The Tone of the Beige Book and the Pre-FOMC Announcement Drift

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Abstract

We examine whether the tone of information from the Federal Reserve (Fed) relates to the investor expectations of monetary policy decisions and the pre-Federal Open Market Committee (FOMC) announcement drift. We measure the tone of the Beige Books using text-mining techniques. We find that the tone of the Beige Books positively relates to federal funds rate (FFR) changes and expected FFR changes. We also find that expected FFR changes are negatively associated with stock market index returns in the 24 hours prior to FOMC announcement time. These results suggest that the Beige Book implies monetary policy changes and positively affects investor expectations. In addition, these results suggest that the extent of pre-FOMC announcement drift is predictable by looking at the tone of disclosed information from the Fed.

Keywords: *FOMC, Federal Reserve, Beige Book, Monetary Policy, Textual Analysis*

JEL classification: *E52, E58, G12*

1. Introduction

The higher stock returns in the 24 hours preceding the Federal Open Market Committee (FOMC) announcement time are attracting academic interest. Since 1981, the FOMC schedules meetings eight times per year and, since 1994, announces monetary policy decisions after those meetings. The higher excess stock returns in 24 hours prior to the scheduled FOMC meeting announcement time are known as "pre-FOMC announcement drift." Prior research investigates the impact of monetary policy and economic mechanisms behind the pre-FOMC announcement drift.

This study investigates whether the tone of disclosed information from the Federal Reserve (Fed) relates to investor expectations of monetary policy decisions and pre-FOMC announcement drift. We focus on the disclosed information and investor expectations for the following reasons. In the last few decades, the Fed and FOMC changed the behavior of information disclosure and policy making to increase transparency and accountability

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(Blinder et al. 2008). The Fed has released the "Summary of Commentary on Current Economic Conditions by Federal Reserve District", commonly known as the Beige Book, since July 1983. Nowadays, we also can get a variety of public information on the Fed's website, such as transcripts of speeches and testimonies. Since 1994, the FOMC has publicly issued statements to announce monetary policy changes after its scheduled meetings. Prior to 1994, investors inferred monetary policy changes from Open Market Operations after the FOMC meetings. In 1999, the FOMC began issuing statements after every meeting, regardless of whether monetary policy changed. In addition, 58 of 65 changes to monetary policy occurred during the FOMC's scheduled meetings from 1994 to 2017, while only 8 of 29 changes took place at a scheduled meeting during the period between 1989 and 1993.

We use the Beige Books as the Fed's disclosed information, because these documents contain the economic and monetary policy outlook of Fed and FOMC members. Alan Greenspan, former chairman of the FOMC, states in his autobiography that "the development of my thinking on economic and public policy may be traced in the transcripts of the hundreds of speeches and congressional testimonies I gave as chairman of the Federal Reserve Board" (Greenspan, 2007, p. 509). Bernanke (2015) alsos tates "monetary policy is 98 percent talk and 2 percent action" (p. 498). In addition, the Beige Book implies the Fed's economic outlook, although the Fed notes that the Beige Book does not reflect its view on economic conditions. Balke and Petersen (2002) and Armesto et al. (2009) demonstrate that the Beige Book reflects current economic conditions and predicts future economic indicators, which suggest that the Beige Book includes the Fed's economic outlook.

The Beige Book is released publicly almost two weeks before the scheduled FOMC meeting, although FOMC members receive the Beige Book, the Bluebook (monetary policy alternatives), and the Greenbook (economic forecasts) prior to the meeting.[1] The Beige Book consists of national and regional summaries, that includes information about economic conditions of some business sectors, for the 12 Fed districts. Furthermore, FOMC members and staff are restricted from disclosing information during the blackout period between the second Saturday before the FOMC meeting and the Thursday after the meeting.

We identify the tone of Beige Books as the economic outlook of Fed and the tone of and monetary policy outlook of FOMC members. Specifically, we count the positive tonal words and negative tonal words in the Beige Book using the merged tonal lists of the General Inquirer's Harvard IV-4 psychological dictionary and the list developed by Loughran and McDonald (2011). This method is in line with Tetlock (2007), Tetlock, Saar-Tsechansky, and Macskassy (2008), and Jegadeesh and Wu (2017).

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[1]   Since June 2010 Bluebook and Greenbook have been merged to Tealbook.

We also measure investor expectations of the monetary policy changes using the implied interest rate changes from Federal Funds Rate (FFR) futures at the Chicago Mercantile Exchange (CME) following Kuttner (2001) and Bernanke and Kuttner (2005). Stock market excess returns in the 24 hours prior to announcement time of scheduled FOMC meetings are calculated as the difference between the stock market index return and the return on 30-day Treasury bill.

In our analysis, we assume that the Fed's disclosed information implies the economic and monetary policy outlook of Fed and FOMC members, which in turn affects the investor expectations of monetary policy decisions. In addition, we predict that investor expectations of tight (loose) monetary policy leads to the higher returns before FOMC announcement time as the investor expectations are associated with risk premium.

We find that the tone of the Beige Book positively affects the FFR changes and expected FFR changes. We also find that expected FFR changes are negatively associated with the excess stock returns before FOMC announcement time, using instrument variable regressions which use the tone of disclosed information as the instrument variable. These results suggest that the Beige Book implies monetary policy changes and affects investor expectations of monetary policy. These results also provide the possibilities that the extent of monetary policy changes and pre-FOMC announcement drift is predictable by looking at the disclosed information of Fed.

Our study contributes to the ongoing debate about the economic mechanisms behind the pre-FOMC announcement drift. Savor and Wilson (2013, 2014) and Lucca and Moench (2015) suggest that the risk around announcement day drives the pre-FOMC announcement drift, since investors can't diversify this systemic risk away. Bernile, Hu, and Tang (2016) find order imbalance preceding the FOMC announcement time and suggest that information leakage leads to the pre-FOMC announcement drift. On the other hand, we provide the potential possibilities that the Fed's disclosed information affects investor expectations and the extent of pre-FOMC announcement drift.

We also contribute to the research about the impact of Fed's disclosed information and communication on financial markets. A large number of studies investigate the impact of central bank communication on financial markets (Blinder et al. 2008; Woodford 2005). Our findings are consistent with some existing literature in that disclosed information affects stock market returns through the investor expectations of future monetary policy decisions. Rosa (2011) finds that the unexpected bullish content in FOMC statements leads to lower stock returns within 25 minutes after the policy announcement in the United States. Schmeling and Wagner (2019) also find that the tone of the European Central Bank (ECB) president's press conference is negatively associated with stock returns on the event day.

The rest of this paper proceeds as follows: Section 2 reviews the related literature.

Section 3 describes the data and methodology and provides a statistical summary. Section 4 presents the empirical results, and Section 5 concludes.

2. Literature Review

This study is related to the literature regarding pre-FOMC announcement drift and the economic mechanism behind this phenomenon. Savor and Wilson (2013) and Lucca and Moench (2015) demonstrate the higher returns on the FOMC announcement days. Notably, Lucca and Moench (2015) find that the S&P500 index increases in the 24 hours prior to the 2:00 pm announcement time on the FOMC announcement day.

Savor and Wilson (2013, 2014) and Lucca and Moench (2015) emphasize the risk-based hypothesis to explain the pre-FOMC announcement drift, although they discuss the alternative hypothesis.[2] Savor and Wilson (2013, 2014) find the link between the macroeconomic, or equity risk, and asset returns on the announcement days. Lucca and Moench (2015) demonstrate that the higher returns on the FOMC announcement days remain after controlling for the effect of liquidity and volatility.

Other studies reveal alternative possibilities that lead to the pre-FOMC announcement drift. Bernanke and Kuttner (2005) find that an unexpected federal funds rate cut leads to higher stock returns on FOMC announcement days. Bernile et al. (2016) find the order imbalance preceding the time of surprised announcement and suggest that the information leakage brings about the pre-FOMC announcement drift. Cieslak, Morse, and Vissing-Jorgensen (2019) also suggest that confidential information about the monetary policy reaches the investors before the FOMC announcement. Azar and Lo (2016) find the investor sentiment on Twitter is positively associated with the returns on FOMC announcement days.

In practice, FOMC members and staff are restricted from speaking in public and giving interviews during the blackout period that starts the second Saturday preceding the meeting and ends the Thursday following the meeting. Therefore, we investigate whether the tone of disclosed information before the FOMC meeting relates to the investor expectations of the monetary policy and the pre-FOMC announcement drift.

3. Data and methodology
3.1 Data and statistics

We collect from Datastream the daily stock market index prices and settlement prices of

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[2] They discuss alternative hypotheses to explain the pre-FOMC announcement drift. Investor behavior hypothesis, following Knight (1921) and Duffie (2010), predicts that some investors sell their position to avoid the risk, while other investors that remain in the market seek a premium for holding their position. Unexpected good news hypothesis is based on easing the monetary policy and positive economic conditions in their sample period.

monthly 30-day federal funds futures contracts from January 1989 to December 2022, the period that the federal funds futures traded at the CME. We obtain the intraday price on S&P500 index and NYSE composite from Tick Data's database. We obtain the return on 30-day Treasury bills (R_f) from the Fama-French factor file on Ken French's website. Our final sample periods are from 1989 to 2022 since 30-Day federal funds futures have been available since 1989.

Table 1 provides the summary statistics of the excess returns in the 24 hours before 2 pm on FOMC announcement days ($R_{2pm\ FOMC\ Ann} = P_{2pm\ FOMC\ Ann} / P_{2pm\ FOMC\ Ann\text{-}1} \times 100\text{-} R_f$) and non-FOMC announcement days ($R_{2pm\ Non\text{-}Ann} = P_{2pm\ Non\text{-}Ann} / P_{2pm\ Non\text{-}Ann\text{-}1} \times 100\text{-} R_f$). We identify the announcement day as the last day of the scheduled FOMC meeting and exclude unscheduled meetings. The excess returns in 24 hours before 2pm on FOMC announcement days are significantly higher than those on non-FOMC announcement days.[3] This result is almost the same as those in Savor and Wilson (2013) and Lucca and Moench (2015).

Table 1. Summary statistics for stock market returns

	$R_{2pm\ FOMC\ Ann}$			$R_{2pm\ Non\text{-}Ann}$				
	Mean	*Median*	*SD*	*Mean*	*Median*	*SD*		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)-(4)	(2)-(5)
S&P500	0.283	0.212	1.111	0.018	0.051	1.092	0.265	0.161
NYSE	0.265	0.205	1.179	0.014	0.058	1.076	0.251	0.147

Table 1 presents the excess returns in the 24 hours prior to 2pm on the FOMC announcement days and the non-announcement days from 1989 to 2022. The mean and median returns on FOMC announcement days are compared with those on non-announcement days using a two-tailed t-test and Wilcoxon tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A of Table 2 provides the summary statistics of the FFR target change. We distinguish between expected FFR target changes and unexpected FFR target changes using 30-day federal funds futures, following Kuttner (2001) and Bernanke and Kuttner (2005).

$$unexpected\ \Delta FFR_t = \frac{m}{m\text{-}t}(f_{s,t}^0 - f_{s,t\text{-}1}^0) \tag{1}$$

where *unexpected ΔFFR_t* is the unexpected or "surprised" FFR target change calculated as scaled difference of implied future rate based on m, the number of days in s month that FOMC meeting holds on. The implied future rate $f_{s,t}^0$ is 100 minus the settlement price in the current month contract future. The unscaled change in 1-month future rate is used when

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[3] NYSE composite index missed data on 09/30/1997 and 11/12/1997 in scheduled FOMC meeting.

Table 2. Summary statistics for FFR target changes and the tone of disclosed information, economic indicators

Panel A: Summary statistics for FFR target change and tone of Beige Book

	Mean	SD	Min	25th	Median	75th	Max
ΔFFR	0.015	0.206	-0.875	0.000	0.000	0.000	0.750
expected ΔFFR	0.015	0.197	-0.917	-0.003	0.000	0.026	0.793
unexpected ΔFFR	0.000	0.054	-0.210	-0.005	0.000	0.003	0.490
Beige Book	0.162	0.199	-0.48	0.040	0.177	0.296	0.570

Panel B. Summary statistics for economic indicators

	Mean	SD	Min	25th	Median	75th	Max
CPI	2.708	1.645	-1.484	1.696	2.555	3.295	8.933
PPI	2.841	5.932	-13.167	-0.370	2.395	5.489	22.686
Unemployment rate	5.809	1.699	3.500	4.600	5.400	6.700	14.700

Table 2 reports the summary statistics for FFR target changes, the tone of Fed's disclosed information, and economic indicators. FFR target change (*ΔFFR*) is decomposed into the expected FFR target change (*expected ΔFFR*) and the unexpected FFR target change (*unexpected ΔFFR*), following Kuttner (2001) and Bernanke and Kuttner (2005). The tone of Beige Book is measured by ln [(number of positive words+1)/(number of negative words+1)] in each document. We use economic indicators in the month preceding the Beige Book release.

t is on the last 3 days on the month. In addition, t is on the first day on the last month, $f_{s-1,m}^{1}$ is be used instead of $f_{s,t-1}^{0}$.

$$expected\ \Delta FFR_t = \Delta FFR_t - unexpected\ \Delta FFR_t \tag{2}$$

where *expected ΔFFR* represents the expected FFR target change, and *ΔFFR* represents the actual FFR target change. We obtain the FFR target from the Federal Reserve Economic Data (FRED). We use the announcement FFR target change as *ΔFFR* after 1994 and use the midpoint of upper and lower FFR target as *ΔFFR* since December 16, 2008 as the Fed has announced ranges for FFR target. As the Fed did not announce monetary policy decisions prior to 1994, we calculate *ΔFFR* as the change from current FOMC meeting day to two days after the current FOMC announcement day before 1994.

We download the Beige Books from the Fed's website. The Fed has been publishing the Beige Book since almost two weeks before the FOMC meeting in 1983.

We measure the tone of the Beige Books using text-mining techniques in the following steps. First, we remove stop words, then parse all text into words and stem the words. Second, we count the number of positive tonal words and negative tonal words using a tonal list we created by merging the General Inquirer's Harvard IV-4 psychological dictionary and

the financial tonal lists developed by Loughran and McDonald (2011). Table 3 represents the top positive and negative words in the Beige Books. Third, we measure the tone of these disclosed information based on period between last FOMC meeting and current FOMC meeting. This study measures the tone of these disclosed information using Equations (3).[4]

Table 3. Top tonal words in Beige Book

	Beige Book				
Rank	Positive	Negative	Rank	Positive	Negative
1	Strong	Decline	11	Stable	Show
2	Real	Slow	12	Improvement	Service
3	Steady	Low	13	Positive	Late
4	Home	Lower	14	Good	Shortages
5	Improve	Weak	15	Optimistic	Mix
6	Contact	Decrease	16	Gains	Slower
7	Modest	Pick	17	Major	Concern
8	Moderate	Fall	18	Interest	Cost
9	Credit	Capital	19	Quality	Slowing
10	Well	Slight	20	Experience	Sluggish

We count the positive and negative words based on the marginal tonal word list, the General Inquirer's Harvard IV-4 psychological dictionary and the list developed by Loughran and McDonald (2011).

$$Tone_d = log \frac{(number\ of\ positive\ words_d + 1)}{(number\ of\ negative\ words_d + 1)} \tag{3}$$

where $tone_d$ is the tone of document d. We plot the time series of tone of Beige Books in Figure 1 from January 1989 to December 2022, the period that the Beige Book has been made available to the public. The Beige Book released on July 17, 2013 has the highest tone while on May 27, 2020 has the lowest tone. Panel A in Table 2 provides the summary statistics for the tone of the Beige Books.

We obtain economic indicators such as the CPI, PPI, and unemployment rate from the FRED. Panel B of Table 2 provides the summary statistics for these economic indicators in one month before the released BeigeBook.

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[4] When we use the negative words fraction (1-number of negative words/number of total words) as document tone instead of Equation (3), we obtain the similar results.
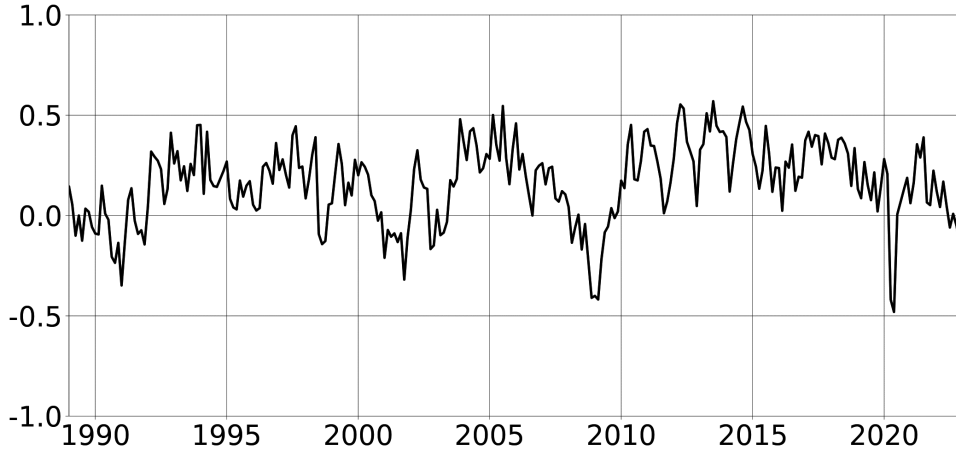
Fig. 1 Tone of the Beige Book over time

Figure 1 plots the tone of the Beige Books. The tone of Beige Book is measured by ln [(number of positive words + 1)/(number of negative words + 1)] in each document.

3.2 Methodology

We first investigate whether disclosed information from the Fed implies the monetary policy changes and affects the investor expectations of monetary policy decisions. We estimate the OLS regression in Equation (4).

$$\Delta FFR \text{ or Expected } \Delta FFR$$
$$= \alpha + \beta_1 \text{ Tone of the Beige Book} + \Sigma\gamma_j \text{ Controls} + \varepsilon \tag{4}$$

where ΔFFR or expected ΔFFR is the dependent variables. As control variables, we use the cumulative excess return of the S&P500 index from the last FOMC announcement day to two days prior to the current FOMC announcement day ($R_{last\ FOMC\ to\ FOMC\ Ann-2}$) to control for market conditions. We control for economic conditions by incorporating the CPI, PPI, and unemployment rate in the month prior to the release of the Beige Book.

Next, we examine the relationship between the investor expectations of monetary policy and the pre-FOMC announcement drift, in order to investigate whether the tone of the Fed's disclosed information affects the extent of pre-FOMC announcement drift through the investor expectations by estimating in Equation (5). But our proxy of investor expectations of monetary policy suffers from an endogeneity problem due to simultaneous interaction between federal funds future prices and monetary policy decisions. We use the instrumental variable regression to investigate whether the higher returns in the 24 hours before FOMC announcement time are driven by the expected monetary policy changes shaped by the disclosed information. In this instrument variable regression, the tone of disclosed information is used as the instrument variable. Our instrument variable estimation relies on

the assumption that the disclosed information shapes the investor expectations of monetary policy but does not directly affect the stock market returns except thorough its impact on investor expectations.

$$R_{2pm\ FOMC\ Ann} = \alpha + \gamma_1 \Delta \widehat{expected}\ FFR + \Sigma \gamma_j\ Controls + \varepsilon \tag{5}$$

4. Empirical Results

4.1. The effect of the Fed's on the investor expectations of the monetary policy and the pre-FOMC announcement drift

Tables 4 and 5 present the results of the OLS regressions to investigate whether the tone of Fed's disclosed information implies monetary policy changes and affects investor expectations of monetary policy decisions. We divide the sample periods into some additional sample periods: 1994-2022 as the FOMC began to announce their monetary policy decisions since 1994. We also drop the zero interest rate periods (ZIRP) from some sample periods. ZIRP are from December 17, 2008 to December 15, 2015 and from March 19, 2020 to March 15, 2022. On December 16, 2008 scheduled meeting, FOMC decided to set FFR target range of 0 to 0.25%. On December 16, 2015 scheduled meeting, FOMC decided to raise FFR target range of 0.25 to 0.5%. On March 15, 2020 unscheduled meeting, FOMC set FFR target range of 0 to 0.25%. On March 16, 2022 scheduled meeting, FOMC raised FFR target range of 0.25 to 0.5%.

Tale 4 reports the OLS regression results between the tone of the Fed's disclosed information and actual FFR changes. We find that the tone of Beige Books is positively associated with the FFR changes in all columns. These results suggest that the Beige Book implies the monetary policy changes; a one standard deviation increase in the tone of the Beige Book is associated with 0.108 percentage increase in FFR during full sample periods without ZIRP.

Table 5 shows the OLS regression results between the tone of Fed's disclosed information and expected FFR changes. We find that the tone of the Beige Books positively affects the expected FFR changes. These results suggest that the Beige Book positively affects the investor expectations of monetary policy changes; the Fed's bullish (bearish) economic outlook implied in the Beige Book leads to the investor expectation of the tightening (easing) monetary policy. In addition, the coefficients of the Beige Book are higher in the post-1994 period than those in the full sample period, suggesting that the Beige Book is more likely to affect the expectations of monetary policy after 1994. The coefficients of the Beige Book are also higher in the sample periods without ZIRP than those in other periods. After 1994, it might become easy to predict the monetary policy decisions, since the Fed announces monetary policy decisions on the last FOMC meeting days. Additionally, the FFR target rate changes generally take place on the scheduled FOMC

Table 4. Relationship between the tone of Fed's disclosed information and monetary policy changes

	Dependent variable: ΔFFR							
Sample period:	1989-2022	1989-2022	1994-2022	1994-2022	1989-2022 without ZIRP	1989-2022 without ZIRP	1994-2022 without ZIRP	1994-2022 without ZIRP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Beige Book	0.328***	0.424***	0.355**	0.474***	0.542***	0.784***	0.658***	0.887***
	[2.847]	[3.844]	[2.375]	[3.741]	[3.287]	[6.474]	[2.687]	[6.313]
$R_{last\ FOMC\ to\ FOMC\ Ann-2}$		0.005*		0.005*		0.004*		0.005*
		[1.803]		[1.727]		[1.701]		[1.752]
CPI		0.054		0.122**		0.090***		0.153***
		[1.298]		[2.221]		[2.773]		[3.841]
PPI		-0.004		-0.019**		-0.002		-0.016*
		[-0.950]		[-2.263]		[-0.361]		[-1.934]
Unemployment rate		-0.005		0.012		-0.036		0.007
		[-0.494]		[1.186]		[-1.583]		[0.274]
(Intercept)	-0.038	-0.165*	-0.039	-0.378***	-0.058	-0.174*	-0.073	-0.513***
	[-1.038]	[-1.651]	[-0.806]	[-2.676]	[-1.190]	[-1.727]	[-0.985]	[-3.161]
Adj. R^2	0.096	0.201	0.099	0.283	0.164	0.413	0.192	0.496
Observations	272	272	232	232	201	201	161	161
F-value	29.872	14.596	26.387	19.197	40.338	29.167	39.114	32.472

Table 4 reports the results of the OLS regressions to investigate whether the tone of Fed's disclosed information implies the monetary policy decisions. The FFR target change (ΔFFR) is announcement changes after 1994. We use the midpoint of upper and lower FFR target as the FFR target since December 16, 2008 as the Fed has announced ranges for FFR target. Prior to 1994, we calculate ΔFFR as the change from current FOMC meeting last day to two days after this meeting last day as Fed did not announce monetary policy decisions. The control variables are the cumulative excess market return from the last FOMC announcement day to two days prior to FOMC announcement days ($R_{last\ FOMC\ to\ FOMC\ Ann.-2}$), CPI, PPI, and the unemployment rate, in the month prior to the release of the Beige Book. ZIRP (Zero interest rate periods) are two periods: from December 17, 2008 to December 15, 2015 and from March 19, 2020 to March 15, 2022. Robust standard errors are clustered by Newey-West, and t-statistics are noted in square brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

meetings after 1994.

Table 5. Impact of tone of the Fed's disclosed information on investor expectations of monetary policy changes

Sample period:	1989-2022	1989-2022	1994-2022	1994-2022	1989-2022 without ZIRP	1989-2022 withou ZIRP	1994-2022 without ZIRP	1994-2022 without ZIRP
	Dependent variable: Expected ΔFFR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Beige Book	0.304**	0.401***	0.330**	0.449***	0.505***	0.738***	0.615**	0.833***
	[2.566]	[3.609]	[2.036]	[3.611]	[3.079]	[6.251]	[2.232]	[6.072]
$R_{last FOMC to FOMC Ann.-2}$		0.006**		0.006**		0.005**		0.006**
		[1.999]		[2.015]		[2.095]		[2.148]
CPI		0.054		0.122*		0.090**		0.153***
		[1.304]		[1.907]		[2.537]		[3.656]
PPI		-0.005		-0.019**		-0.004		-0.018**
		[-1.132]		[-1.997]		[-0.620]		[-2.190]
Unemployment rate		-0.005		0.011		-0.038		0.002
		[-0.577]		[1.016]		[-1.628]		[0.067]
(Intercept)	-0.034	-0.156	-0.035	-0.366**	-0.054	-0.153	-0.067	-0.475***
	[-0.858]	[-1.622]	[-0.626]	[-2.279]	[-1.072]	[-1.570]	[-0.779]	[-3.066]
Adj. R^2	0.091	0.2	0.094	0.294	0.156	0.410	0.186	0.505
Observations	272	272	232	232	201	201	161	161
F-value	28.024	14.567	25.088	20.204	38.011	28.744	37.448	33.629

Table 5 reports the results of the OLS regressions to investigate whether the tone of the Beige Book affects the expectations of the monetary policy decisions. The actual FFR target change (*ΔFFR*) is decomposed into the expected FFR target change (*expected ΔFFR*) and the unexpected FFR target change (*unexpected ΔFFR*). The control variables are the cumulative excess market return from the last FOMC announcement day to two days prior to FOMC announcement day ($R_{last FOMC to FOMC Ann.-2}$), CPI, PPI, and the unemployment rate, in the month prior to the release of the Beige Book. ZIRP (Zero interest rate periods) are two periods: from December 17, 2008 to December 15, 2015 and from March 19, 2020 to March 15, 2022. Robust standard errors are clustered by Newey-West, and *t*-statistics are noted in square brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

4.2. The effect of Fed's disclosed information on pre-FOMC announcement drift through the investor expectations

Table 6 provides the results of instrument variable regressions that investigate whether the tone of disclosed information leads to the pre-FOMC announcement drift through the investor expectations; all columns use the tone of Beige Books as an instrument variable. Panel A of Table 6 reports the effect of the expectations of monetary policy changes shaped by the Fed's disclosed information on the returns of S&P500 index in 24 hours before

FOMC announcement time. We find a statistically significant negative relation between the expected FFR changes and S&P500 index returns in 24 hours prior to 2pm on FOMC announcement day in the sample periods without zero interaste rate periods. We think the results in sample periods without zero interest periods of robust since the adjusted R squared values are positive in columns (3) and (4); on the other hand, the adjusted R squared values are negative in columns (1) and (2). Inaddtion, the tone of disclosed information is a good instrument variable as F-values in 1st stage regressions are high in Table 5. The instrument variable regression also suits our empirical situation as the Durbin-Wu-Hausman test is significant in all columns.

Panels B of Table 6 report the regression results in estimating in Equation (5) using the returns on NYSE composite index as dependent variable respectively. We obtain the similar results to Panel A of Table 6; the expected FFR changes negatively associated with returns on NYSE composite index Average in the 24 hours prior to 2pm on FOMC announcement

Table 6. Impact of the Fed's disclosed information on the pre-FOMC announcement drift through investor expectations of monetary policy decisions

Panel A: Impact of theFed's disclosed information on the return on S&P500 in 24 hours before FOMC announcement time

Dependent variable	$R^{S\&P500}_{2pm\ FOMC\ Ann}$			
Sample period:	1989-2022	1994-2022	1989-2022 without ZIRP	1994-2022 without ZIRP
	(1)	(2)	(3)	(4)
$\widehat{Expected\ \Delta FFR}$	-0.035	-0.031	-0.018**	-0.018**
	[-1.440]	[-1.569]	[-2.233]	[-2.247]
$R_{last\ FOMC\ to\ FOMC\ Ann-2}$	0.000	0.000	0.000	0.000
	[-0.178]	[-0.180]	[-0.425]	[-0.374]
CPI	-0.004	0.001	-0.005***	-0.001
	[-1.277]	[0.386]	[-2.615]	[-0.758]
PPI	0.001***	0.000	0.002***	0.001***
	[3.936]	[0.332]	[5.524]	[3.862]
Unemployment rate	0.001	0.002***	0.001	0.001
	[1.252]	[2.746]	[0.781]	[0.776]
(Intercept)	0.995***	0.979***	0.994***	0.986***
	[148.507]	[113.665]	[208.425]	[107.416]
Adj. R^2	-0.052	-0.055	0.149	0.095
Observations	272	232	201	161
DWH test	***	***	**	*

Panel B: Impact of the Fed's disclosed information on the return on NYSE composite index in 24 hours before FOMC announcement time

Dependent variable	$R^{NYSE}_{2pm\ FOMC\ Ann}$			
Sample period:	1989-2022	1994-2022	1989-2022 without ZIRP	1994-2022 without ZIRP
	(1)	(2)	(3)	(4)
$\widehat{Expected\ \Delta FFR}$	-0.036	-0.032*	-0.020**	-0.020**
	[-1.615]	[-1.755]	[-2.416]	[-2.417]
$R_{last\ FOMC\ to\ FOMC\ Ann-2}$	0.000	0.000	0.000	0.000
	[-0.113]	[-0.137]	[-0.338]	[-0.315]
CPI	-0.005	0.001	-0.006***	-0.002
	[-1.494]	[0.264]	[-2.927]	[-0.920]
PPI	0.001***	0.000	0.002***	0.001***
	[3.962]	[0.471]	[5.298]	[3.640]
Unemployment rate	0.001	0.002***	0.001	0.002
	[1.289]	[2.831]	[1.044]	[1.266]
(Intercept)	0.996***	0.980***	0.993***	0.982***
	[160.418]	[121.368]	[192.749]	[96.791]
Adj. R^2	-0.025	-0.028	0.156	0.106
Observations	270	230	199	159
DWH test	***	***	**	(0.115)

Table 6 reports the results of the instrumental variable regression to investigate whether the disclosed information leads to pre-FOMC announcement drift. The dependent variables are the excess returns on S&P500 index and NYSE composite index in the 24hours prior to 2pm on FOMC announcement day. The actual FFR target change (*ΔFFR*) is decomposed into the expected FFR target change (*expected ΔFFR*) and the unexpected FFR target change (*unexpected ΔFFR*). The control variables are the cumulative excess market return from the last FOMC announcement day to two days prior to FOMC announcement day ($R_{last\ FOMC\ to\ FOMC\ Ann.-2}$), CPI, PPI, and the unemployment rate, in the month prior to the release of the Beige Book. ZIRP (Zero interest rate periods) are two periods: from December 17, 2008 to December 15, 2015 and from March 19, 2020 to March 15, 2022. All columns use the tone of Beige Books as instrument variable. Robust standard errors are clustered by Newey-West, and t-statistics are noted in square brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

day.

These results suggest that the tone of Fed's disclosed information predicts the extent of pre-FOMC announcement drift through the investor expectations of monetary policy decisions. Our results are consistent with Rosa (2011) and Schmeling and Wagner (2019), suggesting that disclosed information from central bank affects the stock price through investor expectations of future monetary policy decisions.

5. Conclusion

This study investigates whether the Fed's disclosed information implies the monetary policy decisions and affects the investor expectations of the monetary policy changes and whether these expectations lead to the pre-FOMC announcement drift. We use the Beige Book as the disclosed information from the Fed. The FOMC members and staff are restricted from disclosing information in the blackout period between the second Saturday preceding the FOMC meeting and the Thursday following the meeting. We measure the tone of the Beige Books by counting the positive and negative tonal words based on the merged tonal lists in the General Inquirer's Harvard IV-4 psychological dictionary and those developed by Loughran and McDonald (2011).

We find that the tone of the Beige Book positively relates to the FFR target changes and expected FFR target changes. We also find the significantly negative relationships between expected FFR target changes and returns on stock market index in the 24 hours prior to an FOMC announcement. These results suggest that the Beige Book predicts the monetary policy decisions and positively affects the investor expectations of monetary policy decisions. These results also imply that the Beige Book predicts the extent of pre-FOMC announcement drift through the investor expectations of monetary policy decisions.

References

Armesto, M. T., Hernández-Murillo, R., Owyang, M. T., & Piger, J. (2009). Measuring the information content of the Beige Book: A mixed data sampling approach. *Journal of Money, Credit and Banking*, *41*(1), 35-55.

Azar, P. D., & Lo, A. W. (2016). The wisdom of Twitter crowds: Predicting stock market reactions to FOMC meetings via Twitter Feeds. *Journal of Portfolio Management, 42*(5), 123-134.

Balke, N. S., & Petersen, D. A. (2002). How well does the Beige Book reflect economic activity? Evaluating qualitative information quantitatively. *Journal of Money, Credit and Banking, 34*(1), 114-136.

Bernanke, B. S. (2015). *The courage to act: A memoir of a crisis and its aftermath*. New York: W.W. Norton & Company.

Bernanke, B. S., & Kuttner, K. N. (2005). What explains the stock market's reaction to Federal Reserve policy? *Journal of Finance, 60*(3), 1221-1257.

Bernile, G., Hu, J., & Tang, Y. (2016). Can information be locked up? Informed trading ahead of macro-news announcements. *Journal of Financial Economics, 121*(3), 496-520.

Blinder, A. S., Ehrmann, M., Fratzscher, M., De Haan, J., & Jansen, D. J. (2008). Central bank communication and monetary policy: A survey of theory and evidence. *Journal of Economic Literature, 46*(4), 910-945.

Cieslak, A., Morse, A., & Vissing-Jorgensen, A. (2019). Stock returns over the FOMC cycle. *Journal of Finance*, *74*(5), 2201-2248.

Duffie, D. (2010). Presidential address: Asset price dynamics with slow-moving capital. *Journal of Finance, 65*(4), 1237-1267.

Greenspan, A. (2007). *The age of turbulence: Adventures in a new world*. New York: Penguin.

Jegadeesh, N., & Wu, D. A. (2017). Deciphering fedspeak: The information content of FOMC meetings. Working Paper.

Knight, F. H. (1921). *Risk, uncertainty and profit*. Boston: Houghton Mifflin Co.

Kuttner, K. N. (2001). Monetary policy surprises and interest rates: Evidence from the Fed funds futures market. *Journal of Monetary Economics, 47*(3), 523-544.

Loughran, T., & McDonald, B. (2011). When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks. *Journal of Finance, 66*(1), 35-6.

Lucca, D. O., & Moench, E. (2015). The pre - FOMC announcement drift. *Journal of Finance, 70*(1), 329-371.

Rosa, C. (2011). Words that shake traders. The stock market's reaction to central bank communication in real time. *Journal of Empirical Finance, 18*(5), 915-934.

Savor, P., & Wilson, M. (2013). How much do investors care about macroeconomic risk? Evidence from scheduled economic announcements. *Journal of Financial and Quantitative Analysis, 48*(2), 343-375.

Savor, P., & Wilson, M. (2014). Asset pricing: A tale of two days. *Journal of Financial Economics, 113*(2), 171-201.

Schmeling, M., & Wagner, C. (2019). Does central bank tone move asset prices? Working Paper.

Tetlock, P. C. (2007). Giving content to investor sentiment: The role of media in the stock market. *Journal of Finance, 62*(3), 1139-1168.

Tetlock, P. C., Saar-Tsechansky, M., & Macskassy, S. (2008). More than words: Quantifying language to measure firms' fundamentals. *Journal of Finance, 63*(3), 1437-1467.

Woodford, M. (2005). Central bank communication and policy effectiveness. NBER working paper: 11898.