Learning About Fed Policy From Macro Announcements: A Tale of Two FOMC Days

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Abstract

I show that pre-FOMC drift and FOMC announcement premium are realized only on the small subset of FOMC days preceded by key macro data releases. On the other two-thirds of all FOMC days, there is neither drift nor announcement premium. These equity returns are thus not unconditionally high around FOMC statements. Instead, they predominantly reflect reactions to new information, in particular to expectations regarding the path of monetary policy that are updated on key macro announcements. More broadly, financial market movements around FOMC statements strongly differ when key macro announcements immediately precede FOMC announcements. On this subset of FOMC days, conventional monetary policy shocks are predictable with past data, the Fed information effect can be observed, the secular decline in interest rates phenomenon around FOMC statements can be seen and the security market line slopes upwards. On all other FOMC days not preceded by macro news, the Fed information effect is absent, monetary policy shocks are not as predictable, there is no decline in interest rates around FOMC statements and the security market line is flat.

1 Introduction

It is striking that up to 80% of the annual equity premium is realized in 24-hour windows around pre-scheduled Federal Open Market Committee (FOMC) announcements, the days the Federal Reserve (Fed) announces its monetary policy (Lucca and Moench, 2015). Savor and Wilson (2014) find the average daily market return is 23.5 bps on FOMC days (announcement premium). Lucca and Moench (2015) find that in the 24-hour window leading up to these announcements, the average market return is 49 bps (pre-FOMC drift). In stark contrast, regular trading days see an average daily return of 2.5 bps. As there are only 8 FOMC announcements in a year, understanding why so much of the annual equity premium is earned on these few days continues to attract substantial academic inquiry.[1]

I study if macro announcements especially if they occur "close" to FOMC days, say earlier the same morning or the day or two before, influence the realizations of these large equity returns on FOMC days. This is motivated by connecting two observations. First, Fisher et al. (2022) show that investors' learning or attention to monetary policy, a key predictor of FOMC announcement premium, rises a few days before FOMC announcements. Second, macro news are known to impact market expectations of monetary policy (Rigobon and Sack, 2008).[2] Thus, I investigate if acquisition of Fed-relevant information on macro announcements that occur "close" to FOMC announcements impacts equity returns on FOMC days. I focus on four macro announcements: GDP, CPI, unemployment, and industrial production. These announcements have direct relevance to Fed policy, as discussed in my prior work (Alam, 2020).

I find that both announcement premium and pre-FOMC drift are high only on particular kinds of FOMC days: those associated with one of the above four macro announcements occurring earlier in the morning, or a few days prior. These large stock price movements are

[1] Also see Savor and Wilson (2013) who study macro announcement premium, Brusa et al. (2020) show that central bank announcement premium is unique to the U.S., Ernst et al. (2019) study announcement premium by controlling for sample-selection and other issues. Ai and Bansal (2018), Laarits (2022), Ying (2020), Ai et al. (2021), Hu et al. (2022), Cocoma (2018) provide theoretical explanations for pre-FOMC drift. Liu et al. (2022) quantify the time-varying risk premium around FOMC statements using option prices. Cieslak et al. (2019) find the high pre-FOMC returns to be part of a broader bi-weekly pattern in stock returns.

[2] The strong impact of macro news on asset prices is well-established. See Cutler et al. (1988) and Fleming and Remolona (1997) who document the impact of macro news on stock and bond markets, respectively. McQueen and Roley (1993); Boyd et al. (2005); Andersen et al. (2007) study the time-varying effects of macro news on financial markets. Gilbert et al. (2017) analyze the heterogenous impact of macro announcements.

absent around all other FOMC days. For example, the FOMC announcement premium is statistically greater than zero only on FOMC days that had one of the four macro announcements occurring earlier the same morning (18% of all FOMC announcements). Pre-FOMC drift too is only significantly positive when macro announcements occur "close" to FOMC announcements (within the previous 2-3 days). Furthermore, there is significantly more buildup in key predictors of FOMC announcement premium and pre-FOMC drift, such as monetary attention, stock and bond implied volatility, ahead of FOMC announcements that immediately follow macro data releases. Thus, the presence of two types of FOMC days challenges a constant risk premium view of FOMC statements. Under a constant risk premium view of FOMC statements, an investor holding the market around these FOMC announcements should be compensated for bearing that risk regardless of the presence of any macro announcements before or not.

I then study the mechanism connecting macro announcements with pre-FOMC drift and FOMC announcement premium in reduced form. To investigate if these returns respond to changing expectations of Fed policy, I regress these equity movements on prior changes in the market's interest rate expectations realized on macro announcements preceding FOMC statements. Using federal fund and eurodollar futures to proxy market expectations of Fed policy, I find that changes in these measures on macro announcements significantly impact both announcement premium and pre-FOMC drift. Movements in these proxies on macro announcements that occur close to FOMC days have the strongest impact, while those that occur 4 days or more away do not have any significant impact. Strictly speaking, the evidence appears to be consistent with a channel of gradual incorporation of recent news. Nonetheless, my estimates suggest that markets respond to new information fairly quickly: within 2-3 days. Including additional controls, such as the macro data release and daily changes in the VIX, does not weaken the explanatory power of proxies of expectations of Fed policy. Adjusted R^2 of these regressions are around 20%, and about 25% in the period before the Great Financial Crisis (GFC), when Fed policy was essentially "conventional".

In noisy rational expectation equilibrium (noisy REE) models of the Grossman and Stiglitz (1980) variety, the switch from conventional to unconventional monetary policy might decrease the "precision of the signal" that markets receive regarding forthcoming Fed actions on macro announcement days. In such models, market reactions to news rise with its precision. As Alam (2020) also shows, using macro data to form expectations

regarding upcoming Fed decisions might be simpler when policy is conventional. For example, it is relatively easy to use the latest CPI data to predict rate hikes of 25bps or 50bps (conventional policy) than to pin down with equal precision the portfolio of securities that the Fed might purchase in the near future (unconventional policy).

Just as price reactions to news rise with its precision in standard noisy REE models, the same models also suggest that market reactions to news rise as the precision of priors falls, ceteris paribus (e.g., Campbell, 2017). I test if market reactions to news vary with the precision of priors and signals by interacting measures of expectations of Fed actions with three proxies of prior and signal precision I discuss below. I proxy for prior precision in two ways. First, I use lagged values of the levels of the VIX. Second, I split the sample into periods in which the Fed reduces or increases interest rates. The latter is motivated by the findings of Schmeling et al. (2022), who show market forecast errors of the federal funds rate to be substantially larger in periods the Fed reduces rates. Additionally, I use the daily monetary attention measure of Fisher et al. (2022) as a high-frequency proxy of informative signal precision. I find evidence for both predictions: market reactions to recent news rise as prior signal precision falls (high levels of VIX; periods of falling rates), and rises as informative signal precision increases (higher monetary attention). Adjusted R^2 of these regressions are about 30% across the entire sample and up to 45% in the pre-GFC era.

Given that pre-FOMC drift is also found in international stocks (Lucca and Moench, 2015), I extend the analysis to non-U.S. stocks too. Similarly, I also extend the analysis to announcement returns among the cross-section of U.S. equities. The picture remains the same: pre-FOMC drift among international stocks and high announcement returns in the cross-section of U.S. equities are only realized prior to those FOMC statements that immediately follow key macro announcements, they tend to respond to the path of Fed policy, learning from macro news is not instantaneous, and the effect is stronger pre-GFC.

Overall, these results suggest two main takeaways. Firstly, there are two types of FOMC days: those that are preceded by key macro news and those that are not. Asset price behavior around FOMC statements strongly differs across the two sets of FOMC days. Secondly, a sizeable share of pre-FOMC drift and announcement premium reflects market response to new information released before FOMC statements, in particular to changing expectations regarding Fed decisions that they make on macro announcements

preceding FOMC statements. However, this Fed-relevant information acquisition on macro announcements does not occur instantaneously, but rather with a modest lag of 2-3 days. The positive correlation between pre-FOMC returns - computed from macro announcements until moments before FOMC announcements are made public - and post-FOMC returns offers further indication that equity returns in the pre-FOMC window reflect markets learning from macro announcements.

Broadly, these findings are consistent with extant theoretical explanations for pre-FOMC drift that rely on new information (Ai and Bansal, 2018; Hu et al., 2022; Laarits, 2022; Ying, 2020). However, in some contrast to these explanations, I do not find evidence that interpretations of Fed announcements vary when macro news occur close to FOMC announcements (Laarits, 2022). Ying (2020) develops a Kyle (1985) model to study pre-FOMC drift and proposes insider trading to be its driver. I do not find that trading activity increases as macro news occurs closer to FOMC announcements, as might be predicted by a Kyle (1985) model in which macro announcements generate insiders. As aforementioned, I do not find that uncertainty reduces instantaneously upon receiving macro news, as in Ai and Bansal (2018), but rather happens over 2-3 days. Furthermore, I do not find evidence for unconditional announcement premium across the macro announcements I consider. Additionally, I find that the degree of uncertainty resolution on FOMC days (or resolution of "impact uncertainty" in Hu et al., 2022) depends on the the macro news released prior to FOMC days. Empirically, Fisher et al. (2022) find higher attention in the days leading to FOMC announcements predicts higher FOMC announcement premium. I find that it is the rise in monetary attention that occurs on macro announcements that predicts higher FOMC announcement premium. Lastly, I am unable to rule out the role of Fed leaks, highlighted by Cieslak et al. (2019) to be a potential driver of equity returns around FOMC announcements. If Fed leaks are the key drivers, my findings would suggest that macro announcements that occur close to FOMC statements attract leaks from the Fed.

While at a broad level, my findings contrast with theoretical explanations that do not rely on new information (Ai et al., 2021; Cocoma, 2018), I do find higher levels of monetary attention to be important, consistent with Ai et al. (2021). The modest lag with which macro news is fully absorbed into equity prices may be a further indication of the interplay between informed and un-informed traders as in Ai et al. (2021). While my findings do not appear to suggest that traders stop learning before FOMC announcements (Cocoma,

2018), disagreement may be one potential channel that could drive the somewhat gradual incorporation of information, as I discuss below.

I present a simple information framework à la Grossman and Stiglitz (1980) to describe the key learning dynamics of my analysis. I use the model to show two intuitive empirical predictions: market reactions to informative signals rise with its precision (or equivalently with attention) and with greater uncertainty (prior imprecision). The remaining issue is that my empirical analysis suggests that markets appear to fully react to the news over 2-3 days, and not instantaneously. In such information models, this incomplete instantaneous reaction may be because of beauty contest effects (Allen et al., 2006), particularly disagreement in higher order beliefs (Banerjee et al., 2009), or because it is costly to infer from prices (Mondria et al., 2022). Without taking a stand on such drivers, I simply model the instantaneously incomplete reaction in the following way. In the first period (t=1), markets receive macro news, form private views about its implications for Fed policy, and act on these private signals. Markets then observe the price reaction to this news and try to gauge everyone else's private signals. This learning from prices occurs in the next trading period (t=2). In standard models, all this occurs instantaneously. This helps to illustrate that future returns will be ex-post predictable with past data as long as markets continue to learn from the recently released news. Once that learning process has concluded, returns computed from that point onward will not be ex-post predictable with past data (e.g., the daily return at t=3 will not be ex-post predictable with t=1 data). Thus, if the FOMC announcement coincides with the macro announcement (they both occur at t=1) or even if they occur "close enough" to each other (macro news at t=1 and FOMC at t=2), asset price movements around FOMC announcements may also reflect market reactions to recent macro news. Empirically, Fisher et al. (2022) show that abnormal attention towards various macro news remains elevated for 3-4 days after the announcement, suggesting markets continue to learn from a macro announcement for at least a few days after its release.

I also discuss some key extensions using the main insight from my analysis on equity premium on FOMC days: our understanding of how FOMC announcements interact with the economy may be confounded by macro announcements that occur on or a few days before FOMC announcements. I find that accounting for such macro announcements can shed light on the Fed information effect (e.g., Nakamura and Steinsson, 2018), the predictability of monetary policy surprises (see Cieslak, 2018; Miranda-Agrippino, 2016;

Bauer and Swanson, 2023b), the secular decline in interest rates which appears to have been realized in 3-day windows around FOMC statements (Hillenbrand, 2021) and the observation that the security market line tends to be upward sloping on FOMC days (Savor and Wilson, 2014). I discuss all these phenomena and show they all depend on the presence of macro announcements within the very recent past.

Nakamura and Steinsson (2018) document a positive covariance between high-frequency interest rate movements around FOMC statements (proxies of monetary policy shocks) and changes in expectations of GDP growth. This positive covariance, interpreted as the "Fed information effect", is puzzling as textbook monetary models predict positive monetary shocks reduce GDP and therefore its forecasts. I consider changes in quarter-over-quarter and year-over-year GDP growth forecasts. Using changes in year-over-year growth forecasts, I find that evidence for the Fed information effect appears to be driven by those FOMC statements that had a macro announcement earlier the same morning. Over these few FOMC statements, the covariance between their monetary policy surprise and change in year-over-year GDP forecasts is positive and significant: the Fed information effect can be observed. Over the remaining FOMC statements, however, the covariance between their monetary policy surprise and change in year-over-year GDP forecasts is small and insignificant: the Fed information effect is not present. Moreover, the point estimate becomes increasingly negative as one focuses on those FOMC statements in which the nearest macro announcement occurs farther away in time. Thus, the relationship between interest rate movements around FOMC statements and changes in GDP surveys tends to resemble the standard theoretical response of these surveys to monetary shocks as one focuses on those FOMC announcements that did not occur immediately after macro data releases. Using quarter-over-quarter GDP growth forecasts yields similar results, albeit not as extreme.

These findings are consistent with Bauer and Swanson (2023a), who find that the Fed information effect reflects the market's response to past public information. My findings suggest an additional nuance: the Fed information effect appears to be stronger when macro and FOMC announcements occur closer together in time. In a related study, Bauer and Swanson (2023b) show that conventional monetary policy surprise measures are predictable with past public information. I focus on the four macro announcements I consider throughout this paper and show that this predictability is driven by macro news that occurs close to FOMC announcements.

Long-term U.S. Treasury (UST) yields have largely been declining since the 1980s, a phenomenon called the secular decline in interest rates. Hillenbrand (2021) suggests that this secular decline is driven by the Fed, as much of the trend can be captured by the 3-day movements in long-term USTs around FOMC announcements. I show that all the downward movement in yields in 3-day windows around FOMC announcements is concentrated around those FOMC announcements that immediately followed key macro announcements. Across all other FOMC announcements, movements in yields appear transitory. I find corroborating evidence by carrying out more conventional event analysis using daily changes in bond yields. The cumulative daily 10-year UST yield changes across the 4 macro announcements I consider over a sample spanning 1994-2019 leads to an overall decline in the 10y UST of 438bps. This compares well with the realized decline of 400bps in the 10-year UST over the same sample. On the other hand, the cumulative decline in daily 10-year UST yields across FOMC announcements that did not have one of the four macro announcements earlier the same morning is a relatively modest 58bps over a sample spanning 1994-2019. Thus, the observation of yields substantially falling on FOMC days seems to be driven by a parsimonious set of key macro announcements that occurred immediately before FOMC statements.

Lastly, I show that the security market line on FOMC days, shown to be upward sloping by Savor and Wilson (2014), has a positive slope when FOMC announcements follow key macro announcements. Across all other FOMC announcements, the security market line is flat. Firm-level FOMC-day returns only seem to be explained by their CAPM beta exposure when FOMC announcements follow macro announcements, while on all other FOMC days, firm-level announcement day returns are unrelated to their respective CAPM beta.

Savor and Wilson (2014) suggest that asset pricing is a tale of two days: macro announcements and regular trading days. In this paper, I focus on FOMC days alone. All my findings together suggest that there is also a tale of two FOMC days: those preceded by macro news and those that are not.

2 Data: Variables, Sources and Definitions

All U.S. Treasury yields are obtained from FRED. All other financial variables at daily frequency are obtained from Bloomberg. Intra-day equity prices are E-mini S&P 500 futures and are obtained from Refinitiv. Monetary attention measures are the daily de-meaned indices from Fisher et al. (2022).[3] I obtain FOMC announcement dates from the Fed's website, while I obtain timestamps of FOMC statements from Bloomberg, appendices of Lucca and Moench (2015) and Gorodnichenko and Weber (2016) and the Fed's website from January 2016 onward. There are minor differences across the first three sources for the period prior to 2016. I resolve this discrepancy by making the following two adjustments: first I round all timestamp minutes to the nearest multiple of 5. Then I set all adjusted timestamps that are between 2:10 pm and 2:15 pm to be 2:15 pm. These adjustments remove the idiosyncratic differences in timestamps across Bloomberg, Lucca and Moench (2015) and Gorodnichenko and Weber (2016). In my regression analyses, the pre-FOMC drift is computed as the cumulative excess return from 2:00 pm from the day prior to FOMC day and ending 15 minutes prior to this adjusted timestamp. Selection of 2:00 pm of the day prior as the starting point is chosen to be consistent with Lucca and Moench (2015). The risk-free rate is obtained from Ken French's website. I consider four macro announcements: GDP, CPI, unemployment, and industrial production. These are the same four macro announcements as the one I considered in my prior work (Alam, 2020).[4] Announcement dates for the four macro announcements are obtained from Bloomberg and official sources. With the exception of industrial production, which is released at 9:15 am, the remaining three macro announcements become public at 8:30 am. My sample spans 1994-2019. I initially ended the sample in 2019 to ensure that the COVID-19 period did not affect my findings. Updating the data to 2023 has not changed any of the results shared below. Upcoming paper revisions will reflect results with the updated sample and are also available upon request.

[3] The data are publicly available here.

[4] One may consider these macro announcements to be a priori relevant in the setting of Fed policy. The Fed has a dual mandate of maximum employment and price stability, making unemployment and CPI announcements relevant. GDP features in all popular "policy rules". For example, see the Fed's website, where it discusses 5 different policy rules, all of which include GDP. Finally, industrial production statistics are released by the Fed, and is often used by researchers understanding the impact of monetary policy on the economy as an indicator of real activity (see e.g., Romer and Romer, 2004) as it is updated monthly (as opposed to GDP which is updated quarterly). Appendix A conducts text analysis of FOMC transcripts and shows the importance of inflation, employment, GDP, and manufacturing in the setting of Fed policy.

Throughout the analysis, I removed the data between July 01, 2008, to June 30, 2009, to ensure that the exceptional period of the Great Financial Crisis (GFC) does not contaminate my estimates. The selection of these dates is consistent with Nakamura and Steinsson (2018). Thus, I ended up dropping 8 FOMC announcements and am ultimately left with 202 scheduled FOMC announcements in my sample. Table 1 lists the number of FOMC announcements that have at least one of GDP, CPI, unemployment, or industrial production announcements happening just before FOMC statements.

It shows that about 1/5 of all FOMC announcements have one of the four macro announcements occurring earlier in the day, at 8:30 am or 9:15 am. And about 2/3 of all FOMC announcements have one of the four macro announcements occurring either earlier in the morning, one day, two days, or at most 3 days before. Over 80% of all FOMC announcements have at least one of the four macro announcements occurring within a week (5 business days). Thus there is an opportunity for markets to learn about forthcoming Fed policy from fresh macro news on a sizeable number of occasions.

Table 1: FOMC Statements Preceded/Not Preceded by Macro News Within

	Same Day	1 day	2 days	3 days	4 days	5 days
FOMC Preceded by Macro [$MacroFOMC$]	37	54	83	136	153	165
Ratio of Total	18%	27%	41%	67%	76%	82%
FOMC Not Preceded by Macro [$FOMCOnly$]	165	148	119	66	49	37
Ratio of Total	82%	73%	59%	33%	24%	18%
Total FOMC Announcements	202	202	202	202	202	202

Note: This table reports the number of FOMC announcements that were preceded or not preceded by one of the four macro announcements over the sample spanning 1994-2019 and excluding the period between July 01, 2008 and June 30, 2009. Each column indicates whether an FOMC statement had a macro announcement at most "x" days before or not. For example, under the column "2 days", this table reports that 83 of the 202 announcements had one of the four macro announcements occurring either earlier in the morning, the day before, or two days before while 119 FOMC statements did not have one of the four macro announcements earlier in the morning, nor the day before, nor two days before, but may have had one or multiple 3 days or more before. Here and throughout this paper, "macro announcement" refers to GDP, CPI, unemployment, or industrial production announcements.

3 Two Different Types of FOMC Days

Here, I introduce the first of my two key messages: there are two types of FOMC days. Asset price behavior around FOMC announcements significantly varies across the set of those FOMC days that immediately follow macro news ($MacroFOMC$ days) versus those that do not ($FOMCOnly$ days). Grouping FOMC statements into two mutually exclusive sets helps study whether pre-FOMC drift and FOMC announcement premium can truly be attributed to Fed statements alone or not. My findings suggest they cannot. In fact, as Section 3.1 shows, the entire FOMC-day announcement premium is driven by those 37 FOMC announcements that had one of the four macro announcements occurring earlier in the morning. Across all other 165 FOMC announcements, there is no announcement premium. Similarly, pre-FOMC drift is only significantly positive on those FOMC days that had one of the four macro announcements in the prior couple of days. I establish these empirical findings in Section 3 for U.S. aggregate stock market (Section 3.1), international stock markets (Section 3.2) and for the cross-section of U.S. equities (Section 3.3).

3.1 FOMC Announcement Premium & PreFOMC Drift

Regressing daily excess returns of the S&P 500 index (SPX) on a constant and a dummy variable that takes a value of 1 on each of the scheduled FOMC announcements gives a significant coefficient of 0.15, suggesting that equity prices rise by 15bps more on each FOMC announcement. Given that the daily return is about 2bps, the annual equity premium is about 7.16% or 716bps over the same sample, and that there are 8 FOMC announcements in any given year, these estimates imply that roughly 19% of the annual equity premium is earned on just 8 days.

Similarly, regressing intra-day excess returns computed over a 24-hour window, starting and ending at 2:00 pm, on a dummy variable that takes a value of 1 for each scheduled FOMC announcement shows that excess equity returns rise by about 22bps *prior* to FOMC statements (a loading of 0.22 on the dummy variable). As this rise happens *before* the Fed releases its statement, it implies an even more striking implication: about 27% of the annual equity premium is earned even before markets receive news from the Fed.

To investigate if FOMC announcement premium and pre-FOMC drift are influenced by

macro announcements occurring before FOMC statements, I categorize FOMC announcements into two mutually exclusive sets: those preceded by macro news ($MacroFOMC$) and those that are not ($FOMCOnly$). I then compare if announcement premium and pre-FOMC drift are different across these two sets of FOMC statements.

I find that the substantial-positive equity movements are realized only around those FOMC announcements that have key macro announcements occurring just before the release of FOMC statements. This is true for both announcement premium and pre-FOMC drift.[5] Table 2 shows estimations of equation (1), where the dummies $\mathbb{1}^{MacroFOMC}$ and $\mathbb{1}^{FOMCOnly}$ are defined differently in each column. Each column thus reports output from a different regression estimation. It delivers a striking message: the FOMC announcement "premium" is entirely driven by those FOMC announcements that had one of the four macro announcements occurring earlier the same day. That is, the entire FOMC announcement premium is driven by just 37 observations; daily excess returns do not rise significantly on the remaining 165 FOMC announcements.

$$\Delta y_t = \alpha + \beta_1 \mathbb{1}_t^{MacroFOMC} + \beta_2 \mathbb{1}_t^{FOMCOnly} + \epsilon_t \tag{1}$$

Pre-FOMC drift too is only realized on those FOMC announcements that had key macro news occurring in the immediate past ($MacroFOMC$ days). Table 2 suggests that if an FOMC announcement did not have one of the four macro announcements within the past 3 days ($\mathbb{1}^{FOMCOnly}$ row, column 5), there is not even weak evidence of any rise in returns happening prior to Fed statements. Annualized Sharpe ratios shown at the bottom suggest that the superior Sharpe ratios observed in the pre-FOMC window too are driven by those FOMC announcements that were immediately preceded by macro news.[6] As the

[5] Daily equity returns are calculated using close-of-day values of equity prices. Pre-FOMC drift is computed as the return from 2:00 pm the day before FOMC day to 15 minutes prior to FOMC statements.

[6] Since there are 8 scheduled FOMC announcements each year, Sharpe ratios are annualized by multiplying the per-meeting Sharpe ratio by $\sqrt{8}$ times the square root of the ratio of each type of FOMC announcement (see Table 1). To compute the per-meeting Sharpe ratio, I estimate the mean excess returns and standard deviation individually for each meeting type. For example, when estimating the annualized Sharpe ratio of pre-FOMC drift for $MacroFOMC$ under the Table 2 column titled "2 days" (those FOMC statements that had a macro announcement occurring earlier in the morning, the day before, or at most two days before), I estimate the mean and standard deviation of pre-FOMC drift over this particular set of FOMC statements only. Then, I multiply that ratio by $\sqrt{8}$ times $\sqrt{41\%}$, the ratio of total number of FOMC statements that had a macro announcement occurring within the previous 2 days (see Table 1).

annual Sharpe ratio of the S&P 500 is about 0.5 over this sample, the bottom row suggests that when FOMC announcements are *not* preceded by macro news, risk-adjusted returns realized around FOMC statements are low. This can be seen both for daily returns and pre-FOMC drift.

Table 2: Returns Around Two Types of FOMC Days

	All FOMC (1)	Same Day (2)	1 Day (3)	2 Days (4)	3 Days (5)	4 Days (6)	5 Days (7)
Panel A: FOMC Announcement Premium							
$\mathbb{1}^{FOMC}$	0.15**						
	(0.07)						
$\mathbb{1}^{MacroFOMC}$		0.32**	0.35**	0.35***	0.23**	0.20**	0.19**
		(0.14)	(0.14)	(0.13)	(0.09)	(0.09)	(0.08)
$\mathbb{1}^{FOMCOnly}$		0.11	0.08	0.01	-0.00	-0.01	0.00
		(0.08)	(0.08)	(0.08)	(0.11)	(0.11)	(0.14)
$Constant$	0.02**	0.02**	0.02**	0.02**	0.02**	0.02**	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	6,563	6,563	6,563	6,563	6,563	6,563	6,563
Sharpe Ratios							
$AllFOMC$	0.49						
$MacroFOMC$		0.48	0.55	0.57	0.54	0.52	0.51
$FOMCOnly$		0.16	0.15	0.08	0.06	0.04	0.08
Panel B: Pre-FOMC Drift							
$\mathbb{1}^{FOMC}$	0.22***						
	(0.06)						
$\mathbb{1}^{MacroFOMC}$		0.26**	0.29**	0.32***	0.28***	0.24***	0.25***
		(0.11)	(0.11)	(0.09)	(0.07)	(0.07)	(0.06)
$\mathbb{1}^{FOMCOnly}$		0.20***	0.19***	0.13*	0.06	0.12	0.05
		(0.07)	(0.07)	(0.07)	(0.11)	(0.12)	(0.14)
$Constant$	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	5,451	5,451	5,451	5,451	5,451	5,451	5,451
Sharpe Ratios							
$AllFOMC$	0.89						
$MacroFOMC$		0.52	0.58	0.78	0.97	0.88	0.96
$FOMCOnly$		0.35	0.41	0.39	0.22	0.44	0.22

Newey-West standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table shows estimations of equation (1), where the LHS variable is the daily excess return (panel A) and pre-FOMC drift (panel B). Dummy variables, $\mathbb{1}^{MacroFOMC}$ and $\mathbb{1}^{FOMCOnly}$, represent mutually exclusive sets of FOMC announcements that are defined differently for each regression. Column headers help identify their definitions. Under "1 day", $\mathbb{1}^{MacroFOMC}$ takes a value of 1 for all FOMC announcements that either had one of the four macro announcements occurring the same day or the day before and is zero otherwise, while $\mathbb{1}^{FOMCOnly}$ takes a value of 1 on all FOMC announcements that did not have one of the 4 macro announcements the same day or the day before. And so on. See Table 1 for more details. For reference, the 1st column displays output for all FOMC announcements. Annualized Sharpe ratios are computed as $\sqrt{8}$ times the square root of the ratio of each type of FOMC announcement (see Table 1) times the per FOMC announcement type Sharpe ratio.

Since pre-FOMC drift is perhaps better recognized visually, Figure 1 illustrates the difference in the realizations of these returns ahead of FOMC statements preceded by macro news (charts on the left), and those that were not preceded by macro data releases (charts on the right). Figure 1 helps visualize the findings reported in Table 2, by showing that the significant buildup in returns ahead of FOMC statements is driven by a small subset of FOMC announcements: those that are immediately preceded by macro news.

Figure 1. Pre-FOMC Drift on Two Types of FOMC Days

Note: This figure shows cumulative excess returns starting at 9:30 am a day before FOMC statements. Charts on the left show cumulative excess returns ahead of $MacroFOMC$ and those on the right show for $FOMCOnly$ announcements. These mutually exclusive sets of FOMC announcements are defined differently in each row. For example, the top-left chart shows the pre-FOMC drift realization on the set of FOMC announcements that had one of the four macro announcements occurring earlier in the morning or the day before FOMC statements are released. The top-right chart displays the pre-FOMC drift on the set of FOMC announcements that did not have one of the four macro announcements earlier in the morning or the day before but may have macro announcements two days or more before the release of FOMC statements. The solid lines show the means, while the dotted lines show associated 2 standard deviations above and below the mean. The vertical line marks 2:00 pm. Typically, FOMC statements are released at either 2:00 pm or 2:15 pm over the sample my data spans. For consistency, I exclude FOMC statements that were announced before 2:00 pm and thus drop 8 FOMC statements (all released at 12:30 pm) in this figure.

Thus, the presence of macro data releases just prior to FOMC statements has a first-order effect on equity price realizations on FOMC day. The closer macro data releases are to forthcoming FOMC announcements, the greater the returns realized around FOMC statements tend to be. While the declining point estimates as one moves from left to right in the $\mathbb{1}^{FOMCOnly}$ rows of Table 2 and the flattening of lines as one moves down in the right column of Figure 1 suggest the same, estimations of equation (2) provide more direct evidence. Equity returns around FOMC statements (announcement return or pre-FOMC drift) are regressed against the number of days one of the four macro announcements is away. The significantly negative coefficient on the $DaystoFOMC$ variable confirms that as the most recent macro announcement occurs farther back in time, future returns realized around FOMC statements monotonically decline.

$$\Delta y_t = \alpha + \beta_1 DaystoFOMC_t + \epsilon_t \tag{2}$$

Table 3: Returns Realized on FOMC Day are Higher the Closer Macro Announcements Are

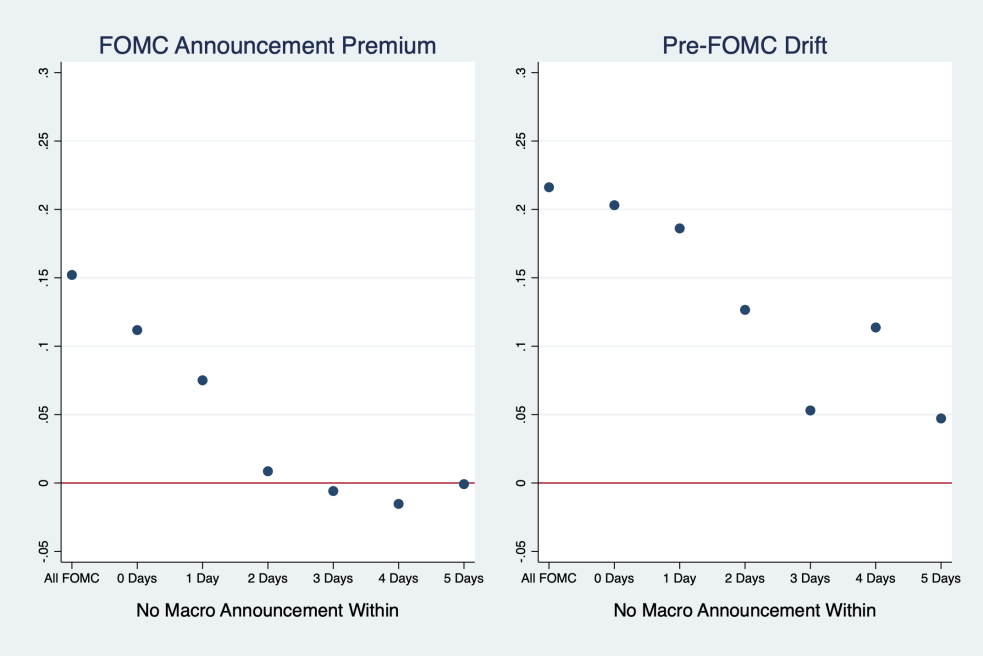
	Announcement Premium	Pre-FOMC Drift
$DaystoFOMC$	-0.12***	-0.07*
	(0.04)	(0.04)
$Constant$	0.53***	0.42***
	(0.14)	(0.12)
Observations	212	179
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Note: This table reports estimations of equation (2) where the LHS variable, Δy_t, is either the daily excess return or pre-FOMC drift (cumulative excess returns from 2:00 pm from the prior day to 15mins before release of FOMC statements). The RHS variable, $DaystoFOMC$, notes the number of days a macro announcement is away from its nearest forthcoming FOMC announcement. If a macro announcement occurs earlier in the morning, the variable takes a value of 0. If the macro announcement occurs the day before its associated FOMC statement, $DaystoFOMC$ takes a value of -1, and so on.

Observing this relationship visually in Figure 2 helps reveal that macro announcements that are closer have a much larger influence on future stock returns around FOMC statements than macro announcements that are further away. For reference, the first dot shows the unconditional daily excess return (left chart) and pre-FOMC drift (right chart) across

all FOMC announcements, without any distinction. As one moves to the right along the x-axis, I plot the announcement returns across the set of $FOMCOnly$ announcements. I sequentially ignore FOMC announcements that had macro announcements in the near past. For instance, when the x-axis says "0 Days", I ignore all FOMC statements that had a macro announcement earlier the same morning (37 announcements - see Table 1), and show the announcement return or drift estimated on the remaining 165 announcements. Similarly, when the x-axis says "1 Day", I ignore all FOMC statements that had a macro announcement either earlier in the day or the day before (54 announcements - see Table 1) and show the estimated excess return around the remaining 148 FOMC statements.

Figure 2. Closeness of Macro News and Announcement Premium & Pre-FOMC Drift



Note: This figure plots the average FOMC announcement premium (left) and pre-FOMC drift (right). Pre-FOMC drift is computed as the cumulative return from 2:00 pm the day before FOMC day till 15 minutes before the release of FOMC statements. In each chart, the leftmost dot shows the unconditional return across all FOMC statements. As one moves along the x-axis, I show announcement returns for $FOMCOnly$ announcements. When the x-axis says "0 Days", I ignore all FOMC statements that had a macro announcement earlier the same morning. And then compute the announcement daily return and pre-FOMC drift, respectively. At the right-most end, when the x-axis says "5 days", I ignore all FOMC announcements that had one of the four macro announcements in the previous 5 days and estimate the announcement daily excess return and pre-FOMC drift over the remaining FOMC statements.

3.2 International Evidence

Lucca and Moench (2015) document pre-FOMC drift among major international stock markets: Canada, UK, Europe, and Japan. That is, benchmark stock indices of these markets rise ahead of Federal Reserve announcements, just like the S&P 500 does. I show that similar to pre-FOMC drift in U.S. stock markets, these substantial excess returns are only realized ahead of those FOMC statements that are preceded by U.S. macro news. To show that, I again estimate equation (1) but with returns of the major international indices now as regressands, and report my findings in Table 4 below.[7] In all cases, pre-FOMC returns are higher ahead of those FOMC announcements preceded by macro news ($MacroFOMC$ days) and are low and insignificant on FOMC days not preceded by macro news ($FOMCOnly$ days).

The results are most striking for Japan's Nikkei 225. Similar to Lucca and Moench (2015), I too do not find evidence of *unconditional* pre-FOMC drift in Nikkei 225 (see column 1 of panel D below). However, pre-FOMC drift in Nikkei becomes immediately evident once FOMC announcements are separated into mutually exclusive sets of those that are immediately preceded by macro news and those that are not. Just like for U.S. daily announcement returns, for the very small subset of those FOMC announcements that have one of the four macro news releases happening earlier in the morning (37 of 202 FOMC days - see Table 1), there is strong evidence of pre-FOMC drift in the Nikkei.

Annualized Sharpe ratios of these indices show the same pattern: they are high on FOMC statements preceded by macro news ($MacroFOMC$ days), and relatively low on those FOMC statements that are not preceded by macro news ($FOMCOnly$ days). For reference, over the same sample, holding the benchmark for a full year would yield Sharpe ratios of 0.32, 0.18, 0.21, and 0.04 for the TSX60, FTSE100, STOXX 50, and Nikkei, respectively.

[7] I estimate pre-FOMC returns similarly as Lucca and Moench (2015). For non-Canadian stocks, I use close-of-day prices (from Bloomberg). For all non-Canadian stocks, since their markets close before FOMC statements are released, close prices can be used to measure pre-FOMC returns. For Canada, I obtain intra-day data on the TSX60 from Refinitiv, and construct pre-FOMC returns similar to the U.S.. In the benchmark, I use cumulative excess returns from 2:00 pm EST of the previous day until 15 minutes prior to the release of FOMC statements.

Table 4: Pre-FOMC Drift Around Two Types of FOMC Days

	All FOMC (1)	Same Day (2)	1 Day (3)	2 Days (4)	3 Days (5)	4 Days (6)	5 Days (7)
Panel A: Canada (TSX60)							
$\mathbb{1}^{FOMC}$	0.16***						
	(0.06)						
$\mathbb{1}^{MacroFOMC}$		0.23	0.23*	0.25***	0.23***	0.21***	0.22***
		(0.15)	(0.12)	(0.09)	(0.07)	(0.07)	(0.07)
$\mathbb{1}^{FOMCOnly}$		0.15**	0.14**	0.10	0.01	0.00	-0.08
		(0.07)	(0.07)	(0.08)	(0.10)	(0.11)	(0.13)
$Constant$	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	4,876	4,876	4,876	4,876	4,876	4,876	4,876
Sharpe Ratios							
$AllFOMC$	0.67						
$MacroFOMC$		0.35	0.45	0.62	0.76	0.75	0.82
$FOMCOnly$		0.27	0.30	0.27	0.07	0.06	-0.23
Panel B: UK (FTSE100)							
$\mathbb{1}^{FOMC}$	0.20***						
	(0.06)						
$\mathbb{1}^{MacroFOMC}$		0.29**	0.28**	0.33***	0.23***	0.21***	0.22***
		(0.14)	(0.13)	(0.10)	(0.08)	(0.07)	(0.07)
$\mathbb{1}^{FOMCOnly}$		0.18***	0.17**	0.11	0.13	0.16	0.12
		(0.07)	(0.07)	(0.07)	(0.10)	(0.10)	(0.12)
$Constant$	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	6,563	6,563	6,563	6,563	6,563	6,563	6,563
Sharpe Ratios							
$AllFOMC$	0.78						
$MacroFOMC$		0.41	0.44	0.65	0.64	0.60	0.66
$FOMCOnly$		0.26	0.31	0.26	0.38	0.54	0.40

Table 4 (continued)

Panel C: EU (STOXX50)							
$\mathbb{1}^{FOMC}$	0.24***						
	(0.06)						
$\mathbb{1}^{MacroFOMC}$		0.34*	0.36**	0.39***	0.30***	0.27***	0.26***
		(0.17)	(0.14)	(0.11)	(0.08)	(0.08)	(0.07)
$\mathbb{1}^{FOMCOnly}$		0.21***	0.19***	0.13*	0.11	0.14	0.13
		(0.07)	(0.07)	(0.07)	(0.10)	(0.11)	(0.13)
$Constant$	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	6,563	6,563	6,563	6,563	6,563	6,563	6,563
Sharpe Ratios							
$AllFOMC$	0.78						
$MacroFOMC$		0.39	0.50	0.75	0.77	0.74	0.77
$FOMCOnly$		0.32	0.36	0.31	0.35	0.49	0.43
Panel D: Japan (Nikkei225)							
$\mathbb{1}^{FOMC}$	0.12						
	(0.10)						
$\mathbb{1}^{MacroFOMC}$		0.31**	0.41***	0.35***	0.19**	0.20**	0.22**
		(0.15)	(0.12)	(0.12)	(0.09)	(0.09)	(0.09)
$\mathbb{1}^{FOMCOnly}$		0.08	0.02	-0.04	-0.01	-0.13	-0.32
		(0.12)	(0.13)	(0.15)	(0.24)	(0.29)	(0.36)
$Constant$	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	6,563	6,563	6,563	6,563	6,563	6,563	6,563
Sharpe Ratios							
$AllFOMC$	0.26						
$MacroFOMC$		0.40	0.67	0.61	0.44	0.45	0.51
$FOMCOnly$		0.07	0.02	-0.04	-0.01	-0.15	-0.36
Newey-West standard errors in parentheses							
*** p<0.01, ** p<0.05, * p<0.1							

Note: This table shows estimations of equation (1), where the LHS variable is pre-FOMC drift computed using close-of-day prices for non-Canadian benchmark indices, and intra-day data for the TSX60. Each column in each panel displays output from a separate regression. Dummy variables, $\mathbb{1}^{MacroFOMC}$ and $\mathbb{1}^{FOMCOnly}$, represent mutually exclusive sets of FOMC announcements that are defined differently for each regression. Column headers help identify their definitions. Under "Same Day", $\mathbb{1}^{MacroFOMC}$ takes a value of 1 for all FOMC announcements that had one of the four macro announcements occurring the same day and is 0 otherwise, while $\mathbb{1}^{FOMCOnly}$ takes a value of 1 on all FOMC announcements that did not have one of the 4 macro announcements earlier the same day. Under "1 day", $\mathbb{1}^{MacroFOMC}$ takes a value of 1 for all FOMC announcements that either had one of the four macro announcements occurring the same day or the day before and is zero otherwise, while $\mathbb{1}^{FOMCOnly}$ takes a value of 1 on all FOMC announcements that did not have one of the 4 macro announcements the same day or the day before. And so on. For reference, the 1st column displays output for all FOMC announcements. Annualized Sharpe ratios are computed as $\sqrt{8}$ times the square root of the ratio of each type of FOMC announcement (see Table 1) times the per FOMC announcement type Sharpe ratio.

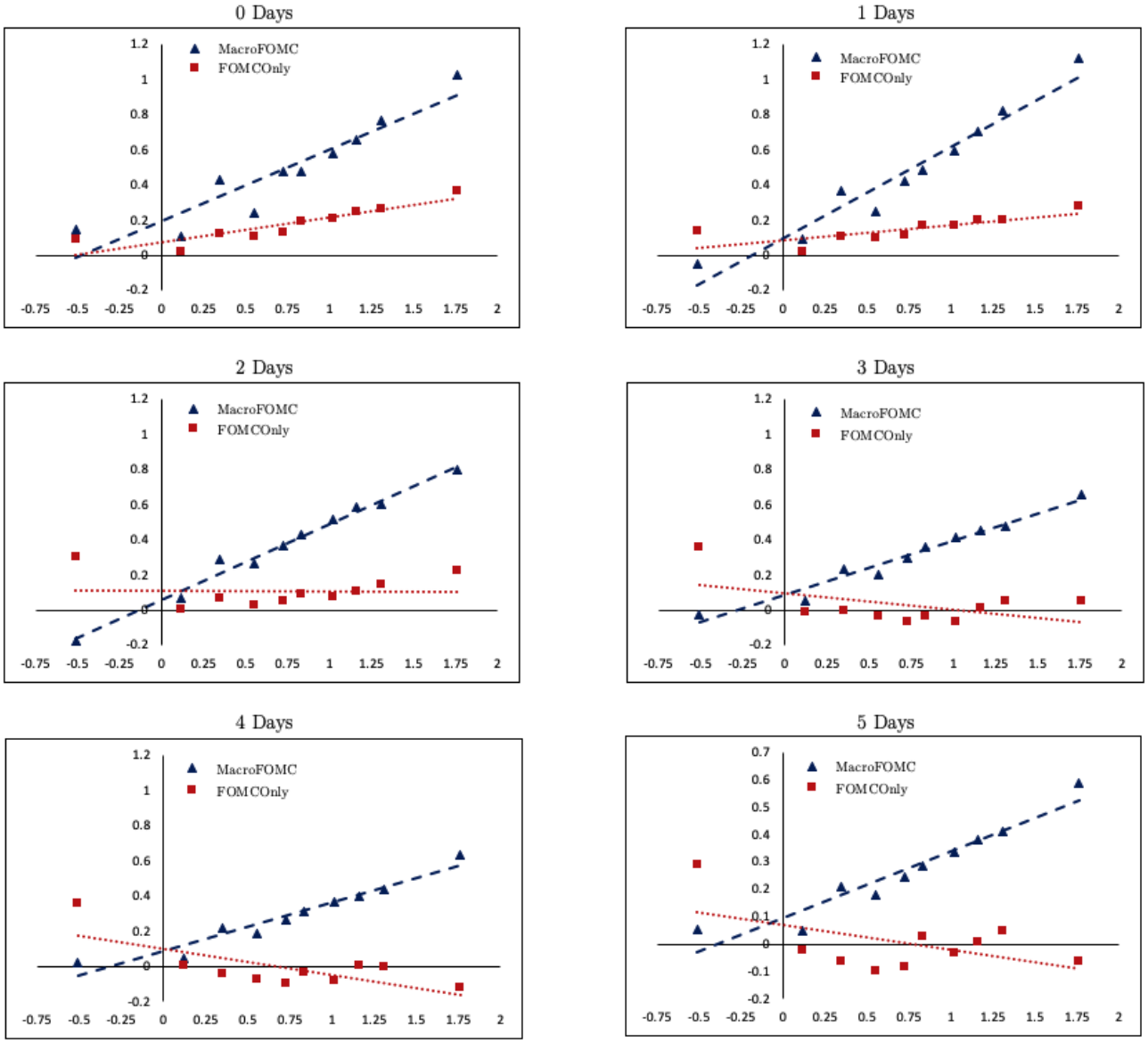
3.3 Cross-Sectional Evidence

Previous studies have found that the security market line slopes upward on FOMC days (Bernanke and Kuttner, 2005; Savor and Wilson, 2014; Lucca and Moench, 2015). Savor and Wilson (2014) focus on the behavior of the cross-section of U.S. stocks on select macro announcement days (including FOMC announcements), and show in Figure 1 of their paper that the security market line is upward sloping on macro announcement days. Given the high market return on macro announcements, stocks with high CAPM beta earn large excess returns compared to those that have low CAPM betas. Since the security market line tends to generally be flat, Savor and Wilson (2014) use their key finding to conclude that asset pricing is a tale of two days: macro announcements and regular trading days. I focus exclusively on FOMC days and reproduce a modified version of Figure 1 of Savor and Wilson (2014) to further advance one of two key messages of this paper: *there is a tale of two FOMC days*. Asset price behavior strongly contrasts across the set of those FOMC days preceded by key macro news and those that are not.

In particular, I estimate equation (3) below for the entire CRSP universe to estimate each firm's unconditional CAPM beta. Then I rank firms into 10 beta-sorted portfolios and plot the average returns of those beta-sorted portfolios against their CAPM betas in Figure 3. It shows that the security market line is upward-sloping only on those FOMC days that are preceded by macro news ($MacroFOMC$ days), and is flat or downward-sloping on FOMC days that are not preceded by macro news ($FOMCOnly$ days). Regression estimates confirm the patterns that can be visually observed in Figure 3: even the cross-section of U.S. stocks display significant announcement returns on those FOMC days preceded by macro news ($MacroFOMC$ days) and display no significant returns on those FOMC days that are not preceded by macro news ($FOMCOnly$ days).

$$EquityReturn_{i,t} = \alpha_i + \beta_{i,1} MarketReturn_t + \epsilon_{i,t} \tag{3}$$

Figure 3. Security Market Line at Two Types of FOMC Days



Note: This figure shows the SML for two types of FOMC days: those associated with macro announcements ($MacroFOMC$); and those that are not ($FOMCOnly$). Chart titles indicate the definition of the two categories of FOMC days. For example, under the chart title "0 Days", $MacroFOMC$ represents all those FOMC announcements that had one of the four macro announcements earlier in the morning on the same day. $FOMCOnly$ in that chart represents all other FOMC days: those that did not have a macro announcement earlier the same day. The entire CRSP universe of firms is sorted into 10 portfolios based on their CAPM beta estimates. The average returns of each portfolio (y-axis) are plotted against their portfolio ranking.

4 Pre-FOMC Drift & Announcement Return: Learning About Future Fed Actions From Macro Announcements

In Section 3, I establish one of two key messages of this paper: there is a tale of two FOMC days. Here, I establish that pre-FOMC drift and FOMC announcement premium respond to *past information* released just a few days ahead of Fed statements. In particular, these returns are strongly explained by movements in proxies of market expectations of future Fed actions (federal fund and eurodollar futures rates) on macro announcements that precede Fed statements. My interpretation of these findings is also the second of my two key messages of this paper: pre-FOMC drift and FOMC announcement premium reflect, in large parts, markets *learning* about future Fed actions from macro announcements.

4.1 Changing Expectations Regarding Path of Fed Policy On Macro News Days Explains Pre-FOMC Drift and Announcement Return

Federal fund futures' payoffs directly depend on the level of the Federal Funds Rate, which the Fed itself controls. Thus, they are one of the best proxies of the market's expectations regarding future Fed actions as shown previously too (see e.g., Gürkaynak et al., 2007b). A large body of literature has used these contracts to measure the market's monetary policy expectations (e.g, Kuttner, 2001).[8] I follow Kuttner (2001) to extract the market's expectations regarding the upcoming Fed announcement.

To be more concrete, here I explain how I compute expectations regarding upcoming Fed statements (variable labeled $\Delta E[Upcoming]$ in the tables that follow). Firstly, I match each macro announcement to its nearest forthcoming FOMC statement. Then I compute the change in expectations regarding the upcoming Fed statement from federal funds futures using equation (4) below. Δf^i denotes the daily change in the futures rate of the relevant month "i". If a macro announcement and its nearest FOMC announcement occur in the same month, i=0. If the nearest FOMC statement happens in the next month, i=1. This

[8]Every federal funds futures contract's payoff depends on the average effective federal funds rate for its reference month. For example, if today is February 07, 2022, the same month's fed fund futures contract will depend on the average of the effective federal funds rate prevalent between February 01, 2022, and February 28, 2022. Price quotations for each contract are 100 - R, where R is the arithmetic average of the daily effective federal funds rate for that contract month. For more information, visit CME here.

change is multiplied by a scaling factor, to account for the number of days the relevant futures' payoff that will be affected and the number of days that will not be affected by the upcoming Fed announcement. Upper case "D" represents the total number of days in the month in which the nearest FOMC statement occurs. Lowercase "d" is the day the nearest upcoming policy is to be announced.[9]

$$\Delta E[Upcoming] = \frac{D}{D-d}\Delta f^i \tag{4}$$

Similar to Bernanke and Kuttner (2005), I also control for what they call "timing": whether a change in the market's expectation regarding the upcoming Fed action arises because they now expect a future action to be committed earlier, or whether it represents a change in expectations regarding the short-term path of policy. As in Bernanke and Kuttner (2005), I measure this "timing" as the difference between the change in the 3-month-ahead federal fund futures rate and $\Delta E[Upcoming]$. This variable is labeled $Timing$ in the tables that follow. To begin, I only focus on the realizations of $\Delta E[Upcoming]$ and $Timing$ on macro announcements, and assess whether they explain pre-FOMC drift and announcement returns of upcoming Fed statements.

For the rest of this paper, I only focus on those macro announcements that occurred at most 5 days before an FOMC statement. This is for two reasons. Firstly, as shown in Section 3.1, macro announcements that are closer to upcoming Fed statements are more relevant in determining future FOMC returns than those macro announcements that are further away. Including macro announcements that are far away can thus reduce the precision of estimates. Secondly, as Table 1 shows, over 80% of all FOMC statements had one of the four macro announcements occurring within the past 5 days. Hence, I am still accounting for the overwhelming majority of FOMC announcements, and only drop a few in my benchmark analysis. Nonetheless, the results I present in the rest of the paper extend to broader cutoff days.

My regression specification is given in equation (5) below. The regressand is either the upcoming FOMC announcement excess return or the pre-FOMC drift. "n" notes the total

[9] Following Gürkaynak et al. (2007b), if an FOMC announcement occurs in the last 7 days of the month, I use the next month's unscaled change in the future's rate to avoid multiplying by a very large scaling factor.

number of main explanatory variables. Subscript $t-$ is meant to remind the reader that values of RHS are realized *before* upcoming FOMC days. Each RHS variable is interacted with "$Days$", which is equal to the number of days each macro announcement is away from its nearest upcoming FOMC announcement. As the RHS variables I use here are at daily frequency, I ignore all macro announcements that occur on the same day as an FOMC announcement. Therefore, the estimations reported in Table 5 are truly predictive for announcement returns (columns 4-6). Since the baseline pre-FOMC drift is the cumulative excess return from 2:00 pm of the day prior to the FOMC announcement to 15 minutes prior to the release of the FOMC statement, there would be some overlap in the LHS and RHS variables on occasions when the macro announcement occurs 1 day before an FOMC announcement.

$$ret_{a,t} = \alpha + \sum_{i=1}^{n} \beta_{1,i} x_{i,t-} + \sum_{i=1}^{n} \beta_{2,i} x_{i,t-} \times Days_{t-} + \gamma Days_{t-} + \epsilon_t \tag{5}$$

$Days = 0$ one day before FOMC announcement day. This reference point is chosen to reflect the closest available day in my estimations. Thus, the main variable coefficient estimates (rows 1 and 3) describe the explanatory relationship when a macro announcement occurs 1 day prior to an FOMC statement. The interaction terms (rows 2 and 4) then represent the attenuation of this relationship as the number of days between macro announcements and upcoming FOMC statements increases.

The negative loadings on the main variables in rows 1 and 3 of Table 5 show that pre-FOMC drift and announcement returns are high when markets lower their expectations regarding the policy rate to be announced on the upcoming FOMC statement (a negative value of $\Delta E[Upcoming]$). Given the interaction term in row 2 is of the opposite sign, it means that the explanatory power of $\Delta E[Upcoming]$ is stronger for macro announcements that are closer to upcoming FOMC statements. In fact, the estimations from columns 1, 3, 4, and 6 suggest that the explanatory power of $\Delta E[Upcoming]$ is negligible for macro announcements that occur 4 days or more away from upcoming FOMC statements. This finding aligns with Figure 1, which showed that pre-FOMC drift is marginally significant for those FOMC statements that may have had macro announcements 3 days or more away (2nd row, right chart), and completely insignificant for those FOMC statements that may have had macro announcements 4 days or more away (3rd row, right chart).

The adjusted R^2 of these regressions suggest that a substantial fraction of pre-FOMC drift and FOMC announcement premium are explained by the *immediate past* realizations of market expectations of forthcoming Fed actions (captured by $\Delta E[Upcoming]$ and $Timing$) around macro news releases just preceding FOMC announcements. Even after excluding changes in these variables around those macro announcements that occurred the same day as FOMC announcements, nearly 20% of the variation in pre-FOMC drift is still mainly explained by the realizations of just two variables on macro announcements (column 3).

Table 5: Learning About Forthcoming Fed Policy From Macro Announcements

	Pre-FOMC Drift			Announcement Premium		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta E[Upcoming]$	-17.11***		-16.92***	-18.22***		-18.23***
	(5.73)		(5.41)	(5.99)		(6.10)
$\Delta E[Upcoming] \times Days$	6.96**		7.59***	6.10***		6.82***
	(3.14)		(2.48)	(2.02)		(2.39)
$Timing$		-11.79	-8.30		-10.80	-10.36**
		(11.44)	(5.85)		(7.35)	(4.29)
$Timing \times Days$		5.74	4.84**		3.83	4.38*
		(4.46)	(2.39)		(2.59)	(2.46)
$Days$	-0.12**	-0.12**	-0.11**	-0.18***	-0.17**	-0.16**
	(0.05)	(0.05)	(0.05)	(0.06)	(0.07)	(0.06)
$Constant$	0.45***	0.46***	0.42***	0.55***	0.51***	0.48***
	(0.11)	(0.13)	(0.11)	(0.16)	(0.17)	(0.16)
Observations	145	145	145	175	175	175
Adjusted R^2	0.174	0.063	0.185	0.108	0.054	0.119
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Note: This table shows estimations of equation (5), where the LHS variable is either the daily excess announcement return or pre-FOMC drift of the nearest upcoming FOMC announcement with respect to each macro announcement. The RHS variables are realizations on macro announcement days preceding FOMC statements. In the baseline reported here, I only focus on those macro announcements that occur at most 5 days before its nearest upcoming FOMC statement. $\Delta E[Upcoming]$ uses federal funds futures to measure the market's expectation regarding the nearest upcoming FOMC policy announcement. $Timing$ is the difference between change in 3-month-ahead federal funds futures futures rate and $\Delta E[Upcoming]$. $Days$ represents the number of days each macro announcement is away from its nearest upcoming FOMC statement. Since I use daily changes in my RHS variables, I ignore all macro announcements that occur on the same day as an FOMC announcement. For ease of interpretation of main variables and interaction terms, $Days$ = 0 if a macro announcement occurred the day before FOMC. See Section 4.1 for more details.

The results in Table 5 suggest that one way macro announcements, occurring close to FOMC announcements, influence pre-FOMC drift and FOMC announcement premium is by influencing the market's expectations of future Fed policy. However, Table 5 does not offer evidence of causality. To establish the causal impact of macro announcements preceding FOMC statements, I estimate equation (6) below. $\mathbb{1}^{Macro} = 1$ if there is a GDP, CPI, unemployment or industrial production announcement, and is 0 otherwise. For similar reasons as provided earlier, I only focus on those macro announcements that occurred at most 5 trading days preceding each FOMC statement in Table 6. $Days$ is defined for each specification as before. For brevity, I omit the $Timing$ variable in the regressions that follow. Including it increases the significance of the coefficients associated with $\Delta E[Upcoming]$, but does not qualitatively change the results.

$$\begin{aligned} ret_t &= \alpha + \sum_{i=1}^{n} \beta_{1,i} x_{i,t-} + \sum_{i=1}^{n} \beta_{2,i} x_{i,t-} \times \mathbb{1}_{t-}^{Macro} + \sum_{i=1}^{n} \beta_{3,i} x_{i,t-t-} \times \mathbb{1}_{t-}^{Macro} \\ &\quad + \gamma_1 Days_{t-} + \gamma_2 \mathbb{1}_{t-}^{Macro} + \gamma_3 Days_{t-} \times \mathbb{1}_{t-}^{Macro} + \sum_{i=1}^{n} \gamma_{4,i} x_{i,t-t-} + \epsilon_t \end{aligned} \tag{6}$$

The significant loading on the interaction with $\mathbb{1}^{Macro}$ (row 2) confirms that indeed it is realizations of $\Delta E[Upcoming]$ on macro announcement days that explain future FOMC announcement premium and pre-FOMC drift. The double interaction term (row 3) also confirms that macro announcements that are closer to upcoming FOMC statements exert a stronger impact on future returns than those that are further away. The estimations in column 3 of Table 6 also support the back-of-envelope calculations mentioned above: the power of $\Delta E[Upcoming]$ to predict pre-FOMC drift is negligible when macro announcements occur 4 days or more away. The far lower adjusted R^2 in Table 6 compared to those reported in Table 5 also further substantiates the importance of macro announcements. Including regular trading reduces the explanatory power of the estimating equation.

Table 6: Learning About Forthcoming Fed Policy From Macro Announcements

	Pre-FOMC Drift			Announcement Premium		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta E[Upcoming]$	0.96		0.87	1.04		1.04
	(1.44)		(1.43)	(0.84)		(0.84)
$\Delta E[Upcoming] \times \mathbb{1}^{Macro}$	-18.07***		-17.65***	-19.26***		-12.45**
	(5.84)		(5.82)	(5.98)		(5.53)
$\Delta E[Upcoming] \times \mathbb{1}^{Macro} \times Days$	7.03**		6.94**	6.18***		3.86**
	(3.10)		(3.05)	(1.99)		(1.84)
$\Delta E[Upcoming] \times Days$	-0.07		-0.07	-0.08		-0.08
	(0.08)		(0.08)	(0.05)		(0.05)
$Attention$		-0.02	-0.02		0.00	0.00
		(0.02)	(0.02)		(0.02)	(0.02)
$Attention \times \mathbb{1}^{Macro}$		0.20	0.05		0.63***	0.53***
		(0.17)	(0.10)		(0.19)	(0.18)
$Attention \times \mathbb{1}^{Macro} \times Days$		-0.06	-0.00		-0.20***	-0.17**
		(0.07)	(0.05)		(0.08)	(0.07)
$Attention \times Days$		0.00	0.00		0.00	0.00
		(0.00)	(0.00)		(0.00)	(0.00)
$\mathbb{1}^{Macro} \times Days$	-0.12**	-0.11**	-0.11**	-0.18***	-0.12*	-0.13**
	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)
$\mathbb{1}^{Macro}$	0.21*	0.19	0.20	0.38**	0.17	0.19
	(0.11)	(0.12)	(0.13)	(0.16)	(0.15)	(0.15)
$Days$	-0.00	-0.00	-0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Constant$	0.24***	0.24***	0.24***	0.17***	0.17***	0.17***
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Observations	5,389	5,389	5,389	6,305	6,306	6,305
Adjusted R^2	0.005	0.001	0.004	0.004	0.005	0.006
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Note: This table shows estimations of equation (6), where the LHS variable is either the daily excess announcement return or pre-FOMC drift of the nearest upcoming FOMC announcement. $\Delta E[Upcoming]$ uses federal funds futures to measure the market's expectation regarding the nearest upcoming FOMC policy announcement. $Attention$ is the monetary attention measure from Fisher et al. (2022). $Days$ represents the number of days each trading day is away from its nearest upcoming FOMC statement. Since I use daily changes in my RHS variables, I do not use values of explanatory variables that occur on the same day as an FOMC announcement. For ease of interpretation of main variables and interaction terms, in the first 6 columns, $Days$ = 0 on the day before FOMC. See Section 4.1 for more details.

To further explore how macro announcements impact market expectations of future Fed policy and how that influences pre-FOMC drift and announcement premium, I also consider monetary attention indices constructed by Fisher et al. (2022). They use mentions of the Fed in popular press to construct their monetary attention measure and show that it rises a few days *before* FOMC announcements. Furthermore, they show higher monetary attention before FOMC announcements predicts higher FOMC announcement premium. However, Fisher et al. (2022) are silent on what events drive the rise in attention before FOMC announcements. Table 6 confirms that indeed higher monetary attention predicts higher FOMC announcements premium. Importantly, Table 6 shows that it is the rise in attention that happens on macro announcements that predicts FOMC announcement premium. As before, this predictive power is stronger the closer the macro announcement is, as evidenced by the negative sign of the double interaction term: $Attention \times Days \times \mathbb{1}^{Macro}$. Also as before, the estimates suggest that the spikes in attention that occur on macro announcements that are 4 days or more away do not have any explanatory power in determining the FOMC announcement premium.

Overall, the results in Tables 5 and 6 suggest that acquisition of Fed-relevant information is one of the key channels through which macro announcements influence pre-FOMC drift and FOMC announcement premium. More fundamentally, the relationship between movements in market proxies of Fed actions ($\Delta E[Upcoming]$ in the tables above) is unlikely to be entirely driven by time-varying risk premium. This is because near-term federal fund futures are known to have minimal risk premium (Sack, 2004; Hamilton, 2009; Schmeling et al., 2022). Daily changes of these contracts removes any traces of risk premium altogether (Piazzesi and Swanson, 2008). Thus, it is unlikely that the significant explanatory power of movements in federal fund futures in Tables 5 and 6 is fundamentally driven by time-varying risk premium, but instead rather reflects the market's updated expectations regarding future Fed policy. Yet, movements in risk may have an important role in explaining pre-FOMC drift and announcement returns, given the strong association of monetary attention. As discussed in Fisher et al. (2022), theories of endogenous attention suggest attention increases in periods of higher uncertainty and/or higher risk aversion. Section 4.2 considers the association between movements in measures of uncertainty and proxies of market expectations of Fed policy in explaining pre-FOMC drift and FOMC announcement premium.

4.2 Role of Variations in Uncertainty

Lucca and Moench (2015) showed that elevated levels of the VIX two days prior to FOMC statements are associated with high pre-FOMC drift, while Hu et al. (2022) show that higher pre-FOMC drift is accompanied by substantially great drops in the VIX just before FOMC statements. Given the critical role of key macro announcements situated just before FOMC statements in determining pre-FOMC drift and FOMC-day-returns as shown thus far, I examine if high-frequency changes in the VIX, as well as other risk measures on these macro announcements, explain forthcoming returns around FOMC statements. I do so by estimating equation (5), now with a larger set of regressors including daily changes in the VIX and MOVE index, which measures implied volatility in bond markets using options on USTs.

I also include the data release itself, labeled $MacroData$ below. I use the actual vintages released on the macro announcement day instead of their revisions. I standardize these released statistics by subtracting their unconditional averages and dividing the difference by their unconditional standard deviations. I standardize the following data releases: GDP growth, CPI inflation, unemployment rate, non-farm payroll growth, and industrial production growth.[10]

As Table 7 shows, changes in VIX or MOVE on macro announcements just preceding upcoming FOMC statements do not explain forthcoming returns around FOMC statements. Similarly, the data release itself does not have much explanatory power either, especially once proxies of the market's Fed expectations ($\Delta E[Upcoming]$ and $Timing$) are included, as columns 3 and 4 show. Using "surprise" measures instead of the data release does not change these findings, and in fact, its effect is weaker than that of the macro data release reported here. Surprises in macro data releases may be measured by taking the difference between the announcement and its associated expectation taken from Bloomberg's survey.[11] However, the explanatory power of market proxies of Fed expectations remains unchanged, as shown in columns 4 and 8 below. This suggests that daily changes in VIX,

[10]GDP growth refers to annualized quarter-over-quarter growth. CPI inflation, industrial production, and non-farm payroll growth are year-over-year percentage changes. The unemployment rate is the released level of the unemployment rate.

[11]The reduced significance when $MacroData$ shown here is replaced with its associated surprise may be because Bloomberg surveys are done several days before macro announcements. This could make these surveys noisy measures of the market's true expectations just before macro announcements.

MOVE or the data release are not key omitted variables driving the association between changes in federal fund futures on macro announcements and pre-FOMC drift and FOMC announcement premium.

Moreover, it suggests that the connection between macro announcements and pre-FOMC drift and FOMC announcement premium is not simply a case of mistaken identity. That is, the full picture is not entirely like the following: uncertainty is resolved on all macro announcements, a macro announcement premium is unconditionally earned, and sometimes macro announcements just happen to coincide with FOMC announcements, leading the econometrician to wrongly ascribe macro announcement premium as either pre-FOMC drift or FOMC announcement premium. In fact, as shown in Appendix D, the evidence of in-sample unconditional announcement premium across the four macro announcements I consider is weak and small in magnitude. A regression of daily equity returns, in excess of the risk-free rate, on a dummy variable that takes a value of 1 on each of these four macro announcements that do not occur on the same day as an FOMC announcement yields an insignificant coefficient of 0.05, suggesting a weak average daily excess equity return of 5bps on macro announcements.[12]

Yet, changes in market expectations of Fed policy that occur on macro announcements close to FOMC days appear to drive the resolution of uncertainty (proxied by the reduction in VIX) on FOMC days. As appendix E shows, the reduction in VIX on FOMC days is positively and significantly related to changes in market expectations ($\Delta E[Upcoming]$) of Fed policy that occur macro announcements preceding FOMC days. This relationship is further mediated by the degree of attention and uncertainty.

[12]Analyzing each of the four macro announcements individually shows that only industrial production announcements offer some evidence of in-sample unconditional macro announcement premium. Regressing daily excess equity returns on a dummy variable that takes a value of 1 on each industrial production announcement that does not take place on the same day as an FOMC announcement yields a significant coefficient (at 10%) of 0.10, suggesting an average in-sample daily return of 10bps across industrial production announcements. However, the evidence for announcement premium across the subset of those FOMC announcements that had one of the other 3 macro announcements (GDP, CPI or unemployment) and not industrial production announcements earlier the same morning is still significant.

Table 7: Learning About Fed Policy From Macro News: *Controlling for Changes in Uncertainty*

	Pre-FOMC Drift				Announcement Premium			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta E[Upcoming]$				-15.79***				-18.16**
				(5.04)				(7.18)
$\Delta E[Upcoming] \times Days$				7.64***				6.63**
				(2.51)				(2.72)
$Timing$				-8.52				-12.70*
				(5.56)				(6.79)
$Timing \times Days$				5.07**				4.88*
				(2.42)				(2.94)
ΔVIX	0.18			0.01	0.12			-0.04
	(0.17)			(0.13)	(0.18)			(0.12)
$\Delta VIX \times Days$	-0.03			0.02	-0.09			-0.05
	(0.06)			(0.05)	(0.06)			(0.05)
$\Delta MOVE$		0.05		0.03		0.03		0.01
		(0.04)		(0.04)		(0.04)		(0.05)
$\Delta MOVE \times Days$		-0.02		-0.01		-0.00		0.01
		(0.02)		(0.02)		(0.02)		(0.02)
$MacroData$			0.26	0.21			0.01	0.01
			(0.16)	(0.13)			(0.19)	(0.16)
$MacroData \times Days$			-0.09	-0.08			0.00	0.01
			(0.05)	(0.05)			(0.07)	(0.06)
$Days$	-0.14**	-0.14**	-0.17**	-0.14**	-0.20***	-0.19***	-0.19***	-0.17***
	(0.06)	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)	(0.06)
$Constant$	0.52***	0.51***	0.60***	0.50***	0.60***	0.59***	0.58***	0.48***
	(0.14)	(0.14)	(0.16)	(0.13)	(0.17)	(0.17)	(0.18)	(0.16)
Observations	145	145	145	145	174	175	171	170
Adjusted R^2	0.069	0.044	0.054	0.189	0.051	0.033	0.025	0.113

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table shows estimations of equation (5), where the LHS variable is either the pre-FOMC drift or excess announcement return of the nearest upcoming FOMC announcement. The RHS variables are realizations on macro announcement days preceding FOMC statements. I only focus on those macro announcements that occur at most 5 days before its nearest upcoming FOMC statement. $\Delta E[Upcoming]$ uses federal funds futures to measure the market's expectation regarding the nearest upcoming FOMC policy announcement. $Timing$ is the difference between change in 3-month-ahead federal funds futures futures rate and $\Delta E[Upcoming]$. $Days$ represents the number of days each macro announcement is away from its nearest upcoming FOMC statement. Since I use daily changes in my RHS variables, I do not use macro announcements that occur on the same day as an FOMC announcement. For ease of interpretation of main variables and interaction terms, $Days = 0$ on the day before FOMC. See Section 4.1 for more details. ΔVIX and $\Delta MOVE$ are daily changes in VIX and MOVE indices, respectively. $MacroData$ is the standardized macro data release. See Section 4.2 for more details on the macro time series included in $MacroData$.

Even though Table 7 suggests that high-frequency changes in the *first difference* of measures of uncertainty do not appear to act as key omitted variables, changes in the *level* of uncertainty can still control reaction to news. In standard noisy rational expectations equilibrium (REE) models of the Grossman and Stiglitz (1980) variety, the reaction of prices to informative (public or private) signals increases with the precision of these signals, ceteris paribus. Furthermore, price reaction to informative signals increases as the precision of priors falls, ceteris paribus. These relationships can also be seen in the illustrative model presented in Section 6.

I use monetary attention to proxy for informative signal precision: the higher is monetary attention, higher the signal's precision. I use lagged level of the VIX to proxy for the precision of priors: the higher is the level of the VIX, lower is the prior's precision. Thus, in either case, higher values of these two variables should increase the magnitude (in absolute terms) of the coefficient of proxies of market expectations of Fed policy (e.g., $\Delta E[Upcoming]$). Lastly, I also consider stages in monetary cycles. Schmeling et al. (2022) find that forecast errors are much more pronounced in periods when the Fed reduces rates. Thus, periods in which the Fed reduces interest rates can serve as an additional proxy of lower precision of priors. Therefore, I construct a dummy variable ($\mathbb{1}^{Easing}$) that takes a value of 1 when markets expect the Fed to reduce interest rates over the next six months; and is 0 otherwise.[13] I operationalize these hypotheses by estimating equation (5), this time by interacting $\Delta E[Upcoming]$ with proxies of precisions of informative signals and priors.

The results reported in Table 8 confirm these hypotheses. Interactions of the market's expectations of upcoming Fed policy ($\Delta E[Upcoming]$) with each of the three proxies are highly significant. Thus, Table 8 suggests that in times of higher uncertainty (high values of standardized VIX or times of Fed expansions) or when attention towards monetary policy is high, reductions in expectations of interest rates are associated with much higher pre-FOMC drift and FOMC announcement premium. More broadly, these findings suggest that our understanding of the variations in pre-FOMC drift and FOMC announcement premium can be enhanced by considering how markets react to news.

[13] Market expectations are measured by considering the difference between the 6-months-ahead and current-month federal fund futures rate ($f^6 - f^0$). Whenever this difference is less than zero, it implies the current level of interest rates is higher than what markets expect them to be in six months' time. Thus, whenever this difference is less than zero, the variable $\mathbb{1}^{Easing}$ takes a value of 1. It is 0 otherwise.

Table 8: Learning About Fed Policy From Macro News: *Interactions With Uncertainty*

	Pre-FOMC Drift			Announcement Premium		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta E[Upcoming]$	7.80	-0.21	15.88**	2.56	1.69	0.95
	(5.23)	(6.44)	(7.59)	(8.43)	(8.09)	(8.48)
$\Delta E[Upcoming] \times Days$	-1.96	0.68	-5.32*	-1.78	-0.35	-0.34
	(2.29)	(3.07)	(2.80)	(2.81)	(2.92)	(2.83)
$Attention$	-0.02			0.52***		
	(0.08)			(0.18)		
$Attention \times Days$	0.01			-0.17**		
	(0.05)			(0.07)		
$\Delta E[Upcoming] \times Attention$	-14.12***			-6.99***		
	(1.96)			(2.37)		
$\Delta E[Upcoming] \times Attention \times Days$	8.59***			3.64**		
	(1.32)			(1.50)		
$L.VIX$		0.52***			0.38**	
		(0.10)			(0.18)	
$L.VIX \times Days$		-0.21***			-0.15**	
		(0.04)			(0.07)	
$\Delta E[Upcoming] \times L.VIX$		-9.71***			-13.91***	
		(3.47)			(4.26)	
$\Delta E[Upcoming] \times L.VIX \times Days$		3.35			4.90***	
		(2.50)			(1.83)	
$\mathbb{1}^{Easing}$			0.81***			-0.13
			(0.28)			(0.45)
$\mathbb{1}^{Easing} \times Days$			-0.37***			0.03
			(0.12)			(0.18)
$\Delta E[Upcoming] \times \mathbb{1}^{Easing}$			-35.37***			-24.35**
			(8.64)			(10.87)
$\Delta E[Upcoming] \times \mathbb{1}^{Easing} \times Days$			13.77***			9.41*
			(4.42)			(5.15)
$Days$	-0.08	-0.02	-0.01	-0.11*	-0.13**	-0.17**
	(0.05)	(0.04)	(0.05)	(0.06)	(0.06)	(0.07)
$Constant$	0.38***	0.26***	0.21**	0.31**	0.42***	0.54***
	(0.12)	(0.08)	(0.10)	(0.15)	(0.15)	(0.17)
Observations	145	145	145	175	175	175
Adjusted R^2	0.287	0.313	0.294	0.194	0.144	0.104

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports regressions of equation (5) that includes interactions of $\Delta E[Upcoming]$ with $Attention$, $L.VIX$ and $\mathbb{1}^{Easing}$. $\Delta E[Upcoming]$ uses federal fund futures to measure market expectations of the nearest upcoming FOMC policy announcement. $Attention$ is the monetary attention variable of Fisher et al. (2022). $L.VIX$ is the previous day's value of the level of the VIX, where VIX has been standardized by subtracting its full-sample mean and dividing this difference by its full-sample standard deviation. $\mathbb{1}^{Easing}$ takes a value of 1 when markets expect the Fed to reduce interest rates over the next six months; and is 0 otherwise. Market expectations are measured by considering the difference between the 6-month-ahead and current-month federal fund futures rate ($f^6 - f^0$). Whenever this difference is less than zero, the variable $\mathbb{1}^{Easing}$ takes a value of 1; and is 0 otherwise. The regressions are performed over all macro announcements that occur at most 5 business days before the nearest upcoming FOMC announcement.

An argument provided against the existence of a learning-based channel is the lack of positive correlation between post-announcement returns and pre-announcement returns, which is constructed over a fixed window and thus does not account for the nearness of macro announcements preceding FOMC statements (Ai et al., 2021; Hu et al., 2022). Below, I instead compute pre-announcement returns over a window from the close of the day before a macro announcement to 12:15 pm of the nearest FOMC announcement day to fully capture market reaction to recent macro news. I measure post-announcement returns over a window from 12:15 pm on the day of FOMC announcements and ending at the close of the same day. These windows capture pre and post-announcement returns, as the earliest in the day an FOMC statement occurs in my intra-day equities sample is at 12:30 pm.

To ensure that returns indeed computed from macro announcements induce this positive correlation between pre and post-announcement returns, I interact pre-announcement returns with $\mathbb{1}^{Macro}$, a dummy variable that takes a value of 1 over each of the 4 macro announcements. As before, I consider macro announcements that occur within the past 5 days of an FOMC announcement. Results of these regressions are reported in Table 9. In contrast to prior literature, I find a positive correlation between pre and post-announcement returns that is driven by returns realized around macro announcements just preceding FOMC statements.

Table 9: Positive Correlation of Pre and Post-Announcement Returns

	Ret_Post (1)	Ret_Post (2)
Ret_Pre	0.09**	-0.05*
	(0.05)	(0.03)
$Ret\_Pre * \mathbb{1}^{Macro}$		0.15**
		(0.06)
$\mathbb{1}^{Macro}$		0.03
		(0.10)
$Constant$	0.03	-0.00
	(0.08)	(0.04)
Observations	179	815
Adjusted R^2	0.020	0.011
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Note: This table shows estimations regressions of post-announcement returns (Ret_Post) against pre-announcement returns (Ret_Pre), where Ret_Pre is the return from the close of the day before until 12:15 pm on the day of the nearest FOMC statement. Ret_Post is the return from 12:15 pm of FOMC day until the close of the same day. Under column (1), the regressions are performed on the subset of those macro announcements that occur within the past 5 days of an upcoming FOMC statement. Under column (2), the regressions are performed over all trading days in a [-5,0] day window around FOMC statements. $\mathbb{1}^{Macro}$ is a dummy variable that takes a value of 1 over each of the 4 macro announcements that occur within a [-5,0] day window around FOMC announcements.

4.3 Changing Dynamics of Pre-FOMC Drift & Announcement Returns

Having established that macro announcements affect pre-FOMC drift and FOMC announcement premium by influencing market expectations regarding forthcoming Fed decisions (Sections 4.1 and 4.2), I dive deeper into this channel by exploring how this relationship might have evolved as the Fed changed the way it did monetary policy after the Great Financial Crisis (GFC) of 2008. Pre-GFC Fed policy was mainly "conventional": it involved changing the federal funds target rate in multiples of 25bps. Post-GFC, the Fed engaged in "unconventional" monetary policy, which involved the purchase of various securities, like USTs of different maturities and mortgage backed securities (MBS), worth billions of dollars.

As I show in previous work (Alam, 2020), using macro data to form expectations

regarding upcoming Fed decisions might be simpler when policy is conventional rather than unconventional. Intuitively, it would appear easier to use macro data to predict conventional Fed actions, e.g., observe the latest CPI/unemployment numbers to forecast rate hikes of 25bps or 50bps, or none at all. In contrast, it would be relatively hard to use similar macro data to precisely pin down upcoming unconventional Fed actions, e.g., observe the latest CPI/unemployment numbers to forecast the precise size and composition of the portfolio of securities that the Fed will announce purchasing on its upcoming FOMC statement.

Thus, I estimate equation (5) separately for pre-GFC and post-GFC samples. Since the policy rate was effectively zero and unchanged for a long time post-GFC, I also include eurodollar future rate of a 24-month horizon to capture changes in expectations regarding the path of policy.[14] Table 10 shows that proxies of Fed policy expectations only have an effect pre-GFC. Differences in R^2 further substantiate the notion that the explanatory power of market proxies of Fed policy expectations was greater in the pre-GFC era, when policy was conventional.

[14]Similar to federal fund futures, eurodollar futures can be used to gauge market's expectations regarding Federal Reserve policy, since eurodollar rates and federal funds rate co-move strongly. Eurodollar future prices are quoted such that 100 - price quote will provide market expectation for the 3-month London interbank offered rate that will prevail over the contract's term. Visit CME's website for more details.

Table 10: Learning About Fed Policy From Macro News: *Changing Dynamics*

	Pre-FOMC Drift		Announcement Premium	
	Pre-GFC	Post-GFC	Pre-GFC	Post-GFC
	(1)	(2)	(3)	(4)
$\Delta E[Upcoming]$	-15.58***	16.88	-17.94**	-21.46
	(5.55)	(15.23)	(7.29)	(32.39)
$\Delta E[Upcoming] * Days$	8.90***	-2.00	8.01**	9.23
	(3.33)	(12.32)	(3.19)	(17.14)
$Timing$	-4.67	21.74	-9.74**	-17.49
	(8.00)	(19.56)	(4.90)	(51.12)
$Timing * Days$	5.79*	-12.87	5.43*	0.55
	(2.95)	(7.82)	(3.21)	(14.87)
ΔED^{24m}	-1.23	-0.11	-1.39	0.79
	(2.34)	(0.83)	(2.89)	(1.77)
$\Delta ED^{24m} * Days$	-0.29	1.93	-0.20	1.45
	(0.74)	(1.18)	(1.08)	(1.12)
$Days$	-0.16**	-0.01	-0.10	-0.21*
	(0.08)	(0.08)	(0.09)	(0.12)
$Constant$	0.75***	-0.02	0.38*	0.52*
	(0.18)	(0.16)	(0.22)	(0.30)
Observations	74	71	104	71
Adjusted R^2	0.261	0.037	0.149	-0.007
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Note: This table shows estimations of equation (5), where the LHS variable is either the pre-FOMC drift or the excess announcement return of the nearest upcoming FOMC announcement. The RHS variables are realizations on macro announcement days preceding FOMC statements. I only focus on those macro announcements that occur at most 5 days before its nearest upcoming FOMC statement. $\Delta E[Upcoming]$ uses federal funds futures to measure market expectations of the nearest upcoming FOMC policy announcement. $Timing$ is the difference between change in 3-month-ahead federal funds futures futures rate and $\Delta E[Upcoming]$. ΔED^{24m} is the daily change in the 24-month-ahead eurodollar futures rate. $Days$ represents the number of days each macro announcement is away from its nearest upcoming FOMC statement. Since I use daily changes in my RHS variables, I do not use macro announcements that occur on the same day as an FOMC announcement. For ease of interpretation of main variables and interaction terms, $Days$ = 0 on the day before FOMC. See Section 4.1 for more details. Pre-GFC is defined as the period before 01 July, 2008. Post-GFC is the period after July 01, 2009.

4.4 International and Cross-Sectional Evidence

For the sake of brevity, I only report below results from estimating equation (5), where the regressand is pre-FOMC drift in international stock indices (Table 11), and excess announcement-return in the cross-section of U.S. equities (Table 12). The results are consistent with the aggregate U.S. stock market. Both pre-FOMC drift in international stock indices and announcement return among the cross-section of U.S. equities strongly respond to market proxies of Fed policy expectations, just like the aggregate U.S. stock market. Similarly, the explanatory power of market proxies is greater when they are realized on macro announcements that are closer to upcoming Fed announcements. For the sake of comparison Table 12 documents results for the beta sorted portfolios discussed in Section 3.3. Carrying out the same exercise for Fama-French industry or book-market portfolios yields similar results.

Table 11: Learning About Fed Policy From Macro News: *International Evidence*

	TSX60 (1)	FTSE100 (2)	Stoxx50 (3)	Nikkei225 (4)
$\Delta E[Upcoming]$	-6.64*	-17.51***	-17.59***	-6.23*
	(3.55)	(5.33)	(6.51)	(3.40)
$\Delta E[Upcoming] * Days$	2.16	7.14***	8.03***	0.94
	(2.58)	(2.17)	(2.56)	(2.36)
$Timing$	-2.37	-4.57	-5.89**	7.59
	(3.12)	(2.78)	(2.56)	(5.56)
$Timing * Days$	3.77**	3.39**	4.69***	-3.81
	(1.75)	(1.61)	(1.76)	(3.15)
$Days$	-0.08	-0.13**	-0.18***	-0.14
	(0.06)	(0.06)	(0.06)	(0.09)
$Constant$	0.38***	0.40***	0.58***	0.56***
	(0.13)	(0.13)	(0.14)	(0.16)
Observations	131	175	175	175
Adjusted R^2	0.049	0.131	0.165	0.010
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Note: This table shows estimations of equation (5), where the LHS variable is the pre-FOMC drift of the nearest upcoming FOMC announcement. The RHS variables are realizations on U.S. macro announcement days preceding FOMC statements. I only focus on those macro announcements that occur at most 5 days before its nearest upcoming FOMC statement. $\Delta E[Upcoming]$ uses federal funds futures to measure market expectations of the nearest upcoming FOMC policy announcement. $Timing$ is the difference between change in 3-month-ahead federal funds futures futures rate and $\Delta E[Upcoming]$. $Days$ represents the number of days each trading day is away from its nearest upcoming FOMC statement.

Table 12: Learning About Fed Policy From Macro News: *Cross-Sectional Evidence*

	Lowest β	2	3	4	5	6	7	8	9	Highest β
$\Delta E[Upcoming]$	20.22***	-1.90	-8.36**	-7.92	-12.54**	-15.92**	-21.97***	-25.02**	-42.75***	-42.75***
	(4.05)	(2.90)	(3.62)	(5.88)	(5.87)	(6.88)	(7.74)	(10.13)	(14.71)	(14.71)
$\Delta E[Upcoming] * Days$	-8.06***	0.59	3.19**	2.78	4.94**	6.51**	8.13***	10.40**	17.67***	17.67***
	(2.11)	(1.22)	(1.33)	(2.18)	(2.24)	(2.77)	(3.11)	(4.08)	(5.92)	(5.92)
$Timing$	6.42*	-0.96	-5.69**	-7.42***	-6.19**	-9.05**	-10.57**	-12.30**	-21.15***	-21.15***
	(3.33)	(1.85)	(2.28)	(2.33)	(2.80)	(4.10)	(4.52)	(5.19)	(7.36)	(7.36)
$Timing * Days$	-3.80**	0.39	2.46**	2.78*	2.93*	4.59*	4.55*	6.53*	11.65**	11.65**
	(1.79)	(1.01)	(1.08)	(1.50)	(1.63)	(2.49)	(2.69)	(3.60)	(5.39)	(5.39)
$Days$	0.15**	-0.06	-0.09*	-0.15***	-0.18***	-0.19**	-0.19**	-0.23**	-0.28**	-0.28**
	(0.06)	(0.05)	(0.05)	(0.05)	(0.06)	(0.08)	(0.08)	(0.09)	(0.12)	(0.12)
$Constant$	-0.22	0.25**	0.28**	0.47***	0.52***	0.58***	0.62***	0.72***	0.93***	0.93***
	(0.22)	(0.11)	(0.13)	(0.14)	(0.16)	(0.18)	(0.20)	(0.23)	(0.30)	(0.30)
Observations	165	165	165	165	165	165	165	165	165	165
Adjusted R^2	0.049	-0.006	0.066	0.084	0.095	0.090	0.115	0.109	0.158	0.158
Robust standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Note: This table shows estimations of equation (5), where the LHS variable is the announcement return of each portfolio on the nearest upcoming FOMC announcement. The RHS variables are realizations on macro announcement days preceding FOMC statements. I only focus on those macro announcements that occur at most 5 days before its nearest upcoming FOMC statement. $\Delta E[Upcoming]$ uses federal funds futures to measure market expectations of the nearest upcoming FOMC policy announcement. $Timing$ is the difference between change in 3-month-ahead federal funds futures futures rate and $\Delta E[Upcoming]$. $Days$ represents the number of days each trading day is away from its nearest upcoming FOMC statement. Since I use daily changes in my RHS variables, I do not use macro announcements that occur on the same day as an FOMC announcement. For ease of interpretation of main variables and interaction terms, $Days$ = 0 on the day before FOMC. See Section 4.1 for more details. Portfolios are formed based on each stock's unconditional beta estimated over the entire sample spanning 1994-2019, excluding the period between July 01, 2008, and June 30, 2009.

Also consistent with the aggregate U.S. stock market, the effects reported above in Tables 11 and 12 are stronger pre-GFC. Furthermore, pre-FOMC drift in international stock indices and announcement returns of U.S. equities are unconditionally significantly positive in the pre-GFC period only. Post-GFC there is neither unconditional drift in international markets, nor unconditional announcement premium in the U.S. cross-section.

5 Key Extensions

The evidence documented thus far shows that asset price behavior around FOMC statements strongly contrasts when FOMC statements occur soon after macro announcements, versus when they do not. Our understanding of how FOMC announcements impact the economy may be confounded by macro announcements that occur "close" to FOMC announcements. Here I use these insights to discuss the Fed information effect and predictability of conventional monetary policy surprise measures (Section 5.1). In Section 5.2, I demonstrate that the observed secular decline in interest rates within 3-day windows around FOMC statements relies crucially on the presence of macro announcements just ahead of FOMC statements. Movements in yields around FOMC statements not preceded by macro news appear transitory.

5.1 Fed Information Effect & Predictable Monetary Policy Surprise

Nakamura and Steinsson (2018) document a "Fed Information Effect", whereby monetary policy surprises on FOMC days are positively associated with future GDP forecasts. This is puzzling since textbook monetary models suggest expansionary monetary policy should raise future GDP and thus its forecasts. Below, I regress the average of one-month changes in the 1-quarter-ahead, 2-quarter-ahead, and 3-quarter-ahead Blue Chip quarter-over-quarter (Table 13, panel A) and year-over-year (Table 13, panel B) real GDP growth forecasts against monetary policy surprise that I obtain from Emi Nakamura's website.[15] My sample

[15]The policy news surprise variable is re-scaled such that a unit change in the surprise leads to a 1 percentage point change in the 1-year US Treasury yield developed by Gürkaynak et al. (2007a). This re-scaling should not affect the significance of estimated coefficients and is done to be consistent with Nakamura and Steinsson (2018).

spans January, 1995 through March, 2014. I exclude all FOMC statements between July 01, 2008, and June 30, 2009, and those that occurred within the first 7 calendar days. The use of average changes and the sampling filters are both set to be as close to Nakamura and Steinsson (2018) as possible and leave me with 120 scheduled FOMC statements. The results in Table 13 below suggest that the puzzling positive association between GDP forecasts and their shock measure is driven by those FOMC announcements that occurred immediately after key macro data releases. This observation is more strongly suggested when using year-over-year growth forecasts than the annualized quarter-over-quarter growth used by Nakamura and Steinsson (2018).

In fact, similar to the announcement premium reported in Table 2, the evidence for the Fed information effect when using year-over-year growth forecasts appears to be driven by those few FOMC statements that had one of four macro announcements earlier the same morning - mere 21 observations (panel B, row 2, column 2). On the other hand, the estimate over the remaining 99 scheduled FOMC statements that did not have a macro announcement earlier the same morning is insignificant and the point estimate is small (panel B, row 3, column 2). The point estimate becomes virtually 0 if one focuses on those FOMC statements that did not have a macro announcement within the past two days (panel B, row 3, column 4) and becomes increasingly negative when the nearest macro announcement occurs farther away in time (panel B, row 3, columns 5-7).

While these findings are not as extreme when using annualized quarter-over-quarter growth forecasts (panel A), they broadly comply with the results in panel B. The point estimate over FOMC announcements immediately preceded by macro news (panel A, row 2) is consistently higher than its mutually exclusive counterpart (panel A, row 3). Furthermore, once one focuses on FOMC announcements that did not have macro news within the past 2 days, the evidence for the Fed information effect also disappears for quarter-over-quarter growth forecasts (panel A, row 3, columns 4-7).

Table 13: $\Delta GDPForecasts_t = \alpha + \beta NSPolicyShock_t + \epsilon_t$

	All FOMC (1)	Same Day (2)	1 Day (3)	2 Days (4)	3 Days (5)	4 Days (6)	5 Days (7)
Panel A: Quarter-Over-Quarter Annualized Growth							
$NSPolicyShock$	1.00***						
	(0.32)						
$NSPolicyShock$		2.29***	1.06	1.41***	1.17***	1.18***	1.02**
$[MacroFOMC]$		(0.77)	(0.79)	(0.43)	(0.42)	(0.41)	(0.39)
$NSPolicyShock$		0.81**	0.97***	0.46	0.44	0.48	0.65
$[FOMCOnly]$		(0.32)	(0.34)	(0.43)	(0.45)	(0.42)	(0.60)
Observations							
$AllFOMC$	120						
$MacroFOMC$		21	31	52	74	85	93
$FOMCOnly$		99	89	68	46	35	27
Panel B: Year-Over-Year Growth							
$NSPolicyShock$	0.80*						
	(0.48)						
$NSPolicyShock$		3.77***	2.77***	1.45**	1.25**	1.41**	1.28**
$[MacroFOMC]$		(1.19)	(0.84)	(0.65)	(0.60)	(0.59)	(0.55)
$NSPolicyShock$		0.35	0.20	0.03	-0.20	-0.54	-1.01
$[FOMCOnly]$		(0.47)	(0.50)	(0.58)	(0.64)	(0.59)	(0.81)
Observations							
$AllFOMC$	120						
$MacroFOMC$		21	31	52	74	85	93
$FOMCOnly$		99	89	68	46	35	27
Robust standard errors in parentheses							
*** p<0.01, ** p<0.05, * p<0.1							

Note: Estimations of the equation written in the table's caption are reported here. The LHS variable, $\Delta GDPForecasts_t$ is the average of one-month changes in Blue Chip annualized quarter-over-quarter (panel A) or year-over-year (panel B) real GDP forecasts over the next 3 quarters. The RHS variable is the policy news shock on scheduled FOMC statements. The shock series is obtained from Emi Nakamura's website, and scaled to have a 1 percentage point impact on 1-year UST yield constructed by Gürkaynak, Sack and Wright (2007). Regression estimations reported here are done over different types of FOMC announcements. Each estimate reports output from a separate regression. In the 1st row of each panel, the regression is performed over all scheduled FOMC statements without distinguishing them. In each panel's 2nd row, they are done over FOMC announcements which were immediately preceded by macro announcements (i.e., $MacroFOMC$ announcements), defined differently in each column. In each panel's 3rd row, they are done over FOMC announcements which were not immediately preceded by macro announcements (i.e., $FOMCOnly$ announcements), also defined differently under each column. Column headers help identify how $MacroFOMC$ and $FOMCOnly$ are defined in each specification. Under "Same Day", $MacroFOMC$ includes all those scheduled FOMC statements that had one of 4 macro announcements earlier the same morning (21 observations), while $FOMCOnly$ is its mutually exclusive counterpart: those scheduled FOMC statements that did not have a macro announcement the same morning but may have had one before (99 observations). My sample spans January, 1995 through March, 2014, excluding all FOMC statements that occur between July 01, 2008 and June 30, 2009 and also excluding FOMC statements that occurred within the first 7 calendar days. All these sampling filters are set to be consistent with Nakamura and Steinsson (2018).

Overall, my findings are consistent with Bauer and Swanson (2023a), who find that the Fed information reflects the market's response to past information. Table 13 highlights an additional nuance: the Fed information effect appears to be stronger when macro news and FOMC statements occur in closer temporal proximity. In a related study, Bauer and Swanson (2023b) use findings of their complementary work in Bauer and Swanson (2023a) to show that conventional monetary policy measures are predictable with past macro and financial data. However, they do not distinguish macro announcements that occur closer to FOMC statements from those that are more distant.

In Table 14 below, I regress conventional measures of monetary policy surprise against past macro data, that I standardize as explained in Section 4.2 earlier. To differentiate macro news that occur close to FOMC statements from those that do not, I interact the standardized macro data series with $\mathbb{1}_{t\leq 5}^{Macro}$: a dummy variable that takes a value of 1 on all those macro announcements that occur 5 business days or less before an upcoming FOMC statement. In column 1, I consider the federal funds target rate surprise, which I measure using the method proposed by Kuttner (2001). Similar to Gürkaynak et al. (2005), I use 30-minute changes in federal fund futures around FOMC statements to compute the target surprise.[16] Since the federal funds target rate was effectively unchanged for most of the post-GFC period, I estimate this regression with data from the pre-GFC era only.[17] The other shock series I consider is the unadjusted monetary policy surprise of Bauer and Swanson (2023b).[18] This is the first principal component of changes in eurodollar futures of horizons up to one year. Hence, this measure captures changes in market expectations of more longer-term interest rates. Consequently, I estimate this regression over the full sample.

The analysis documented in Table 14 suggests a similar nuance as before: when macro announcements and FOMC statements occur close together in time, the predictability of conventional monetary policy shocks is amplified. The predictability of the target rate surprise is entirely driven by those macro announcements that occur within 5 business days of an FOMC statement. While the results for the surprise measures that capture changes in longer-term interest rate expectations are less extreme, the second row of column 2

[16] Specifically, I use movements in federal fund futures over a [-10, +20] minutes window. This corresponds to the "tight" window of Gürkaynak et al. (2005).

[17] The results are qualitatively unchanged if I estimate this regression over the full sample.

[18] I obtain this series from Michael Bauer's website.

suggests that the predictive power of macro data released close to FOMC statements is roughly 2.7 times greater than that of macro data released in the more distant past.

Table 14: Predictability of Monetary Policy Shocks

	Target Surprise (1)	Unadjusted MPS (2)
$MacroData$	-0.002	0.006***
	(0.002)	(0.002)
$MacroData \times \mathbb{1}_{t\leq 5}^{Macro}$	0.017**	0.010**
	(0.007)	(0.004)
$\mathbb{1}_{t\leq 5}^{Macro}$	-0.010*	-0.004
	(0.006)	(0.004)
$Constant$	-0.004*	-0.006***
	(0.002)	(0.002)
Observations	530	1,058
Adjusted R^2	0.010	0.024
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Note: $MPS_t = \alpha + \beta_1 MacroData_{t-} + \beta_2 MacroData_t \times \mathbb{1}_{t\leq 5}^{Macro} + \mathbb{1}_{t\leq 5}^{Macro} + \epsilon_t$. This table shows estimations of the above equation. Each column reports output from a separate regression. MPS_t is a conventional monetary policy surprise measure. In column 1, MPS_t follows the Kuttner (2001) method to measure federal funds target surprise on FOMC day, using changes in federal fund futures over a [-10, +20] minute window around FOMC statements. The regression in column 1 is run over a sample spanning January 1994 - June 2008, data permitting. In column 2, MPS_t is the unadjusted monetary policy surprise measure obtained from Michael Bauer's website. This regression is run over a sample spanning January 1994 - December 2019, excluding the period between July 2008 - June 2009. $MacroData_{t-}$ is standardized past macro data. See Section 4.2 for more details. $\mathbb{1}_{t\leq 5}^{Macro}$ is a dummy variable that takes a value of 1 on all those macro announcements that occur 5 business days or less before an upcoming FOMC statement.

5.2 The Secular Decline of Interest Rates Around FOMC Announcements

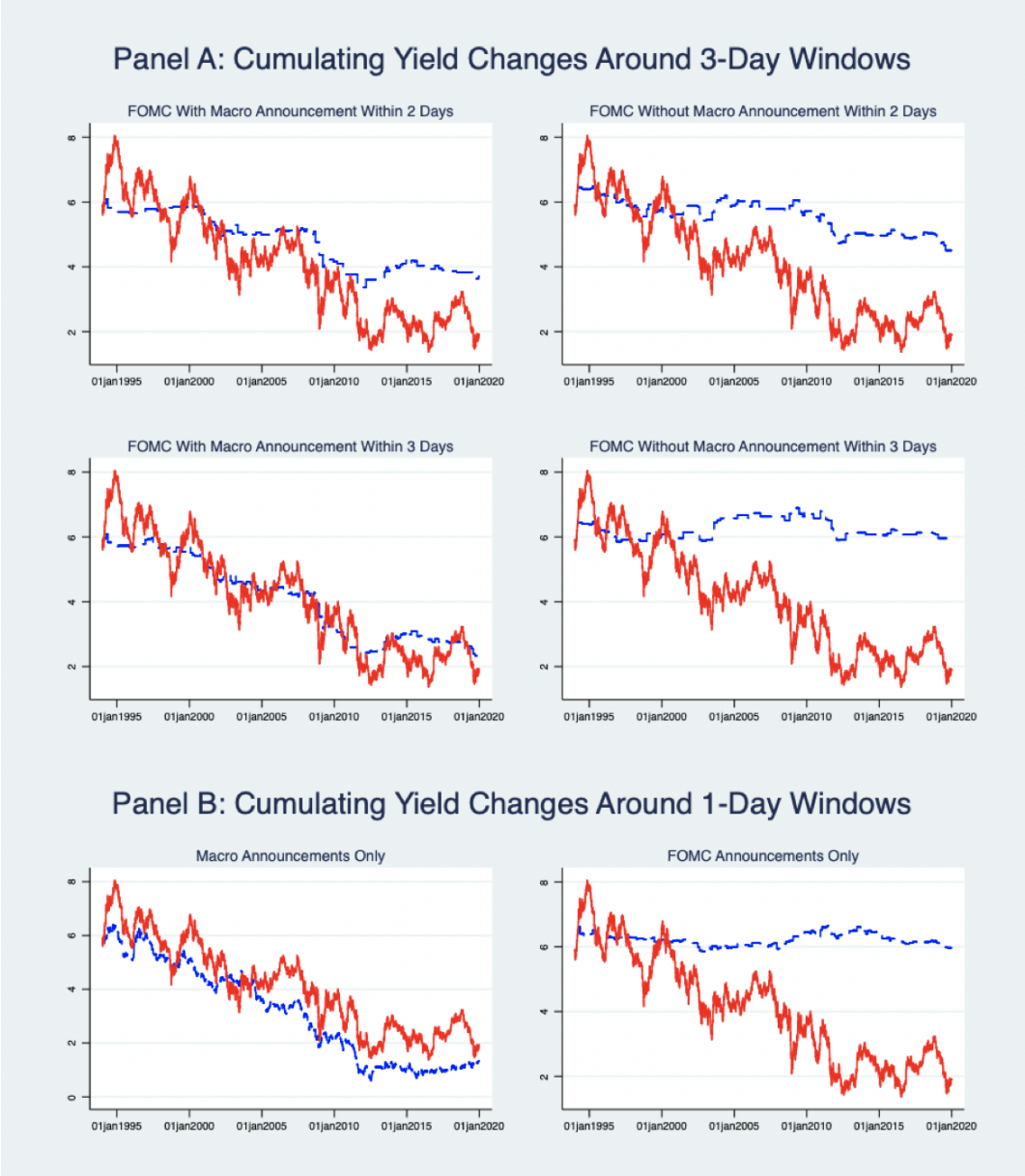
Hillenbrand (2021) documents that the entire secular decline in bond yields appears to be concentrated in 3-day windows around FOMC days. One way this case is made is by comparing the hypothetical evolution of the 10-year UST against the actual 10-year UST, where the hypothetical 10y is constructed by cumulating changes in yields over a 3-day window around FOMC statements. The observation that the secular decline in yields is concentrated around FOMC days too seems to be driven by macro announcements.

As panel A of Figure 4 shows, cumulating yield changes over 3-day windows around FOMC statements, separated into mutually exclusive sets depending on whether they were preceded by key macro news or not, shows that the decline is concentrated around those FOMC statements that followed soon after macro data releases. Yield changes across the set of those FOMC announcements that did not have a macro announcement within 2 (top-right chart) or 3 days (middle-right chart) appear transitory.

Doing a more conventional event analysis by only considering 1-day changes in yields on announcement days shows that the decline in 10y UST is perhaps better described by movements in yields on macro announcements. In panel B of Figure 4, I redo the above exercise but now only cumulate 1-day changes in yields. I do so for the 4 macro announcements I consider in this paper (bottom-left chart) and across all FOMC announcements (bottom-right chart). To avoid confounding in panel B, I ignore the few observations in which one of the four macro announcements occurred the same day as an FOMC announcement. This ensures that in the bottom-left chart changes in yields are truly driven by macro announcements and not by FOMC statements. Similarly, the same ensures that yield changes are truly driven by FOMC statements in the bottom-right chart.[19]

[19] I lose 41 of a total of 209 FOMC statements over the entire sample spanning 1994-2019. Here I include observations between July 2008 and July 2009, which had been ignored throughout this paper. That is why there are 41 FOMC statements that have a macro announcement earlier the same day and not 37 FOMC statements as shown in Table 1. Between July 01 2008 and June 30, 2009, there were 4 FOMC statements that had a macro announcement earlier the same day. Each of the FOMC statements on September 16, 2008, December 16, 2008, and March 18, 2009, had a CPI announcement earlier in the morning. The FOMC announcement on April 29, 2009, had a GDP announcement earlier the same day.

Figure 4. Evolution of 10y UST: Hypothetical (Dotted) vs. Actual (Solid)



Note: This figure compares the hypothetical evolution of the 10-year UST (dotted blue line) against the actual 10-year UST (solid red line), where the hypothetical 10y is constructed by cumulating yield changes over 3-day windows in Panel A and 1-day windows in panel B. In Panel A, I focus on FOMC announcements and divide them into mutually exclusive sets in each row. In panel B, I plot the hypothetical 10y by cumulating the sum of 1-day yield changes across all FOMC (macro) announcements in the bottom-right (bottom-left) charts. To avoid confounding in panel B, I ignore those observations in which one of the four macro announcements occurred the same day as an FOMC announcement to obtain the true contribution of each type of announcement.

6 Illustrative Model

I present a simple information framework à la Grossman and Stiglitz (1980) to describe the key dynamics of my empirical findings. The setup and timeline are given in the figure below. It shows that informed agents, who have CARA preferences, observe a public signal regarding the economic outlook and a private signal regarding the upcoming Fed announcement on a macro announcement that precedes the FOMC statement. The macro announcement occurs on the first day, at t=1. On the following day, informed-rational agents might use traded prices to learn other agents' private signals.

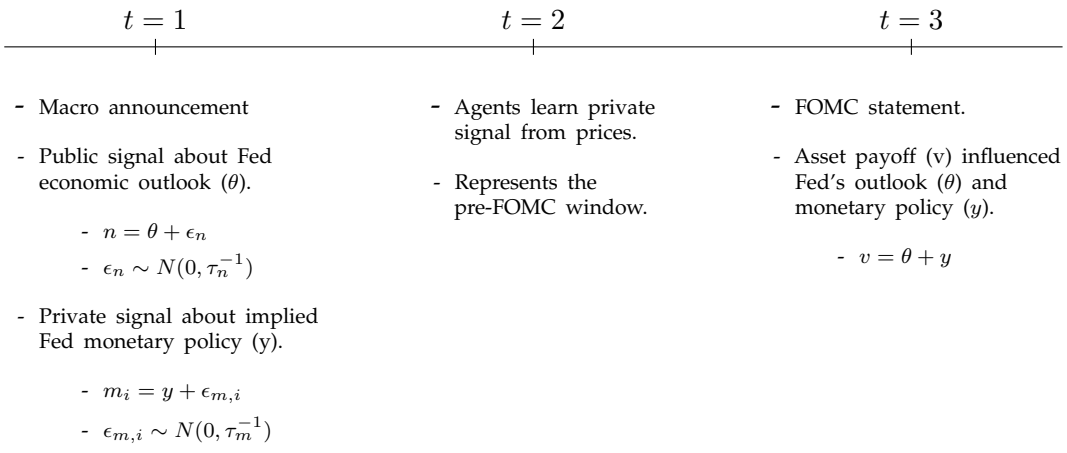
This setup is meant to model the idea that after observing the latest macro news (e.g., CPI data), agents might take some time to form their *ultimate views* regarding the latest data release's implications for Fed policy. Agents first form private views on macro announcement day, at t=1. On the following day, agents may learn other people's views e.g., from interviews others give to news agencies, private conversations they may have with other people in their network, or truly from the price reactions agents observe following the macro announcement. The model thereby allows for *a bit of time* to elapse before all information in the economy gets fully reflected in asset prices. That is, learning from the data release, asset prices, and from all the agents in the economy is not assumed to occur instantaneously.

Instead, the model helps to break down this learning process in a discrete-time setup to describe how prices might evolve at high frequency towards their equilibrium value. After observing and acting upon public and private signals, each agent's individual information is aggregated into prices, from which all rational agents learn. The role of prices in aggregating information has a long tradition in economics - see e.g., Hayek (1945). This setup helps to show that the predictability of future returns can be ex-post observed for as long as this learning process ensues. In the timeline shown below, t=2 represents the pre-FOMC window. Returns over this period will be ex-post predictable to the econometrician as long as markets continue to learn from the latest macro news. If all learning has concluded by the start of the pre-FOMC window, returns over this period will then not be ex-post predictable. In the context of such models, this delayed reaction may be due to beauty contest effects (Allen et al., 2006), particularly disagreement in higher-order beliefs (Banerjee et al., 2009), or because learning from prices may be costly (Mondria et al., 2022).

I abstract away from such complexities by imposing a one-period lag in learning from prices. Empirically, Fisher et al. (2022) show abnormal attention to macro news remains elevated for a few days after announcement, suggesting markets continue to learn from a macro announcement for a few days after its release.

Figure 5. Model Setup and Timeline

- Two economic fundamentals driving asset price: economic outlook and Fed's monetary policy.
- Total supply of risky asset: Q.
- Two types of agents: informed & noise traders. Informed have CARA preferences.
- Noise traders aggregate demand is x, where $x \sim N(0, \tau_x^{-1})$.
- Informed agents' common priors regarding economic outlook: $\theta \sim N(\mu_\theta, \tau_\theta^{-1})$.
- Informed agents' common priors regarding Fed's monetary policy: $y \sim N(\mu_y, \tau_y^{-1})$.
- Asset payoff realized in $t = 2$ with payoff $v = \theta + y$



Following Goldstein and Yang (2017), I obtain a linear solution of the model by conjecturing a relationship and then verifying it. Prices are conjectured to be linear in priors, agents' signals and noise traders' aggregate demand as follows:

$$P_1 = P_{k1} + P_n n + P_y y + P_x x_1 \tag{7}$$

Given that informed agents have CARA preferences, each of these agents will demand the following quantity of the risky asset.

$$D_{i,1} = \frac{\mu_\theta \tau_\theta + \mu_y \tau_y + n\tau_n + m_i \tau_m - (\tau_\theta + \tau_y + \tau_n + \tau_m) P_1}{\gamma} \tag{8}$$

Using market clearing condition, $\int_0^1 D_{i,1} \ + x = Q$, one can derive the equilibrium price at t=1 to be:

$$P_1 = \left(\frac{1}{\tau_\theta + \tau_y + \tau_n + \tau_m} \right) \left[(-\gamma Q) + (\mu_\theta \tau_\theta + \mu_y \tau_y) + (n\tau_n) + (y\tau_m) + (\gamma x_1) \right] \tag{9}$$

At t=2, rational agents can use prices observed thus far to extract one anothers private signals regarding upcoming Fed policy. The price signal will take the following form:

$$s_p = \frac{P_1 - P_{k1} - P_n n}{P_y} = y + \frac{\gamma}{\tau_m} x_1 = y + \rho^{-1} x_1 \tag{10}$$

This newer information will be reflected in prices at t=2 as follows:

$$P_2 = \left(\frac{1}{\tau_\theta + \tau_y + \tau_n + \tau_m + \rho^2 \tau_x} \right) \left[(-\gamma Q) + (\mu_\theta \tau_\theta + \mu_y \tau_y) + (n\tau_n) + y(\tau_m + \rho^2 \tau_x) + \rho \tau_x x_1 + (\gamma x_2) \right] \tag{11}$$

Defining returns as simply the difference in prices, one can obtain expressions for returns over consecutive days. Under the model's timeline, ret_2 represents pre-FOMC drift.

$$\begin{aligned} ret_1 = P_1 - P_0 &\approx \frac{n\tau_n + y\tau_m + \gamma x_1}{\tau_\theta + \tau_y + \tau_n + \tau_m} = \frac{n\tau_n + y\tau_m + \gamma x_1}{a_1} \\ ret_2 = P_2 - P_1 &\approx \frac{y\rho^2 \tau_x + \rho \tau_x x_1 + \gamma x_2}{\tau_\theta + \tau_y + \tau_n + \tau_m + \rho^2 \tau_x} = \frac{y\rho^2 \tau_x + \rho \tau_x x_1 + \gamma x_2}{a_2} \end{aligned} \tag{12}$$

The covariance between pre-FOMC drift and past returns will then be non-zero as shown below

$$Cov(ret_2, ret_1) = \frac{1}{a_1 a_2}\left[\sigma_y^2 \tau_m \rho^2 \tau_x + \gamma \rho \tau_x \sigma_x^2\right] \tag{13}$$

Finally, one can use equation (13) to observe three key implications. Firstly, covariance or predictability is greater the closer the macro announcement is to forthcoming FOMC days. For example, if there were another trading period between t=2 and FOMC day, that is FOMC occurred on t=4, the expression for $ret_3 = P_3 - P_2$ would simply be noise, introduced by noise traders. Thus, the covariance between ret_3, which would now represent pre-FOMC drift, and past returns on macro days (ret_1) would be zero. Hence, when macro announcement is in the more distant past, the predictability of returns over the pre-FOMC window using past returns would vanish. Secondly, equation (13) also shows that, under certain conditions, predictability is higher the greater the precision of the private signal regarding upcoming Fed decisions is, i.e., predictability rises with τ_m under certain conditions. Thirdly, equation (13) can again be used to see that this predictability rises as prior precision falls (i.e., as τ_y or τ_θ fall).

7 Conclusion

Often, high returns realized around FOMC statements are interpreted purely as compensation for holding risk or a puzzle. The results in this paper suggest that these heightened returns may also reflect market's learning about forthcoming Fed policy from prior macro data releases. Accounting for the economic forces that govern market reactions to recent news can help deepen our understanding of the variations in both pre-FOMC drift and FOMC announcement premium. For example, the ability to learn about future Fed policy from macro announcements seems stronger in the pre-GFC era, a period characterized by conventional monetary policies. Intuitively, it is easier to predict Fed actions using macro data when Fed actions mainly comprise adjusting the federal funds rate (conventional policy). However, when Fed actions comprise various asset purchases (unconventional policies), the same kind of macro data may not be *as helpful* in predicting - with similar precision - announcements of forthcoming unconventional Fed actions. Standard noisy REE models suggest that if there is an exogenous decrease in signal precision, as I propose

in this example, price reactions to news would also decline.

Broadly speaking, differentiating between FOMC statements preceded by macro news and those that are not can help offer perspective on various issues of interest surrounding FOMC announcements. This separation not only helps to understand the pre-FOMC drift and announcement return - the main focus of this paper -, but also offers insights into the Fed information effect, the slope of the security market line realized on FOMC days, the secular decline of interest rates observed in 3-day windows around FOMC statements, as well as the measurement of monetary policy surprise, a key variable of interest for researchers interested in issues surrounding monetary policy. Thus, there is a tale of two FOMC days: economic outcomes around FOMC statements strongly differ by the presence of macro announcements immediately prior to FOMC announcements. Future research in this space could benefit from this categorization of FOMC statements.

A final point before I conclude. While I focus on four macro announcements, I do not mean to claim that these are the *only* data releases that might matter. Saying that would require a separate exercise that extensively compares and contrasts contributions of the constellation of macro announcements. When this paper demonstrates that the closeness of macro announcements that seem directly relevant in shaping monetary policy expectations appear to be driving the returns realized on FOMC day, it highlights the importance of questioning whether observations made around FOMC statements are solely due to those FOMC announcements, or whether other events may drive or contribute to them.

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Appendices

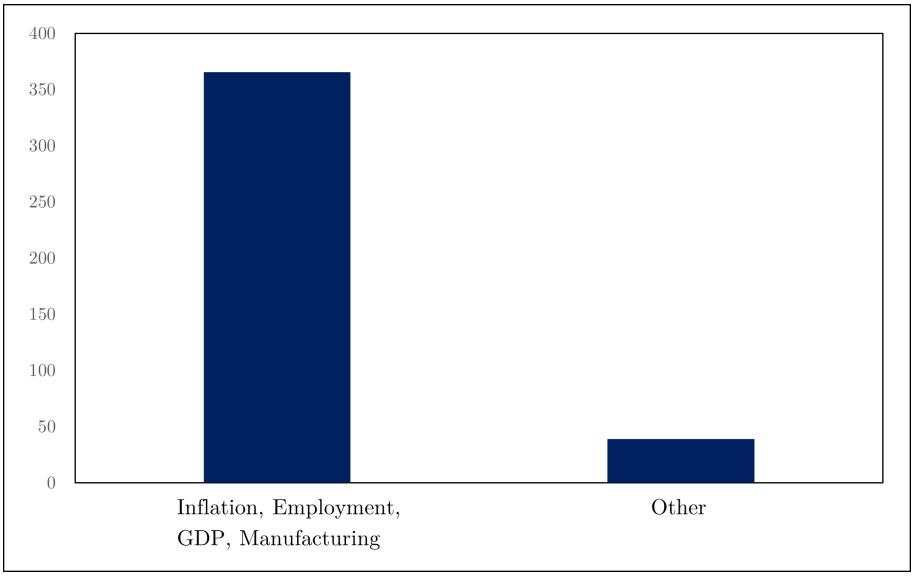
A Text Analysis of FOMC Transcripts: Discussions of Macro Indicators

To gauge the importance of various macroeconomic indicators in the setting of Fed policy, I conduct text analysis of all FOMC transcripts publicly available since 1994. I generate a word list capturing all macro announcements and indicators analyzed in Andersen et al. (2007) and Gilbert et al. (2017), and note the counts of each word in each transcript. To facilitate text analysis, I first lowercase the entire document. My word list is as follows: "inflation", "employment", "gdp", "pce", "manufacturing", "cpi", "ppi", "retail sales", "consumer confidence", "payrolls', "industrial production", "nonfarm", "capacity utilization", "blue chip", "durable goods", "housing starts", "personal income", "manufacturing survey", "business outlook survey", "consumer credit", "ism", "ip", "trade balance", "personal consumption expenditure", "new home sales", "consumer price index", "durable goods orders", "construction spending", "pmi", "napm", "gross domestic product", "business inventories", "factory orders", "index of leading indicators", "producer price index", "government budget deficit". Thus, my set includes 36 "words", loosely defined, such that "gross domestic product" and "consumer price index" count as two different words.

To analyze how much each of these macro indicators or announcements is discussed, I compute the average frequency of each word in each transcript. In Figure A.1, I consolidate my findings by presenting the average frequencies of two groups of words. The first group includes 4 out of the above 36 words: "inflation", "employment", "gdp" and "manufacturing". The left bar in Figure A.1 shows the sum of the average frequencies of each of these 4 words. The right bar shows the sum of the average frequencies of the remaining words.[20] The former group of four words are on average mentioned over 350 times, while the latter group of remaining words is collectively mentioned about 40 times in each FOMC transcript. This offers indicative evidence of the importance of announcements referring to inflation, employment, GDP, and manufacturing in the setting of Fed policy.

[20] I use all of the remaining 32 words except: "cpi", "payrolls", "industrial production", "nonfarm", "capacity utilization", "ip", "consumer price index", and "gross domestic product". Thus, by excluding these 8 words, I am left with 24 words in the remaining category, called "Other" in Figure A.1.

Figure A.1. Discussions of Macro Indicators



Note: This figure shows the sum of the average frequency of different words in FOMC transcripts from 1994 - 2017. The left bar is the sum of the average frequencies of four words: "inflation", "employment", "gdp", and "manufacturing". The right column, labelled, "Other", is the sum of the average frequencies of the following words: "pce", "ppi", "retail sales", "consumer confidence", "blue chip", "durable goods", "housing starts", "personal income", "manufacturing survey", "business outlook survey", "consumer credit", "ism", "trade balance", "personal consumption expenditure", "new home sales", "durable goods orders", "construction spending", "pmi", "napm", "business inventories", "factory orders", "index of leading indicators", "producer price index", "government budget deficit".

B Buildup in Key Predictors of FOMC Announcement Premium and Pre-FOMC Drift

Prior literature finds that there is buildup in monetary attention (Fisher et al., 2022) and the VIX (Lucca and Moench, 2015; Hu et al., 2022) in the days leading to FOMC announcements, particularly those associated with press conferences (Boguth et al., 2019). These papers find that higher levels of attention and VIX are associated with higher FOMC announcement premium and pre-FOMC drift. I find that the buildup in these variables is concentrated around those FOMC announcements that occur "immediately" after macro announcements. I additionally report similar analysis using the buildup in the MOVE index, which is the implied volatility in the U.S. Treasury market, and show it has similar dynamics as monetary attention and the VIX.

Table B.1: Buildup in Attention on Two FOMC Days

	All FOMC (1)	Same Day (2)	1 Day (3)	2 Day (4)	3 Day (5)	4 Day (6)	5 Day (7)
$\mathbb{1}^{MacroFOMC}$		0.07	0.13	0.29***	0.36***	0.31***	0.21*
		(0.14)	(0.11)	(0.09)	(0.09)	(0.10)	(0.11)
$Constant$	0.24***	0.22***	0.20***	0.12**	-0.00	-0.00	0.06
	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)	(0.08)	(0.10)
Observations	201	201	201	201	201	201	201
Robust standard errors in parentheses							
*** p<0.01, ** p<0.05, * p<0.1							

Note: This table reports buildup in attention on two types of FOMC days by estimating the following: $attentionbuild_{t-1} = \alpha + \beta \mathbb{1}_t^{MacroFOMC} + \epsilon_{t-1}$. The buildup in attention (variable $attentionbuild_{t-1}$) is defined as in Fisher et al. (2022). It is the difference between the average monetary attention from four days after the previous FOMC announcement to four days before the current announcement and the average attention in the pre-FOMC window, comprising the three days prior to the announcement. Higher levels of this variable thus measure higher average levels of attention in the three days prior to FOMC days than in the recent past. All estimations are done over scheduled FOMC days. In column 1, I perform regressions over all FOMC days, without distinguishing them. The constant reports the average across all FOMC days in column 1. In columns 2-7, I introduce the dummy variable $\mathbb{1}_t^{MacroFOMC}$ which takes a value of 1 if the FOMC announcement is associated with a macro announcement "immediately" before, defined differently in each column, and is 0 otherwise. See Table 1 for more details. The constant in these specifications measures the average buildup in attention across all FOMC days that did not have a macro announcement in the "immediate past", and the loading on $\mathbb{1}^{MacroFOMC}$ thus measures the additional buildup that occurs on those FOMC days that are associated with macro news in the "immediate past".

Table B.2: Buildup in VIX on Two FOMC Days

	All FOMC (1)	Same Day (2)	1 Day (3)	2 Day (4)	3 Day (5)	4 Day (6)	5 Day (7)
$\mathbb{1}^{FOMC}$	0.45**						
	(0.21)						
$\mathbb{1}^{MacroFOMC}$		1.08**	0.99***	1.00**	0.67***	0.50**	0.46*
		(0.43)	(0.34)	(0.39)	(0.26)	(0.25)	(0.24)
$\mathbb{1}^{FOMCOnly}$		0.32	0.25	0.06	-0.06	0.27	0.40
		(0.23)	(0.25)	(0.22)	(0.32)	(0.31)	(0.37)
$Constant$	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Observations	6,113	6,113	6,113	6,113	6,113	6,113	6,113
Newey-West standard errors in parentheses							
*** p<0.01, ** p<0.05, * p<0.1							

Note: This table reports buildup in the VIX on two types of FOMC days by estimating the following: $\Delta VIX_{[t-7,t-1]} = \alpha + \beta_1 \mathbb{1}_t^{MacroFOMC} + \beta_2 \mathbb{1}_t^{FOMCOnly} + \epsilon_{[t-7,t-1]}$. Buildup in the VIX is measured by taking the difference between the VIX from 7 days before FOMC days and 1 day before FOMC days ($\Delta VIX_{[t-7,t-1]}$). This window is taken to capture the cumulative buildup in the VIX over a six-day period prior to FOMC announcements similar to Hu et al. (2022). $\mathbb{1}_t^{MacroFOMC}$ takes a value of 1 over all FOMC days that are associated with macro news in the "immediate past", defined differently in each column, and is 0 otherwise. $\mathbb{1}_t^{FOMCOnly}$ is its mutually exclusive counterpart: those FOMC announcements that did not have a macro announcement in the "immediate past". See Table 1 for more details.

Table B.3: Buildup in MOVE on Two FOMC Days

	All FOMC (1)	Same Day (2)	1 Day (3)	2 Day (4)	3 Day (5)	4 Day (6)	5 Day (7)
$\mathbb{1}^{FOMC}$	1.10**						
	(0.50)						
$\mathbb{1}^{MacroFOMC}$		2.46*	1.92*	2.43***	1.58**	1.30**	1.21**
		(1.34)	(1.01)	(0.86)	(0.63)	(0.60)	(0.56)
$\mathbb{1}^{FOMCOnly}$		0.80	0.80	0.16	0.10	0.47	0.60
		(0.53)	(0.58)	(0.58)	(0.77)	(0.83)	(1.00)
$Constant$	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08
	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)
Observations	6,515	6,515	6,515	6,515	6,515	6,515	6,515

Newey-West standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports buildup in the MOVE index on two types of FOMC days by estimating the following: $\Delta MOVE_{[t-7,t-1]} = \alpha + \beta_1 \mathbb{1}_t^{MacroFOMC} + \beta_2 \mathbb{1}_t^{FOMCOnly} + \epsilon_{[t-7,t-1]}$. Buildup in the MOVE is measured by taking the difference between the MOVE from 7 days before FOMC days and 1 day before FOMC days ($\Delta VIX_{[t-7,t-1]}$). This window is taken to capture the cumulative buildup in the MOVE over a six-day period prior to FOMC announcements, consistent with the window used for the buildup in the VIX (see Table B.2). $\mathbb{1}_t^{MacroFOMC}$ takes a value of 1 over all FOMC days that are associated with macro news in the "immediate past", defined differently in each column, and is 0 otherwise. $\mathbb{1}_t^{FOMCOnly}$ is its mutually exclusive counterpart: those FOMC announcements that did not have a macro announcement in the "immediate past". See Table 1 for more details.

C Learning About Fed Policy From Macro Announcements: Role of Risk

Table C.1 below reports output from a similar regression as in Table 8, but estimating it over the pre-GFC sample, which is defined as the period prior to July 01, 2008. It shows that the relationships observed in Table 8 are stronger in the pre-GFC period, when Fed policy was essentially "conventional". Adjusted R^2 of these regressions are as high as 45%.

Table C.1: Interactions With Uncertainty: Pre-GFC

	Pre-FOMC Drift			Announcement Premium		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta E[Upcoming]$	14.01***	1.81	15.30**	1.91	2.76	1.75
	(4.34)	(8.98)	(6.18)	(10.57)	(9.72)	(8.45)
$\Delta E[Upcoming] \times Days$	-4.22**	-0.12	-4.63*	-1.49	-0.65	-0.55
	(2.03)	(3.86)	(2.56)	(3.47)	(3.43)	(2.82)
$Attention$	0.13			0.33		
	(0.19)			(0.21)		
$Attention \times Days$	-0.03			-0.11		
	(0.09)			(0.10)		
$\Delta E[Upcoming] \times Attention$	-14.80***			-7.54***		
	(1.52)			(2.58)		
$\Delta E[Upcoming] \times Attention \times Days$	9.02***			3.80**		
	(1.16)			(1.54)		
$L.VIX$		0.48***			0.27	
		(0.12)			(0.17)	
$L.VIX \times Days$		-0.21***			-0.11	
		(0.04)			(0.08)	
$\Delta E[Upcoming] \times L.VIX$		-10.62**			-15.34***	
		(4.57)			(5.17)	
$\Delta E[Upcoming] \times L.VIX \times Days$		3.83			5.43***	
		(2.98)			(2.00)	
$\mathbb{1}^{Easing}$			0.73**			0.03
			(0.36)			(0.57)
$\mathbb{1}^{Easing} \times Days$			-0.31**			0.00
			(0.15)			(0.21)
$\Delta E[Upcoming] \times \mathbb{1}^{Easing}$			-32.25***			-24.48**
			(7.81)			(11.45)
$\Delta E[Upcoming] \times \mathbb{1}^{Easing} \times Days$			11.57**			8.88*
			(4.89)			(5.34)
$Days$	-0.14*	-0.03	-0.04	-0.12	-0.08	-0.12
	(0.08)	(0.06)	(0.08)	(0.09)	(0.08)	(0.09)
$Constant$	0.70***	0.46***	0.46**	0.42**	0.34*	0.44**
	(0.18)	(0.14)	(0.19)	(0.21)	(0.19)	(0.20)
Observations	74	74	74	104	104	104
Adjusted R^2	0.457	0.375	0.366	0.167	0.161	0.126

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports regressions of equation (5) that includes interactions of $\Delta E[Upcoming]$ with $Attention$, $L.VIX$ and $\mathbb{1}^{Easing}$. $\Delta E[Upcoming]$ uses federal fund futures to measure market expectations of the nearest upcoming FOMC policy announcement. $Attention$ is the monetary attention variable of Fisher et al. (2022). $L.VIX$ is the previous day's value of the level of the VIX, where VIX has been standardized by subtracting its full-sample mean and dividing this difference by its full-sample standard deviation. $\mathbb{1}^{Easing}$ takes a value of 1 when markets expect the Fed to reduce interest rates over the next six months; and is 0 otherwise. Market expectations are measured by considering the difference between the 6-month-ahead and current-month federal fund futures rate ($f^6 - f^0$). Whenever this difference is less than zero, the variable $\mathbb{1}^{Easing}$ takes a value of 1; and is 0 otherwise. The regressions are performed over all macro announcements that occur at most 5 business days before the nearest upcoming FOMC announcement. All estimations are done over the pre-GFC sample (before July 01, 2008).

D Announcement Premium on Macro Announcements

Table D.1: $ret_t = \alpha + \beta \mathbb{1}_t^{Announcement} + \epsilon_t$

	(1)	(2)	(3)	(4)	(5)
$\mathbb{1}^{Macro}$	0.05				
	(0.03)				
$\mathbb{1}^{GDP}$		0.02			
		(0.06)			
$\mathbb{1}^{CPI}$			-0.02		
			(0.06)		
$\mathbb{1}^{Unemp}$				0.08	
				(0.07)	
$\mathbb{1}^{IP}$					0.10*
					(0.06)
$Constant$	0.02	0.02**	0.02**	0.02*	0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	6,361	6,361	6,361	6,361	6,361
Newey-West standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Note: This table shows estimations of the equation in the table's caption. $\mathbb{1}_t^{Announcement}$ is a dummy variable that takes a value of 1 on a macro announcement day, defined differently in each row, and is 0 otherwise. $\mathbb{1}^{Macro}$ takes a value of 1 on each day there is either a GDP, CPI, unemployment or industrial production announcement, and is zero otherwise. $\mathbb{1}^{GDP}$ takes a value of 1 each day there is a GDP announcement and is zero otherwise. $\mathbb{1}^{CPI}$ takes a value of 1 each day there is a CPI announcement and is zero otherwise. Similarly, $\mathbb{1}^{Unemp}$ takes a value of 1 each day there is an unemployment announcement, and $\mathbb{1}^{IP}$ takes a value of 1 each day there is an industrial production announcement. They are equal to zero otherwise. In all specifications, I ignore the observations that fall on FOMC days to avoid confounding.

E Resolution of Uncertainty on FOMC Days

Table G.1 shows that the resolution of uncertainty on FOMC days, as measured by the reduction in VIX on FOMC days, depends on the changes in market expectations of Fed policy on macro announcements prior to FOMC days. Additionally, this relationship is mediated by the degree of attention and uncertainty (proxied by the level of the VIX and the stage of the monetary cycle).

Table E.1: Reduction in VIX on FOMC Days

	(1)	(2)	(3)	(4)
$\Delta E[Upcoming]$	26.66***	-4.30	4.04	4.75
	(9.29)	(13.93)	(12.06)	(10.40)
$\Delta E[Upcoming] \times Days$	-9.14***	1.73	-2.66	-1.64
	(3.10)	(4.59)	(4.30)	(3.47)
$Attention$		-0.84*		
		(0.47)		
$Attention \times Days$		0.24		
		(0.15)		
$\Delta E[Upcoming] \times Attention$		8.99**		
		(3.85)		
$\Delta E[Upcoming] \times Attention \times Days$		-3.89*		
		(2.28)		
$L.VIX$			-0.77**	
			(0.36)	
$L.VIX \times Days$			0.24*	
			(0.12)	
$\Delta E[Upcoming] \times L.VIX$			16.15***	
			(5.22)	
$\Delta E[Upcoming] \times L.VIX \times Days$			-7.47***	
			(2.18)	
$\mathbb{1}^{Easing}$				-0.32
				(0.66)
$\mathbb{1}^{Easing} \times Days$				0.21
				(0.24)
$\Delta E[Upcoming] \times \mathbb{1}^{Easing}$				30.79**
				(14.43)
$\Delta E[Upcoming] \times \mathbb{1}^{Easing} \times Days$				-16.37**
				(6.29)
$Days$	0.28***	0.15*	0.21**	0.21**
	(0.09)	(0.08)	(0.08)	(0.10)
$Constant$	-1.05***	-0.65***	-0.87***	-0.94***
	(0.25)	(0.19)	(0.21)	(0.28)
Observations	175	175	175	175
Adjusted R^2	0.106	0.210	0.168	0.106
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Note: I show estimations of equation (5), with the change in the VIX on FOMC days as the LHS variable. The RHS includes interactions of $\Delta E[Upcoming]$ with $Attention$, $L.VIX$ and $\mathbb{1}^{Easing}$. $\Delta E[Upcoming]$ uses federal fund futures to measure market expectations of the nearest upcoming FOMC policy announcement. $Attention$ is the monetary attention measure of Fisher et al. (2022). $L.VIX$ is the value of the level of the VIX on the day before macro announcement day, where VIX has been standardized by subtracting its full sample mean and dividing this difference by its full sample standard deviation. $\mathbb{1}^{Easing}$ takes a value of 1 when markets expect the Fed to reduce interest rates over the next six months; and is 0 otherwise. The regressions are performed over all macro announcements that occur at most 5 business days before the nearest upcoming FOMC announcement.

F Interpretation of FOMC Announcements Across the Two FOMC Days

Laarits (2022) proposes that pre-FOMC drift is compensation for the kind of news that the Fed delivers. Thus, Laarits (2022) suggests that the correlation between stock returns and interest rate movements, both computed around FOMC statements, would vary with the pre-FOMC drift. I conduct regressions of stock returns on a standard monetary policy surprise measure (Table F.1) and intra-day movements in U.S. Treasury futures around FOMC statements (Table F.2). Given that pre-FOMC drift is concentrated around those FOMC announcements that immediately precede macro news, I perform these regressions separately over $MacroFOMC$ and $FOMCOnly$ announcements. I find that the signs of the regression coefficients remain stable across all specifications. This is consistent with Bauer and Swanson (2023b), who find that the impact of monetary policy on asset prices is unaffected by past macro and other public information.

Table F.1: Impact of Monetary Policy Shocks on Equities on FOMC Days

	Same Day (1)	1 Day (2)	2 Day (3)	3 Day (4)	4 Day (5)	5 Day (6)
Panel A: $MacroFOMC$ Announcements						
$UnadjustedMPS$	-5.22***	-5.01***	-6.15***	-6.13***	-5.92***	-5.86***
	(0.94)	(0.79)	(1.03)	(0.99)	(0.96)	(0.92)
$Constant$	0.01	0.01	-0.09*	-0.07*	-0.06	-0.05
	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)
Observations	34	47	76	121	133	140
Adjusted R^2	0.338	0.274	0.325	0.310	0.289	0.286
Panel B: $FOMCOnly$ Announcements						
$UnadjustedMPS$	-5.28***	-5.33***	-4.45***	-3.33***	-3.39**	-3.18**
	(0.95)	(1.05)	(1.31)	(1.19)	(1.28)	(1.43)
$Constant$	-0.06	-0.07*	-0.02	-0.02	-0.03	-0.05
	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)	(0.07)
Observations	137	124	95	50	38	31
Adjusted R^2	0.253	0.257	0.196	0.136	0.170	0.153
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Note: This table shows estimations of the following equation: $ret_t = \alpha + \beta_1 MPS_t + \epsilon_t$. ret_t is the return in the Emini S&P500 over a [-10,+20] minute window around FOMC statements. MPS_t is the unadjusted monetary policy surprise measure obtained from Michael Bauer's website. Each column in each panel reports output from a separate regression. In Panel A, I estimate this regression on the set of those FOMC announcements that were immediately preceded by macro news (i.e., $MacroFOMC$), and its mutually exclusive counterpart of FOMC announcements that were not immediately preceded by macro announcements (i.e., $FOMCOnly$). Column headers help identify how $MacroFOMC$ and $FOMCOnly$ are defined in each specification. Under "Same Day", $MacroFOMC$ includes all those scheduled FOMC statements that had one of 4 macro announcements earlier the same morning, while $FOMCOnly$ is its mutually exclusive counterpart: those scheduled FOMC statements that did not have a macro announcement the same morning but may have had one before. See Table 1 for more details.

Table F.2: Impact of UST Futures on Equities on FOMC Days

	Same Day	1 Day	2 Day	3 Day	4 Day	5 Day
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: $MacroFOMC$ Announcements						
ΔUST^{5y}	0.90***	1.08***	0.77*	0.85**	0.79**	0.81**
	(0.25)	(0.22)	(0.44)	(0.39)	(0.36)	(0.35)
$Constant$	0.04	0.04	-0.03	-0.02	-0.02	-0.01
	(0.06)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)
Observations	34	47	76	121	133	140
Adjusted R^2	0.158	0.252	0.0770	0.0927	0.0839	0.0889
Panel B: $FOMCOnly$ Announcements						
ΔUST^{5y}	0.78**	0.71**	0.83***	0.71***	0.82***	0.76***
	(0.30)	(0.34)	(0.29)	(0.19)	(0.18)	(0.18)
$Constant$	-0.03	-0.04	-0.01	-0.02	-0.02	-0.04
	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)	(0.06)
Observations	138	125	96	51	39	32
Adjusted R^2	0.0964	0.0728	0.130	0.134	0.204	0.188
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Note: This table shows estimations of the following equation: $ret_t = \alpha + \beta_1 \Delta UST_t^{5y} + \epsilon_t$. ret_t is the return in the Emini S&P500 over a [-10,+20] minute window around FOMC statements. ΔUST_t^{5y} is the return in the 5-year U.S. Treasury future over the same [-10,+20] minute window around FOMC statements. Each column in each panel reports output from a separate regression. In Panel A, I estimate this regression on the set of those FOMC announcements that were immediately preceded by macro news (i.e., $MacroFOMC$), and its mutually exclusive counterpart of FOMC announcements that were not immediately preceded by macro announcements (i.e., $FOMCOnly$). Column headers help identify how $MacroFOMC$ and $FOMCOnly$ are defined in each specification. Under "Same Day", $MacroFOMC$ includes all those scheduled FOMC statements that had one of 4 macro announcements earlier the same morning, while $FOMCOnly$ is its mutually exclusive counterpart: those scheduled FOMC statements that did not have a macro announcement the same morning but may have had one before. See Table 1 for more details.

G Trading Activity as Macro Announcements Occur Close to FOMC Days

In a Kyle (1985) model, an insider would try to take advantage of her private information by trading non-aggressively and thus profit from the un-informed market maker. However, if an event were to occur where the truth would be revealed to all, making her private information useless, she would have no other choice other than to trade aggressively to profit from that information as much as possible.[21] Interpreting FOMC announcement to be an event that reveals the truth to all and a macro announcement to be an event that generates insiders, then one prediction of a Kyle (1985) model might be that trading activity would rise as the macro announcement occurs close to FOMC announcements. I check for this possibility by regressing trading volume, a coarse indicator of trading activity, on the number of days macro announcements are away from an upcoming FOMC announcement, i.e., the variable $Days$ as defined in this paper. I find the loading on the variable $Days$ to be positive and insignificant, suggesting that trading volume on macro announcements does not fall as they occur farther away from FOMC announcements.

Table G.1: $volume_t = \alpha + \beta Days_t + \epsilon_t$

	SPY	Emini
	(1)	(2)
$Days$	0.01	0.03
	(0.03)	(0.12)
$Constant$	0.06	-1.00***
	(0.06)	(0.27)
Observations	172	142
Adjusted R^2	-0.004	-0.007
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Note: I regress the detrended trading volume of the SPY and Emini S&P500 on the number of days each macro announcement is away from its nearest upcoming FOMC announcement. Similar to Fisher et al. (2022), I detrend volume by the 60-day moving average of the natural logarithm of trading volume. All estimations are done over macro announcements that occur at most 5 business days before an FOMC announcement. I ignore all those macro announcements that occur on the same day as an FOMC announcement to avoid confounding.

[21] Also see Campbell (2017) for a discussion on insider trader's aggression when the fully revealing event occurs closer in time.