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Macroeconomic Surprises and the Demand for Information about Monetary Policy*

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Abstract

This paper studies the demand for information about monetary policy, while the literature on central bank transparency and communication typically studies the supply of information by the central bank or the reception of the information provided. We use a new data set on the number of views of the Federal Reserve's website to measure the demand for information. We show that exogenous news about the state of the economy as reflected in U.S. macroeconomic news surprises raise the demand for information about monetary policy. Surprises trigger an increase in the number of views of the policy-relevant sections of the website, but not the other sections. Hence, market participants do not only revise their policy expectations after a surprise, but actively acquire new information. We also show that attention to the Fed matters: a high number of views on the day *before* the news release weakens the high-frequency response of interest rates to macroeconomic surprises.

Keywords: macroeconomic announcements, nonfarm payroll, attention, event study, central bank communication

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1 Introduction

Central banks communicate with financial markets and the general public. The past two decades have seen a remarkable shift towards a higher degree of transparency of central banks about their intentions, the decision making process and their internal forecasts (Blinder et al, 2008). More recently, central banks such as the Federal Reserve (Fed) or the European Central Bank (ECB) reached the zero lower bound on nominal short-term interest rates and had to resort to unconventional tools to implement a further monetary easing. Among these new tools is forward guidance, i.e. enhanced communication with the public about monetary policy in the future. The adoption of forward guidance further increased the interest in central bank communication

However, central bank communication is typically understood as the provision of information by the central bank to markets and the wider public. Hence, it is about the supply of information in order to reduce the information asymmetry between the central bank and the market. As of yet, the literature does not pay much attention to the demand for information. Papers study the response of asset prices to central bank announcements or the reception of central bank communication by the press or the public (e.g. Gürkaynak et al., 2005a; Gürkaynak et al., 2005b; Hansen and McMahon, 2016; Hansen, et al., 2019; Neuhierl and Weber, 2019; Cieslak and Schrimpf, 2019; Swanson, 2019). Much less is known about the demand side of central bank communication, that is, what type of information market participants strive for or at what time they want to update their information set about future monetary policy.

This paper studies the demand for information about the monetary policy of the Federal Reserve. We use a new data set that contains the daily number of views of the Federal Reserve Board's website between 2015 and 2019. The data, which has not yet been used to understand the interaction of the public with the Fed, allows us to break down the demand for information into different aspects of central banking. This is possible because we know the views of each section of the Fed's website such as the "Monetary Policy" section, the "News & Events" section or the "FOMC" subsection of the "Monetary Policy" section. We discuss the data set with all its limitations below.

As a matter of fact, the number of views of the Fed's website is influenced by a number of determinants. One of them is monetary policy itself. For example, views of the website explode around meetings of the Federal Open Market Committee (FOMC). Therefore, we concentrate on the response of website views to exogenous macroeconomic surprises which are orthogonal to other determinants. Financial

markets pay a lot of attention U.S. data releases such as new nonfarm payroll employment figures on "Payroll Fridays". The literature shows that financial markets immediately adjust their assessment of future monetary policy based on the surprise component of news announcements (e.g. Fleming and Remolona, 1999; Balduzzi et al., 2001; Gürkaynak et al., 2005b, Andersen et al., 2003; Andersen et al., 2007, Hördahl et al., 2015).[1] These news surprises are exogenous with respect to the number of website views on the days before the release and allow us to study exogenous movements in website views triggered by the news release.

The only two papers using central bank website data thus far are Haldane et al. (2019) and Jung and Kühl (2019). Haldane et al. (2019) use data on website traffic associated with the release of the Inflation Report of the Bank of England. Their data shows an increase in website visits following the introduction of a "layered" form of presentation that addresses experts and the wider public differently. Jung and Kühl employ website traffic on the ECB's homepage to show how ECB communication affects the public's demand for information about monetary policy. They use monetary policy shocks from tick-by-tick data to show that the demand for information increases in the size of the policy shock. The adoption of forward guidance by the ECB reduced the demand for information, while complex unconventional programs such as the Asset Purchase Program raised the demand for information.

Based on our new data set, we pursue two research questions. First, we study the response of of website views to exogenous macroeconomic surprises. To the extent news surprises lead markets to recalibrate their expectations about monetary policy, investors should also actively acquire new information, e.g. by searching the Fed's website for new information, re-reading the last FOMC statement or checking the last set of FOMC projections. In order to identify whether the change in website views is indeed motivated by the demand for information about monetary policy, we separately study the views of each section of the Fed's website. A release after which the number of views of the "Monetary Policy" section increases but interest in the remaining sections remains unchanged is interpreted as a shift in attention towards monetary policy.

We find that macroeconomic surprises lead to a higher demand for information about monetary policy. The number of views of the policy-relevant sections of the website increases significantly on days with macroeconomic news. The views of the other sections of the website, in contrast, remain insensitive to news. Hence,

[1] Beechey and Wright (2009) show that real interest rates are responsive to macroeconomic surprises and explain a large part of the responses of nominal interest rates on announcement days. Gilbert et al. (2017) contrast the market response to news surprises with their intrinsic value, i.e. their ability to forecast future real economic activity.

market participants not only adjust their expectations of future monetary policy, but they actively acquire new information. We also study whether positive or negative news surprises have asymmetric effects on information demand as well as the role of forecast disagreement before the news release for the subsequent demand for Fed information. Positive news trigger a stronger increase in the demand for Fed information compared to negative news. Forecast disagreement weakens the demand for information about monetary policy. This finding is in line with Pericoli and Veronese (2016), who show that the market response to news falls in the dispersion of beliefs reflected in the Bloomberg survey.

Second, we study the role of information quality on the day *before* the news release for the strength of the market adjustment in the 30-minutes window following the release of nonfarm payroll employment. The high-frequency response of interest rates of different maturities in the 30-minutes window following the release at the first Friday of each month at 8:30 am EST should reflect the reassessment of future monetary conditions in light of the macroeconomic surprise. We let this reassessment interact with the number of website views on Thursdays immediately preceding payroll Friday. This is based on the observation that the upcoming release of the job report by the Bureau of Labor Statistics is extensively covered by the media in the days before the actual publication.

We find that more attention to the "Monetary Policy" section of the Fed's website before the release weakens the high-frequency response of interest rates. A better than expected performance of the labor market raises 2-year, 5-year and 10-year interest rates, but less so if the monetary policy section of the website had more views on the day before. Put differently, more or better information about the Fed's policy reduces the need to adjust expectations following the new information about the macroeconomy. The effect is strongest for 2-year rates and smallest for 10-year rates.

The literature provides several approaches to explain variation in the sensitivity of asset prices to news. Our contribution fits into this literature as we propose the attention to monetary policy as an alternative mechanism that changes the response of rates to surprises. Goldberg and Grisse (2015) and Law et al. (2019) show that the variation over time on the nexus between news and returns is driven by economic risk or the business cycle, respectively. An interesting perspective is offered by Tang (2017). She shows that markets are particularly sensitive to the types of macroeconomic indicators that were mentioned in the previous FOMC statement or the minutes of the last FOMC meeting. In this paper, we propose that the time-varying amount the information about the Fed before the data release

affects the sensitivity of interest rates to surprises. Hautsch and Hess (2007) test whether the price impact of news increases in the precision of news. They construct a measure of news precision from the sequence of absolute revisions of the underlying indicator. More accurate news do indeed have a larger effect on asset prices. In this paper, we do not focus on the precision of news, but the attention paid to monetary policy before the news release. Kurov and Stan (2018) focus on the degree of policy uncertainty as a determinant of the sensitivity of markets to new information. They show that a more uncertain environment weakens the response of stock markets to news, but strengthens the response of bond markets.

While the quality of information is one dimension that could affect the sensitivity to news, the attention markets pay to macroeconomic developments is an additional factor. Ben-Rephael et al. (2017) use data on the information demand as revealed by the usage statistics of traders' terminals. The authors argue that higher attention by investors facilitates the mechanism of price discovery by which asset prices incorporate new information. Corporate earnings announcements accompanied by high investor attention result in larger absolute returns on the announcement day. As shown by Hirshleifer and Sheng (2019), higher attention to macroeconomic announcements on release days does not crowd-out attention to firm-level news. In fact, attention to aggregate economic surprises triggers higher attention to corporate news.

The papers most closely related to our second contribution are Benamar et al. (2019) and Fisher et al. (2020). Benamar et al. (2019) use clicks on news headlines related to the U.S. labor market as a measure of information demand about macroeconomic conditions. Interest rate futures respond more strongly to nonfarm payroll releases if the demand for information is high before the announcement day. Fisher et al. (2020) build an attention index based on newspaper reporting about the business cycle. They show that attention increases around macroeconomic data releases. Furthermore, attention has predictive power for the announcement premium, that is, the change in asset prices on the announcement day.

In contrast to this literature, we focus on attention paid to monetary policy rather than the macroeconomy.[2] To the extent changes in interest rates on announcement days are driven by changes in expectations about monetary policy in the future, attention to the Federal Reserve should affect the announcement return. We show that views of the policy-relevant sections of the Fed's website, which reflect markets' attention to monetary policy, weakens the price impact of news.[3]

[2]Boguth et al. (2019) study the attention-coordination effect of press conferences after meetings of the FOMC.

[3]Our result is similar in spirit to the evidence provided by Swanson and Williams (2014) about

Our results can also be interpreted through the lens of recent attempts to introduce rational inattention or rational information choice into macroeconomics and finance (see Sims, 2010; Veldkamp, 2012). Attention is a precious resource, which agents allocate optimally when updating their information set. In contrast to the Rational Expectations paradigm, markets do not continuously update their information using all information available. In our case, a macroeconomic surprise triggers interest in the policy-sections of the website, though there might be no new information available.

This paper is organized as follows: Section two introduces our data set of website views. Sections three contains evidence on the demand for information following macroeconomic surprise. Sections four and five extend this analysis and allow for asymmetric responses to news and disagreement of forecasters, respectively. Section six shows that attention to the Fed before the actual news release affects how strongly interest rates response to the surprise component. Section seven concludes.

2 The data set

We measure the demand for information about monetary policy by the number of views of the Federal Reserve Board's website (https://www.federalreserve.gov/) and its main sections. This is made possible by a new data set to be introduced below. Apart from Haldane et al. (2019) and Jung and Kühl (2019), website views have not yet been used to study the flow of information between central banks and the public.

We believe website visits offer several advantages over alternative measures of attention to the Fed such as newspaper articles or the search volume on Google.com: first, in contrast to newspaper reports, clicking on the Fed's website reflects an active research for information. The appearance of an article in a leading newspaper, in contrast, is not informative about how often the article is actually read. Second, using visits to the Fed's website allows to distinguish between sections of the website. Hence, we can narrow the acquisition of new information down to, say, information about monetary policy as opposed to information about the payments system. Third, in contrast to the Google Trends search volume, the number of website views is available on a daily frequency (as opposed to weekly on Google Trends, for which data over a longer sample is available on a weekly frequency only) and

the sensitivity of U.S. long-term interest rate to macroeconomic news. The authors show that forward guidance anchors expectations and leads to a smaller response of rates to surprise changes in macroeconomic conditions. Carlston and Ochoa (2016) find that interest rates close to the Zero Lower Bound respond more strongly to news.

is informative about the absolute level of the demand for information.[4] Data from Google Trend, in contrast is normalized such that the observation with the highest search volume is assigned a value of 100. As a matter of fact, the Fed's website is just one out of many sources of information about monetary policy. In particular, financial professionals use news-wire services of data providers such as Bloomberg to search for information. However, even for professional market participants, the Fed's website remains an important source of information. Hayo and Neuenkirch (2015) conduct a survey among 195 market participants showing that respondents rely on self-monitoring their home central bank, while they retrieve information through media reports regarding foreign central banks' actions.

Figure (1) shows a screenshot of the Fed's website as of February 2020. We use the number of views of the home page as well as all the main sections of the site, that is, "About the Fed", "News & Events", "Monetary Policy", "Supervision & Regulation", "Payment Systems", "Economic Research", "Data" and "Consumers & Communities". While the "Monetary Policy" section is clearly related to monetary policy, the other segments are not. This distinction allows to identify whether an increase in the number of views is indeed related to monetary policy. We also use data for the main subsection of the "Monetary Policy" section, i.e. the subsection "FOMC", that contains all the information about the Federal Open Market Committee (FOMC) including the meeting calender, minutes, transcripts, projections. Figure (1) shows the navigation bar with the content of the "Monetary Policy" section unfolded in order to see the content of the "FOMC" subsection.

We filed a Freedom of Information Request to the Board of Governors of the Federal Reserve System and obtained data on the daily number of views of the aforementioned sections of the Fed's website for the time period October 02, 2015 to October 08, 2019.[5] The sample period mostly covers the period after the Fed returned to conventional monetary policy in December 2015. In October and November 2015 markets were already anticipating the "lift-off" from the zero lower bound in December 2015.

We obtained the number of views only. We could not obtain the number of distinctive users or the clicks per user. Since the Fed does not use persistent cookies or single session cookies to track views, the number of unique views would is inaccurate.[6]

[4]Da et al. (2011) were able to obtain daily numbers on the Google search volume.

[5]For the "Economic Research", "Data", "Consumers & Communities" and the "Supervision & Regulation" subsections, the data starts in 2017 due to a reorganization of these website sections.

[6]The Fed's website policies are explained here: https://www.federalreserve.gov/website-linking-policies.htm.

Figure 1: The website of the Board of Governors of the Federal Reserve System

Notes: Navigation bar on the home page page of the Board of Governors of the Federal Reserve system: https://www.federalreserve.gov/, accessed on February 07, 2020

Figure (2) shows the daily number of views of each section of the Fed's website over the sample period. We see that that number of views as well as the volatility of views differ strongly across sections of the website. For the "Consumers & Communities" section, the number of views is the smallest and least volatile. The views of the "FOMC" and "Monetary Policy" sections, in contrast are very volatile with the number of clicks exploding on FOMC meeting days. On selected days, the number of views is 200 times higher than the average number of views of the "Consumers & Communities" section. To account for the vast differences in average website views, we will base the empirical analysis below on the number of views in standard deviations from its section-specific mean. The regression model will also contain a number of dummy variables, i.e. for FOMC meetings, publication dates of FOMC minutes and day-of-the-week dummies, which account for the strong pattern of seasonality in the data.[7]

[7]The same strong seasonality is also found in Jung and Kühl (2019) for the number of views of the ECB website.

Importantly, the number of views of the policy relevant sections fluctuates even in the inter-meeting period. We will study macroeconomic news announcements as one exogenous source of these fluctuations. Figure (3) zooms into the number of views in one randomly selected quarter (April to June 2018). We clearly spot the need to account for the seasonality of views through day-of-the-week effects.

To understand the data series, we study the distribution of views of each website section and the correlation of views across website sections. Figure (4) shows histograms of views for each section. The histograms also document the skewness and the long-tails of the distributions of views. Views of the policy-related sections of the website, i.e. the "Monetary Policy" section and the "FOMC" subsection, jump on days of important monetary policy decisions. This should not be a problem for our daily event study as the days of macroeconomic news announcements do not coincide with FOMC meeting days.

Figure (5) shows scatter plots, from which we can obtain information about the correlation of views of the "Monetary Policy" section on the one hand and each of the other sections on the other. Daily views of the monetary policy section are strongly positively correlated with views of the home page and, to an even larger extent, with views of the FOMC subsection. The correlation between the monetary policy section and the "About the Fed" and the "News & Events" section is also positive, but less clear-cut. The scatter plots shown in the figure suggest that views of the policy-related sections are only loosely correlated with views of the remaining sections.

We finish this section with a first glance on the distribution of website views on release days. Since the number of views strongly depends on the day of the week, we compare Fridays with and without releases of the job report and leave out all other days of the week. Figure (7) depicts box plots for the main website sections. On payroll Fridays, the median number of views is higher for the monetary policy and the FOMC sections of the website compared to Fridays without the job report. For non-policy sections such as "About the Fed", we cannot see a difference in the number of views. As a second observation we find that the dispersion of views on payroll Fridays is smaller than on other Fridays. The number of outliers as reflected in the red symbols, is strongly reduced on release days. Since this evidence is descriptive only, we now turn to a more formal empirical analysis.

3 The demand for information after news announcements

3.1 Macroeconomic news surprises

The demand for information about the Federal Reserve and the number of clicks on the Federal Reserve's website are endogenous variables. Hence, throughout the paper, we study only those changes in the demand for information about monetary policy which are triggered by exogenous news surprises about the U.S. economy. We focus on scheduled monthly releases of new macroeconomic figures, i.e. about the labor market or capacity utilization, which should lead to an adjustment of expectations about monetary policy. These news releases are the main source of public information about changes in the state of the U.S. business cycle.

Table (1) lists the indicators and their release schedule. Certainly, some of those indicators are more important than others. For example, news about nonfarm payroll employment is by far the most closely watched monthly real economic indicator for the U.S. economy. Market observers typically discuss these numbers days before their release. Many of our results will be based on nonfarm payroll releases. However, we include a broad set of indicators in order to highlight the importance of nonfarm payroll data. Besides nonfarm payroll numbers, our indicators include the ISM manufacturing survey, industrial production, capacity utilization, retails sales and personal income. In light of the short sample period, we do not use the first releases of GDP and other macroeconomic aggregates, which are available on a quarterly frequency only.

While most indicators are published by U.S. statistical agencies, some (industrial production and capacity utilization) are released by the Federal Reserve Board itself. We keep these indicators in the sample in order to assess whether the Fed's own data releases raise interest in the monetary policy sections of its website.

Financial markets should be driven by the unexpected part of the data release only. To isolate the surprise component of the news, we follow the large literature and contrast the release of indicator j at day t, I_t^j, where j is one of the indicators listed in Table (1), with the median consensus forecast, F_t^j. Hence, the surprise component is

$$Surp_t^j = \frac{I_t^j - F_t^j}{\sigma_{F,j}.} \tag{1}$$

The difference between realization and consensus expectation should be the macroeconomic surprise. It is normalized by the standard deviation of forecasts. The constant used to normalize the difference should have no effect on the results. A

positive $Surp_t^j$ reflects an unexpected improvement in macroeconomic conditions, while $Surp_t^j < 0$ is a surprise deterioration of economic activity.
For each of the macroeconomic indicators, we use the surprise component available on Bloomberg, which is based on the Bloomberg survey of market participants. Since the nonfarm payroll release is much more important than the other indicators, we use surprises based on the survey from FXstreet.com an alternative data source. Below, we will study the difference between both surprise components for the nonfarm payroll releases in detail and elaborate on the role of forecast dispersion for the response to news.
The survey forecasts, both the Bloomberg survey and the one conducted by FXStreet.com, collect forecasts from market participants in the days before the release. For each indicator, we have 48 news surprises throughout our sample period. The surprise components on announcement dates m are shown in Figure (6).

3.2 The demand for information triggered by news surprises

We now turn to one of our two main research questions: to what extent do exogenous news surprises change the demand for information about monetary policy? To address this question, we regress the number of website views, which we introduced before, on the macroeconomic surprises. On macroeconomic announcement days, a change in the attention of market participants with respect to monetary policy should be reflected in an increase in the number of views of policy-related sections of the website.
Let $\Delta V_t^{(i)}$ be the percentage change of views of the Fed's website section i on day t relative to the day before, $t-1$.[8] Hence, our dependent variable is defined as

$$\Delta V_t^i = \frac{V_t^i - V_{t-1}^i}{V_{t-1}^i}.$$

The growth rates are standardized.
We run a model separately for each website segment i and each macroeconomic indicator j, in which we regress the change in website views on the absolute news surprise and a set of control variables, i.e.

$$\Delta V_t^i = \beta_0 + \beta_1 |Surp_t^j| + \beta_2 T_t^{after} + \Gamma' X_t + \varepsilon_t, \tag{2}$$

where β_0 is a constant, and X_t is a vector of control variables to be explained

[8] We express the dependent variable in percentage growth rates. Alternative specifications with standard deviations of log-levels deliver qualitatively similar results.

below. In a separate specification to be introduced below, we include more than one news surprise at a time. We use the absolute news surprise as positive and negative surprises would equally well trigger interest in monetary policy. The variable T_t^{after} is the number of days that have elapsed since the last FOMC announcement. Ehrmann and Sondermann (2012) show that the relative information content of news increases if the distance to important news of the past becomes larger. Therefore, we expect that the number of views increases the more time has elapsed since the previous policy meeting.[9] We are primarily interested in the coefficient estimate for β_1. A positive coefficient would imply that a macroeconomic surprise raises the interest in section i of the Fed's website.

The vector X_t contains control variables that should reflect other determinants of the public's interest in the Fed website. We include a dummy that is one on FOMC meeting days and zero otherwise. This variable captures the strong increase in the public's interest on meeting days.[10] Since the interest in the Fed remains high even on the day after the announcement, we also include a dummy that is one the day after the announcement. The publication of the FOMC meeting's minutes two weeks after the FOMC statement should also raise the interest in the Fed. Hence, we construct a dummy that is one on those days that coincide with the publication of FOMC minutes and zero otherwise.[11] Finally, we include a set of day-of-the-week dummies to control for the seasonality of website views. This should capture the smaller number of views on Fridays and the weekend relative to other days of the week, weekly releases of data and other factors.

Table (2) presents the full set of coefficient estimates for all sections of the website when the Bloomberg nonfarm payroll surprises are used as the exogenous driving variable. As a key result, we find that news surprises raise the number of views of the policy-relevant sections of the Fed's website, i.e. the monetary policy section and the FOMC subsection. The effect is significantly positive. Put differently, either

[9] A nonlinear function of the number of days after the FOMC announcement is also possible. For example, interest could remain high after the announcement, decreases thereafter and increases as the new FOMC meeting approaches. We experimented with different specifications, which, however, leave the main findings unchanged.

[10] To further distinguish between FOMC meetings with and without a press conference, another dummy is constructed that equals one meeting days on which the Fed chair holds a press conference and zero otherwise. Note that the frequency of press conferences changed in 2019 from one press conference per quarter to a press conference after each meeting. Hence, this dummy is not identical to the FOMC meeting dummy. However, this dummy does not make any difference to the results and we do not include it our regression models.

[11] Likewise, the chair's semiannual testimony to congress should raise the public's interest in the Fed and, as a result, the clicks on its website. Hence, we construct a dummy that is one for days that coincide with the chair's testimony and zero otherwise. This dummy, however, remains always insignificant and is excluded from the regression.

a negative or a positive news surprise raises the demand for information about monetary policy. Views of other sections of the website, which do not primarily contain information about monetary policy, remain unaffected by the surprise.

We also find that the number of views of the policy-relevant sections increases in the number of days elapsed since the last FOMC statement. As the next FOMC meeting approaches, the public's demand for information increases. All dummy variables enter the equation with highly significant coefficients. To save space, we do not report them here. Thanks to the set of dummy variables, the model is able to explain 85% of the variation of the dependent variable related to the "FOMC" and "Monetary Policy" sections.

For nonfarm payroll surprises calculated by FX Street, see Table (3), the results are the same: macro surprises shift attention to the Federal Reserve. Surprise changes of the ISM manufacturing survey, see Table (4), in contrast, do not trigger an increase in attention to the Federal Reserve's monetary policy. Surprise changes of monthly industrial production and capacity utilization, see Tables (5) and (6), have an effect on the demand for information about monetary policy, though the effect is smaller than the impact of nonfarm payroll surprises. This supports the central role of nonfarm payroll information for market participants.

Finally, unexpected changes of personal income and retail sales, see Tables (7) and (8), leave the attention paid to the policy-related sections of the website unaffected.

We conclude this section by looking at an extension of the regression equation to more than one surprise series. It remains to be seen whether, say, industrial production remains a significant factor in driving the demand for information about policy if market participants also change their attention to the Fed as a result of preceding nonfarm payroll news. In Table (9), we show the results for a model that includes the three most important news surprises jointly, i.e. nonfarm payroll news, news about the ISM manufacturing survey and news about industrial production. For the two key policy-relevant segments of the website, nonfarm payroll news and news about industrial production remain significant shifters of attention. Surprise changes of the ISM survey shift the demand for information about the FOMC, but not about monetary policy in general.

It could be argued that the attention to the Fed triggered by news releases is due to President (or candidate) Trump's public pressure on the Fed. The president mostly uses his Twitter account to comment on the Fed's reluctance to ease monetary conditions and to attack chair Powell personally.[12] A tweet from the president on

[12]See Tillmann (2019) for evidence on the effect of Trump's pressure on interest rate expectations incorporated into long-term yields.

announcement days rather than the announcement itself could be the true driver of attention to the Fed. Therefore, we search the Trump Twitter Archive for tweets sent on release days of the job report.[13] We then run a specification of the regression equation in which we include two additional variables. The first is the number of tweets sent on release days that cover labor market issues. The second is the number of tweets that mention the Federal Reserve. The selected tweets are listed in the online appendix. We found only three tweets sent on two release days containing references to the Fed. The remaining tweets comment on the job report and do not mention the Fed.

Table (10) presents the results of the extended model. For all website sections, the tweets on the Fed are highly significant. Tweets on the labor market itself, however, do not affect website views. Importantly, the main results remain unchanged: news surprises still shift attention to the policy section of of the website, but not the remaining sections.

The online appendix contains results from a placebo experiment: we shift the nonfarm payroll surprises one day or one week, respectively, into the past of the future and estimate the baseline model again. We find a significant increase in views only for the original payroll surprises, not the placebo dates. This corroborates the notation that the nonfarm payroll news systematically contain information that triggers the public's search fr information.

To summarize, this section shows that news surprises trigger market participants' demand for information about monetary policy. This is the first key result of this paper. Fed observers actively start acquiring information about policy and not just reassess their existing information set.

4 The asymmetric response of information demand

In the previous section, we used the absolute news surprise as positive and negative surprises should equally raise the demand for information about monetary policy. We now distinguish between positive and negative surprise in order to assess whether the effect is symmetric.

The announcement literature contains several examples of negative surprises, i.e. a surprising contraction of the economy, having a stronger effect on asset prices compared to a surprise expansion of the economy of identical absolute magnitude (Andersen et al., 2003 and 2007; Hautsch and Hess, 2007).

[13] See http://www.trumptwitterarchive.com/.

Though the focus of the analysis so far is on the demand for information triggered by macro surprises, not the adjustment of market prices, we aim to find out whether the demand for policy-relevant information is also characterized by an asymmetry. Do negative news spark a higher demand for Fed-information than positive news? We construct a dummy variable that is one for negative surprises, i.e. $D_t^{neg} = 1$, and zero otherwise. The interaction of this dummy with the absolute news surprise thus allows negative surprises to have an effect on website views that is different from positive surprises. The modified regression reads as follows

$$\Delta V_t^i = \beta_0 + \beta_1 |Surp_t^j| + \beta_2 T_t^{after} + \beta_3 D_t^{neg} + \beta_4 D_t^{neg} \times |Surp_t^j| + \Gamma' X_t + \varepsilon_t. \quad (3)$$

We are particularly interested in the coefficient β_4. The estimated coefficients are reported in Table (11). We show these results for the most important parts of the website only and restrict ourselves to nonfarm payroll (Bloomberg) surprises.[14] For the monetary policy section and the FOMC subsection, news surprises remain a significant determinant of website views. Moreover, the number of views increases in the number of days elapsed since the last FOMC meeting. The demand for policy-information, however, is asymmetric: a positive surprise raises interest in the monetary policy section, while a negative surprise reduces the demand for information.

This result has to be interpreted against the backdrop of the interest rate cycle over much of the sample period. After the lift-off from the zero lower bound in December 2015, the Fed raised the target Federal funds rate in several steps, before it implemented the first rate cut in July 2019. Hence, through most of the sample period, markets reflected on a faster or slower tightening of monetary conditions, but not on an easing of policy. According to our results, markets believed that favorable labor market news required gathering additional information about monetary policy, possibly because they make a further tightening more likely. Negative news, in contrast, might have been interpreted as an indicator of the Fed leaving monetary conditions unchanged.

5 The role of forecast disagreement

Unfortunately, we do not have access to the survey responses underlying the construction of the two alternative labor market surprise series used in this paper, so we cannot use the underlying cross-sectional dispersion of forecasts. However, we can

[14] The full set of estimates is available upon request.

use the difference between both surprises as a proxy for the dispersion of forecasts. Remember that both surprise series are constructed as the difference between realization and median forecast. The difference between both surprises, hence, should be proportional to the difference in median forecasts in two alternative surveys of market participants as both surprise measures share the same realized value.
In this spirit, we construct the simple measure of forecast dispersion as the absolute difference of news surprises,

$$dis_t^{nonfarm} = |\widehat{Surp}_t^{nonfarm,Bloomberg} - \widehat{Surp}_t^{nonfarm,FXStreet}|, \tag{4}$$

where the hat over the variables denotes that we divide both surprise series by their standard deviation to make sure that both surprises are equally volatile.[15] Note that this measure reflects forecast dispersion before the release of the labor market figures. Figure (8) shows the two standardized surprise series as well as the difference between them. The graph also shows a scatter plot between the absolute news surprise and the measure of forecast dispersion. We spot a positive correlation. Hence, periods with a wider dispersion of forecasts are also periods with large surprises. This supports the notation that forecast dispersion is a useful but noisy measure of uncertainty.
We use $dis_t^{nonfarm}$ in a straightforward extension of our empirical model,

$$\Delta V_t^i = \beta_0 + \beta_1 |Surp_t^{nonfarm}| + \beta_2 T_t^{after} + \beta_3 dis_t^{nonfarm} + \Gamma' X_t + \varepsilon_t, \tag{5}$$

where the coefficient β_3 is our primary object of interest. A positive coefficient would indicate that markets' need for information increases if the release has been preceded by more heterogeneous views on the state of the economy.
We find that forecast dispersion reduces the demand for Federal Reserve information on announcement days, see Table (12) for the set of coefficients. The positive impact of the absolute news surprise on the number of views remains significant. This result is puzzling: to the extent a more dispersed range of forecasts of nonfarm payroll employment ahead of the official data release reflects uncertainty about the state of the economy, we should expect a higher demand for Fed information. One potential explanation is that a wider dispersion of forecasts reflects uncertainty of monetary policy itself about the economy, thus calling for a less activist policy response to the labor market news and, as a consequence, a smaller demand for information by the public.

[15] Of course, we cannot rule out that one market participant contributes to both surveys or that one survey was conducted earlier than the other, thus reflecting different information sets. Hence, the dispersion measure is indicative only.

6 The effect of market attention on the response to news

Having established the shift in the demand for information upon news releases, we now turn to the impact of news surprises on expected future monetary policy and its interaction with information demand. While the previous section looked at the change in website views on the day of news surprises, we now focus on the high-frequency market response immediately following the news release and the role of information on the day *before* the news release.

Nonfarm payroll news are covered extensively in the financial press *before* the release of new figures. Because of its dominant role as a leading indicator, the press devotes regular columns to the upcoming labor market report such as *Bloomberg's* "What to Expect From Tomorrow's Jobs Data" column or the *Wall Street Journal's* "5 Things to Watch in the [month] Jobs Report".

We concentrate on a narrow window of 30 minutes following the release of nonfarm payroll numbers on the first Friday of each months at 8.30 am EST. The interest rate response within this narrow window should be a relatively clean statistic of the change in market expectations triggered by the news surprise.

The regression we estimate is straightforward. We narrow the sample to the nonfarm payroll announcement days only. On each announcement day m, $\Delta y_{m,n}^{(30m)}$ is the change in the $n-$period interest rate in the 30-minutes window following the release. We regress the market response on a constant, the news surprise, $Surp_m^j$, the number of views of section i of the website on the previous day $t-1$ and the interaction between the news surprise and the website views. The website views are expressed in standard deviations around the sample mean. Hence, the model is

$$\Delta y_{m,n}^{(30m)} = \beta_0 + \beta_1 Surp_m^j + \beta_2 V_{m,t-1}^i + \beta_3 \left(Surp_m^j \times V_{m,t-1}^i\right) + \varepsilon_m. \tag{6}$$

This regression equation is very similar to the model in chapter four of Fisher et al. (2020), though the authors focus on macroeconomic attention rather than attention to policy. We expect the estimated coefficient β_1 to be positive. A positive surprise, i.e. a better than expected U.S. job market, should raise the expected future interest rates as the Fed is more likely to tighten policy. The interesting coefficient for our purpose is the estimate of β_3. Suppose $\beta_3 < 0$. In this case, the recalibration of market expectations following an expansionary surprise would be weaker if markets were well informed about the Fed the day before.

The model is estimated for the high-frequency changes over 30 minutes for 2-year,

5-year and 10-year U.S. Treasuries.[16] Since we focus on announcement days only, we disregard the sections of the Fed's website for which we do not have visitor statistics for the full sample.

Table (13) shows the results for the response of 2-year interest rates. As expected, the nonfarm payroll surprise enters with a highly significant positive coefficient. Thus, surprise news about an expansion of employment trigger a reassessment of future monetary policy, which results in shift towards an expected tightening of monetary conditions. The strong significance of the surprise to news is in line with most of the literature (Fleming and Remolona, 1999; Balduzzi et al., 2001; Gürkaynak et al., 2005b, Andersen et al., 2003; Andersen et al., 2007).

The focus of this section is on the coefficient on the interaction between the news surprise and the website views on the day before the news release. We find this coefficient estimate to be significantly negative when views of the monetary policy section of the website are used. For all other website sections, the coefficient remains indistinguishable from zero. This implies that a high level of attention to monetary policy on the days before the release of the employment data reduces the need for markets to adjust their views about future policy. It should be stressed that the relationship between prior demand for information and announcement returns is predictive only. We do not pursue a causal interpretation of the effect. It is, however, consistent with the notion that more information about monetary policy anchors market participants' beliefs about the future policy path, such that the beliefs become less sensitive to news.

As discussed in the introduction, the role of attention to economic developments and the returns on announcement days has been studied before. The contribution of this paper is to show that attention to monetary policy rather than attention to macroeconomic developments also affects the asset market responses.

The qualitative results for longer maturities are very similar. Table (14) reports the estimates for 5-year rates and Table (15) contains the results for 10-year rates. In both tables, the number of views of the monetary policy part of the website reduces the sensitivity of markets to payroll surprises. With the exception of views of the "About the Fed" section, this does not hold for other categories of the website. Hence, it is information specifically about monetary policy that reduces the sensitivity of long-term rates.

Figure (9) presents a scatter plot of the high-frequency responses of 2-year rates against the nonfarm payroll surprises. The size of the bubbles is proportional to the

[16]The Bloomberg mnemonics are USGG2YR, USGG5YR and USGG10YR, respectively. The announcement returns provided by Bloomberg's Economic Analysis are in percent rather than percentage points.

number of views of the monetary policy section on the Thursday before the release day. Higher attention to the website does not coincide with extreme realizations of either interest rates or payroll surprises. Hence, the weakening effect of website views on the sensitivity of interest rates is not driven by outliers.[17]

The sensitivity of long-term interest rates to economic surprises falls as the maturity of the underlying asset increases. Two-year yields are more than twice as sensitive to nonfarm payroll news compared to 10-year rates. Furthermore, existing information about monetary policy, as expressed by website views in $t-1$, have a stronger effect on the surprise - yield nexus for short maturities compared to long maturities. A one standard deviation increase in website views reduces the sensitivity of 2-year rates to news by 0.5, while the sensitivity of 10-year rates falls by 0.3. In either case, a strong increase in website views the day before the announcement can even change the sign of the surprise - yield nexus.[18]

7 Conclusions

In this paper, we used the number of views of the Federal Reserve Board's website to quantify the demand for information about U.S. monetary policy. This allows us to shed light on the behavior of the demand for information around macroeconomic news surprises, which are widely regarded as the main source of public information about the state of the business cycle. The literature has firmly established that interest rates are very sensitive to news surprises as investors recalibrate their expectations of future policy in light of the new information.

We add to this literature by showing that market participants do not only update their beliefs about monetary policy, but they actively search for new information. The number of website views of the policy-relevant sections of the Fed's website increases after macroeconomic announcements. Attention to the Fed as reflected in website views also affects the strength by which asset markets respond to new information. Higher attention to the policy-relevant sections of the website on the day *before* the release weakens the response of interest rates. Our findings are in line with a wide literature on the allocation of attention of investors and offer new insights into the demand for central bank information.

[17]These high-frequency results remain unchanged if we control for the level of macroeconomic uncertainty the day before the news release. We use two alternative uncertainty indicators, the daily Economic Policy Uncertainty index of Baker et al. (2016) and the daily macroeconomic uncertainty index provided by Scotti (2016).

[18]Estimates for the response of the S&P 500 stock market index in the 30-minutes interval after the nonfarm payroll releases suggest that stock prices are sensitive to surprises, but are not affected by the extent of information about the Fed's monetary policy.

The paper also offers lessons for the design of central bank communication. We stress the role of the website as an important source of information on days of scheduled macroeconomic data releases. This implies that information provided on these specific dates should be relatively more effective than on other days. On these days, central banks such as the Federal Reserve could provide information they believe is particularly important to steer market expectations.

A visit to the current home page of the Fed is not very informative. The front page does not not include information on the current level of the Federal funds rate target, the date of the next FOMC meeting, the current inflation rate, the inflation target or the definition of the Fed's mandate. Making this information quickly and easily accessible, without the need to click through the site, would enhance the role of the website as a main tool of communication with the public.[19] A better understanding of the demand for information about monetary policy should contribute to the design of a more effective central bank communication.

[19] Haldane et al. (2019) show experimental evidence on the effects of simpler and more accessible forms of information about monetary policy.

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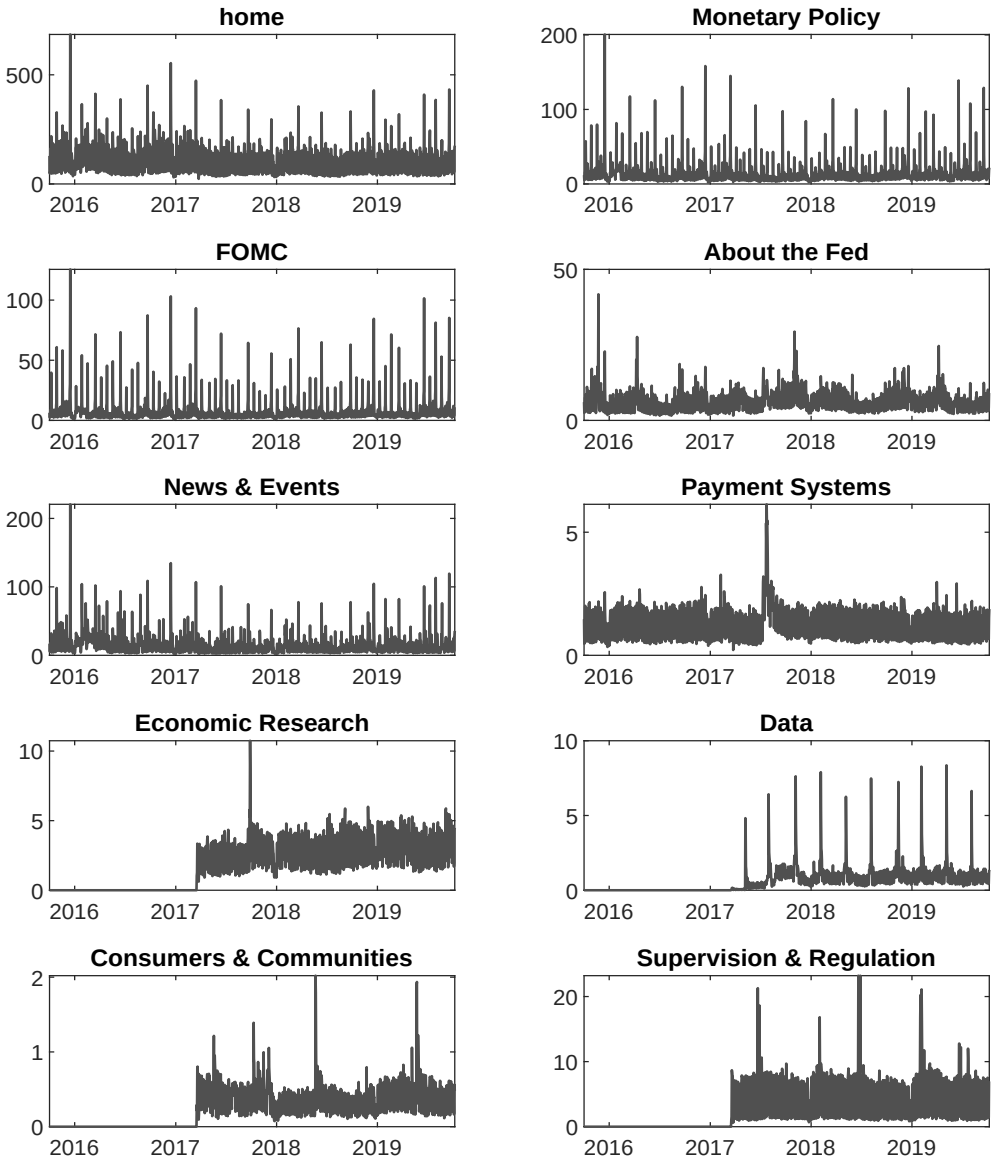
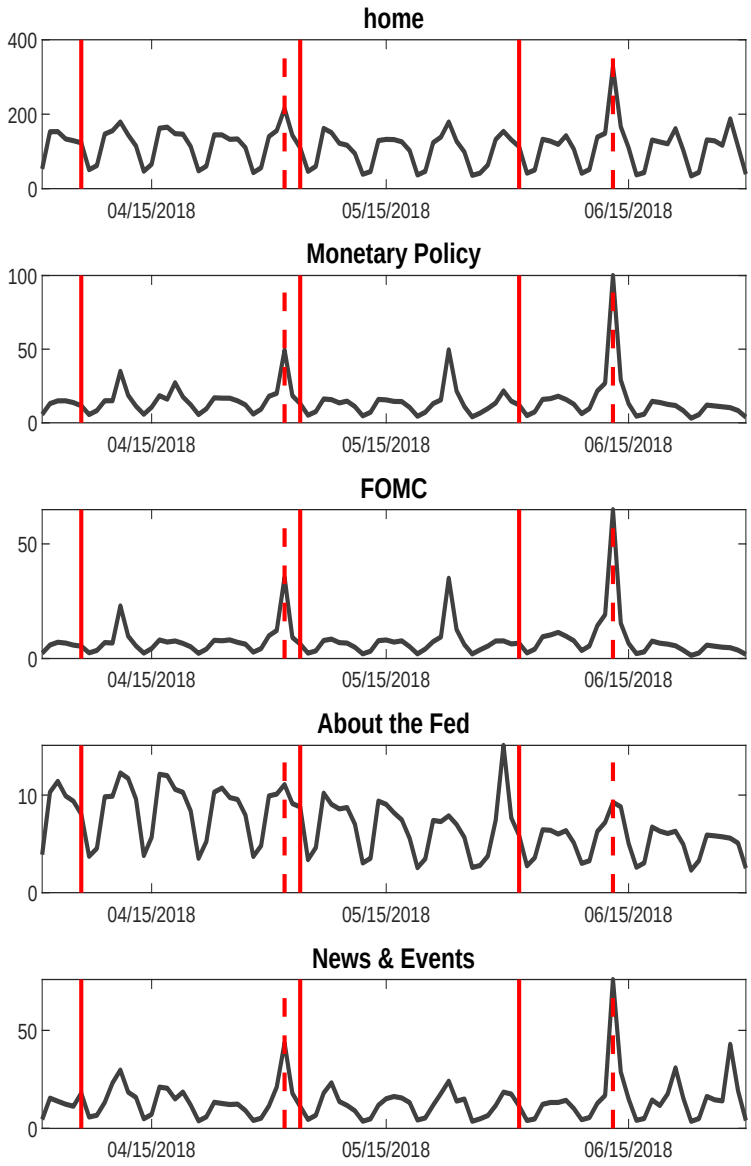
Figure 2: Number of daily views of the Federal Reserve website



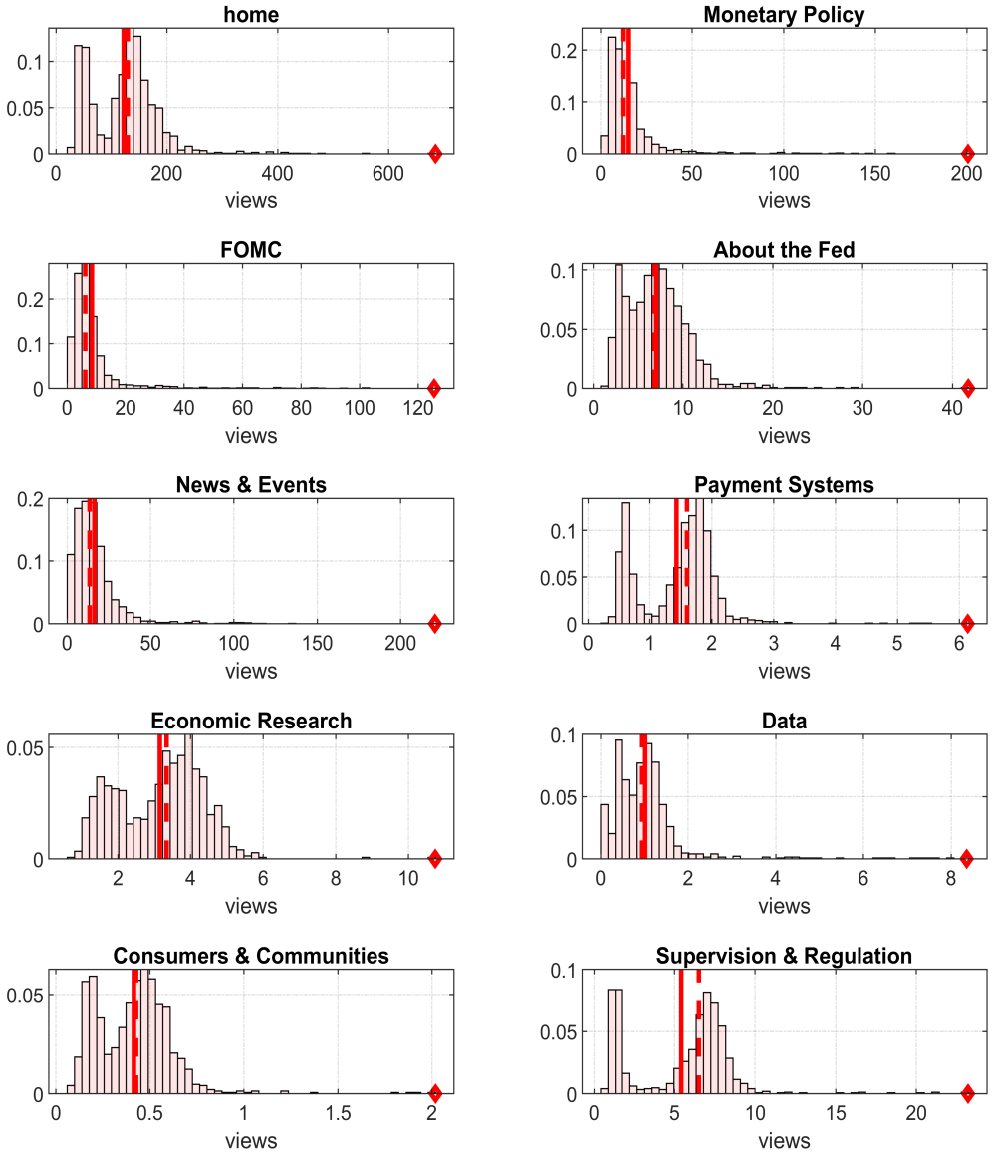
Notes: The graph shows the number of daily views (divided by 1000) of each section of the Federal Reserve Board's website. The sample period covers October 2, 2015 to October 8, 2019.

Figure 3: Number of daily views of the Federal Reserve website between April and June 2018



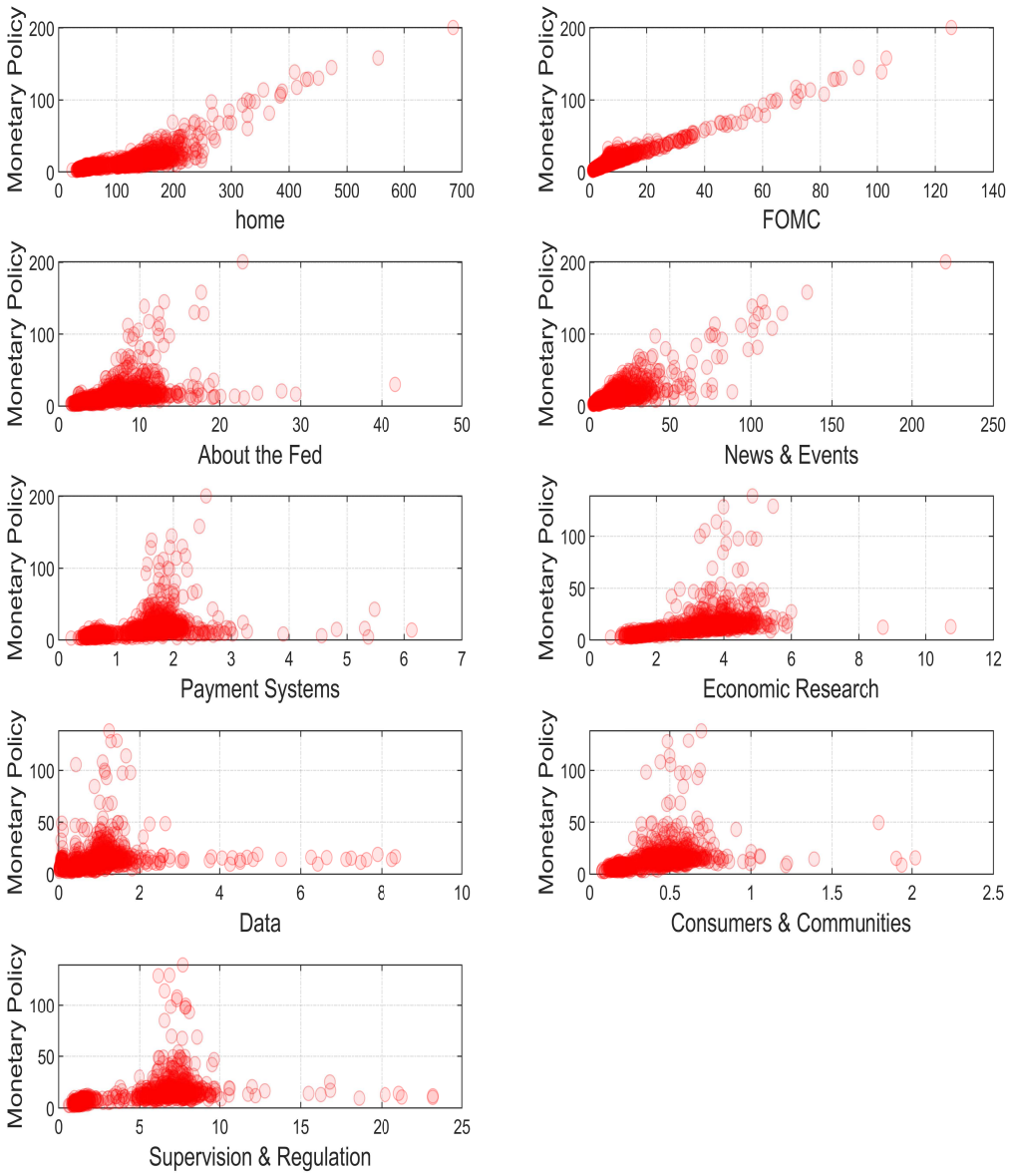
Notes: The graph shows the number of daily views (divided by 1000) of selected sections of the Federal Reserve Board's website between April and June 2018. The solid vertical lines represent the release dates of nonfarm payroll employment figures (April 6, May 4, and June 1, 2018). The dashed vertical lines indicate the FOMC meeting dates (May 2 and June 13, 2018).

Figure 4: Distribution of daily views of Federal Reserve website



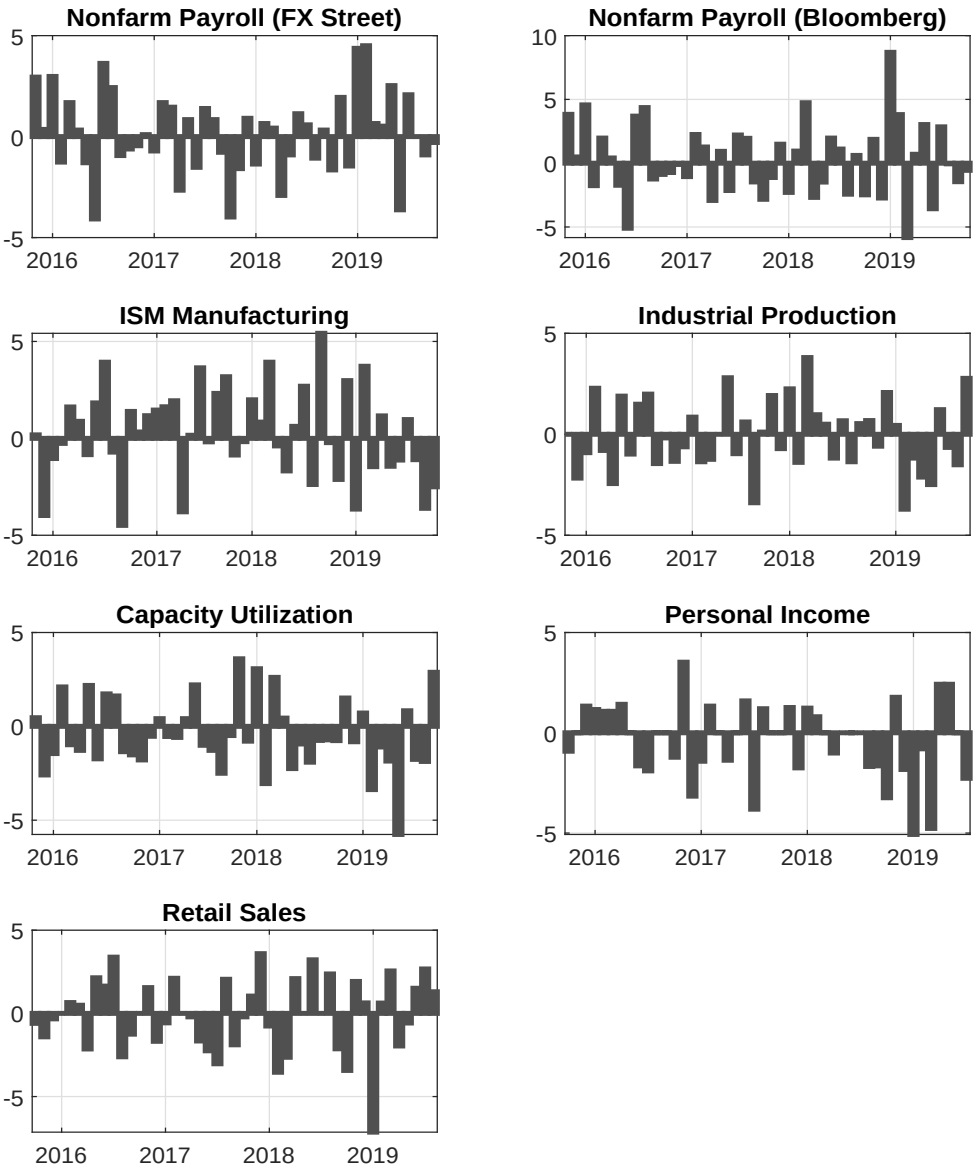
Notes: The graph shows histograms of the number of daily views (divided by 1000) of each section of the Federal Reserve Board's website. The solid (dashed) vertical line is the mean (median). The diamond marks the maximum number of views. The sample period covers October 2, 2015 to October 8, 2019.

Figure 5: Correlation of views of Federal Reserve website



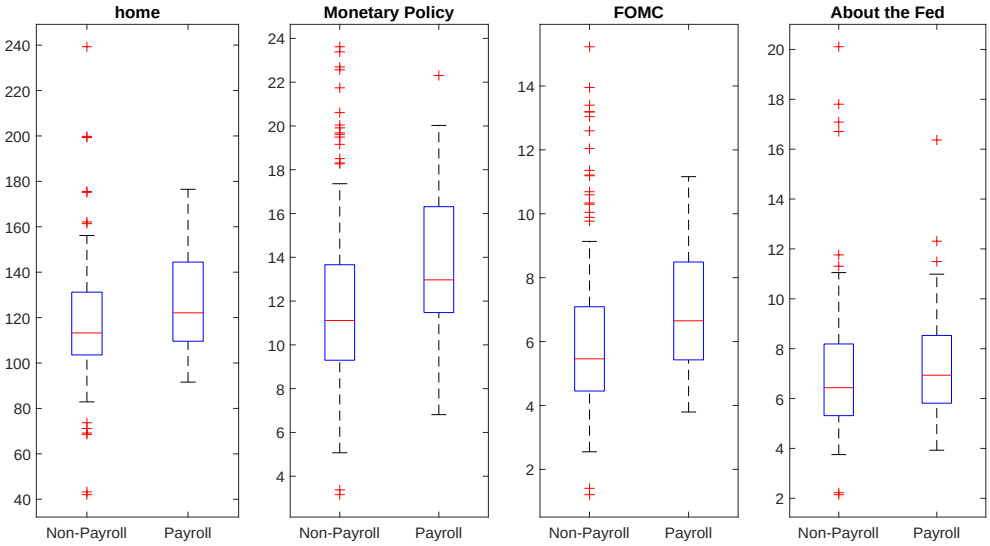
Notes: The graph shows the correlation of the daily number of views (divided by 1000) of different sections of the Federal Reserve's website with the number of views of the Monetary Policy Section of the website. The sample period covers October 2, 2015 to October 8, 2019.

Figure 6: Macroeconomic news surprises



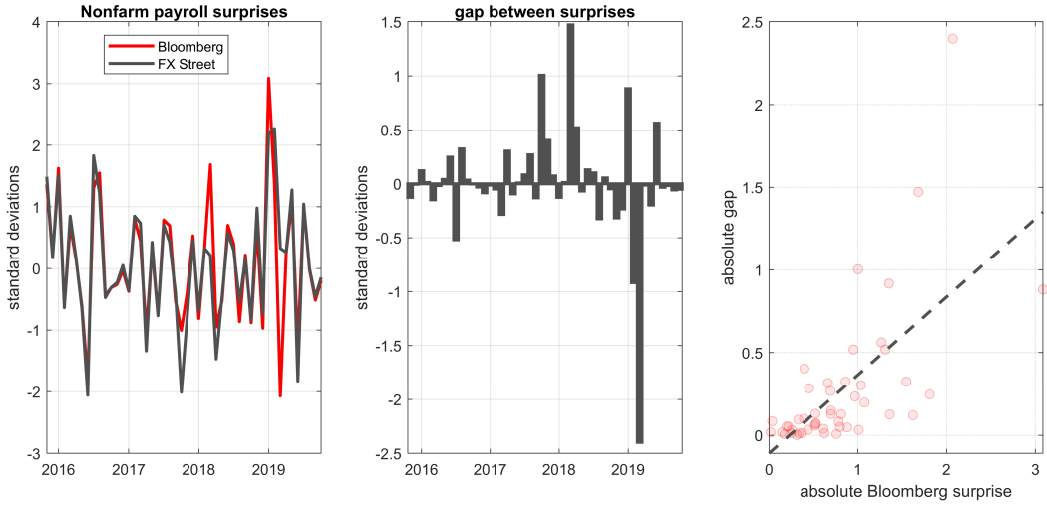
Notes: The graph shows the surprises elements of different macroeconomic news announcements on announcement days. The first surprise series is taken from FX Street, the remaining surprise series are drawn from Bloomberg. The surprises are defined as the difference between the news release and the median of the consensus forecast divided by the standard deviation of forecasts. The sample period covers October 2, 2015 to October 8, 2019.

Figure 7: Distribution of views on Fridays



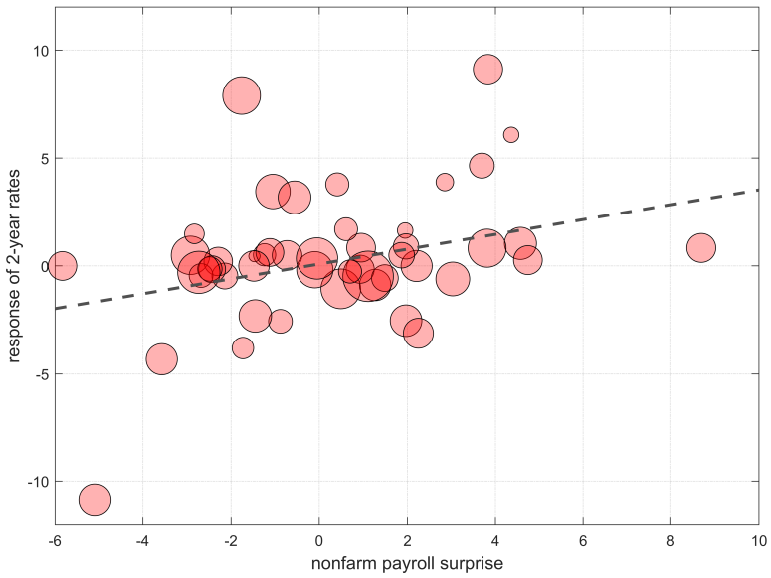
Notes: The graph shows box plots for the daily views (divided by 1000) of selected sections of the Federal Reserve Board's website on Fridays with and without the release of the job report. The red horizontal line is the median, edges of the box reflect the 75% and 25% percentiles, respectively. The length of the whiskers is scaled be equal to the interquartile range. The red symbols depict outliers. The sample period covers October 2, 2015 to October 8, 2019.

Figure 8: Comparing nonfarm payroll surprises



Notes: The graph shows a comparison of nonfarm payroll surprises from Bloomberg and FX Street, respectively. Each surprise series is normalized by its respective standard deviation. The sample period covers October 2, 2015 to October 8, 2019.

Figure 9: The market reaction to nonfarm payroll surprises



Notes: The graph shows the nonfarm payroll news surprises (horizontal axis) and the response of 2-year yields in a 30-minutes window following the nonfarm payroll release at 8:30 am EST (vertical axis). The size of each bubble is proportional to the number of views of the Monetary Policy section of the Fed's website on the day before the nonfarm payroll release. The sample period covers October 2, 2015 to October 8, 2019.

Table 1: Releases of U.S. macroeconomic indicators

	Indicator	Release schedule
(1)	Nonfarm payroll employment	on first Friday of the month by the Bureau of Labor Statistics
(2)	ISM manufacturing survey	on first business day of the month by the Institute für Supply Management
(3)	Industrial production	around the 15th of each month by the Federal Reserve Board together with (4)
(4)	Capacity utilization	around the 15th of each month by the Federal Reserve Board together with (3)
(5)	Personal income	last business day of the month by the Bureau of Economic Analysis
(6)	Retail sales	around the 15th of each month by the U.S. Census Bureau

Notes: The table lists the set of macroeconomic indicators, whose surprise components we focus on in the empirical analysis. We maintain the releases of industrial production and capacity utilization in our data set, although these indicators are provided by the Fed itself, in order to investigate whether their release triggers interest in the policy-related sections of the Fed's website.

Table 2: Response of website views to nonfarm payroll surprises (Bloomberg)

website section	absolute surprise	days after FOMC	dummies for meeting	dummies for minutes	dummies for day of the week	# obs.	R^2
home	0.020 (0.012*)	0.001 (0.001)	yes	yes	yes	1467	0.859
Monetary Policy	0.040 (0.015***)	0.005 (0.001***)	yes	yes	yes	1467	0.845
FOMC	0.042 (0.013***)	0.005 (0.000***)	yes	yes	yes	1467	0.857
About the Fed	0.035 (0.024)	0.000 (0.001)	yes	yes	yes	1467	0.798
News & Events	0.013 (0.017)	0.001 (0.001)	yes	yes	yes	1467	0.681
Payment Systems	0.016 (0.017)	0.000 (0.001)	yes	yes	yes	1467	0.814
Research Economic	0.029 (0.017*)	−0.001 (0.001)	yes	yes	yes	940	0.805
Supervision & Regulation	0.011 (0.011)	−0.001 (0.001)	yes	yes	yes	934	0.833
Consumers & Communities	−0.001 (0.035)	−0.001 (0.001)	yes	yes	yes	935	0.631
Data	−0.000 (0.004)	−0.004 (0.004)	yes	yes	yes	961	0.039

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 3: Response of website views to nonfarm payroll surprises (FX Street)

website section	absolute surprise	days after FOMC	dummies for meeting	dummies for minutes	dummies for day of the week	# obs.	R^2
home	0.030 (0.017*)	0.001 (0.001)	yes	yes	yes	1467	0.859
Monetary Policy	0.051 (0.023**)	0.005 (0.001***)	yes	yes	yes	1467	0.845
FOMC	0.050 (0.020**)	0.005 (0.000***)	yes	yes	yes	1467	0.856
About the Fed	0.049 (0.039)	0.000 (0.001)	yes	yes	yes	1467	0.798
News & Events	0.019 (0.026)	0.001 (0.001)	yes	yes	yes	1467	0.681
Payment Systems	0.029 (0.025)	0.000 (0.001)	yes	yes	yes	1467	0.814
Research Economic	0.035 (0.022)	−0.001 (0.001)	yes	yes	yes	940	0.805
Supervision & Regulation	0.022 (0.017)	−0.001 (0.001)	yes	yes	yes	934	0.833
Consumers & Communities	−0.004 (0.052)	−0.001 (0.001)	yes	yes	yes	935	0.631
Data	−0.005 (0.006)	−0.004 (0.004)	yes	yes	yes	961	0.039

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from FX Street. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 4: Response of website views to ISM manufacturing surprises

website section	absolute surprise	days after FOMC	dummies for meeting	dummies for minutes	dummies for day of the week	# obs.	R^2
home	0.083 (0.035**)	0.001 (0.001)	yes	yes	yes	1467	0.860
Monetary Policy	0.036 (0.027)	0.005 (0.001***)	yes	yes	yes	1467	0.845
FOMC	0.039 (0.025*)	0.005 (0.000***)	yes	yes	yes	1467	0.856
About the Fed	0.015 (0.038)	0.000 (0.001)	yes	yes	yes	1467	0.797
News & Events	0.031 (0.040)	0.001 (0.001)	yes	yes	yes	1467	0.681
Payment Systems	0.094 (0.039**)	0.000 (0.001)	yes	yes	yes	1467	0.815
Research Economic	0.066 (0.029**)	−0.001 (0.001)	yes	yes	yes	940	0.805
Supervision & Regulation	0.059 (0.044)	−0.001 (0.001)	yes	yes	yes	934	0.833
Consumers & Communities	0.088 (0.069)	−0.001 (0.001)	yes	yes	yes	935	0.633
Data	−0.027 (0.029)	−0.004 (0.004)	yes	yes	yes	961	0.039

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 5: Response of website views to industrial production surprises

website section	absolute surprise	days after FOMC	dummies for meeting	dummies for minutes	dummies for day of the week	# obs.	R^2
home	0.073 (0.030**)	0.001 (0.001)	yes	yes	yes	1467	0.859
Monetary Policy	0.102 (0.046**)	0.005 (0.001***)	yes	yes	yes	1467	0.846
FOMC	0.123 (0.074*)	0.005 (0.000***)	yes	yes	yes	1467	0.857
About the Fed	0.005 (0.029)	0.000 (0.001)	yes	yes	yes	1467	0.797
News & Events	0.067 (0.059)	0.001 (0.001)	yes	yes	yes	1467	0.681
Payment Systems	−0.020 (0.015)	0.000 (0.001)	yes	yes	yes	1467	0.814
Research Economic	−0.037 (0.028)	−0.001 (0.001)	yes	yes	yes	940	0.805
Supervision & Regulation	−0.026 (0.009***)	−0.001 (0.001)	yes	yes	yes	934	0.833
Consumers & Communities	−0.056 (0.022***)	−0.001 (0.001)	yes	yes	yes	935	0.632
Data	0.002 (0.011)	−0.004 (0.004)	yes	yes	yes	961	0.039

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 6: Response of website views to capacity utilization surprises

website section	absolute surprise	days after FOMC	dummies for meeting	dummies for minutes	dummies for day of the week	# obs.	R^2
home	0.089 (0.034***)	0.001 (0.001)	yes	yes	yes	1467	0.860
Monetary Policy	0.096 (0.045**)	0.005 (0.001***)	yes	yes	yes	1467	0.846
FOMC	0.109 (0.058*)	0.005 (0.000***)	yes	yes	yes	1467	0.857
About the Fed	0.015 (0.030***)	0.000 (0.001)	yes	yes	yes	1467	0.797
News & Events	0.090 (0.058)	0.001 (0.001)	yes	yes	yes	1467	0.682
Payment Systems	−0.011 (0.013)	0.001 (0.001)	yes	yes	yes	1467	0.814
Research Economic	−0.016 (0.018)	−0.001 (0.001)	yes	yes	yes	940	0.805
Supervision & Regulation	−0.021 (0.009**)	−0.001 (0.001)	yes	yes	yes	934	0.833
Consumers & Communities	−0.055 (0.022**)	−0.001 (0.001)	yes	yes	yes	935	0.632
Data	−0.003 (0.006)	−0.004 (0.004)	yes	yes	yes	961	0.039

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 7: Response of website views to personal income surprises

website section	absolute surprise	days after FOMC	dummies for meeting	dummies for minutes	dummies for day of the week	# obs.	R^2
home	−0.028 (0.019)	0.001 (0.001)	yes	yes	yes	1467	0.859
Monetary Policy	−0.013 (0.028)	0.005 (0.001***)	yes	yes	yes	1467	0.845
FOMC	−0.021 (0.034)	0.005 (0.000***)	yes	yes	yes	1467	0.856
About the Fed	−0.055 (0.034)	0.000 (0.001)	yes	yes	yes	1467	0.798
News & Events	−0.030 (0.038)	0.001 (0.001)	yes	yes	yes	1467	0.681
Payment Systems	0.027 (0.027)	0.000 (0.001)	yes	yes	yes	1467	0.814
Research Economic	−0.096 (0.045**)	−0.001 (0.001)	yes	yes	yes	940	0.806
Supervision & Regulation	−0.038 (0.021*)	−0.001 (0.001)	yes	yes	yes	934	0.833
Consumers & Communities	−0.106 (0.026***)	−0.001 (0.001)	yes	yes	yes	935	0.633
Data	−0.023 (0.023)	−0.004 (0.004)	yes	yes	yes	961	0.039

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 8: Response of website views to retail sales surprises

website section	absolute surprise	days after FOMC	dummies for meeting	dummies for minutes	dummies for day of the week	# obs.	R^2
home	−0.003 (0.012)	0.001 (0.001)	yes	yes	yes	1467	0.859
Monetary Policy	−0.008 (0.018)	0.005 (0.001***)	yes	yes	yes	1467	0.845
FOMC	−0.006 (0.013)	0.005 (0.000***)	yes	yes	yes	1467	0.856
About the Fed	−0.032 (0.016**)	0.000 (0.001)	yes	yes	yes	1467	0.798
News & Events	−0.007 (0.034)	0.001 (0.001)	yes	yes	yes	1467	0.681
Payment Systems	−0.021 (0.009**)	0.000 (0.001)	yes	yes	yes	1467	0.814
Research Economic	−0.024 (0.016)	−0.001 (0.001)	yes	yes	yes	940	0.805
Supervision & Regulation	−0.008 (0.015)	−0.001 (0.001)	yes	yes	yes	934	0.833
Consumers & Communities	−0.046 (0.018**)	0.000 (0.000***)	yes	yes	yes	935	0.632
Data	−0.016 (0.011)	−0.004 (0.004)	yes	yes	yes	961	0.039

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 9: Response of website views to the most important news surprises

website section	absolute surprise nonfarm	ISM	IP	days after FOMC	dummies for meeting, minutes & day of the week	# obs.	R^2
home	0.020 (0.013)	0.083 (0.035**)	0.079 (0.031***)	yes	yes	1467	0.860
Monetary Policy	0.043 (0.015***)	0.036 (0.028)	0.108 (0.046**)	yes	yes	1467	0.846
FOMC	0.046 (0.013***)	0.040 (0.024*)	0.130 (0.074*)	yes	yes	1467	0.858
About the Fed	0.034 (0.024)	0.013 (0.038)	0.009 (0.02)	yes	yes	1467	0.798
News & Events	0.014 (0.018)	0.031 (0.040)	0.070 (0.060)	yes	yes	1467	0.681

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 10: Response of website views to nonfarm payroll surprises (Bloomberg): the role of President Trump's tweets

website section	absolute surprise	days after FOMC	#tweets labor market	#tweets Fed	dummies for meeting, minutes & day of the week	# obs.	R^2
home	0.007 (0.007)	0.001 (0.001)	0.016 (0.024)	0.604 (0.096***)	yes	1467	0.860
Monetary Policy	0.029 (0.012**)	0.005 (0.001***)	0.001 (0.037)	0.622 (0.156***)	yes	1467	0.846
FOMC	0.045 (0.014***)	0.005 (0.000***)	−0.049 (0.036)	0.369 (0.066***)	yes	1467	0.857
About the Fed	0.032 (0.026)	0.000 (0.001)	−0.020 (0.054)	0.358 (0.088***)	yes	1467	0.798
News & Events	0.000 (0.019)	0.001 (0.001)	0.030 (0.048)	0.361 (0.060***)	yes	1467	0.681
Payment Systems	0.009 (0.015)	0.000 (0.001)	−0.016 (0.034)	0.545 (0.194***)	yes	1467	0.815

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression includes the number of tweets sent by President Trump on release days that include reference to the labor market and the Fed, respectively. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 11: Asymmetric response of website views to nonfarm payroll surprises

website section	absolute surprise	dummy negative surprise	dummy × negative surprise	days after FOMC	dummies for meeting, minutes & day of the week	# obs.	R^2
home	0.031 (0.017*)	0.014 (0.060)	−0.032 (0.028)	0.001 (0.001)	yes	1467	0.859
Monetary Policy	0.057 (0.020***)	0.087 (0.060)	−0.072 (0.029***)	0.005 (0.001***)	yes	1467	0.845
FOMC	0.051 (0.017***)	0.065 (0.054)	−0.044 (0.027)	0.005 (0.000***)	yes	1467	0.857
About the Fed	0.025 (0.020)	−0.221 (0.147)	0.092 (0.092)	0.000 (0.001)	yes	1467	0.798
News & Events	0.020 (0.018)	0.001 (0.113)	−0.022 (0.046)	0.001 (0.001)	yes	1467	0681

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 12: The response of website views to nonfarm payroll surprises: the role of forecast dispersion

website section	absolute surprise	forecast dispersion	days after FOMC	dummies for meeting	dummies for minutes	dummies for day of the week	# obs.	R^2
home	0.045 (0.023**)	−0.179 (0.089**)	0.001 (0.001)	yes	yes	yes	1467	0.859
Monetary Policy	0.071 (0.027***)	−0.226 (0.105**)	0.005 (0.001***)	yes	yes	yes	1467	0.845
FOMC	0.060 (0.019***)	−0.130 (0.080*)	0.005 (0.000***)	yes	yes	yes	1467	0.857
About the Fed	0.066 (0.037*)	−0.224 (0.130*)	0.000 (0.001)	yes	yes	yes	1467	0.798
News & Events	0.034 (0.023)	−0.151 (0.082*)	0.001 (0.001)	yes	yes	yes	1467	0.681

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of macroeconomic surprises is drawn from Bloomberg. "Days after FOMC" counts the number of days elapsed since the last FOMC statement. Forecast dispersion is measured by the absolute difference between the Bloomberg and the FX Street surprises. The regression also includes a constant. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 13: High-frequency responses of 2-year yields to macroeconomic surprises: the role of attention to the Fed

website section	surprise	views on day before	surprise × views	# obs.	R^2
home	0.612 (0.232***)	0.031 (1.063)	−0.444 (0.554)	48	0.161
Monetary Policy	0.519 (0.178***)	−0.502 (0.793)	−0.895 (0.426**)	48	0.196
FOMC	0.421 (0.191**)	−0.655 (0.763)	−0.571 (0.502)	48	0.170
About the Fed	0.601 (0.188***)	−0.202 (0.268)	−0.575 (0.197***)	48	0.236
News & Events	0.364 (0.163**)	−0.148 (1.056)	0.209 (0.512)	48	0.147
Payment Systems	0.675 (0.314**)	0.635 (0.967)	−0.620 (0.440)	48	0.175

Notes: The dependent variable is the response of U.S. 2-year rates in the window from 8:30 to 9:00 am EST following the release of the nonfarm payroll employment numbers by the Bureau of Labor Statistics. The explanatory variables are (i) the surprise element of the news release obtained from Bloomberg (in percent) as explained in the text and (ii) the number of views of different sections of the Federal Reserve website on the day before (in standard deviations from the mean). We use only those website sections for which we have observations over the full sample from October 2, 2015 to October 8, 2019. The regression also includes a constant. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 14: High-frequency responses of 5-year yields to macroeconomic surprises: the role of attention to the Fed

website section	surprise	views on day before	surprise × views	# obs.	R^2
home	0.480 (0.171***)	−0.207 (0.706)	−0.333 (0.367)	48	0.198
Monetary Policy	0.392 (0.128***)	−0.654 (0.592)	−0.539 (0.325*)	48	0.219
FOMC	0.337 (0.128***)	−0.701 (0.657)	−0.393 (0.394)	48	0.206
About the Fed	0.494 (0.119***)	−0.267 (0.212)	−0.511 (0.138***)	48	0.309
News & Events	0.292 (0.116**)	−0.338 (0.677)	0.175 (0.336)	48	0.178
Payment Systems	0.545 (0.210***)	0.557 (0.680)	−0.507 (0.298*)	48	0.213

Notes: The dependent variable is the response of U.S. 5-year rates in the window from 8:30 to 9:00 am EST following the release of the nonfarm payroll employment numbers by the Bureau of Labor Statistics. The explanatory variables are (i) the surprise element of the news release obtained from Bloomberg (in percent) as explained in the text and (ii) the number of views of different sections of the Federal Reserve website on the day before (in standard deviations from the mean). We use only those website sections for which we have observations over the full sample from October 2, 2015 to October 8, 2019. The regression also includes a constant. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

Table 15: High-frequency responses of 10-year yields to macroeconomic surprises: the role of attention to the Fed

website section	surprise	views on day before	surprise × views	# obs.	R^2
home	0.293 (0.106***)	−0.410 (0.332)	−0.222 (0.186)	48	0.216
Monetary Policy	0.233 (0.077***)	−0.519 (0.319)	−0.344 (0.173**)	48	0.217
FOMC	0.199 (0.078**)	−0.366 (0.434)	−0.332 (0.252)	48	0.204
About the Fed	0.299 (0.073***)	−0.229 (0.121*)	−0.337 (0.082***)	48	0.318
News & Events	0.175 (0.080**)	−0.321 (0.340***)	0.010 (0.174***)	48	0.166
Payment Systems	0.296 (0.141**)	0.059 (0.471)	−0.243 (0.209)	48	0.188

Notes: The dependent variable is the response of U.S. 10-year rates in the window from 8:30 to 9:00 am EST following the release of the nonfarm payroll employment numbers by the Bureau of Labor Statistics. The explanatory variables are (i) the surprise element of the news release obtained from Bloomberg (in percent) as explained in the text and (ii) the number of views of different sections of the Federal Reserve website on the day before (in standard deviations from the mean). We use only those website sections for which we have observations over the full sample from October 2, 2015 to October 8, 2019. The regression also includes a constant. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.

ONLINE APPENDIX

1 Tweets from President Trump

The following list contains the tweets President Trump sent on nonfarm payroll release days that contain references to the labor market or the Federal Reserve. Tweets on the Federal Reserve are shown in bold. The source is http://www.trumptwitterarchive.com/.

June 03, 2016
"Terrible jobs report just reported. Only 38,000 jobs added. Bombshell!"

May 05, 2017
"JOBS, JOBS, JOBS!"
"Great jobs report today - It is all beginning to work!"

August 04, 2017
"Excellent Jobs Numbers just released - and I have only just begun. Many job stifling regulations continue to fall. Movement back to USA!"

November 03, 2017
"JOBS, JOBS, JOBS!"

December 08, 2017
" 'The unemployment rate remains at a 17-year low of 4.1%. The unemployment rate in manufacturing dropped to 2.6%, the lowest ever recorded. The unemployment rate among Hispanics dropped to 4.7%, the lowest ever recorded...' "

January 05, 2018
"Dow goes from 18,589 on November 9, 2016, to 25,075 today, for a new all-time Record. Jumped 1000 points in last 5 weeks, Record fastest 1000 point move in history. This is all about the Make America Great Again agenda! Jobs, Jobs, Jobs. Six trillion dollars in value created!"

February 02, 2018
"With 3.5 million Americans receiving bonuses or other benefits from their employers as a result of TAX CUTS, 2018 is off to great start!
✓Unemployment rate at 4.1%.
✓Average earnings up 2.9% in the last year.
✓200,000 new American jobs.
✓#MAGA "

May 04, 2018
"Because Jobs in the U.S. are doing so well, Americans receiving unemployment aid is the lowest since 1973. Great!"
"JUST OUT: 3.9% Unemployment. 4% is Broken! In the meantime, WITCH HUNT!"

June 01, 2018
"Looking forward to seeing the employment numbers at 8:30 this morning."

July 06, 2018
"JOBS, JOBS, JOBS!"

August 03, 2018
"July is just the ninth month since 1970 that unemployment has fallen below 4%. Our economy has added 3.7 million jobs since I won the Election. 4.1 GDP. More than 4 million people have received a pay raise due to tax reform. $400 Billion brought back from "overseas." @FoxNews"
"Almost 500,000 Manufacturing Jobs created since I won the Election. Remember when my opponents were saying that we couldn't create this type of job anymore. Wrong, in fact these are among our best and most important jobs!"

September 07, 2018
" 'Unprecedented Jobs Growth Streak Continues as Wages Rise' "

October 05, 2018
"Just out: 3.7% Unemployment is the lowest number since 1969!"

November 02, 2018
"Wow! The U.S. added 250,000 Jobs in October - and this was despite the hurricanes. Unemployment at 3.7%. Wages UP! These are incredible numbers. Keep it going, Vote Republican!"

January 04, 2019
"GREAT JOBS NUMBERS JUST ANNOUNCED!"

February 01, 2019
"JOBS, JOBS, JOBS!"
" 'Job growth surges by 312,000 in December' "

March 08, 2019
" 'This is as good a time as I can remember to be an American Worker. We have the strongest economy in the world.' Stuart Varney @foxandfriends So true!"
"Women's unemployment rate is down to 3.6% - was 7.9% in January, 2011. Things are looking good!"

May 03, 2019
"JOBS, JOBS, JOBS! 'Jobs surge in April, unemployment rate falls to the lowest since 1969' "
" 'The U.S. Created 263,000 Jobs in April, Unemployment Fell to Lowest Level Since 1969' "

July 05, 2019
"JOBS, JOBS, JOBS!"
" 'Record 157,005,000 Employed; 19th Record of Trump Era' "
"Strong jobs report, low inflation, and other countries around the world doing anything possible to take advantage of the United States, knowing that our Federal Reserve doesn't have a clue! They raised rates too soon, too often, & tightened, while others did just the opposite...."
"....As well as we are doing from the day after the great Election, when the Market shot right up, it could have been even better - massive additional wealth would have been created, & used very well. Our most difficult problem is not our competitors, it is the Federal Reserve!"

September 06, 2019
"China just enacted a major stimulus plan. With all the Tariffs THEY are paying to the USA, Billions and Billions of Dollars, they need it! In the meantime, our Federal Reserve sits back and does NOTHING!"

October 04, 2019
"Breaking News: Unemployment Rate, at 3.5%, drops to a 50 YEAR LOW. Wow America, lets impeach your President (even though he did nothing wrong!)."

2 Additional results

Table 1: Response of website views to placebo nonfarm payroll surprises

website section	absolute nonfarm payroll surprise in $t-7$	in $t-1$	in t	in $t+1$	in $t+7$
home	−0.005 (0.008)	−0.003 (0.004)	0.020 (0.012*)	0.009 (0.009)	−0.006 (0.008)
Monetary Policy	0.004 (0.009)	−0.001 (0.007)	0.040 (0.015***)	0.008 (0.019)	0.006 (0.010)
FOMC	0.008 (0.011)	−0.004 (0.007)	0.042 (0.013***)	0.020 (0.016)	0.002 (0.010)
About the Fed	−0.010 (0.017)	−0.006 (0.009)	0.035 (0.024)	0.014 (0.013)	−0.007 (0.027)
News & Events	−0.016 (0.015)	0.003 (0.007)	0.013 (0.017)	−0.013 (0.014)	−0.007 (0.018)
Payment Systems	0.001 (0.012)	−0.010 (0.007)	0.016 (0.017)	0.011 (0.010)	−0.021 (0.014)

Notes: The dependent variable is the daily change in the number of views (in standard deviations) of the specific section of the Federal Reserve's website. The series of absolute nonfarm payroll surprises is shifted one day or one week, respectively, into the past or the future in order to generate placebo events. The regression includes a constant and all the variables and dummy variables introduced in the main text. The sample period covers October 2, 2015 to October 8, 2019. Robust standard errors in parentheses. A significance level of 1%, 5% and 10% is denoted by ***, ** and *.