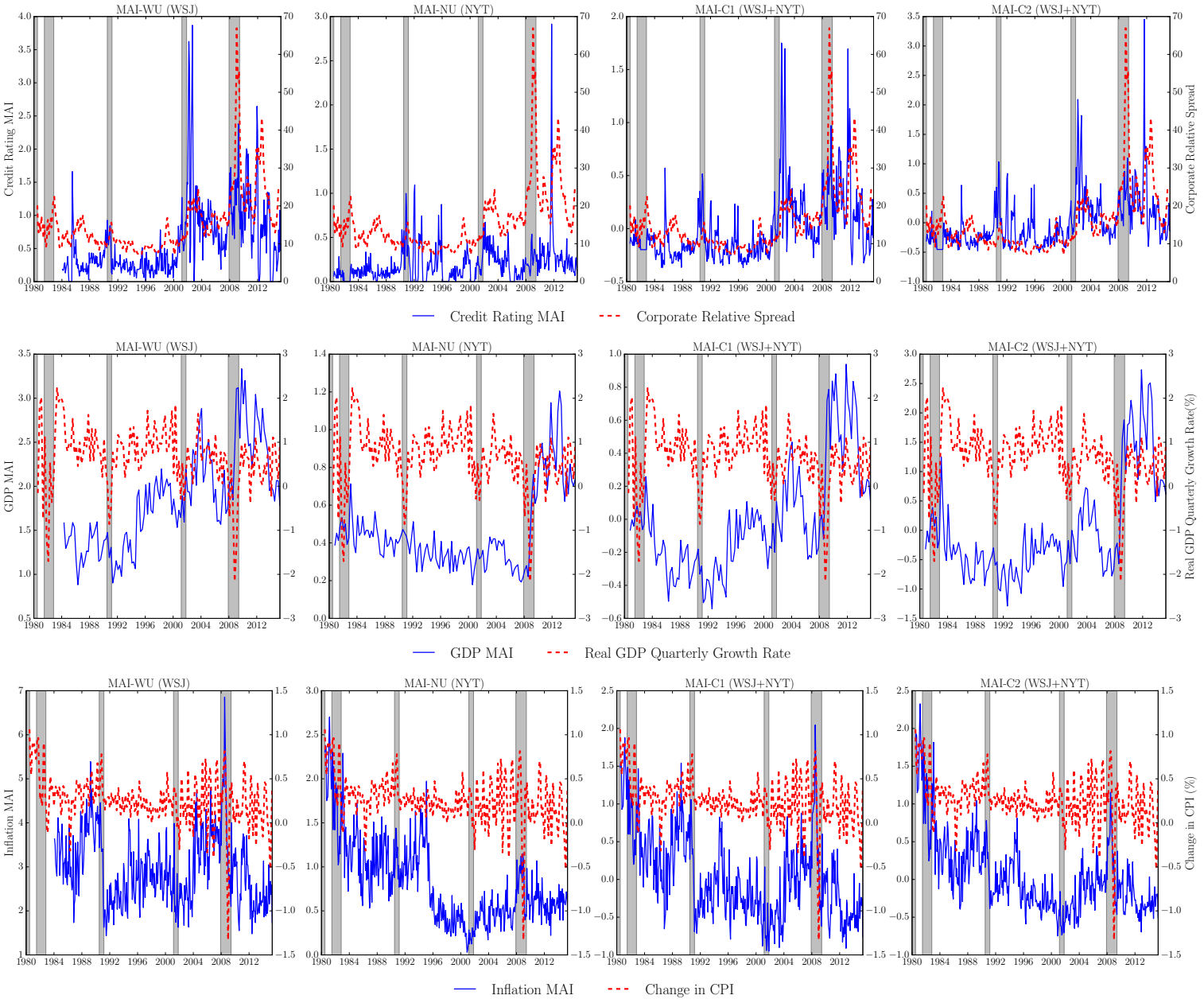

Figure 1: Continued

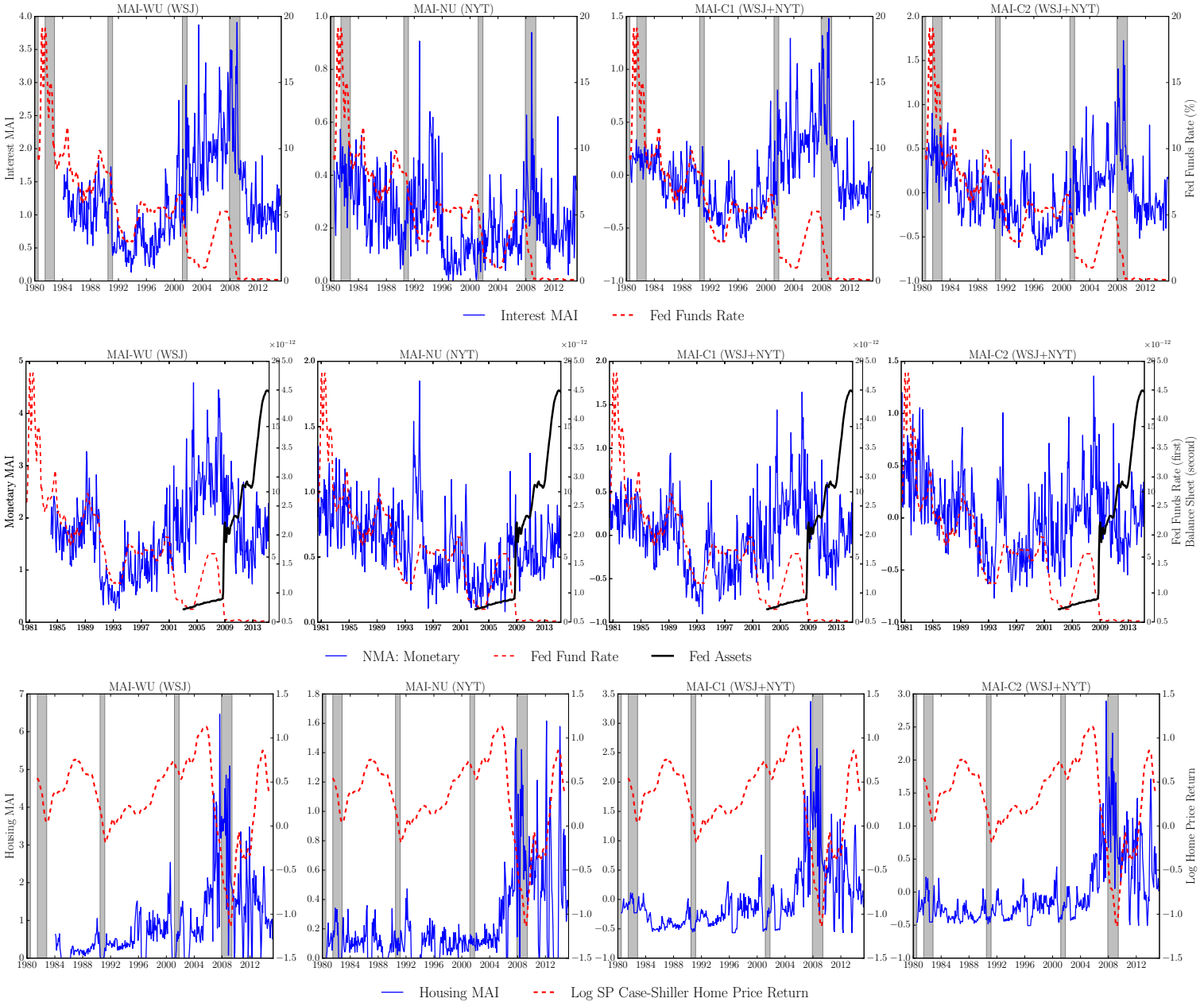

Figure 1: Continued

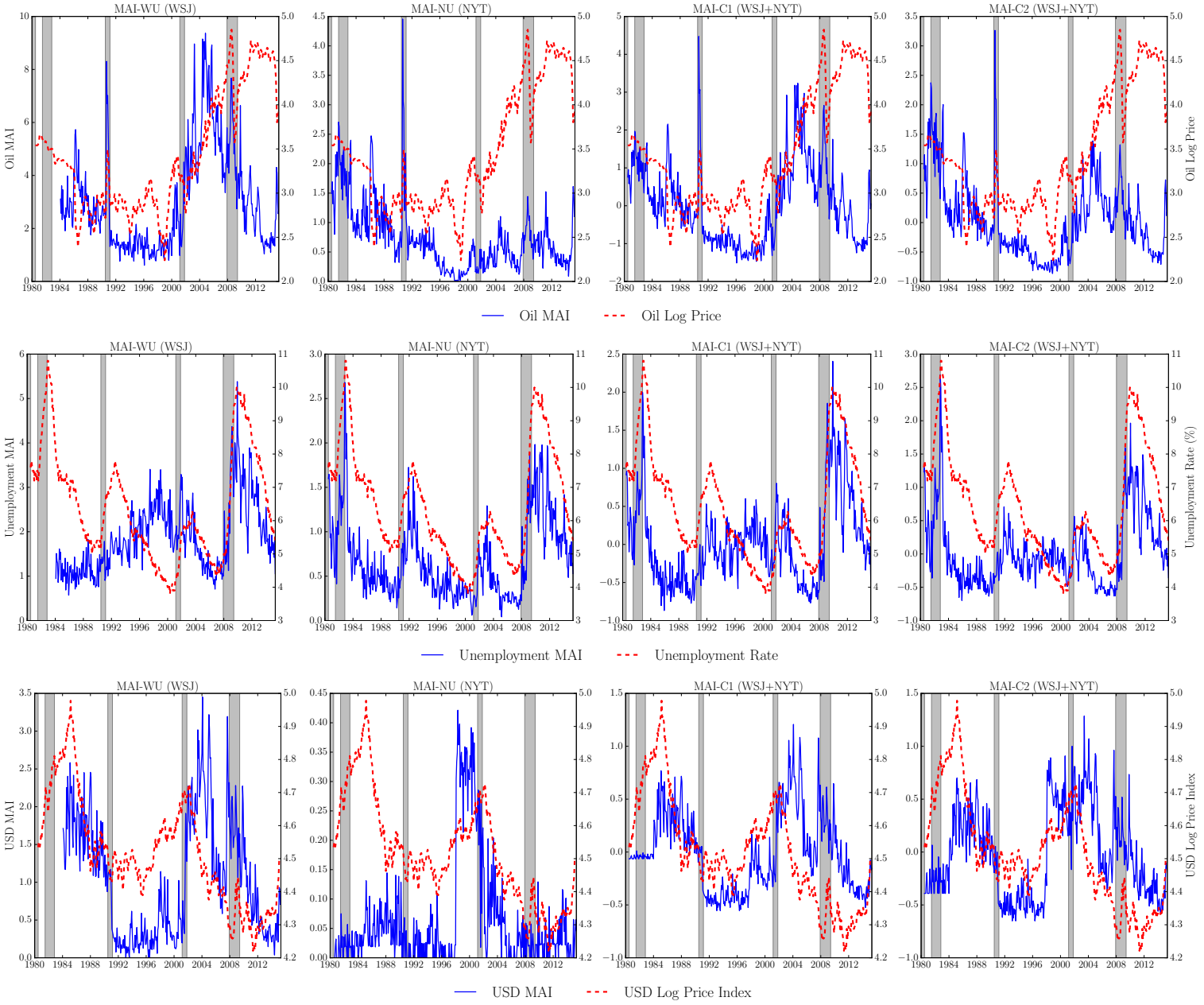

Figure 2: Media Attention and Macroeconmic Announcements

This figure shows the autocorrelation ρ_k of the composite media attention index MAI-C2 for k lags ranging from 1 to 250 trading days. The dashed line represents the 95% critical value for the test $\rho_k \leq 0$, where we use the "large-lag" standard errors of Anderson (1976). These standard errors account for the observed autocorrelations for lags less than k.

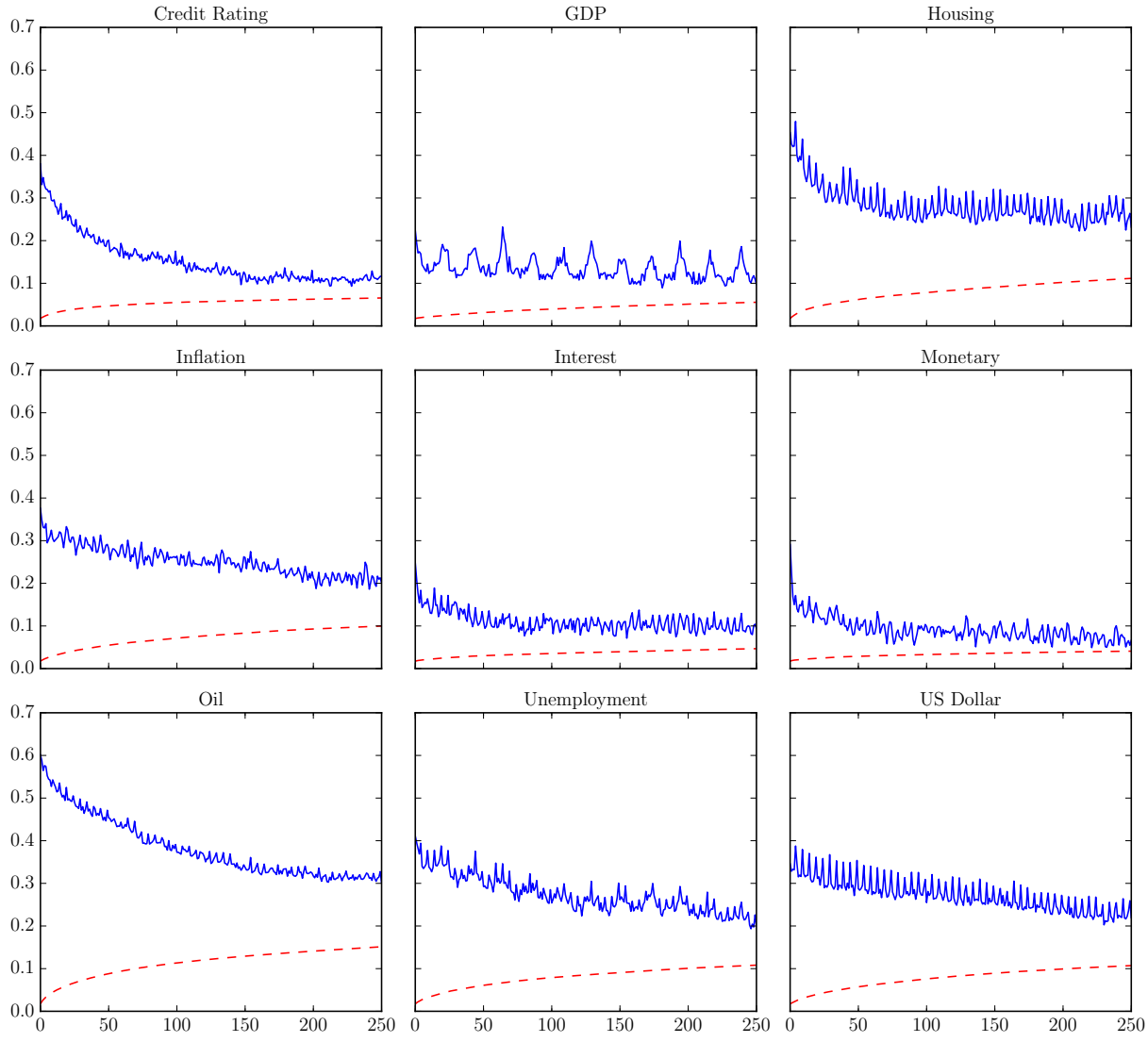

Figure 3: Media Attention and Macroeconmic Announcements

This figure shows the coefficients from a regression of the composite media attention index MAI-C2 on related announcements as specified in equation (4). The shaded area corresponds to the 95% confidence interval. The X-axis is the number days since the announcement. CPI Ann. and PPI Ann. stand for the monthly consumer price index and producer price index announcements, respectively. Employment Ann. is the monthly employment situation announcement. FOMC Ann. stands for the Federal Open Market Committee announcements. We also separate FOMC announcements into two group: Pre-1994 and Post-1994 Announcements. GDP Advance, Preliminary, and Final are the three of GDP announcements.

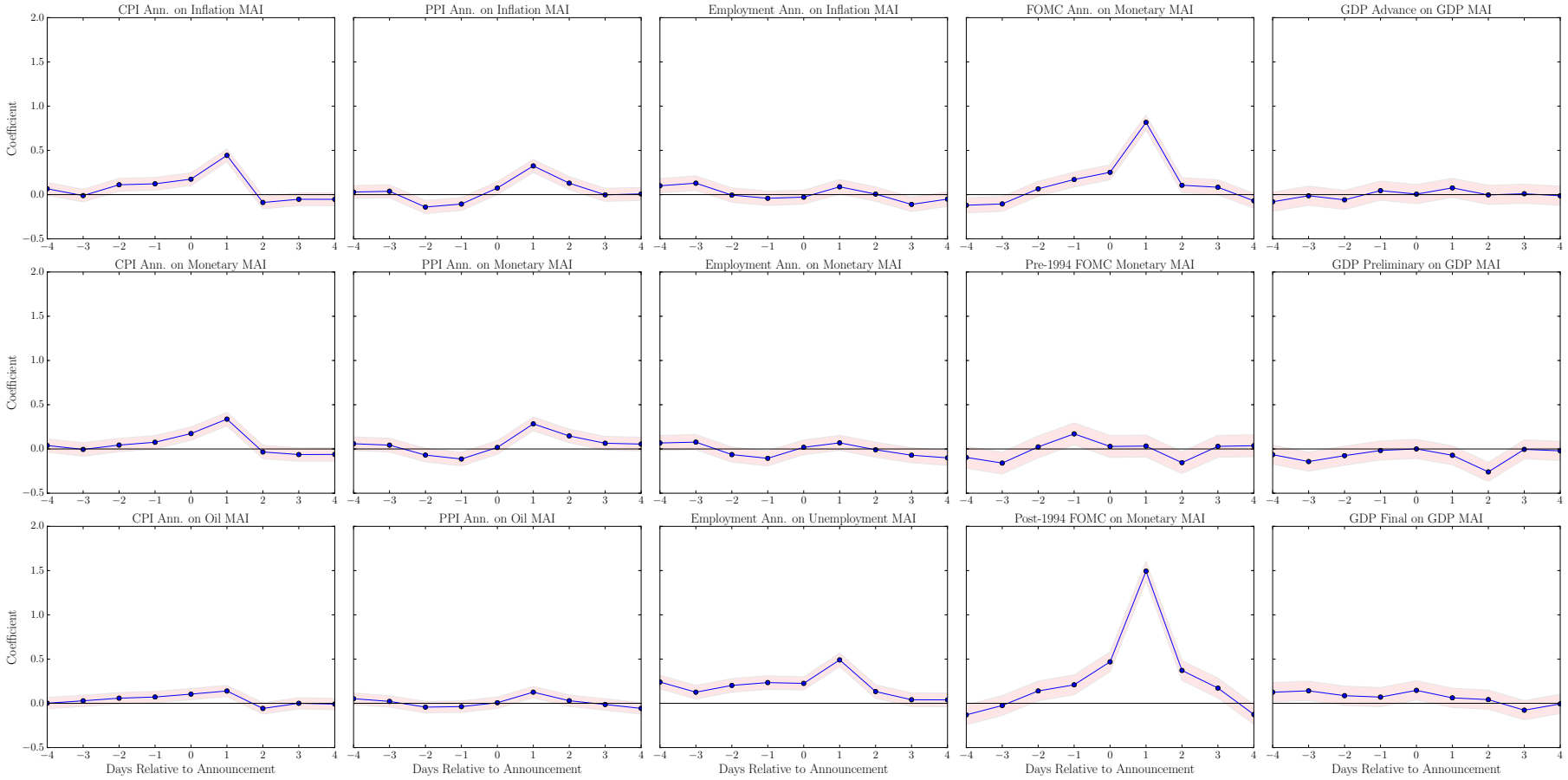

Figure 4: Media Attention around Unemployment Announcement

This figure shows the daily 60-day moving average of the unemployment media attention for the Wall Street Journal (MAI-WU), the New York Times (MAI-NU), the demeaned composite (MAI-C1), and the demeaned and standardized composite (MAI-C2) indices around the employment situation announcements. The window is 250 trading days before and after each announcement. We separate each of the employment situation announcement surprises described in the main text into terciles. The MAI around low surprise is in blue (solid line), medium surprise is in red (dotted line), and high surprise is in black (dashed line).

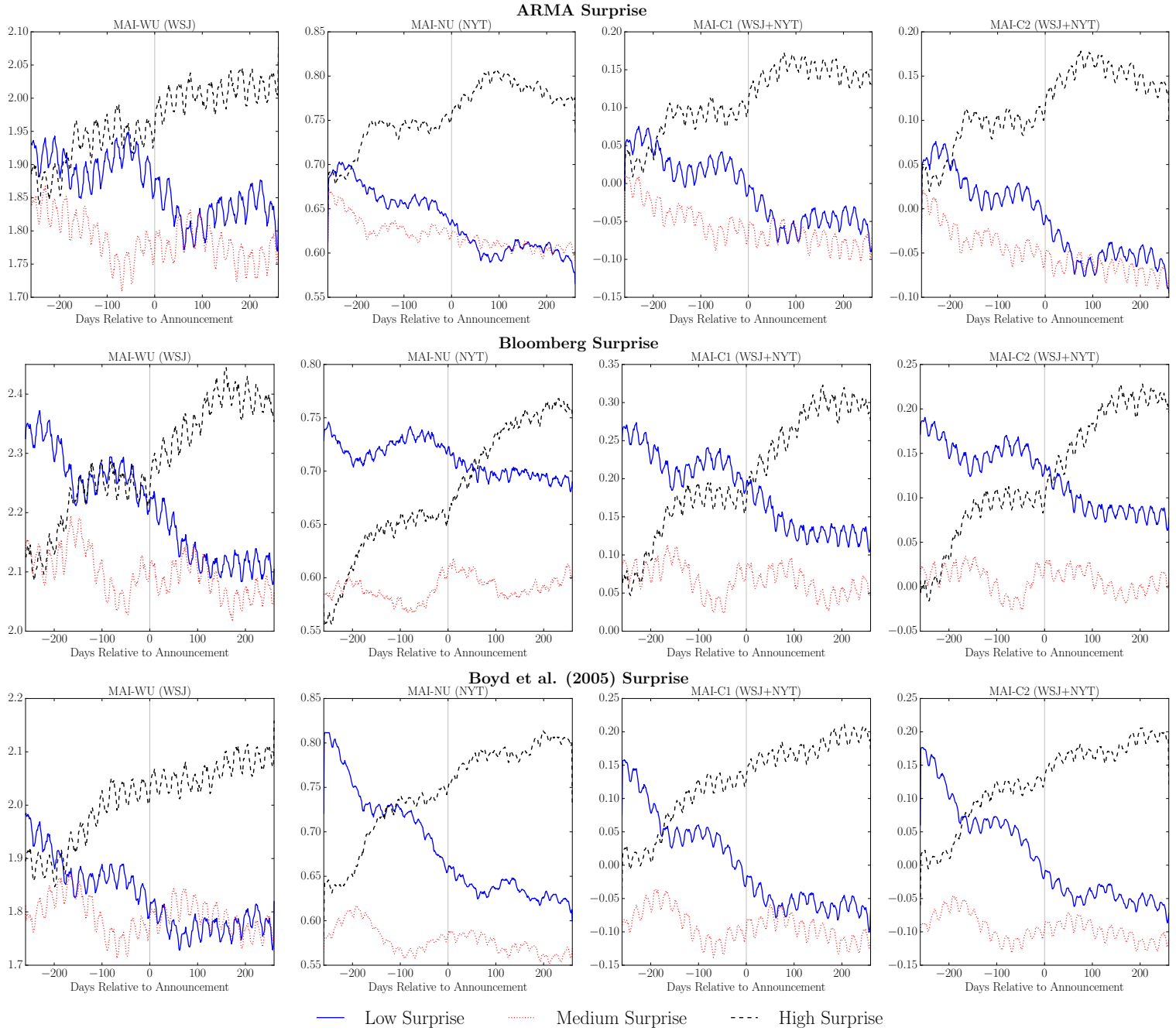

Table 1: Newspapers Search Words

This table presents the search words used to select the articles related to nine specific macroeconomic fundamentals in the Wall Street Journal and New York Times. The nine macroeconomic fundamentals are credit rating, Gross Domestic Product (GDP), housing market, inflation, interest rate, monetary, oil, US dollar, and unemployment.

Category	Newspapers Search Words
Credit Rating	(credit rating) or (bond rating)
GDP	gross domestic product or GDP or G.D.P or G.N.P or gross national product or GNP
Housing Market	(housing market) or (house sale) or (new home start) or (home construction) or (residential construction) or (housing sale) or (home price)
Inflation	inflation and (economy or economic or Federal Reserve)
Interest Rate	interest rate and (economic or economy or federal reserve)
Monetary	(federal reserve or federal open market committee or FOMC) and (interest rate or monetary or inflation)
Oil	oil
U.S. Dollar	u.s. dollar or u.s. exchange rate or u.s. currency
Unemployment	(unemployment or population out of work) and (economy or economic)

Table 2: Media Attention Link to Macroeconomic Fundamentals

This table presents the media attention indices (MAI) for credit rating, Gross Domestic Product (GDP), housing market, inflation, interest rate, monetary, oil, US dollar, and unemployment and their related macroeconomic fundamentals and announcements. The table also reports the data sources for the fundamentals.

MAI	Fundamental		Macroeconomic Announcement	
	Name of Fundamental	Source of Fundamental	Name of Announcement	Frequency
Credit Rating	Corporate Relative Spread	Moody's		
GDP	Quarter-to-quarter real GDP growth rate	BLS	Gross Domestic Product (GDP)	Quarterly
Housing	S&P Case-Shiller Home Price Index	Standard & Poors	Case-Shiller Home Price	Monthly
Inflation	Change in CPI	Bureau of Labor Statistics	Consumer Price Index (CPI)	Monthly
Inflation	Change in PPI	Bureau of Labor Statistics	Producer Price Index (PPI)	Monthly
Interest	Federal Fund Rate	Federal Reserve	Federal Open Market Committee (FOMC)	8 per year
Monetary	Federal Fund Rate	Federal Reserve	Federal Open Market Committee (FOMC)	8 per year
Oil	Crude Oil Spot Price	Energy Information Administration (EIA)		
Unemployement	Unemployment rate	Bureau of Labor Statistics	Employment Situation	Monthly
USD	U.S. Dollar Index	FRED		

Table 3: Descriptive Statistics and Correlation

Panel A of this table presents the descriptive statistics for the daily unadjusted media attention indices (MAI) for the Wall Street Journal (MAI-WU$_{f,t}$) and New York Times (MAI-NU$_{f,t}$) and for the Economic Policy Uncertainty (EPU) index, implied volatility (VXO), and detrended log S&P 500 trade volume. Columns Mon to Sun are the daily averages for each MAI. Panel B shows the descriptive statistics at the monthly frequency. The columns Jan to Dec correspond to the monthly averages. Panels C and D show the correlation between the nine demeaned and standardized media attention composite indices (MAI-C2$_{f,t}$) at the daily and monthly frequency, respectively. Obs. stands for the number of observations, St. Dev. is the standard deviation.

Panel A: Descriptive Statistics - Daily MAI (1980-2015)

	Obs.	Mean	St. Dev.	Min	Max	Mon	Tues	Wed	Thur	Frid	Sat	Sun
Wall Street Journal												
Credit Rating	11443	0.46	0.89	0.00	9.67	0.50	0.58	0.73	0.57	0.62	0.22	0.00
GDP	11443	1.41	1.54	0.00	12.91	2.09	1.65	1.82	1.77	1.94	0.62	0.00
Housing	11443	0.71	1.46	0.00	17.18	0.62	0.68	1.40	0.84	0.99	0.42	0.00
Inflation	11443	2.24	2.06	0.00	15.71	3.28	2.47	3.01	2.86	3.15	0.87	0.00
Interest	11443	0.95	1.23	0.00	13.54	1.21	1.02	1.40	1.31	1.30	0.40	0.00
Monetary	11443	1.31	1.49	0.00	16.08	1.88	1.44	1.77	1.79	1.71	0.61	0.00
Oil	11443	2.34	2.57	0.00	19.47	2.82	2.98	3.37	3.05	3.16	0.97	0.00
Unemp.	11443	1.44	1.64	0.00	14.07	2.00	1.48	2.09	1.59	2.18	0.73	0.00
USD	11443	0.78	1.08	0.00	9.60	0.97	1.07	1.07	1.03	1.08	0.24	0.00
New York Times												
Credit Rating	12752	0.20	0.43	0.00	10.06	0.11	0.21	0.24	0.23	0.20	0.17	0.23
GDP	12752	0.51	0.58	0.00	5.65	0.37	0.43	0.46	0.49	0.53	0.43	0.88
Housing	12752	0.29	0.57	0.00	7.23	0.11	0.18	0.28	0.28	0.28	0.20	0.68
Inflation	12752	0.90	0.91	0.00	12.26	0.66	0.70	0.93	0.89	0.94	0.82	1.37
Interest	12752	0.26	0.38	0.00	3.12	0.19	0.21	0.27	0.28	0.26	0.24	0.34
Monetary	12752	0.62	0.62	0.00	6.51	0.41	0.50	0.67	0.70	0.73	0.66	0.68
Oil	12752	0.76	0.84	0.00	8.94	0.50	0.73	0.80	0.84	0.81	0.70	0.91
Unemp.	12752	0.81	0.90	0.00	10.53	0.58	0.55	0.70	0.67	0.92	0.78	1.48
USD	12752	0.08	0.20	0.00	3.34	0.01	0.08	0.07	0.08	0.08	0.07	0.18
Other Variables												
EPU	11077	102.61	70.29	3.38	719.07	111.25	102.56	96.44	90.01	93.26	90.70	134.02
VXO	7386	20.73	9.06	8.51	150.19	20.80	20.67	20.68	20.79	20.74	NaN	NaN
Volume	8725	20.15	1.48	16.52	23.16	20.07	20.17	20.18	20.17	20.15	20.20	20.14

Table 3: continued

Panel B: Descriptive Statistics - Monthly MAI (1980-2015)

	Obs.	Mean	St. Dev.	Min	Max	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wall Street Journal																	
Credit Rating	376	0.60	0.56	0.00	3.87	0.59	0.61	0.60	0.51	0.52	0.65	0.61	0.68	0.56	0.58	0.62	0.65
GDP	376	1.86	0.61	0.73	4.10	1.93	1.92	1.79	1.77	1.70	1.78	1.83	2.03	1.83	1.85	1.95	1.90
Housing	376	0.90	1.01	0.00	6.47	1.00	0.87	0.86	0.86	0.93	0.96	0.94	0.96	0.88	0.92	0.83	0.83
Inflation	376	2.96	0.82	1.43	6.85	3.15	3.08	2.93	2.81	3.00	3.05	2.79	3.00	2.98	2.81	2.87	3.01
Interest	376	1.24	0.69	0.13	3.91	1.34	1.12	1.25	1.13	1.18	1.31	1.20	1.39	1.22	1.24	1.26	1.31
Monetary	376	1.71	0.78	0.23	4.59	1.84	1.68	1.69	1.56	1.71	1.80	1.67	1.84	1.72	1.65	1.63	1.77
Oil	376	3.07	1.94	0.61	9.37	3.13	2.87	3.13	3.09	3.08	2.99	2.89	3.15	3.13	3.20	3.03	3.22
Unemp.	376	1.87	0.80	0.57	5.38	2.03	1.91	1.74	1.68	1.68	1.78	1.85	1.90	1.98	1.86	1.99	2.03
USD	376	1.04	0.79	0.00	3.45	1.21	0.99	1.01	0.99	0.97	0.89	1.08	1.05	1.08	1.07	1.12	1.05
New York Times																	
Credit Rating	419	0.20	0.23	0.00	2.91	0.23	0.19	0.17	0.17	0.17	0.18	0.20	0.21	0.19	0.21	0.23	0.22
GDP	419	0.46	0.23	0.11	1.55	0.51	0.45	0.42	0.46	0.40	0.43	0.45	0.43	0.46	0.46	0.48	0.50
Housing	419	0.23	0.28	0.00	1.62	0.28	0.27	0.21	0.18	0.18	0.17	0.23	0.28	0.25	0.26	0.20	0.22
Inflation	419	0.82	0.48	0.03	2.70	0.97	0.85	0.81	0.74	0.82	0.87	0.83	0.81	0.82	0.78	0.74	0.82
Interest	419	0.24	0.14	0.00	0.94	0.24	0.23	0.25	0.21	0.24	0.23	0.26	0.27	0.24	0.24	0.21	0.24
Monetary	419	0.60	0.27	0.08	1.85	0.69	0.63	0.60	0.53	0.59	0.60	0.61	0.65	0.61	0.58	0.55	0.57
Oil	419	0.74	0.58	0.00	4.46	0.82	0.75	0.78	0.72	0.68	0.71	0.72	0.78	0.73	0.75	0.63	0.77
Unemp.	419	0.68	0.45	0.04	2.68	0.81	0.71	0.61	0.55	0.61	0.61	0.70	0.66	0.72	0.76	0.76	0.71
USD	419	0.06	0.09	0.00	0.42	0.06	0.07	0.07	0.06	0.08	0.06	0.05	0.08	0.05	0.07	0.06	0.06
Other Variables																	
EPU	360	101.33	41.96	37.27	271.83	127.67	106.13	94.75	82.98	86.87	89.70	94.48	95.44	107.89	112.99	111.94	105.12
VXO	352	20.77	8.36	9.54	61.41	21.04	20.54	20.50	19.40	19.21	18.82	19.84	20.91	22.67	23.88	21.91	20.63
Volume	415	0.01	0.09	-0.35	0.31	0.12	-0.04	0.05	0.02	-0.03	0.02	0.05	-0.03	0.00	0.07	-0.08	-0.04

Table 3: continued

Panel C: Correlation - Daily MAI-C2 (1980-2015)

	Credit Rating	GDP	Housing	Inflation	Interest	Monetary	Oil	Unemp.	USD	EPU	VXO	Volume	Lag VXO	Lag Volume
Credit Rating	1.00	0.14	0.14	-0.06	0.06	0.02	0.04	0.12	0.09	0.15	0.18	0.28	0.18	0.27
GDP	0.14	1.00	0.14	0.17	0.11	0.14	0.07	0.30	0.04	0.12	0.07	0.21	0.07	0.21
Housing	0.14	0.14	1.00	0.03	0.17	0.13	0.05	0.15	0.02	0.06	0.03	0.41	0.03	0.41
Inflation	-0.06	0.17	0.03	1.00	0.35	0.56	0.39	0.29	0.02	0.05	0.01	-0.35	0.01	-0.33
Interest	0.06	0.11	0.17	0.35	1.00	0.56	0.26	0.17	0.11	0.12	0.13	0.01	0.13	0.02
Monetary	0.02	0.14	0.13	0.56	0.56	1.00	0.27	0.21	0.11	0.10	0.06	-0.06	0.07	-0.06
Oil	0.04	0.07	0.05	0.39	0.26	0.27	1.00	0.09	0.11	0.06	0.09	-0.20	0.09	-0.20
Unemp.	0.12	0.30	0.15	0.29	0.17	0.21	0.09	1.00	-0.05	0.25	0.17	0.10	0.17	0.09
USD	0.09	0.04	0.02	0.02	0.11	0.11	0.11	-0.05	1.00	-0.01	0.26	0.09	0.26	0.08
EPU	0.15	0.12	0.06	0.05	0.12	0.10	0.06	0.25	-0.01	1.00	0.28	0.08	0.29	0.08
VXO	0.18	0.07	0.03	0.01	0.13	0.06	0.09	0.17	0.26	0.28	1.00	0.11	0.97	0.11
Volume	0.28	0.21	0.41	-0.35	0.01	-0.06	-0.20	0.10	0.09	0.08	0.11	1.00	0.11	0.99
Lag VXO	0.18	0.07	0.03	0.01	0.13	0.07	0.09	0.17	0.26	0.29	0.97	0.11	1.00	0.11
Lag Volume	0.27	0.21	0.41	-0.33	0.02	-0.06	-0.20	0.09	0.08	0.08	0.11	0.99	0.11	1.00

Panel D: Correlation - Monthly MAI-C2 (1980-2015)

	Credit Rating	GDP	Housing	Inflation	Interest	Monetary	Oil	Unemp.	USD	EPU	VXO	Volume	Lag VXO	Lag Volume
Credit Rating	1.00	0.41	0.27	-0.24	0.15	-0.02	0.01	0.24	0.18	0.34	0.30	0.01	0.28	0.01
GDP	0.41	1.00	0.35	-0.09	0.09	0.07	0.01	0.61	-0.05	0.22	0.14	-0.07	0.17	-0.09
Housing	0.27	0.35	1.00	-0.09	0.32	0.17	0.01	0.20	-0.02	-0.03	0.06	0.05	0.03	-0.03
Inflation	-0.24	-0.09	-0.09	1.00	0.44	0.63	0.59	0.18	-0.13	0.10	-0.02	0.06	-0.07	-0.01
Interest	0.15	0.09	0.32	0.44	1.00	0.73	0.51	0.17	0.21	0.16	0.22	0.06	0.22	-0.02
Monetary	-0.02	0.07	0.17	0.63	0.73	1.00	0.47	0.16	0.14	0.08	0.09	0.08	0.06	-0.02
Oil	0.01	0.01	0.01	0.59	0.51	0.47	1.00	0.09	0.13	0.18	0.09	0.05	0.05	-0.03
Unemp.	0.24	0.61	0.20	0.18	0.17	0.16	0.09	1.00	-0.22	0.42	0.29	-0.03	0.32	-0.07
USD	0.18	-0.05	-0.02	-0.13	0.21	0.14	0.13	-0.22	1.00	-0.02	0.43	0.02	0.42	0.01
EPU	0.34	0.22	-0.03	0.10	0.16	0.08	0.18	0.42	-0.02	1.00	0.44	0.05	0.41	-0.02
VXO	0.30	0.14	0.06	-0.02	0.22	0.09	0.09	0.29	0.43	0.44	1.00	0.05	0.83	0.05
Volume	0.01	-0.07	0.05	0.06	0.06	0.08	0.05	-0.03	0.02	0.05	0.05	1.00	-0.13	-0.19
Lag VXO	0.28	0.17	0.03	-0.07	0.22	0.06	0.05	0.32	0.42	0.41	0.83	-0.13	1.00	0.05
Lag Volume	0.01	-0.09	-0.03	-0.01	-0.02	-0.02	-0.03	-0.07	0.01	-0.02	0.05	-0.19	0.05	1.00

Table 4: AR(p) and Frequency Regressions

Panel A of this table presents AR(p) models of the monthly demeaned and standardized media attention composite indices (MAI-C2$_{ft}$), controlling for monthly time-fixed effects. DF(p-value) are the p-values for the Dickey-Fuller (DF) statistics that test the null of a unit root in each time series. Panel B reports the estimates from OLS regression of the daily demeaned and standardized media attention composite indices (MAI-C2$_{ft}$) on various moving average lags of itself. L1 corresponds to the lag of itself and L5, L21, L62, L250, and L1000 are the moving average for 5, 21, 62, 250, and 1000 days preceding the observed values at time t. We control for day-of-week fixed effects. The standard errors are reported in parenthesis and are calculated using Newey-West standard errors (10 lags). Obs. stands for the number of observations. *, **, and *** denote the statistical significance at the 10%, 5%, 1% levels, respectively.

Panel A: Monthly MAI-C2 AR(4) Coefficients and DF statistics

	Credit Rating	GDP	Housing	Inflation	Interest	Monetary	Oil	Unemp.	USD
const	0.02	0.05	-0.01	0.08**	0.03	0.03	0.11**	-0.01	-0.04
	(0.05)	(0.04)	(0.05)	(0.03)	(0.04)	(0.04)	(0.05)	(0.04)	(0.03)
AR(1)	0.66***	0.26***	0.60***	0.49***	0.53***	0.47***	0.66***	0.67***	0.54***
	(0.07)	(0.06)	(0.10)	(0.05)	(0.05)	(0.04)	(0.05)	(0.06)	(0.06)
AR(2)	0.01	0.28***	0.09	0.25***	0.15**	0.15***	0.18***	0.13**	0.19***
	(0.07)	(0.04)	(0.08)	(0.05)	(0.07)	(0.05)	(0.05)	(0.06)	(0.05)
AR(3)	0.05	0.31***	0.14	0.08	-0.03	0.08*	0.08	0.10*	0.13**
	(0.05)	(0.06)	(0.09)	(0.05)	(0.05)	(0.04)	(0.10)	(0.06)	(0.05)
AR(4)	0.09	0.06	0.03	0.09**	0.17***	0.06	-0.02	0.01	0.07
	(0.05)	(0.05)	(0.08)	(0.04)	(0.04)	(0.04)	(0.06)	(0.05)	(0.06)
DF (p-value)	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.09
Adj-R2	0.55	0.66	0.64	0.76	0.52	0.44	0.75	0.78	0.77
Obs.	415	415	415	415	415	415	415	415	415

Panel B: Daily MAI-C2 Frequency Regressions

	Credit Rating	GDP	Housing	Inflation	Interest	Monetary	Oil	Unemployment	U.S. Dollar
const	-0.15***	0.00	-0.21***	-0.02	-0.10***	-0.15***	-0.18***	-0.03	-0.22***
	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)
L1	0.08***	0.07***	0.04*	0.06***	0.13***	0.17***	0.11***	0.04**	0.01
	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)	(0.02)	(0.01)
L5	0.28***	0.12***	0.46***	0.13***	0.15***	0.12***	0.39***	0.22***	0.16***
	(0.06)	(0.03)	(0.07)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
L21	0.40***	0.06	0.23***	0.26***	0.27***	0.24***	0.30***	0.25***	0.39***
	(0.09)	(0.07)	(0.08)	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)
L62	0.06	0.34***	0.06	0.36***	0.15*	0.19***	0.13**	0.26***	0.29***
	(0.06)	(0.10)	(0.07)	(0.07)	(0.08)	(0.07)	(0.05)	(0.08)	(0.07)
L250	0.08	0.41***	0.17**	0.08	0.25***	0.16**	0.01	0.23***	0.14**
	(0.06)	(0.11)	(0.08)	(0.06)	(0.07)	(0.07)	(0.03)	(0.06)	(0.05)
L1000	0.02	-0.05	0.01	0.05	-0.01	0.01	0.03	-0.08***	-0.03
	(0.05)	(0.06)	(0.06)	(0.04)	(0.04)	(0.05)	(0.02)	(0.03)	(0.03)
Obs.	8109	8109	8109	8109	8109	8109	8109	8109	8109
Adj-R2	0.28	0.18	0.42	0.20	0.18	0.17	0.52	0.36	0.34

Table 5: Media Attention and Macroeconomic Fundamental

This table presents the results of an OLS regression of monthly macroeconomic media attention indices (MAI) on different macroeconomic fundamentals. Panels A, B, C and D report the results for the Wall Street media attention indices (MAI-WU), the New York Times (MAI-NU), the demeaned composite index (MAI-C1) and the demeaned and standardized composite index (MAI-C2), respectively. The general regression is specified in equation 6. F corresponds to the associated fundamental to each MAI as described in Table 2 and F_t is the moving average over t days. We control for monthly fixed effects. The standard errors are reported in parenthesis and are calculated using Newey-West standard errors (5 lags). Obs. stands for the number of observations. *, **, *** denote the statistic significance at the 10%, 5%, 1% levels, respectively.

Panel A: MAI-WU (Wall Street Journal)

MAI:	Credit Rating	GDP	Housing	Inflation	Interest	Monetary	Oil	Unemployment	US Dollar
F:	Credit Rating Spreads	GDP Growth	Home Price Ret	Δ CPI	Fed Fund	Fed Fund	Oil Price Ret	Unemp. Rate	USD Index Ret
$F_t - F_{t,t-3}$	0.055**		-0.276	-0.259	-0.280	-0.084	-0.024	-0.061	0.007
	(0.023)		(0.345)	(0.199)	(0.245)	(0.286)	(0.015)	(0.350)	(0.016)
$(F_t - F_{t,t-3})^2$	-0.002		0.483	-0.274	0.571	0.801	0.009***	4.124**	0.016**
	(0.003)		(0.436)	(0.331)	(0.603)	(0.572)	(0.002)	(1.830)	(0.008)
$F_{t,t-3} - F_{t,t-12}$	0.024*	0.176	-0.680***	0.704	0.161	0.293*	0.032	0.080	-0.023
	(0.012)	(0.124)	(0.255)	(0.456)	(0.140)	(0.161)	(0.021)	(0.230)	(0.050)
$(F_{t,t-3} - F_{t,t-12})^2$	0.001	0.315**	0.670***	1.139**	0.362***	0.327***	0.007***	0.179	0.055**
	(0.001)	(0.150)	(0.200)	(0.487)	(0.107)	(0.117)	(0.002)	(0.170)	(0.022)
$F_{t,t-12} - F_{t,t-48}$	0.022	0.294	-0.262	4.609***	0.132*	0.165**	0.172**	0.240***	-0.360***
	(0.019)	(0.294)	(0.272)	(1.098)	(0.071)	(0.075)	(0.074)	(0.085)	(0.115)
$(F_{t,t-12} - F_{t,t-48})^2$	0.001	0.399	2.406***	12.976**	0.075**	0.065*	-0.020	0.090**	0.296**
	(0.001)	(0.432)	(0.428)	(5.653)	(0.031)	(0.037)	(0.015)	(0.038)	(0.127)
const	0.556***	1.740***	0.141	3.015***	1.032***	1.562***	2.762***	1.847***	0.827***
	(0.087)	(0.100)	(0.112)	(0.111)	(0.115)	(0.126)	(0.324)	(0.134)	(0.152)
Obs.	372	125	372	376	376	376	376	376	374
Adj-R2	0.11	0.06	0.47	0.19	0.13	0.11	0.12	0.32	0.14

Panel B: MAI-NU (The New York Times)

MAI:	Credit Rating	GDP	Housing	Inflation	Interest	Monetary	Oil	Unemployment	US Dollar
F:	Credit Rating Spreads	GDP Growth	Home Price Ret	Δ CPI	Fed Fund	Fed Fund	Oil Price Ret	Unemp. Rate	USD Index Ret
$F_t - F_{t,t-3}$	0.022		-0.229*	-0.171**	-0.020	-0.003	-0.004	0.174	0.000
	(0.014)		(0.130)	(0.076)	(0.018)	(0.030)	(0.005)	(0.179)	(0.002)
$(F_t - F_{t,t-3})^2$	0.000		0.535***	-0.476***	0.030***	0.047***	0.001	1.096	0.000
	(0.001)		(0.121)	(0.162)	(0.007)	(0.012)	(0.001)	(0.942)	(0.001)
$F_{t,t-3} - F_{t,t-12}$	-0.001	0.059**	-0.318***	-0.533***	0.004	0.012	0.002	0.022	-0.001
	(0.004)	(0.029)	(0.103)	(0.158)	(0.012)	(0.029)	(0.014)	(0.088)	(0.004)
$(F_{t,t-3} - F_{t,t-12})^2$	-0.000	0.055	0.241***	-0.260	0.014**	0.045***	0.002	0.204**	-0.004**
	(0.000)	(0.053)	(0.081)	(0.165)	(0.005)	(0.014)	(0.001)	(0.100)	(0.002)
$F_{t,t-12} - F_{t,t-48}$	-0.012	0.154	-0.009	0.641	-0.019***	-0.021	-0.007	0.145***	-0.020*
	(0.011)	(0.096)	(0.109)	(0.642)	(0.006)	(0.014)	(0.031)	(0.040)	(0.011)
$(F_{t,t-12} - F_{t,t-48})^2$	0.001*	0.190	0.423**	6.503***	0.007***	-0.002	-0.006	0.068***	-0.016*
	(0.001)	(0.136)	(0.203)	(1.918)	(0.002)	(0.005)	(0.006)	(0.021)	(0.010)
const	0.188***	0.416***	0.003	0.644***	0.187***	0.509***	0.706***	0.558***	0.068***
	(0.038)	(0.046)	(0.044)	(0.081)	(0.025)	(0.045)	(0.111)	(0.058)	(0.016)
Obs.	415	125	415	419	419	419	419	419	417
Adj-R2	0.05	0.06	0.35	0.15	0.16	0.11	0.02	0.51	-0.00

Table 5: continued

Panel C: MAI-C1 (Demeaned Composite Index)

MAI:	Credit Rating	GDP	Housing	Inflation	Interest	Monetary	Oil	Unemployment	US Dollar
F:	Credit Rating Spreads	GDP Growth	Home Price Ret	Δ CPI	Fed Fund	Fed Fund	Oil Price Ret	Unemp. Rate	USD Index Ret
$F_t - F_{t,t-3}$	0.035**		-0.256	-0.234**	-0.042	-0.003	-0.014*	0.177	0.004
	(0.014)		(0.199)	(0.113)	(0.035)	(0.038)	(0.008)	(0.210)	(0.007)
$(F_t - F_{t,t-3})^2$	-0.001		0.513**	-0.407*	0.007	0.006	0.005***	1.601	0.007**
	(0.002)		(0.249)	(0.209)	(0.019)	(0.019)	(0.001)	(1.131)	(0.004)
$F_{t,t-3} - F_{t,t-12}$	0.011	0.117	-0.462***	-0.085	-0.005	0.027	0.014	0.111	-0.007
	(0.007)	(0.072)	(0.154)	(0.227)	(0.028)	(0.037)	(0.014)	(0.115)	(0.022)
$(F_{t,t-3} - F_{t,t-12})^2$	0.000	0.185**	0.449***	0.288	0.015	0.035*	0.003***	0.209**	0.023**
	(0.000)	(0.089)	(0.122)	(0.232)	(0.013)	(0.019)	(0.001)	(0.099)	(0.010)
$F_{t,t-12} - F_{t,t-48}$	0.003	0.224	-0.093	2.268***	0.010	0.026	0.053	0.172***	-0.185***
	(0.013)	(0.182)	(0.162)	(0.546)	(0.022)	(0.024)	(0.046)	(0.051)	(0.053)
$(F_{t,t-12} - F_{t,t-48})^2$	0.001*	0.295	1.429***	9.858***	0.007	0.001	-0.012	0.079***	0.141**
	(0.001)	(0.277)	(0.307)	(1.436)	(0.006)	(0.008)	(0.009)	(0.022)	(0.058)
const	-0.032	-0.076	-0.474***	-0.062	-0.006	-0.003	-0.068	-0.064	-0.100
	(0.045)	(0.063)	(0.057)	(0.077)	(0.065)	(0.061)	(0.174)	(0.074)	(0.067)
Obs.	415	125	415	419	419	419	419	419	417
Adj-R2	0.10	0.08	0.49	0.19	0.01	0.05	0.09	0.49	0.14

Panel D: MAI-C2 (Demeaned and Standardized Composite Index)

MAI:	Credit Rating	GDP	Housing	Inflation	Interest	Monetary	Oil	Unemployment	US Dollar
F:	Credit Rating Spreads	GDP Growth	Home Price Ret	Δ CPI	Fed Fund	Fed Fund	Oil Price Ret	Unemp. Rate	USD Index Ret
$F_t - F_{t,t-3}$	0.050**		-0.322	-0.216**	-0.054	0.005	-0.008	0.165	0.003
	(0.023)		(0.196)	(0.094)	(0.048)	(0.044)	(0.005)	(0.210)	(0.008)
$(F_t - F_{t,t-3})^2$	-0.001		0.692***	-0.456**	0.053**	0.036**	0.002**	1.585	0.007*
	(0.002)		(0.217)	(0.185)	(0.021)	(0.016)	(0.001)	(1.119)	(0.004)
$F_{t,t-3} - F_{t,t-12}$	0.011	0.300*	-0.501***	-0.378*	-0.001	0.017	0.004	0.135	-0.007
	(0.009)	(0.164)	(0.155)	(0.192)	(0.030)	(0.036)	(0.011)	(0.105)	(0.023)
$(F_{t,t-3} - F_{t,t-12})^2$	0.000	0.414*	0.447***	-0.028	0.032**	0.057***	0.002*	0.203*	0.009
	(0.001)	(0.218)	(0.120)	(0.173)	(0.015)	(0.021)	(0.001)	(0.114)	(0.011)
$F_{t,t-12} - F_{t,t-48}$	-0.006	0.636	-0.040	1.729***	-0.008	0.008	0.005	0.168***	-0.225***
	(0.020)	(0.451)	(0.171)	(0.599)	(0.020)	(0.019)	(0.032)	(0.044)	(0.059)
$(F_{t,t-12} - F_{t,t-48})^2$	0.002*	0.819	1.186***	9.650***	0.015***	0.002	-0.007	0.074***	0.081
	(0.001)	(0.693)	(0.328)	(1.750)	(0.005)	(0.007)	(0.006)	(0.022)	(0.062)
const	-0.046	-0.194	-0.452***	-0.109	-0.064	-0.054	0.011	-0.069	-0.091
	(0.063)	(0.168)	(0.059)	(0.074)	(0.062)	(0.053)	(0.117)	(0.065)	(0.076)
Obs.	415	125	415	419	419	419	419	419	417
Adj-R2	0.09	0.08	0.48	0.22	0.12	0.13	0.04	0.53	0.09

Table 6: Media Attention and Aggregate Trade Volume

This table presents the results of an OLS regression of the detrended S&P 500 trade volume regressed on the daily demeaned and standardized media attention composite indices (MAI-C2). We detrend the log trade volume using the moving average of the log trade volume of the past 60 trading days. We regress the detrended trade volume on the difference between the 5-day and 20-day moving average of MAI-C2 and a dummy equals 1 if there is a related announcement specified in Table 2, 0 otherwise. For all model specifications, we control for day-of-week fixed effects. The standard errors are reported in parenthesis and are calculated using Newey-West standard errors with 20 lags. Obs. stands for the number of observations. *, **, *** denote the statistical significance at the 10%, 5%, 1% levels, respectively.

MAI:	Inflation	Inflation	Inflation	Inflation	Inflation	Inflation	Monetary	Monetary	Monetary	Interest	Interest	Interest
Ann:	CPI	CPI	CPI	PPI	PPI	PPI	FOMC	FOMC	FOMC	FOMC	FOMC	FOMC
MAI_{5-20}	0.059***	0.058***	0.063***	0.059***	0.058***	0.063***	0.071***	0.071***	0.072***	0.049***	0.048***	0.049***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Ann		0.035***	0.042***		0.035***	0.042***		0.027***	0.030***		0.029***	0.030***
		(0.008)	(0.008)		(0.008)	(0.008)		(0.009)	(0.009)		(0.009)	(0.009)
MAI_{5-20}*Ann			-0.115***			-0.115***			-0.063**			-0.033
			(0.032)			(0.032)			(0.031)			(0.032)
const	0.003	0.001	0.001	0.003	0.001	0.001	0.003	0.003	0.003	0.003	0.003	0.003
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Obs.	8705	8705	8705	8705	8705	8705	8705	8705	8705	8705	8705	8705
Adj-R2	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.06	0.06

MAI:	GDP	GDP	GDP	Unemployment	Unemployment	Unemployment	Credit Rating	Oil	USD
Ann:	GDP Report	GDP Report	GDP Report	Employment	Employment	Employment			
MAI_{5-20}	0.018*	0.018*	0.016	0.033***	0.032***	0.034***	0.042***	0.041**	0.027*
	(0.010)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)	(0.013)	(0.018)	(0.014)
Ann		0.005	0.002		0.012	0.016			
		(0.008)	(0.009)		(0.011)	(0.013)			
MAI_{5-20}*Ann			0.060			-0.030			
			(0.042)			(0.040)			
const	0.003	0.003	0.003	0.003	0.001	0.001	0.003	0.015**	0.028***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.006)
Obs.	8705	8705	8705	8705	8705	8705	8705	7286	8282
Adj-R2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06

Table 7: Media Attention and Implied Volatility

This table presents the results of an OLS regression of implied volatility proxied by VXO regressed on the difference between the 20-day and 250-day moving average MAI-C2 and a dummy equals 1 if there is a related announcement specified in Table 2, 0 otherwise. For all model specifications, we control for day-of-week fixed effects. The standard errors are reported in parenthesis and are calculated using Newey-West standard errors (5 lags). Obs. stands for the number of observations. *, **, *** denote the statistical significance at the 10%, 5%, 1% levels, respectively.

MAI:	Inflation	Inflation	Inflation	Inflation	Inflation	Inflation	Monetary	Monetary	Monetary	Interest	Interest	Interest
Ann:	CPI	CPI	CPI	PPI	PPI	PPI	FOMC	FOMC	FOMC	FOMC	FOMC	FOMC
MAI_{20-250}	-2.415	-2.413	-2.455	-2.415	-2.413	-2.455	0.735	0.733	0.762	5.909**	5.908**	5.935**
	(4.722)	(4.722)	(4.683)	(4.722)	(4.722)	(4.683)	(2.753)	(2.753)	(2.763)	(2.575)	(2.575)	(2.579)
Ann		0.273	0.286		0.273	0.286		-0.254	-0.271		-0.191	-0.202
		(0.187)	(0.192)		(0.187)	(0.192)		(0.249)	(0.253)		(0.226)	(0.234)
MAI_{20-250}*Ann			0.910			0.910			-0.880			-0.855
			(1.164)			(1.164)			(0.818)			(1.072)
const	20.783***	20.766***	20.766***	20.783***	20.766***	20.766***	20.798***	20.799***	20.799***	20.794***	20.795***	20.795***
	(1.248)	(1.244)	(1.243)	(1.248)	(1.244)	(1.243)	(1.265)	(1.265)	(1.265)	(1.262)	(1.262)	(1.262)
Obs.	7304	7304	7304	7304	7304	7304	7304	7304	7304	7304	7304	7304
Adj-R2	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	0.03	0.03	0.03

MAI:	GDP	GDP	GDP	Unemployment	Unemployment	Unemployment	Credit Rating	Oil	USD
Ann:	GDP Report	GDP Report	GDP Report	Employment	Employment	Employment			
MAI_{20-250}	12.990***	12.998***	13.050***	14.019***	14.021***	14.058***	5.537***	1.421	4.351**
	(5.037)	(5.038)	(5.023)	(4.878)	(4.878)	(4.892)	(1.729)	(1.759)	(1.936)
Ann		0.325	0.311		0.210	0.209			
		(0.202)	(0.204)		(0.156)	(0.161)			
MAI_{20-250}*Ann			-1.039			-0.753			
			(1.116)			(1.002)			
const	20.688***	20.664***	20.663***	20.683***	20.635***	20.635***	20.833***	20.831***	20.812***
	(1.130)	(1.126)	(1.126)	(1.073)	(1.075)	(1.074)	(1.223)	(1.254)	(1.254)
Obs.	7304	7304	7304	7304	7304	7304	7279	7279	6966
Adj-R2	0.08	0.08	0.08	0.15	0.15	0.15	0.05	0.00	0.01

Table 8: Unemployment Surprise Forecasts

This table presents the results of an OLS regression of the unemployment surprise regressed on various detrended daily media attention indices at different frequencies and an interaction term between the detrended media attention indices and an NBER dummy. The NBER dummy equals 1 if the unemployment surprise occurs during a NBER recession. We use four different unemployment surprises. Each surprise is calculated as the difference between the actual unemployment for month t reported in month $t+1$ and (1) the random-walk (i.e. the previous month unemployment rate), (2) the forecasted unemployment rate from an ARMA model, (3) the forecasted unemployment rate as in Boyd et al. (2005), or (4) the median of the forecasted unemployment rate by economists surveyed by Bloomberg. The standard errors are reported in parenthesis and are calculated using the White's heteroskedasticity robust standard errors. Obs. stands for the number of observations. *, **, *** denote the statistical significance at the 10%, 5%, 1% levels, respectively.

Panel A: Wall Street Journal MAI

Dependent Variable: Random-Walk

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.024	0.008	0.038***	0.013	0.074***	0.019	0.128***	0.039
	(0.015)	(0.014)	(0.013)	(0.012)	(0.024)	(0.021)	(0.033)	(0.029)
MAI*NBER		0.205***		0.145***		0.197***		0.301***
		(0.066)		(0.026)		(0.044)		(0.040)
const	-0.012	-0.012	-0.012	-0.015*	-0.003	-0.011	-0.003	-0.013
	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Obs.	372	372	361	361	361	361	361	361
Adj-R2	0.01	0.05	0.03	0.11	0.04	0.10	0.07	0.14

Dependent Variable: ARMA Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.007	-0.003	0.014	-0.001	0.030	-0.004	0.049*	-0.005
	(0.014)	(0.014)	(0.011)	(0.011)	(0.020)	(0.021)	(0.027)	(0.027)
MAI*NBER		0.132***		0.090***		0.121***		0.184***
		(0.048)		(0.022)		(0.038)		(0.043)
const	-0.005	-0.005	-0.007	-0.009	-0.004	-0.009	-0.004	-0.010
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Obs.	372	372	361	361	361	361	361	361
Adj-R2	-0.00	0.02	0.00	0.04	0.01	0.03	0.01	0.04

Table 8: continued

Panel A: Continued.

Dependent Variable: Boyd et al. (2005) Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.019	0.015	0.025**	0.017	0.044**	0.025	0.069***	0.035
	(0.013)	(0.014)	(0.011)	(0.011)	(0.018)	(0.020)	(0.025)	(0.027)
MAI*NBER		0.054		0.045		0.066*		0.114**
		(0.058)		(0.029)		(0.039)		(0.045)
const	-0.022***	-0.022***	-0.021***	-0.022***	-0.015**	-0.018**	-0.015**	-0.019**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
Obs.	372	372	361	361	361	361	361	361
Adj-R2	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.03

Dependent Variable: Bloomberg Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.036**	0.024	0.020*	0.010	0.005	-0.014	0.012	-0.029
	(0.015)	(0.015)	(0.011)	(0.012)	(0.020)	(0.025)	(0.029)	(0.037)
MAI*NBER		0.136***		0.048**		0.060		0.119**
		(0.047)		(0.022)		(0.040)		(0.051)
const	-0.040***	-0.040***	-0.036***	-0.038***	-0.032***	-0.036***	-0.032***	-0.038***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)
Obs.	213	213	213	213	213	213	213	213
Adj-R2	0.02	0.05	0.01	0.02	-0.00	-0.00	-0.00	0.01

Table 8: continued

Panel B: New York Times MAI

Dependent Variable: Random-Walk

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	-0.011	-0.008	0.076***	0.044*	0.190***	0.121***	0.304***	0.187***
	(0.035)	(0.035)	(0.024)	(0.025)	(0.035)	(0.038)	(0.054)	(0.061)
MAI*NBER		-0.032		0.239***		0.278***		0.506***
		(0.153)		(0.088)		(0.081)		(0.110)
const	-0.004	-0.004	-0.007	-0.013	-0.002	-0.010	-0.002	-0.013
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Obs.	415	415	404	404	404	404	404	404
Adj-R2	-0.00	-0.00	0.03	0.07	0.08	0.11	0.12	0.17

Dependent Variable: ARMA Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	-0.039	-0.033	0.013	-0.002	0.068**	0.029	0.103*	0.024
	(0.034)	(0.035)	(0.022)	(0.025)	(0.033)	(0.040)	(0.053)	(0.063)
MAI*NBER		-0.067		0.110*		0.160**		0.343***
		(0.114)		(0.063)		(0.074)		(0.103)
const	0.002	0.002	0.001	-0.002	0.002	-0.003	0.002	-0.005
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Obs.	415	415	404	404	404	404	404	404
Adj-R2	0.00	0.00	-0.00	0.01	0.01	0.02	0.01	0.04

Dependent Variable: Boyd et al. (2005) Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.001	0.001	0.041*	0.034	0.093***	0.088**	0.164***	0.126**
	(0.032)	(0.034)	(0.021)	(0.023)	(0.031)	(0.035)	(0.048)	(0.058)
MAI*NBER		0.006		0.049		0.019		0.163
		(0.110)		(0.057)		(0.078)		(0.101)
const	-0.017**	-0.017**	-0.018**	-0.019**	-0.015**	-0.016**	-0.015**	-0.019**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
Obs.	415	415	404	404	404	404	404	404
Adj-R2	-0.00	-0.00	0.01	0.01	0.02	0.02	0.04	0.04

Dependent Variable: Bloomberg Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.000	0.011	0.019	0.013	0.046	0.022	0.015	-0.070
	(0.039)	(0.040)	(0.029)	(0.032)	(0.046)	(0.058)	(0.065)	(0.080)
MAI*NBER		-0.151		0.034		0.073		0.272**
		(0.118)		(0.070)		(0.091)		(0.130)
const	-0.032***	-0.032***	-0.033***	-0.034***	-0.032***	-0.034***	-0.032***	-0.038***
	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)
Obs.	213	213	213	213	213	213	213	213
Adj-R2	-0.00	-0.00	-0.00	-0.01	0.00	-0.00	-0.00	0.01

Table 8: continued

Panel C: Demeaned MAI

Dependent Variable: Random-Walk

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.029	0.008	0.075***	0.039**	0.160***	0.097***	0.241***	0.139***
	(0.025)	(0.024)	(0.019)	(0.019)	(0.029)	(0.032)	(0.040)	(0.046)
MAI*NBER		0.294**		0.220***		0.219***		0.362***
		(0.119)		(0.043)		(0.063)		(0.063)
const	-0.008	-0.008	-0.012	-0.017**	-0.001	-0.009	-0.001	-0.011
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Obs.	415	415	404	404	404	404	404	404
Adj-R2	0.00	0.03	0.05	0.12	0.09	0.12	0.12	0.17

Dependent Variable: ARMA Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	-0.006	-0.019	0.021	-0.001	0.059**	0.019	0.080**	0.007
	(0.023)	(0.024)	(0.017)	(0.018)	(0.027)	(0.033)	(0.038)	(0.046)
MAI*NBER		0.186**		0.133***		0.140**		0.258***
		(0.094)		(0.038)		(0.056)		(0.066)
const	0.001	0.001	-0.001	-0.004	0.002	-0.003	0.002	-0.005
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Obs.	415	415	404	404	404	404	404	404
Adj-R2	-0.00	0.01	0.00	0.03	0.01	0.03	0.01	0.04

Dependent Variable: Boyd et al. (2005) Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.025	0.018	0.047***	0.036**	0.088***	0.077***	0.130***	0.094**
	(0.023)	(0.023)	(0.016)	(0.017)	(0.024)	(0.029)	(0.034)	(0.043)
MAI*NBER		0.103		0.063		0.038		0.129**
		(0.096)		(0.043)		(0.054)		(0.065)
const	-0.020**	-0.020**	-0.021***	-0.023***	-0.015*	-0.016**	-0.015**	-0.018**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
Obs.	415	415	404	404	404	404	404	404
Adj-R2	0.00	0.00	0.02	0.03	0.03	0.03	0.04	0.05

Dependent Variable: Bloomberg Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.052**	0.037	0.030*	0.016	0.017	-0.011	0.016	-0.048
	(0.026)	(0.026)	(0.018)	(0.020)	(0.029)	(0.038)	(0.042)	(0.055)
MAI*NBER		0.283**		0.066*		0.077		0.178**
		(0.111)		(0.035)		(0.059)		(0.076)
const	-0.039***	-0.041***	-0.035***	-0.038***	-0.032***	-0.036***	-0.032***	-0.039***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)
Obs.	213	213	213	213	213	213	213	213
Adj-R2	0.01	0.04	0.01	0.02	-0.00	-0.00	-0.00	0.01

Table 8: continued

Panel D: Demeaned and Standardized MAI

Dependent Variable: Random-Walk

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.023	0.006	0.083***	0.047**	0.170***	0.112***	0.251***	0.155***
	(0.029)	(0.030)	(0.021)	(0.020)	(0.030)	(0.032)	(0.044)	(0.050)
MAI*NBER		0.218*		0.238***		0.219***		0.375***
		(0.130)		(0.055)		(0.067)		(0.078)
const	-0.007	-0.006	-0.010	-0.017**	-0.001	-0.009	-0.001	-0.011
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Obs.	415	415	404	404	404	404	404	404
Adj-R2	-0.00	0.01	0.05	0.11	0.10	0.13	0.12	0.17

Dependent Variable: ARMA Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	-0.016	-0.028	0.021	0.000	0.063**	0.027	0.083*	0.014
	(0.029)	(0.030)	(0.019)	(0.022)	(0.028)	(0.036)	(0.043)	(0.052)
MAI*NBER		0.139		0.138***		0.136**		0.270***
		(0.107)		(0.048)		(0.062)		(0.077)
const	0.001	0.002	-0.000	-0.004	0.002	-0.003	0.002	-0.005
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Obs.	415	415	404	404	404	404	404	404
Adj-R2	-0.00	0.00	0.00	0.02	0.01	0.03	0.01	0.04

Dependent Variable: Boyd et al. (2005) Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.022	0.015	0.049***	0.039**	0.091***	0.083***	0.135***	0.100**
	(0.028)	(0.029)	(0.018)	(0.019)	(0.025)	(0.030)	(0.038)	(0.047)
MAI*NBER		0.095		0.068		0.029		0.137*
		(0.104)		(0.048)		(0.058)		(0.072)
const	-0.019**	-0.019**	-0.020***	-0.022***	-0.015**	-0.016**	-0.015**	-0.019**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
Obs.	415	415	404	404	404	404	404	404
Adj-R2	-0.00	-0.00	0.02	0.03	0.03	0.03	0.04	0.05

Dependent Variable: Bloomberg Surprise

MAI:	MAI_{5-20}	MAI_{5-20}	MAI_{5-250}	MAI_{5-250}	MAI_{20-250}	MAI_{20-250}	MAI_{60-250}	MAI_{60-250}
MAI	0.052	0.039	0.033	0.018	0.027	-0.004	0.018	-0.059
	(0.034)	(0.034)	(0.022)	(0.025)	(0.035)	(0.047)	(0.050)	(0.065)
MAI*NBER		0.333**		0.072		0.082		0.214**
		(0.169)		(0.047)		(0.072)		(0.093)
const	-0.037***	-0.039***	-0.035***	-0.037***	-0.032***	-0.035***	-0.032***	-0.039***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)
Obs.	213	213	213	213	213	213	213	213
Adj-R2	0.01	0.02	0.01	0.01	-0.00	-0.00	-0.00	0.01

Table 9: S&P Return Forecast on Employment Situation Announcement Days

This table presents the results of an OLS regression of the daily S&P 500 log return on the employment situation announcement date regressed on the Boyd et al. (2005) surprise of the announcement, the surprise interacted with an NBER dummy, the daily detrended unemployment media attention index composite index MAI-C2, and the detrended unemployment media attention index interacted with an NBER dummy. The NBER dummy equal 1 if the unemployment surprise occurs during a NBER recession. We show the results for two different detrended frequencies for the unemployment media attention index. The standard errors are reported in parenthesis and are calculated using the White's heteroskedasticity robust standard errors. Obs. stands for the number of observations. *, **, *** denote the statistical significance at the 10%, 5%, 1% levels, respectively.

Dependent Variable: S&P 500 Daily Log Return - Surp: Random-Walk

MAI:		MAI_{5-20}	MAI_{5-20}	MAI_{5-20}	MAI_{20-250}	MAI_{20-250}	MAI_{20-250}
MAI		0.410**	0.389**	0.378**	0.281	-0.052	-0.087
		(0.173)	(0.175)	(0.176)	(0.194)	(0.193)	(0.196)
MAI*NBER			0.269	0.268		1.248**	1.813***
			(0.756)	(0.745)		(0.488)	(0.546)
Surp	0.443			0.410			0.472
	(0.340)			(0.338)			(0.360)
Surp*NBER	-0.247			-0.401			-2.259**
	(0.901)			(1.104)			(1.089)
const	0.032	-0.006	-0.005	0.006	0.036	-0.012	0.019
	(0.056)	(0.061)	(0.061)	(0.061)	(0.058)	(0.060)	(0.059)
Obs.	419	414	414	414	403	403	403
Adj-R2	-0.00	0.01	0.01	0.00	0.00	0.02	0.03

Dependent Variable: S&P 500 Daily Log Return - Surp: ARMA Surprise

MAI:		MAI_{5-20}	MAI_{5-20}	MAI_{5-20}	MAI_{20-250}	MAI_{20-250}	MAI_{20-250}
MAI		0.410**	0.389**	0.388**	0.281	-0.052	-0.051
		(0.173)	(0.175)	(0.175)	(0.194)	(0.193)	(0.191)
MAI*NBER			0.269	0.323		1.248**	1.503***
			(0.756)	(0.727)		(0.488)	(0.505)
Surp	0.316			0.347			0.371
	(0.357)			(0.354)			(0.372)
Surp*NBER	-0.329			-0.900			-2.106*
	(0.975)			(1.281)			(1.224)
const	0.030	-0.006	-0.005	0.005	0.036	-0.012	0.004
	(0.055)	(0.061)	(0.061)	(0.060)	(0.058)	(0.060)	(0.059)
Obs.	419	414	414	414	403	403	403
Adj-R2	-0.00	0.01	0.01	0.01	0.00	0.02	0.03

Table 9: continued

Dependent Variable: S&P 500 Daily Log Return - Surp: Boyd et al. (2005) Surprise

MAI:		MAI_{5-20}	MAI_{5-20}	MAI_{5-20}	MAI_{20-250}	MAI_{20-250}	MAI_{20-250}
MAI		0.410**	0.389**	0.367**	0.281	-0.052	-0.102
		(0.173)	(0.175)	(0.176)	(0.194)	(0.193)	(0.193)
MAI*NBER			0.269	0.420		1.248**	1.478***
			(0.756)	(0.723)		(0.488)	(0.482)
Surp	0.592*			0.559			0.701*
	(0.355)			(0.351)			(0.369)
Surp*NBER	-1.899*			-2.129*			-2.984**
	(1.137)			(1.274)			(1.281)
const	0.051	-0.006	-0.005	0.019	0.036	-0.012	0.011
	(0.057)	(0.061)	(0.061)	(0.062)	(0.058)	(0.060)	(0.060)
Obs.	419	414	414	414	403	403	403
Adj-R2	0.01	0.01	0.01	0.01	0.00	0.02	0.04

Dependent Variable: S&P 500 Daily Log Return - Surp: Bloomberg Surprise

MAI:		MAI_{5-20}	MAI_{5-20}	MAI_{5-20}	MAI_{20-250}	MAI_{20-250}	MAI_{20-250}
MAI		0.410**	0.389**	0.408*	0.281	-0.052	0.106
		(0.173)	(0.175)	(0.245)	(0.194)	(0.193)	(0.403)
MAI*NBER			0.269	1.612		1.248**	1.221*
			(0.756)	(1.550)		(0.488)	(0.725)
Surp	0.085			-0.032			-0.015
	(0.523)			(0.533)			(0.523)
Surp*NBER	-2.345			-2.845			-2.594
	(1.952)			(1.819)			(1.882)
const	0.147*	-0.006	-0.005	0.090	0.036	-0.012	0.099
	(0.089)	(0.061)	(0.061)	(0.094)	(0.058)	(0.060)	(0.090)
Obs.	213	414	414	213	403	403	213
Adj-R2	0.00	0.01	0.01	0.01	0.00	0.02	0.03

Appendix

A Sample of news articles mentioning macroeconomic fundamentals

We present in this appendix samples of news articles from the Wall Street Journal (WSJ) and New York Time (NYT) that are selected to build our media attention indices to macroeconomic fundamentals.

A.1 Inflation

1) Jonathan Fuerbringer, "Do Deficit Impede Recovery? New Analysis", New York Times, January 21, 1983.
"These levels give rise to the persistent fear of renewed inflation with the Federal Reserve being forced, in an effort to keep the economy going, to ease its tight hold on the money supply and push down interest rates so that the deficit is easier to finance and the recovery will not be tripped up."

A.2 Unemployment

1) Ken Gilpin, "Jobs Data Push Bonds Up Sharply", New York Times, July 3, 1992.
"Stunning weakness in labor statistics for June and the Federal Reserve Board's equally striking response to the data caused an eruption in the credit markets yesterday. Prices of fixed-income securities rose sharply and interest rates fell."

2) Jonathan Fuerbringer, "Greenspan Speaks: Recession's Over," New York Times, March 10, 2002.
"The recovery, he told Congress, 'is already well under way.' His comments followed economic data showing a turnaround in manufacturing and a surge in the service sector. Then, on Friday, the Labor Department said the unemployment rate had slipped and that the number of lost jobs had shrunk to just 50,000. All this was uplifting for stocks and bad for bonds."

3) Kate Davidson, "Strong Jobs Report Clears Fed for Liftoff on Rates" Wall Street Journal, December 4, 2015.
"The U.S. economy delivered another month of sturdy job growth in November, clearing a path for the Federal Reserve to end later this month an extraordinary seven-year run of near-zero interest rates."

A.3 Monetary policy

1) Greg Ip, Nicholas Kulish and Jacob M. Schlesinger, "New Model: This Economic Slump Is Shaping Up to Be A Different Downturn," Wall Street Journal, January 5, 2001.
"One reason is that investors may respond quickly to a cut in Fed interest rates – as they did with Wednesday's huge rally in response to the surprise reduction of half a percentage point in short-term rates. That instantly eased some of the pain that had spread through the economy. The stock market has become the most important transmission mechanism of monetary policy,' says Jan Hatzius, senior economist at Goldman Sachs. And that's one reason, adds Brad DeLong, an economist at the University of California at Berkeley, that Fed moves have a bigger effect now."

2) Michael Derby, "Yield Curve, Fresh Data Are Unsettling Factors—Back From Holiday Break, Investors Will Get a Look at FOMC's Dec. 12 Mintues," Wall Street Journal, January 3, 2006.
"Not only will the market digest reports on manufacturing and employment data, but the publication of the minutes from the Federal Open Market Committee's Dec. 13 meeting today also could help settle the debate over whether a yield-curve inversion makes sense... The Fed's role has become more important to the market after central bankers rejiggered their policy statement at their last gathering to suggest at least one more rise in the federal-funds rate, bringing it to 4.50% from 4.25%, is likely."

B Details of Major Movements in the Attention Indices

In the first row of Figure 1, attention to credit spikes in the WSJ when the relative credit spread ((BAA rate - AAA rate)/AAA rate)[5] is high during the saving and loan crisis of the late 1980s, the tech bubble in early 2000s, and in the 2008-2009. The NYT index comoves less with these changes in fundamentals. In the second row of Figure 1, output growth attention generally rises when the rate of output growth is low, for both WSJ and NYT.

The third row of Figure 1 shows that attention to inflation is high in the early 1980s following a period of high inflation, and decreases when the inflation rate drops against the three month moving average inflation. The spike in the WSJ index during the late 1980s reflects the concern about inflation risks when Paul Volcker departed as the Chairman of the Federal Reserve in 1987. We suspect that the big drop in media attention to inflation in early 1991 captures a series of events that attracted more media attention, such as the Gulf War. The recent 2008-2009 financial crisis raised people concerns about inflation risks once more. The NYT attention to inflation seems only predominant in the early 1980s.

We show in the fourth row of Figure 1 the interest rate MAI against the federal (Fed) funds rate. The spike of the WSJ index in early 2008 captures the widespread fears of credit crunch, bank collapses, and European economy after the U.S. housing crisis started impacting the financial sector. The peak of in the WSJ index in late 2008 reflects the fact that the Federal reserve cut rates to a historically low level. In the fifth row of Figure 1, we plot the monetary MAI against the Fed funds rate and the Federal Reserve total assets (solid black line) to capture Quantitative Easing (QE) operations. While the WSJ and NYT shows similar pattern as in interest rates, the new feature of the monetary attention is that it captures the signficant increase in the Fed's balance sheet due to QE.

In the sixth row of Figure 1, we show the housing MAI with the twelve month moving average Case-Shiller home price return. The big spikes of both WSJ and NYT indices reflects people's concern on the important drop in housing prices since 2006. In the seventh row of Figure 1, we show the oil MAI against the unemployment rate. The huge spikes of

[5]The BAA and AAA rating, GDP growth rate, Fed fund rate, Federal Reserve total assets, and the U.S. dollar index come from the Federal Reserve Economic Data website (FRED).

both WSJ and NYT indices in the 1990s captures the widespread fears of oil price when the Gulf War I began in the early 1990s. In general, the WSJ pays more attention to oil, while the NYT index seems to be less concerned about oil until the recent big drop in oil price in mid-2014. In the eighth row of Figure 1, we show the unemployment MAI against the unemployment rate. The NYT index co-moves strongly, almost perfectly, with the unemployment rate, suggesting people's concern about unemployment increases when the unemployment rate raises. The WSJ index has similar pattern since the tech bubble. Finally, the last row of Figure 1 shows the U.S. dollar MAI against the U.S. dollar log price index. While both the WSJ and NYT indices reflect people's concern on currency risk around 1998 Asian crisis, the NYT index appears to be less sensitive to the development in the currency market.