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Leaning Against the Data: Policymaker Communications under State-based Forward Guidance*

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Abstract

A purported benefit of state-based forward guidance is that the private sector adjusts the expected stance of policy without further policymaker communications. This assumes a shared understanding of how policymakers are interpreting the data and that policymakers are consistent in their assessment of the data. Using text analysis, we test whether the FOMC's introduction of state-based forward guidance in December 2012 changed the tone of policymaker communications. We find that policymakers tended to downplay positive data following the introduction of the guidance, in effect leaning against the data and reinforcing the dependence of policy expectations on policymaker communications.

JEL Classification: E30, E40, E50, G12.

Keywords: state-based forward guidance, text analysis, outlook assessment, financial market.

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1 Introduction

Forward guidance about the path of the policy interest rate has become a standard instrument of monetary policy used by central banks around the world, including the Federal Reserve (Eberly et al. (2020)). With more frequent use, the nature of forward guidance has evolved over time. Although early examples of forward guidance mostly the path of the policy rate explicitly or implicitly to a calendar time, it has become more common recently for forward guidance to tie the path of the policy rate to economic conditions such as the labor market and inflation. One purported benefit of this evolution from "date-based" to "state-based" forward guidance is that the state-based guidance allows the private sector to adjust their expectations about the expected stance of policy, (as well as broader financial conditions), in response to economic news without further policymaker communications.

The benefit of state-based forward guidance crucially depends on the assumption that policymakers can commit to a relatively transparent policy reaction function linking economic conditions to the policy rate (much like a Taylor rule).[1] Under these circumstances, the private sector should adjust their expectations for policy in response to the incoming economic data. However, in addition to an understanding of the reaction function, the private sector also needs to make a judgment on how policymakers are interpreting incoming data. Policy expectations do not simply reflect the public's interpretation of the data; instead policy expectations reflect the public's interpretation of how policy makers are interpreting the data. Suppose policymakers change the way that they assess the economic outlook after introducing the state-based forward guidance, perhaps in a way that weakens the constraints of the forward guidance ("leaning against the data"). Then the private sector will first have to assess how policymakers view surprises in macroeconomic indicators before updating their policy expectations. This does not necessarily make the state-based forward guidance less effective. However, it certainly weakens the argument that a benefit of the state-based forward guidance is that it facilitates the market's spontaneous adjustment of policy expectations in response to economic news.

[1] For instance, during the press conference after the December 2012 FOMC meeting when the FOMC introduced the threshold-based forward guidance tied to the unemployment rate and the inflation rate, Chair Bernanke made an analogy between the announcement and the Taylor rule by saying "It is not a Taylor rule but it has the same feature that it relates policy to observables in the economy, such as unemployment and inflation." FOMC (2012a).

To demonstrate this potential shortcoming, we examine the evolution of policymakers' outlook assessments once state-based forward guidance is introduced as well as how the introduction of this guidance affects financial market responses to economic news.

In this paper, we examine the policymaker and financial market reaction to the state-based forward guidance implemented with thresholds, i.e., threshold-based forward guidance introduced in the December 2012 FOMC meeting. At the meeting, the FOMC decided to keep the federal funds rate target at the effective lower bound (0 to 1/4 percent range) "at least as long as the unemployment rate remains above 6-1/2 percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continued to be well anchored." This was the first time that the FOMC provided forward guidance explicitly based on numeric values of economic indicators. To test the effect of the forward guidance on policymaker communications we measure the sentiment of all FOMC participants' outlook-related speeches before and after December 2012 by comparing the relative frequency of positive words versus negative words classified by Loughran and McDonald (2011). Specifically, we examine how policymaker sentiment responds to revisions in the forecast of key macroeconomic variables (real GDP, unemployment rate, inflation) before and after the introduction of the threshold-based forward guidance. Also, using high-frequency financial market data, we assess whether asset prices became more or less sensitive to labor market news related to the threshold.

We find that policymakers indeed changed the way they discussed the economic outlook – especially the unemployment rate – after the introduction of the 2012 forward guidance. In particular, we find that policymaker's speeches became relatively more pessimistic even after positive surprises in the unemployment rate forecast. The change in speech sentiment also coincided with the attenuation of financial market responses to positive surprises in the unemployment rate, suggesting financial markets internalized the change in policymaker sentiment.

These findings question the view that the 2012 threshold-based forward guidance successfully shaped the reaction of the private sector's expectations to economic news. The transcripts of the December 2012 FOMC meeting reveal that many FOMC participants had reservations about providing a clear numeric guideline for the future path of policy FOMC (2012b). Primarily they were concerned about losing flexibility in an uncertain

environment, suggesting an uneasiness with the commitment implied by the numerical threshold on the unemployment rate. The subsequent shift in tone of these participants' speeches could be viewed as an attempt to maintain flexibility under the threshold guidance. We conclude that both policymakers and financial market participants did not regard the threshold-based forward guidance as signaling a credible policy reaction function free of further interpretation and communication, undercutting the argument that state-based forward guidance allows the financial market participants to automatically update their policy expectations in response to incoming data.

Overall, our findings illustrate challenges in designing effective state-based forward guidance. Announcing precise economic conditions to guide the path of policy may not be sufficient for achieving the full advantage of state-based guidance, given that the private sector recognizes that policymakers retain flexibility in interpreting data. Instead, policymakers may be able to achieve better results by being less precise about the conditions that will guide their policy stance. The literature on Bayesian persuasion following Kamenica and Gentzkow (2011) suggests that when the information sender's objective (e.g., policymakers) is not fully aligned with the information receiver's objective (e.g., financial market participants), it is optimal for the information sender to be less precise about the signal for the state variable that affects payoffs of both the sender and the receiver.[2] And policymakers' objectives may indeed not be fully aligned with market participants. Policymakers tend to put a greater weight on avoiding market disruption from policy changes than individual market participants who are solely interested in financial gains from trading.[3] If that is the case, providing a less precise signal (e.g., a range of values rather than a particular value for the state variable) may be more effective in shaping market expectations.

The paper is organized as follows. In Section 2, we construct our measure of sentiment in FOMC participants' speeches related to the economic outlook based on text analysis. We run split sample regressions to see how the introduction of the threshold-based forward guidance changes the sensitivity of policymaker sentiment to data surprises as reflected

[2] In a related context, Morris and Shin (2002) argue that increased public disclosures does not always lead to welfare improvement.

[3] Stein and Sunderam (2018) discuss various reasons why policymakers may dislike bond market volatility. For example, they may be concerned that bond market volatility would tighten financial market conditions and negatively affect real economic activities in a way not well captured by the target interest rate based on macroeconomic conditions.

in private sector forecast changes. In Section 3, we look at high-frequency stock and bond market reactions to macroeconomic news announcements related to labor market developments. In Section 4, we discuss policy implications. We provide concluding remarks in Section 5.

2 Sentiment Analysis of Outlook Speeches

2.1 Data

We examine the speech transcripts of all 59 FOMC participants from January 2005 to December of 2020.[4] We trim out speeches unrelated to the economic outlook by excluding speeches which do not mention unemployment and inflation. We tokenize the transcripts and create a dictionary of words corresponding to each speech. To identify the tone of words in a speech, we use the classification of positive and negative words in Loughran and McDonald (2011).[5] For information on the revision to the outlook, independent of participant speeches, we use revisions to the BlueChip Consensus forecasts for real GDP growth, unemployment, and inflation.[6]

2.2 Sentiment score

We identify policymakers' characterization of the outlook by linking the tone of policymaker speeches to revisions in the private forecasts. Our primary question is if the relationship between forecast revisions and the tone of policymaker communications changed after threshold-based forward guidance was formally introduced. To answer this question, we first construct a measure of the tone of policymaker speeches from text analysis using the frequency of positive words and negative words in the speech as in Garcia (2013).

[4] According to FRB (2019), the total number of public remarks by the Federal Reserve officials began to increase from 2005.

[5] The word lists in Loughran and McDonald (2011) are based on the universe of regulatory filings submitted to the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system maintained by the Security and Exchange Commission and include six categories (positive, negative, uncertainty, litigious, strong modal, and weak modal). However, we limit ourselves to the positive and negative categories as these are most applicable to our analysis.

[6] We examine revisions to the current year forecast to focus on high frequency changes in the outlook.

Let $S_{i,t}$ be the tone of the i-th policymaker's speech made at time t. We define $S_{i,t}$ as the ratio between the number of positive words exceeding the number of negative words in the speech and the total number of words in the speech as follows:

$$S_{i,t} = \frac{1}{n_{i,t}} \sum_{j=1}^{n_{i,t}} \left[\mathbb{1}_{\{w_{i,t,j} \in W_p\}} - \mathbb{1}_{\{w_{i,t,j} \in W_n\}} \right], \tag{1}$$

where W_p and W_n are the list of positive and negative words in the dictionary created by Loughran and McDonald (2011); $n_{i,t}$ is the total number of words in the speech; $w_{i,t,j}$ is the j-th word in the speech; and $\mathbb{1}$ is the indicator function that takes the value of 1 if the condition inside the parenthesis is satisfied and 0 otherwise. We associate the positive tone of the speech with the more optimistic outlook for the economy.

According to our computation, speeches made by Eric S. Rosengren (President of the Federal Reserve Bank of Boston from 2007 to 2021) are most negative (average of -0.029), which is in contrast to speeches made by Mark W. Olson (Governor of the Federal Reserve Board from 2001 to 2006) which are least negative (average of -0.0009). The former Chairman of the Federal Reserve, Ben S. Bernanke is in the middle of the two averaging around -0.009. The median number of speeches among 59 FOMC participants is 51.

2.3 Empirical framework

Next, to identify the effect of the introduction of threshold-based forward guidance on how FOMC participants characterize the outlook, we must determine the systematic relationship between the tone of speeches and new information on the key macroeconomic variables underpinning the forward guidance. We use revisions in the BlueChip consensus forecasts for unemployment and inflation to capture new information on the outlook.[7] We then compare the change in tone in policymaker communications with the forecast revisions. We capture this relationship by the following regression.

$$S_{i,t} = \alpha_0 + \alpha_1 S_{i,t_-} + \alpha_2 \Delta(\widehat{y}_t) + \alpha_3 \Delta(\widehat{u}_t) + \alpha_4 \Delta(\widehat{\pi}_t) + \epsilon_{i,t}, \tag{2}$$

[7]We also include revisions in real GDP forecasts since policymakers typically make projections for real GDP growth as well as unemployment and inflation in their speeches.

where S_{i,t_-} is the tone of the i-th speaker's most recent past speech. $\Delta(\widehat{y}_t)$, $\Delta(\widehat{u}_t)$, and $\Delta(\widehat{\pi}_t)$ represent the BlueChip consensus forecast revisions for real GDP growth, unemployment and inflation. We split our sample into two periods, before and after December 2012 when the threshold-based forward guidance was introduced, and run regressions separately. If policymakers changed the way that they discuss the outlook after the threshold-based forward guidance was introduced, regression coefficients on those variables linked to thresholds such as α_3 and α_4 might have shifted.

2.4 Threshold-based guidance and the shift in policymaker tone

Table 1 shows split sample estimation results on the sentiment of the outlook speeches by FOMC participants. Reassuringly, the signs make sense in both samples. The most noticeable change is that the coefficients on forecast revisions for GDP, inflation, and unemployment all become insignificant after the adoption of threshold-based guidance. This is particularly apparent in the response to revisions in unemployment forecasts (α_3). Before the introduction of threshold-based forward guidance, the tone of policymaker communications was sensitive to revisions in the unemployment forecast in a statistically significant way. Since the coefficient estimate during the first subsample is negative, the tone of outlook speech was likely to be more positive when the unemployment rate forecast was revised downward. However, during the second subsample after threshold-based forward guidance was introduced, the coefficient estimate shrinks toward zero and is statistically insignificant.[8] The shift indicates that the tone of policymakers' outlook speeches became insensitive to unemployment news after the introduction of threshold-based guidance.

Given the sluggish improvement in labor market conditions before the introduction of the threshold-based forward guidance, FOMC participants expected a very gradual improvement in labor market conditions at the time of the December 2012 meeting. Figure 1 shows the median forecast of the unemployment rate from the summary of economic projections at the December 2012 FOMC meeting as well as the comparable private one from BlueChip forecasts and realized values. While both policymakers and the private

[8]The FOMC dropped the 6.5% threshold language in the March 2014 FOMC statement. Our results do not materially change even if we use a shorter sample period from March 2011 to Jan 2014 and split the sample into two subsamples before and after December 2012. We also consider a longer sample period from 2005 to 2020 and obtain similar results. Details are provided in the online appendix.

Table 1: Outlook speech tone and forecast revisions: 2011-2014

Coefficient	Jan 3, 2011 ∼ Dec 3, 2012	Dec 17, 2012 ∼ Dec 8, 2014
Constant	−0.020	−0.011
	(0.002)	(0.001)
Past speech (α_1)	0.164	0.110
	(0.054)	(0.060)
Revisions for GDP growth (α_2)	0.055	0.029
	(0.031)	(0.040)
Revisions for unemployment (α_3)	−0.019	-0.008
	(0.009)	(0.008)
Revisions for inflation (α_4)	−0.063	-0.029
	(0.035)	(0.040)
Obs	352	281
R^2	0.05	0.02

Notes: We estimate $S_{i,t} = \alpha_0 + \alpha_1 S_{i,t\_} + \alpha_2 \Delta(\widehat{y}_t) + \alpha_3 \Delta(\widehat{u}_t) + \alpha_4 \Delta(\widehat{\pi}_t) + \epsilon_{i,t}$ where $S_{i,t\_}$ is the tone of the i-th speaker's most recent past speech. $\Delta(\widehat{y}_t)$, $\Delta(\widehat{u}_t)$, and $\Delta(\widehat{\pi}_t)$ represent the BlueChip consensus forecast revisions for real GDP growth, unemployment and inflation. We split sample into two periods, before and after the December 2012 when the threshold-based forward guidance was introduced, and run regressions separately. Standard errors are provided in parentheses.

sector expected the unemployment rate to remain above the 6.5% threshold through the end of 2015, the decline in the unemployment rate was much faster, approaching the threshold by the end of 2013 and crossing the threshold in April 2014.[9]

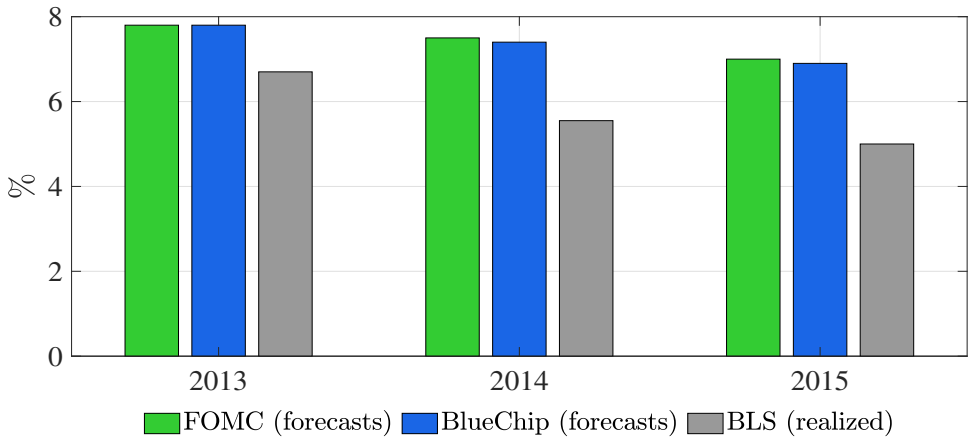
However, the rapid decline in the unemployment rate was not entirely due to increased employment and improving labor market conditions. The decline in unemployment also reflected a decline in labor force participation rate as potential workers exited the labor market. For this reason, some policymakers explicitly downplayed the significance of the decline in the unemployment rate which was the key criterion in the threshold-based forward guidance and emphasized a wider view of labor market conditions. The following excerpt from the speech made by Eric S. Rosengren illustrates this view clearly.

It is certainly good news that the national unemployment rate has fallen from

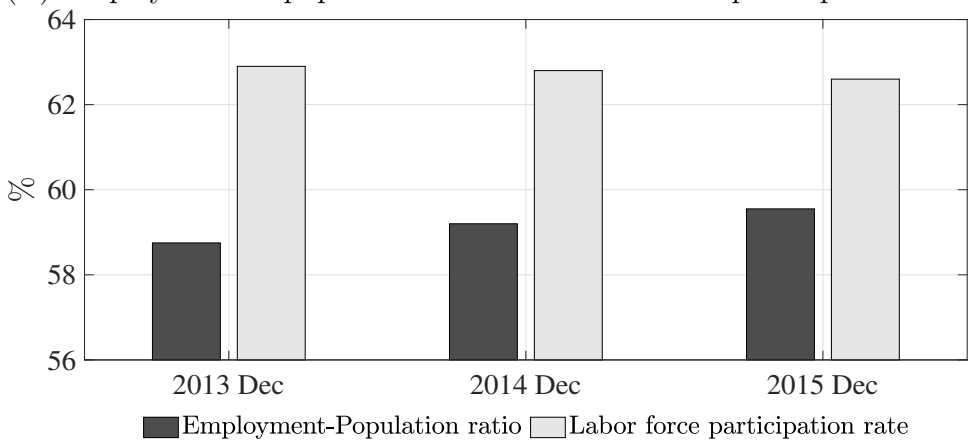
[9]The time-based forward guidance made before the December 2012 meeting was signaling the rate hike after the mid-2015, roughly consistent with the threshold-based forward guidance and the median forecast from the summary of economic projections. For this reason, FOMC (2012a) stressed the consistency between the threshold-based forward guidance and the time-based forward guidance.

Figure 1: Labor market conditions

(A) Unemployment rate: Forecasts versus realizations



(B) Employment to population ratio and labor force participation rate



Notes: (A) Data sources are the Federal Reserve Board, Wolters Kluwer, Bureau of Labor Statistics, and Haver Analytics. For the FOMC forecasts, we use the median projections made in the December 2012 FOMC meeting. For BlueChip forecasts, we use median forecasts made in October and December 2012. (B) Data source is the Federal Reserve Bank of St. Louis.

a peak of 10 percent in the post-financial crisis recession to 6.7 percent as of December. Unfortunately, not all reductions in the unemployment rate are alike. For example, some are caused by rapid employment growth, while others are due to people giving up looking for a job... The fact that other labor market indicators have not been as favorable as the unemployment rate suggests that the rate may be falling for both reasons. Gauged by these broader measures of

> *labor market utilization, we remain far from conditions experienced prior to the so-called "Great Recession."*
>
> (Eric S. Rosengren — New College of Florida, Feb 6, 2014)

The tone of this speech contrasts with views on unemployment and inflation prior to the introduction of threshold-based forward guidance.

> *It is worth noting that a variety of factors outside the realm of monetary policy (for example, demographics) affect how low unemployment can get without igniting inflationary pressures. But my own personal view is that if inflationary pressures remain muted, then labor market conditions would need to be more like 6.5 percent unemployment to warrant the federal funds rate being lifted off the zero bound.*
>
> (Eric S. Rosengren — Babson College, Nov 1, 2012)

Rosengren was not an exception. Federal Reserve Bank of New York President William C. Dudley, who strongly argued for the adoption of the threshold-based forward guidance at the December 2012 FOMC meeting, also downplayed the significance of the decline in the unemployment rate and suggested the employment to population ratio, which had not improved as quickly as the unemployment rate, was a better gauge of labor market conditions.

> *Even though the unemployment rate has declined by 2.7 percentage points from its peak of 10 percent in October of 2009, there are still many people that want jobs but are not counted as unemployed because they are not actively looking for work. An alternative measure of labor market conditions, the employment to population ratio, which is not influenced by changes in the number of these workers, has shown limited improvement. Job loss rates have fallen, but hiring rates remain depressed at low levels. Taken together, the labor market still cannot be regarded as healthy. Numerous indicators, including the behavior of labor compensation, are all consistent with the view that there remains a great deal of slack in labor market.*
>
> (William C. Dudley — Syracuse University, Sept 27, 2013)

The pessimistic tone of these speeches is consistent with our finding that after the introduction of threshold-based guidance positive surprises on the unemployment rate were no longer reflected in a more positive tone in policymaker speeches. In a sense, policymakers started to "lean against the data" after the introduction of threshold-based forward guidance. As shown in Figure 1, even the employment population ratio improved in 2014 as the unemployment rate continued to decline. The shift in tone suggests that some policymakers began to view the 6.5% unemployment threshold as too restrictive and perhaps worried that the guidance could elicit a premature tightening of financial conditions. However, if financial market participants interpret the shift in tone as an understanding that the threshold is somewhat malleable, then financial market policy expectations would likely discount positive labor market developments as well. As such, the changing tone of policymaker communications could break the link between the data and financial market policy expectations that the threshold-based guidance was originally intended to achieve. To examine this possibility, we examine asset price sensitivity to the unemployment surprises after the introduction of threshold-based guidance.

3 Asset Price Sensitivity to Labor Market News

We first explain construction of the explanatory variables for this section. We construct the time-series of sentiment score S_t by concatenating all available speeches in our dataset. In doing so, if there are multiple speeches available in a given day, we take their median values.[10] Next, we define the surprise component in the unemployment rate as the difference between the realized unemployment rate and the consensus forecast as complied by Bloomberg. We also consider the surprise in non-farm payrolls as another measure of labor market surprise, which is released simultaneously with the unemployment announcements.

For asset returns, we compute the intraday stock futures (E-mini) and the 10-year Treasury futures returns (expressed in percentage points) based on ±30-minute window intervals around scheduled labor market announcement days of non-farm payrolls and

[10] While not every FOMC participant is a voting member at each meeting, all of them contribute to the discussion on the economic outlook at FOMC meetings and we put equal weights on every participant's speech. Even non-voting members' speeches regularly draw market attention.

Table 2: Asset return sensitivity to labor market news

	Stock returns		Bond returns	
Non-farm payrolls surprise	0.227	0.470	-0.290	-0.275
	(0.069)	(0.077)	(0.041)	(0.080)
Unemployment surprise	-0.013	-0.130	0.011	0.045
	(0.056)	(0.071)	(0.043)	(0.060)
Sentiment	0.045	0.115	0.001	0.005
	(0.060)	(0.090)	(0.036)	(0.054)
Non-farm payrolls surprise × 2013/14 dummy		-0.425		-0.027
		(0.096)		(0.092)
Unemployment surprise × 2013/14 dummy		0.231		-0.102
		(0.085)		(0.084)
Sentiment × 2013/14 dummy		-0.202		-0.040
		(0.103)		(0.082)
R^2	0.257	0.597	0.536	0.554

Notes: We estimate (3) based on the intraday stock futures (E-mini) and the 10-year Treasury futures returns (expressed in percentage points) based on ±30-minute window intervals around scheduled labor market announcement days of non-farm payrolls and unemployment rates. Both labor market surprises and sentiment scores are standardized in the regression. We allow for an interaction with a dummy variable that takes the value of one during periods between 2013 and 2014 and 0 otherwise. The estimation sample is from 2011 to 2014. Standard errors are reported in parentheses.

unemployment rates. We work with futures returns as both labor announcements are released at 8:30 in the morning. We then estimate

$$r_t = \alpha + \beta_{NF} x_{NF,t} + \beta_{UR} x_{UR,t} + \beta_S S_{t_-} + \mathbb{1}_{2013}^{2014}\{\gamma_{NF} x_{NF,t} + \gamma_{UR} x_{UR,t} + \gamma_S S_{t_-}\} + u_t \tag{3}$$

where r_t is either the ±30-minute intraday stock futures returns or the 10-year Treasury futures returns; $x_{NF,t}$ and $x_{UR,t}$ are surprises of non-farm payrolls and unemployment rate, respectively; S_{t_-} is most recent available sentiment score prior to labor announcements; and $\mathbb{1}_{2013}^{2014}$ is a dummy variable which takes the value of one during periods between 2013 and 2014 and 0 otherwise.

Table 2 provides the coefficient estimates of (3) based on an estimation sample from January 2011 to December 2014, which matches the estimation sample in Table 1. The stock market is likely to fall (increase) when the labor market deteriorates (improves),

implying that β_{UR} (β_{NF}) is negative (positive). For the bond market, assuming a standard Taylor rule type relationship between the unemployment rate and the policy rate, we should expect a positive (negative) value for β_{UR} (β_{NF}) as an unexpected increase in the unemployment rate (non-farm payrolls) results in expectations of easing (tightening) monetary policy. The stock (bond) market is likely to move up (down) with more positive policy sentiment. In sum, we find that the estimates in Table 2 are largely consistent with our intuitions.[11]

What is particularly interesting is that once we allow for an interaction with a dummy variable that takes the value of one during periods between 2013 and 2014 and 0 otherwise, we find that the coefficients of labor surprises move in the opposite direction from the previous period and the sign of coefficient for sentiment score turns statistically strongly negative for stock returns.[12] To be specific, for example, despite a much stronger-than-expected April 2014 labor report (e.g., non-farm payroll employment rose by 288,000 significantly above the market expectation 218,000 and the unemployment rate fell by 0.4 percentage point to 6.3 percent significantly lower than the market expectation 6.6%), stock market barely moved. Two interpretations are possible for this observation. The first one, which is consistent with our story, is that the stock market started to discount positive labor market developments and pay more attention to policymakers' speeches, e.g., the market is reassured by the pessimistic tone of policymakers' speeches. The second possible interpretation is that the stock market linked the solid labor reports to a higher probability on the FOMC raising interest rates. Under this interpretation, positive "cash flows" news is canceled out by positive "discount rate" news.

Because the two interpretations lead to observationally equivalent outcome on stock market, we examine bond market evidence to better understand which interpretation is supported in the data. The bond market implication under the first (second) interpretation would be that coefficients on non-farm payrolls and unemployment surprises during 2013 and 2014 periods become insignificant or even change sign (more significant while retaining identical sign). We remain cautious in our view as the two interpretations

[11] While the sign of the estimated coefficient on sentiment is positive for bond returns, which is opposite of what we expected, it is statistically insignificant implying that the estimate is predominantly driven by statistical noises.

[12] This finding is consistent with Elenev et al. (2021) who document that the stock sensitivity is largest exiting the Great Recession and essentially zero during 2013 and 2014. Different from that paper, we relate policy sentiment to the cyclicality of stock sensitivity in this paper.

are not mutually exclusive and the evidence is somewhat mixed. However, our view is that data lend more support to the first interpretation as we can see from the estimated coefficients in Table 2.

4 Policy Implications

Our empirical findings illustrate significant challenges in implementing effective forward guidance. In particular, a supposed benefit of state-based forward guidance is that it allows financial markets to adjust policy expectations in response to economic news without further communications from policymakers. However, it is not clear that this benefit always holds in practice. To maintain such a benefit, policymakers need to commit to the announced criterion. However, the experience with the 2012 guidance suggests that policymakers can become uncomfortable with specific guidance given that economy can evolve in unexpected ways that are unlikely to be captured by a particular data point. This discomfort could lead policymakers to "lean-against-the-data." As financial market participants sense the shift in policymaker tone, they would rationally start to view economic news through the prospective of policymaker communication rather than a strict interpretation of the announced forward guidance.

How can we interpret our empirical findings in the context of state-based forward guidance? The threshold-based forward guidance might have been "too precise" to be credible. The precision of the guidance led policymakers to emphasize caveats in order to maintain flexibility in the context of unexpected economic developments, including the continued weakness of labor force participation in this particular case. The evolution of the economy led to repeated communications that the threshold was not a trigger, which could have reduced the credibility of the threshold-based forward guidance. This suggests that using language that is more qualitative like "broad labor market conditions", as the Committee has done more recently, could be preferable.[13]

This interpretation is plausible not only because it is consistent with our empirical findings but also because the theoretical literature on the design of the optimal information structure suggests that providing more precise information is not always optimal

[13] Waller (2022) expresses a similar view on the value of maintaining flexibility when providing forward guidance on the lift-off of the federal funds rate form the zero lower bound in 2021.

from the viewpoint of the policymaker. It has been well known since Crawford and Sobel (1982) that an equilibrium in the strategic information game involves some kind of "garbling" when the information sender's objective is not fully aligned with the information receiver's one. In our context, this could be the Committee's desire to maintain optionality in the path of policy versus financial market's desire for certainty.[14] Optionality could imply that policymakers have a preference for the gradual adjustment of the interest rate toward the target interest rate while the private sector prefers the instantaneous adjustment, as in Stein and Sunderam (2018). The recent literature on Bayesian persuasion also suggest that when the preferences of the information sender and receiver are not fully aligned, the optimal signaling strategy of the sender may involve providing less precise information on the state than she has (Kamenica and Gentzkow (2011)).[15] The baseline assumption in Crawford and Sobel (1982) and Kamenica and Gentzkow (2011) is that the information sender and receiver share the prior of the state. Cieslak et al. (2019) show that signaling less precise information can be optimal when the sender's prior diverges significantly from the receiver's one.[16]

5 Conclusion

State-based forward guidance is often touted as more effective than the time-based guidance because it allows the private sector to adjust policy expectations in response to economic news without further communication from policymakers. Implicit in this view is the policymakers' ability to commit to the reaction function communicated by the state-based forward guidance. However, our study suggests that policymakers prefer to

[14] We describe a simple model of the strategic communication to illustrate this point in the online appendix.

[15] The main difference between Crawford and Sobel (1982) and Kamenica and Gentzkow (2011) is that the former finds the Bayes-Nash equilibrium in a simultaneous game and the latter finds the Bayes subgame perfect equilibrium in a dynamic game.

[16] All the papers in this paragraph assume fully rational equilibrium. Jia and Wu (2021) argue that the intentional ambiguity in the communication of the average inflation targeting framework can be welfare improving in a model with social learning because it allows policymakers not to be constrained by the time inconsistency problem (e.g., announcing average inflation targeting now but switching to inflation targeting later without announcing it in the future). However, we doubt that financial market participants could be fooled by the ambiguity in the threshold-based forward guidance in such a way. For this matter, we share the view in Stein and Sunderam (2018) that financial market participants can see through policymakers' incentives.

maintain some optionality in an uncertain economic environment and work to maintain this optionality by altering the tone of their communications on the outlook. Financial markets internalize this shift and actually put more weight on policymaker communications and less weight on the data, counter to an important justification for the adoption of forward guidance. Following the adoption of threshold-based forward guidance in December 2012, policymakers' communications became less sensitive to the news on the unemployment rate. In addition, financial markets begin to pay less attention to the data relative to communications. Our findings suggest that the threshold-based forward guidance could have been "too precise". More recent instances of forward guidance have emphasized more qualitative state-based guidance and risk management, potentially side-stepping some of the issues we have raised.

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