The Pre-FOMC Announcement Drift

David O. Lucca and Emanuel Moench*
Federal Reserve Bank of New York

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Abstract

Since the Federal Open Market Committee (FOMC) began announcing its monetary policy decisions in 1994, U.S. stocks experienced large excess returns in the 24 hours preceding these announcements. These abnormal returns account for more than 80% of the U.S. equity premium over the past 17 years. Other major international equity indices experienced similar abnormal returns before FOMC announcements. In contrast, no such return pattern is detectable on U.S. fixed income assets or the exchange value of the dollar. We discuss a few possible explanations for the pre-FOMC announcement drift for equities, none of which appears to be fully consistent with the empirical evidence.

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1 Introduction

This paper documents that stocks in the U.S. and several other major economies have experienced large abnormal returns right before U.S. monetary policy announcements since 1994. These returns are puzzling and difficult to explain with standard asset pricing models.

Members of the FOMC—the Federal Reserve's (Fed) monetary policy-making body—convene at pre-scheduled meetings eight times per year. The outcomes of these meetings have been announced to the public at known times since 1994. We document that since then, the S&P500 index has on average increased 49 basis points in the 24 hours prior to the FOMC announcements. The abnormal returns do not revert in subsequent trading days and, more generally, excess returns outside the 24-hour pre-FOMC window have on average been orders of magnitude smaller. As a result, a staggering 80% of the annual U.S. equity premium since 1994 was earned in the 24 hours before FOMC announcements. A simple trading strategy of holding the index only in the 24 hours leading up to an FOMC announcement yields an annualized Sharpe ratio of above 1.1. Other major foreign stock markets exhibited similar abnormal returns, and the 24-hour pre-FOMC returns have accounted for a large fraction of these markets' equity premia as well.

We show that the abnormal returns are not explained by outliers and are not the result of data-snooping. Based on one-year rolling averages, we find the pre-FOMC drift to be positive for the vast majority of the sample period. In terms of time-series variation, returns are somewhat countercyclical and, using economic survey data, we show that they are higher when monetary easing is expected and when forecasters disagree less about future Fed policy. The pre-FOMC returns are broad-based across U.S. industry and size portfolios. A single market factor model captures a significant fraction of the cross-sectional variation of these returns. Fixed income assets and currencies have not featured analogous abnormal pre-FOMC returns, and other major U.S. macroeconomic news announcements do not give rise to analogous pre-announcement returns in the post-1994 sample.

What explains these findings? First, price jumps, shown to command risk premia (Pan [2002]), are an unlikely source of the price drift as the pre-FOMC return accrues *prior* to the announcement when investors are not exposed to the jumps at the announcement. In terms of realized monetary policy, the federal funds rate has trended lower over the sample period, reaching historically low levels at the end of the sample. In addition, interest rate policy has sometimes been characterized as having an asymmetric impact on riskier asset values through implicit floors, or so called "government puts" (for example, Diamond and Rajan [2011]). If these were the true sources of the drift, however, it is not clear why

they would have impacted stock prices only right ahead of the meetings, rather than on all days in the sample. Indeed, while FOMC members regularly discuss monetary policy in speeches and interviews, they refrain from any such discussion ahead of policy meetings (a time interval known as the *purdah* period). We consistently find measures of equity volatility and liquidity to be somewhat lower in the hours before FOMC announcements relative to other days. Previous work finds that lower liquidity and volatility is associated with higher excess returns (Campbell and Hentschel [1992], Amihud [2002]). However, the magnitude of these declines is too small to account for the size of the pre-FOMC return in the data. Furthermore, the source of these movements would still need to be explained. Similarly, one would still need to identify the source of a contemporaneous shift in risk aversion that may rationalize the price drift within a consumption-based pricing kernel.

We consider several alternative models that can lead to price drifts ahead of scheduled announcements featuring, in particular, political risk (Pastor and Veronesi [2011]), rationally inattentive investors (Kacperczyk, Nieuwerburgh, and Veldkamp [2009]), and limited stock market participation (Duffie [2010]). Although these models can qualitatively match the price drift ahead of the announcements, they are at odds with other features of the data, such as liquidity, return volatility and the persistence of the pre-FOMC return.

In addition to the work cited thus far, this paper is related to different strands of the literature. A vast literature has tried to explain the equity premium puzzle (see for example Campbell [2003] for a review). Our paper documents that since 1994 the bulk of the equity premium can be accounted for by returns in the 24 hours preceding scheduled FOMC announcements, a finding that may help shed light on alternative theories. A large literature has also studied asset price responses to monetary policy rate decisions (e.g. Kuttner [2001]).[1] For U.S. equities, Bernanke and Kuttner [2005] document large stock market responses to unexpected federal funds rate shocks. We see our results as complementary to these studies as we document the existence of an *unconditional* excess return that is earned *ahead* of the FOMC announcement. These returns are thus likely driven by an anticipation rather than the realization of policy decisions. A related literature has documented a sizeable conditional response of various asset classes to other economic news announcements (Jones, Lamont, and Lumsdaine [1998], Fleming and Remolona [1999], Andersen, Bollerslev, Diebold, and Vega [2003]). The existence of returns ahead of scheduled announcements question, to some extent, the exclusive focus on asset price responses to announcements, as sizeable unconditional effects may also be present. More recently, Savor and Wilson [2010] find positive excess equity returns on days of scheduled macroeconomic data releases, in-

[1] A more recent literature has also focused on financial asset responses to communication about future, rather than actual realization, of monetary policy actions (Gürkaynak, Sack, and Swanson [2005], Lucca and Trebbi [2009])

cluding FOMC announcements, from 1958 through 2009. Our results suggest that at least since 1994, these returns are only associated with FOMC announcements, and most importantly that the returns are not earned when the announcements are realized, for example as a reward for jump risk, but rather before. Lamont and Frazzini [2007] have recently documented a qualitatively similar upward drift of individual stock prices prior to scheduled earnings announcements. While these authors focus on a behavioral "attention grabbing" effect as a potential explanation, we mainly consider theories based on rational expectations. Nonetheless we stress in the paper that, due to the absence of new fundamental public information ahead of scheduled FOMC announcements, informational frictions may play an important role in explaining the drift. Recently, for example, Tetlock [2011] shows that stale news can affect stock prices. We discuss additional relevant literature along the way.

The remainder of the paper is organized as follows. Section 2 provides a brief discussion of the monetary policy decision process in the U.S. and reviews the data used in this paper. In Section 3, we present the main empirical findings. Section 4 discusses a list of potential explanations for our findings, and Section 5 concludes.

2 FOMC meetings and Data

2.1 FOMC meetings

The Federal Open Market Committee (FOMC, or Committee) is the monetary policy-making body of the U.S. Federal Reserve System. The FOMC makes policy decisions— setting the target for the federal funds rate, and since 2008, large-scale asset purchases of Treasury and agency securities—under the statutory dual mandate of maximum employment and stable prices.[2] Policy decisions are made under a majority rule at FOMC meetings, which are scheduled to occur eight times per year (or about once every six weeks). These scheduled meetings are the focus of this paper. A list of the meeting dates and times is reported in Table 1. The FOMC can also meet at other times in unscheduled meetings. These meetings have been rather infrequent and their occurrence is unknown to investors in advance.[3]

[2]The Committee is composed of twelve members: the seven members of the Board of Governors and five of the twelve Reserve Bank presidents. The Federal Reserve Board Chairman also serves as the FOMC Chairman. With the exception of the president of the Federal Reserve Bank of New York, who is a permanent voting member and FOMC vice-Chair, presidents of all other Banks take voting positions on a rotating basis that last one year.

[3]Unscheduled meetings typically occur via teleconference and are known to investors right-after the meeting only when a target rate change occurs. Since 1994, such meetings have occurred on the following dates: April 18, 1994, October 15, 1998, January 3, 2001, September 17, 2001, January 21, 2008, October 7, 2008. In addition intermeeting statements related to "liquidity facilities" were released on: August 10/16,

Prior to 1994, the FOMC did not disclose its policy decisions and market participants generally inferred the target federal funds rate from the size of open market operations on the days following the FOMC meeting. Starting in February 1994 the FOMC began to announce its decisions and accompanying statements (FOMC statements) after pre-scheduled meetings only when a change to the current policy was made. Starting in May 1999, statements have been released after every pre-scheduled meeting irrespective of whether a policy change occurred or not. From September 1994 to March 2011, FOMC statements were regularly released at, or a few minutes after, 2:15pm ET following each scheduled meeting.[4] Since April 2011, the time of the release has been 12:30pm on days of FOMC meetings, after which a press conference by the FOMC Chairman is held at 2:15pm. Our analysis focuses on the sample from September 1994 through March 2011 over which FOMC releases have consistently been made at, or within a few minutes of, 2:15pm, as reported in Table 1.

To enhance transparency in communicating its policy decisions over the past 20 years, members of the FOMC have increasingly employed speeches, testimonies to Congress and other means to communicate to market participants the likely path of monetary policy. While this communication is today considered a key policy instrument in its own regard (e.g. Blinder, Ehrmann, Fratzscher, Haan, and Jansen [2008]), importantly FOMC participants refrain from any policy discussion in the week leading up to each FOMC meeting (the purdah period, see Ehrmann and Fratzscher [2009]). Hence, no such information about the likely outcome of the policy decision is released in the days before FOMC meetings. This is an important fact to bear in mind when interpreting the evidence presented in this paper.

2.2 Data

Our analysis focuses on financial asset returns around scheduled FOMC meetings between September 1994 and March 2011. Most of the evidence is based on intraday data and focuses on the 24-hour period from 2pm on the day before a scheduled FOMC announcement until 2pm on the day of a scheduled FOMC announcement, which is about fifteen minutes before the announcement release time. Hence, by construction, returns computed over this time interval do not contain news about the upcoming monetary policy decisions and therefore allow us to exclusively study anticipatory effects associated with FOMC announcements.

2008 and May 9, 2010. Over the same sample period, 24 other unscheduled meetings took place without any immediate release of a statement. These meetings were made public only with the release of the minutes of the subsequent scheduled meeting (about one to two months after the original meeting took place).

[4]The only exception to this rule is the statement of March 26, 1996 which was released in the morning because the Chairman was scheduled to testify in Congress later that day. The timing of the release was pre-announced to investors.

Due to limited availability of intraday data some evidence in the remaining sections is based on daily close-to-close returns as explicitly noted (for example, portfolio returns). We use several data sources: Thomson Reuters TickHistory and Tickdata.com for intraday data, Bloomberg data for dividend data, and daily returns on sorted U.S. stock portfolios from Ken French's website. We use information about professional forecasters' federal funds rate expectations from the BlueChip Financial Forecasts survey, and source data on the number of articles published in the financial press from Factiva. Table 2 provides summary statistics on FOMC days and non-FOMC days for the main variables used in our empirical analysis. Since most of our analysis refers to mean returns in these two subsamples, we omit a detailed discussion here and instead refer interested readers to the Table.

3 Facts

In this section we present the empirical findings of the paper. We first document large excess returns on broad U.S. and international stock market indices, as well as U.S. industry and size portfolios ahead of scheduled FOMC meetings. We then show the absence of such returns on other asset classes around FOMC announcements, and on U.S. equity returns around other major macroeconomic releases.

3.1 The pre-FOMC Announcement Drift in the S&P500

Figure 1 shows a striking pattern of U.S. stock returns around FOMC announcements. The black solid line in the chart represents the mean point-wise cumulative intraday percent return of the S&P500 index (SPX henceforth) over a three-day window from the market open on the day ahead of scheduled FOMC meetings to the day after. The mean is taken over the 131 scheduled FOMC meetings from September 1994 to March 2011.[5]

As seen in the Figure, the SPX index displays a strong upward drift in the hours ahead of FOMC announcements. First, the SPX index rises slightly on the afternoon of the day before the FOMC (left panel). It then drifts sharply higher in the morning of scheduled FOMC announcements. Right before the time of the announcement (vertical red dashed line) it reaches a level about 50 basis points above that of the previous-day open. Following the announcement at 2:15pm the SPX is on average about flat, both in the hours immediately after the announcement and on the following day (right panel). As evidenced by the point-wise

[5]Relative to the dates reported in Table 1 we lose one observation (Jul 1, 1998) because of missing intraday data. The close-to-close return on that day was 1.3 percent.

95% confidence interval for the mean return (light grey area), the cumulative return earned prior to scheduled FOMC announcements is strongly significantly different from zero.

To put the economic magnitude of this pre-FOMC drift in perspective, the dashed black line in Figure 1 shows the average cumulative returns on all other three-day windows in the sample excluding day triplets centered around FOMC announcements, along with the point-wise 95% confidence bands (dark gray shaded area).[6] On average cumulative returns on these days have essentially been zero over our sample period.

The mean intraday returns in the chart do not include dividend payments, and are not premium measures because they do not account for the level of the risk-free rate. To account for these and assess the magnitudes of the returns more formally we run the simple dummy-variable regression model:

$$rx_t = \beta_0 + \beta_1 \mathbb{1}_t(FOMC) + \beta_x X_t + \epsilon_t, \tag{1}$$

where rx_t denotes the cum-dividend log excess return on the SPX over the risk-free rate in percentage points.[7] In the main specification, the explanatory variable is a dummy variable, which is equal to one on scheduled FOMC announcement dates and zero otherwise. In alternative specifications in Section 4 we include explanatory variables X_t.

In the regression excluding other controls X_t, the coefficient β_1 is the mean return on FOMC days when the constant β_0 is omitted, and the mean excess return differential on FOMC days versus other days when the constant is present. The constant measures the unconditional mean excess return earned on non-FOMC announcement days.

Table 3 reports coefficient estimates for these two parameters over different return windows and time samples. The dependent variable in the first two columns is the 2pm-to-2pm SPX excess return. By construction, this 24-hour return ending on 2pm on the day of scheduled FOMC announcements does not include any information regarding the realized policy decision, which is yet to be announced. As seen in the first column, for the 131 FOMC observations in the sample, the 24-hour window return right before the FOMC meeting has on average been 49 basis points, with a t-statistic of more than 4.5 based on the Huber-White standard errors (squared brackets). As shown in the second column, this excess return of less than one-half basis points has been orders of magnitude larger than the mean excess return on all other 2pm-to-2pm windows in the sample.

[6] These intervals account for the serial correlation due to the overlapping window structure of these returns using Newey-West standard errors. Truncation lags are wider than the actual daily overlap because of the kernel down-weighting: three-day window on the second day, and a five days window on the third day.

[7] We use as risk-free rate the daily rate on a one-month Tbill locked in the month before.

Yet, there are only eight scheduled FOMC meetings each year. To gauge the impact of this return difference on the total equity premium in the sample, the middle panel of Table 3 presents annualized returns on FOMC and non-FOMC days. While the excess return on the SPX over the 24 hours prior to the FOMC announcement has on average been 3.89 percent per year, it has only been 0.89 percent on all remaining trading days. These point estimates imply that since 1994 more than 80 percent of the U.S. equity premium has been earned in the 24 hours before scheduled monetary policy announcements. The simple strategy that consists in buying the SPX at 2pm the day before a scheduled FOMC announcement and selling fifteen minutes before the announcement while holding cash on all other days would have earned a large annualized Sharpe ratio of 1.14 as reported in the Table.

Consistent with Figure 1, the excess SPX return between 2pm and market close on the day of the announcement has instead been zero (column 3 in the Table). In other words, while the SPX has displayed a large positive drift in the 24 hours leading up to the announcement, stock returns have on average been zero at or following the announcement. This implies that while equity market investors have at times been surprised by the FOMC decision (Bernanke and Kuttner [2005]), these surprises averaged out to zero over our sample period.

Looking at the close-to-close excess returns on the SPX (column 4), which include the afternoon following the announcement, rather than the afternoon before, the FOMC return differential has been somewhat lower at about 33 basis points in the sample period. However, the average close-to-close return on all other days is less than one basis point, and the annualized FOMC day return on a close-to-close basis still accounts for more than half of the annual equity premium (2.7 percent compared to 2.03 percent on all other days). The close-to-close FOMC day return still remains highly significant and yields a considerable annualized Sharpe Ratio of 0.84 as reported in the Table.

As previously discussed our sample starts when the FOMC first consistently released its policy decisions right after the meeting at a known time. Indeed, before that time market participants had to infer the likely policy action through open market operations in the days following the FOMC meeting. If the drift were related to anticipations about the actual policy action at the meeting, rather than a simple calendar effect, we would thus expect the drift to be much less pronounced before 1994.

In the last column of Table 3 we run the dummy variable regression on the sample 1970-1993, for a total of 236 FOMC announcement days.[8] While we find evidence of a positive

[8]Following Kuttner [2001], we assume that FOMC decisions became public one day after its meeting prior to 1994, which is typically when the first open market operation following each meeting was conducted. In other words, over this sample the dummy variable takes on the value of one the day after scheduled FOMC meetings and zero on all other days.

differential excess return on FOMC announcement days compared to other days, it is tiny in magnitude (about 5 basis points) and not statistically different from zero. Consequently the decomposition of the annual excess return is much less tilted towards FOMC days, and the Sharpe ratio of an FOMC-only investment strategy is 0.2 in this sample.

Given the large magnitude of the pre-FOMC drift, one might be concerned that a few outlier observations may be driving the results. Table 4 provides summary statistics of the 2pm-to-2pm return on the SPX on FOMC days versus all other days in the post-1994 sample. The mean excess return and its standard error (first two rows) are the same as in Table 3. The standard deviation of excess returns is 1.2 per cent both on FOMC days and on other days, implying that, in terms of variance, stocks are not more risky on FOMC days (we discuss the relation between volatility and returns in Section 4). The skewness of the two return distributions, however, displays a notable difference. While equity returns exhibit a strong positive skew ahead of FOMC announcements, they are slightly negatively skewed on all other days. Indeed, 98 of the 131 pre-FOMC announcement returns are positive in our sample—or three quarters of the total—but only 33 are negative (not reported in the table). Instead, positive and negative excess returns are roughly equally split on non-FOMC days in the sample.

The distributional differences in the empirical densities are shown in Figure 2. The 2pm-2pm FOMC return density (black line) is similar to that on non-FOMC days (grey), but importantly omits a left tail, with most of the corresponding density mass instead concentrated in positive returns. While at this point it is clear that outliers do not dominate the results we have seen so far, Table 4 shows that the kurtosis of pre-FOMC returns is slightly higher than on regular days suggesting a somewhat more fat-tailed distribution on FOMC days. As a final check we thus drop the top and bottom percentile and compare the resulting moments of the FOMC and non-FOMC day distributions (last two columsn in Table 4).[9] None of the summary measures are qualitatively affected when we exclude outliers. Dropping the top and bottom 1% of all observations, the mean pre-FOMC announcement return is still very large at 45 basis points while the mean return on all other days is 1 basis point (as evidenced in the second row, the statistical significance increases). The standard deviation of returns remains very similar in both samples. While the skewness of pre-FOMC announcement returns somewhat falls without the tail observations, it is still positive while that on all other days remains negative. Finally, the kurtosis is now similar in both trimmed samples.

[9]The top and bottom 1% of pre-FOMC returns amount to only two observations. The largest positive outlier is a 9.5% return on October 29, 2008. News reports on that day partly attributed the surge in equity prices to speculation that the FOMC may cut interest rates the next day. Moreover, talk of a federal rescue for General Motors and Chrysler also may have contributed to the price action. The largest negative outlier is a -2.9 % return on June 26, 2002, driven mainly by news of an accounting fraud at phone company WorldCom.

As noted above about three quarters of the pre-FOMC return observations have been positive. Have all these observations been clustered together in the 17 year long sample period that we study? Figure 3 shows the time series of 2pm-2pm pre-FOMC announcement returns (thin red line) along with the one-year moving average of these returns (black line) and on non-FOMC days (grey line).[10] As seen from the red line positive and negative returns on FOMC days have been rather equally distributed in the sample period. One-year average returns remained positive for very long periods of time, and turned negative only in two brief periods in 2002 and 2010. We will study possible determinants of the pre-FOMC returns in Section 4.2.1. Before doing so, we turn briefly to the pre-FOMC return pattern on sorted equity portfolios, foreign equities and on SPX index returns around other major macroeconomic announcements.

3.2 Cross-sectional Evidence

This section shows that U.S equity excess returns around FOMC announcements have been broad based across industry- and size-sorted portfolios. We also characterize the cross-section of these returns and show that a single market factor model captures a significant fraction of the portfolio variation on FOMC announcement days. Because of limited availability of intra-day data at the disaggregated level, this evidence is based on daily close-to-close returns.

Table 5 summarizes results of the dummy variable regression (1) including a constant, a FOMC dummy for excess returns on the CRSP value/equal weighted, and ten value weighted portfolios sorted by firm size. Not surprisingly, the return pattern for the value-weighted portfolio (column 1) is very similar to that for the close-to-close return on the S&P500 index (Table 3). Indeed, the return differential has been a highly significant 36 basis points, FOMC announcement days have accounted for the majority of the annual equity premium in the sample, and the Sharpe ratio of an FOMC-only investment strategy has been equal to 0.92.

The daily excess return differential on the CRSP equal weighted market portfolio (column 2) on FOMC days has been somewhat smaller at 25 basis points, but still highly statistically significant. Since the equal weighted portfolio attributes a large weight to small firms relative to their share of total market capitalization, this finding suggests the FOMC return differential may be somewhat lower for small firms. This conjecture is confirmed by the results for the size decile portfolios shown in the remaining columns of Table 5. Indeed, the

[10]The large right-tailed observation (October 29, 2008) that we exclude in Table 4 is excluded from the pre-FOMC moving average and marked with an "X".

portfolio containing the smallest firms earned an average excess return of 20 basis points on FOMC announcement days.[11] All remaining decile portfolios, instead, displayed differential returns ranging between 31 to 46 basis points, with Sharpe ratios between 0.8 to 1.07.

Table 6 provides estimates for the dummy variable regressions for the 49 industry sorted portfolios from Ken French's website. While there is some cross-sectional dispersion of FOMC announcement day returns across industries, the excess return differential is broad-based. Indeed, 36 out of 49 industry portfolios feature excess returns on FOMC announcement days that are statistically significantly different from zero at least at the 5 percent level. Among these, the dummy variable coefficients range from 23 basis points for the consumer goods industry (HSHLD) to 69 basis points for trading firms (FIN). A group of only ten industries as diverse as Agriculture (AGRIC), Food products (FOOD), Utilities (UTIL), and Telecommunication (TELCM) do not feature statistically significant excess returns on scheduled FOMC announcement days.

It is natural to ask whether the average FOMC announcement day returns in different industries are in line with their typical comovement with the market portfolio, as would be implied by the Capital Asset Pricing Model (CAPM). To answer this question, we estimate industry betas from a regression of the excess return in each industry on the excess return of the CRSP value-weighted market portfolios.[12] We then estimate a regression of average excess returns on the 59 industry and size portfolios on the estimated betas. Figure 4 shows a scatter plot of observed average FOMC announcement day returns against the fitted values from this regression. We superimpose the estimated regression line (dashed) as well as the 45 degree line (solid). The chart shows that the single market factor model provides a fairly good description of the cross-section of FOMC announcement day returns. Indeed, the slope coefficient λ, which represents the price of market risk, is estimated to be 49 basis points and highly statistically significant. By contrast, the constant α in the regression is not statistically different from zero. Moreover, the adjusted R-squared of the CAPM regression on FOMC announcement days is 64 percent. In sharp contrast to the poor fit of the CAPM on all daily returns (Fama and French [1993]), these results suggest that the observed cross-sectional variation of FOMC announcement day returns is well captured by exposure to aggregate market risk.[13]

[11] This smallest market cap portfolio contains on average about 50 percent of all firms in the CRSP universe.

[12] We run this regression using daily data including FOMC announcement days. Dropping these days from the sample barely affects the β estimates.

[13] At announcement, Bernanke and Kuttner [2005] also find that the CAPM does a good job at explaining the cross-sectional variation of the response of different industry portfolio returns to monetary policy shocks.

3.3 International Evidence

Previous research has documented ample evidence of international stock return comovement (e.g. Karolyi and Stulz [1996], Forbes and Rigobon [2002], and Bekaert, Hodrick, and Zhang [2009]). This evidence suggests that international equity indices may also feature an FOMC equity return differential.

To assess this question, we first reestimate model (1) with a constant and a FOMC dummy on daily close-to-close excess returns of major OECD stock indices. The results of these regressions are documented in Table 7. The first five columns report estimates based on excess returns on the German DAX, the British FTSE 100, the French CAC40, the Spanish IBEX, as well as the Swiss SMI. Importantly, because of the time offset the close-to-close returns on these European stock indices never include scheduled FOMC announcements and thus provide estimates of pre-FOMC announcement returns. The FOMC dummy variables in all five countries are highly statistically significant and economically large, with estimates ranging from 29 basis points in Switzerland to 53 basis points in France. In all five countries the share of the equity premium earned on FOMC announcement days has been substantial since 1994, and the Sharpe ratios of an FOMC only investment strategy range between 0.75 and 1.07. Results for the Canadian TSX index and the Japanese NIKKEI 225 are reported in the last two columns of Table 7. The TSX shows a statistically significant albeit lower FOMC announcement day return than the European indices.[14] Interestingly, the NIKKEI index is the only major stock market index that does not feature a significant FOMC announcement day return.

Figure 5 visualizes these results. It displays cumulative returns over the trading hours of the respective exchange on the international stock indices on three days around scheduled FOMC announcements, and the SPX cumulative return is superimposed for reference (it is the same as in Figure 1). The international pattern of intraday stock returns is very similar to that in the U.S. In other words, the large pre-FOMC return appears to be a global phenomenon. In unreported results, we also investigated whether European, UK and Japan stock indices feature similar return patterns around its corresponding central bank's monetary policy announcement days, but we failed to find such effects. While a global phenomenon, the pre-announcement return is thus specific to U.S. monetary policy decisions. In the next section, we show that this effect is also absent for other major U.S. macroeconomic announcements.

[14]Note that the TSX is computed from close prices taken after the FOMC announcement and therefore potentially contains both a pre-announcement and a post-announcement component.

3.4 Other Macroeconomic Announcements and Other Assets

In this Section, we first document that the SPX does not feature abnormal excess returns around other major macroeconomic announcements. We then show that fixed income assets and major currencies do not exhibit abnormal pre-FOMC announcement returns.

We consider a set of nine major economic releases: weekly initial claims for unemployment insurance (INCLM) released by the U.S. Department of Labor, the advance GDP (GDPADV) estimate released quarterly by the Bureau of Economic Analysis (BEA), the monthly Institute for Supply Management's (ISM) manufacturing index, Industrial Production (IP) released monthly by the Board of Governors of the Federal Reserve, Housing Starts (HS) published monthly by the Census Bureau as well as Personal Income (PI) released monthly by the BEA. Except for IP, which is released at 9:15 am ET, and the ISM, which is released at 10:00 am ET, all these data releases occur at 8:30 am ET. To parse out both the pre-announcement and announcement effects, we run two regressions for each release: one where the dummy variable equals one on the release date (announcement effect), and one where the event dummy equals one on the day prior to the release (pre-announcement effect).

As shown in Table 8, only the ISM release features a significant announcement day excess return of 23 basis points over our sample period. All other macroeconomic releases do not feature statistically significant pre-announcement or post-announcement returns in our sample.

In a recent paper, Savor and Wilson [2010] use a joint sample of FOMC, employment, and inflation releases in the 1958-2009 sample, and find a differential average excess return of the CRSP value-weighted market return of about 10 basis points on these announcement days. The return they consider is close-to-close, and the authors rationalize their result with jump-risk at the announcement. The results for our shorter sample suggest that the macroeconomic announcement returns tare driven by the pre-FOMC announcement drift. As we discuss in detail in Section 4.1.1, because of their timing these returns cannot be rationalized with jump risk.

We next study the pre-FOMC announcement returns on other asset classes. We focus on securities known to be responsive to monetary policy decisions: short-term rate derivatives, 2- and 10-year Treasury yields, and the exchange rate value of the U.S. dollar against the Yen and Euro.[15] The short-term rate derivatives that we consider are standard market implied measures of policy rate expectations: the first and second fed funds futures contracts, which

[15]See Kuttner [2001] and Bernanke and Kuttner [2005], for asset responses to policy rate decisions, and Gürkaynak, Sack, and Swanson [2005] and Lucca and Trebbi [2009] for responses to the content of the statements. Note that we use the DM/USD exchange rate prior to January 1999.

measure policy expectations one- and two-months out. Because the liquidity of fed funds futures drops at longer horizons, we use eurodollar futures for expectations one-year out (4th quarterly contract). Table 9 provides dummy variable regression results for these securities. As none of the coefficients is statistically significant, it clearly shows that the pre-FOMC announcement drift is specific to equities. We now turn to potential explanations of the empirical findings documented thus far.

4 Discussion

In this section, we attempt to rationalize the pre-FOMC drift with a few alternative explanations. We start by testing the robustness of our findings to possible data-snooping. We then turn to a few standard risk-based explanations, and finally attempt to reconcile our findings with models of political risk, investor inattention, and time varying stock market participation.

4.1 Data-Snooping and Statistical Significance

As discussed in Section 3, we find the pre-FOMC return to be highly statistically significant. We have also seen that the SPX does not display excess returns ahead of other major U.S. macroeconomic announcements. A skeptical reader may worry that the significance of our finding (and thus the Sharpe-ratios) could be the artificial outcome of an extensive search across the universe of economic news announcements for the highest t-statistic. Of course, such a search would not bias the size of the return.

We address this concern by carrying out a reality check in the spirit of White [2000]. In particular, we simulate the snooping bias by resampling the pre-FOMC return series and collecting the largest t-statistic among the ten economic announcements considered in Table 8 (including the FOMC) for each replication.[16] We find that 99.9 percent of the bootstrap distribution of maximum robust t-statistics are smaller than the value of 4.48 (Table 3, column 3). In other words, the statistical significance of our finding is extremely unlikely to be the result of a data-snooping exercise.

[16]More in detail, we use the block-bootstrap procedure of Politis and Romano [1994] with a smoothing parameter of $q = .5$ to generate 10,000 bootstrap samples of the 2pm-to-2pm excess return on the SPX. For each sampled return series, we loop over the list of ten dummy variables and record the maximum robust t-statistic from each regression in the sample.

4.1.1 Standard Risk Explanations: Consumption, Jumps, Volatility and Liquidity

Recent specifications of the canonical consumption-based asset pricing model, for example featuring habit preferences (Campbell and Cochrane [1999]) or long-run risks (Bansal and Yaron [2004]) have been shown to be consistent with the magnitude of U.S. equity risk premium in the post-war period. In consumption based models, investors demand compensation for holding assets whose payoffs are positively correlated with their marginal utility of consumption. While, of course, it is hard to measure consumption at intraday frequencies, it seems unlikely that its covariance with stock returns would be significantly different in the 24-hour window ahead of FOMC announcements. While this leaves the door open for potential shifts in risk aversion over the 24-hour windows, as a source of the change in the covariance, such shifts would still require an explanation. We next turn to jump risk.

Financial asset prices may jump in response to large unexpected realizations of economic news announcements. As the direction of the surprise is not predetermined, holding financial assets around economic announcements is a risk that investors need to be compensated for. Previous research has found that this risk is priced in equities (e.g., Pan [2002]). Figure 6 plots the five-minute moving sums of squared tick-by-tick returns on the SPX in the three-day window around the FOMC announcement. As one may suspect, realized volatility jumps at 2:15pm on scheduled FOMC days. Yet, as we documented above, the FOMC announcement return is earned before the actual release. Because of the timing difference, it is therefore difficult to reconcile the pre-FOMC drift with pure jump risk at the announcement. That being said, we will discuss alternative models below in which informational frictions or limited market participation can give rise to smooth asset price adjustments in anticipation of events that represent jump risks.

We turn next to volatility and liquidity risk. First we note from Figure 6 that realized volatility is somewhat lower ahead of the FOMC announcement, and, as discussed below, the same holds for implied volatility (as measured by the VIX). Starting with Black [1976], a number of papers have shown a negative contemporaneous correlation between volatility and returns. Campbell and Hentschel [1992], in particular, discuss a "volatility feedback effect" where causality runs from volatility to returns. In that explanation, because of its persistence, an unexpected decline in volatility leads to a downward revision of future expected volatility, and thus to lower risk.

A large literature has also documented a negative correlation between equity returns and trading liquidity (Amihud and Mendelson [1986], Campbell, Grossman, and Wang [1993], Pastor and Stambaugh [2003] and Acharya and Pedersen [2005] among others). While most

of the literature focuses on the cross-section of returns, a few papers have also studied the impact of liquidity on market-wide returns.[17]

While we do not observe trades or bid-ask spreads for all SPX constituents on an intraday basis, we proxy liquidity measures for the cash-index basket with measures on tick-by-tick trades and quotes on the SP500 E-mini futures, which started trading in 1997, and the SPDR S&P500 exchange-traded fund (SPY, available to us since 1996). Both track the SPX very closely and exhibit almost identical pre-FOMC announcement returns as the cash index itself.

Figure 7 shows five minute average trading volumes on the most traded (either first- or next-to-front) E-mini SP500 futures contract over the same three-day window as above. Because trading volume has a low-frequency trend in our sample period, we display volume levels relative to their prior 21-day mean. For comparison, we also superimpose intraday average relative volumes on non-FOMC days. Trading volumes on the day prior to an FOMC announcement follow the typical U-shaped pattern on other days. Not surprisingly, on scheduled FOMC days volumes spike at the time of the FOMC announcement. Earlier in the day, trading volumes slowly decline from the high opening levels, as on other days, but bottom out at lower levels.

In sum, volatility and liquidity are both lower in the pre-FOMC drift time window. This is consistent with the fact that no new FOMC information is consistently being released during the purdah period. We assess whether the reduction in these two factors can explain the pre-FOMC return using the simple reduced form regression model (1) and including volatility and liquidity proxies as controls X_t. For volatility, we first obtain its expected and unexpected components with time series regressions of 2pm levels on their lags (i.e. the prior day 2pm level) as well as an FOMC announcement day dummy:

$$\Delta VIX_t = 0.41_{[0.07]} + 0.98_{[0.03]} VIX_{t-1} - 0.28_{[0.16]} \mathbb{1}_t(FOMC) \tag{2}$$

The estimated residual in this regression is a measure of volatility surprises that accounts for the predictably lower level of the VIX on scheduled FOMC days, which has previously been discussed for example by Chuli, Martens, and van Dijk [2010]. We use this innovation as an additional control variable in regression (1) along with the lagged (2pm) level of the VIX. As liquidity proxies we construct a daily series of bid-ask spreads at 2pm, relative trading

[17] Amihud [2002], for instance, constructs an simple measure of illiquidity and documents a positive relationship between illiquidity and future excess returns, and a negative relationship between contemporaneous unexpected illiquidity and excess returns in U.S. equities. He rationalizes the latter result with the notion that higher realized illiquidity increases expected illiquidity which in turn raises expected stock returns and lowers contemporaneous stock prices.

volume in the 2pm-2pm time interval, and Amihud's illiquidity measure over the same time window (the absolute return from 2pm-2pm divided by the dollar volume traded over the previous 24 hours).

Regression estimates are shown in Table 10 where the liquidity measures are defined on the SPY (left-most columns) from January 1996 through March 2011 and the E-mini futures (right-most columns) from September 1997 through March 2011. Because of the slightly shorter samples we first re-estimate the FOMC-only regression, which is the same as in Table 3. Over the shorter samples the pre-FOMC drift is 55 basis points for the SPY and 54 basis points for the E-mini with t-statistics above 5. When we include the liquidity and volatility measures (columns 2 and 4) the coefficients on the dummy variables are essentially unchanged in magnitude while their significance increases notably. In terms of the other controls, the liquidity measures only partially contribute to explaining the returns, while the VIX innovation is statistically significant and of the expected negative sign.[18] In sum, the regression results imply that the lower liquidity and volatility ahead of the announcement cannot quantitatively account for the pre-FOMC drift.

4.2 Non-standard explanations

In the previous section, we found it hard to rationalize the pre-FOMC announcement return with standard risk-based explanations. In this section, we consider possible other, non-standard, explanations. Where these theories give rise to predictions that are testable with the available data, we perform these tests. Before turning to this discussion, we attempt to build some intuition by correlating the time-series of pre-FOMC returns with a few explanatory variables.

4.2.1 The Time Series of Pre-FOMC Announcement Returns

As discussed in Section 3, while mostly positive, the 2pm-2pm pre-FOMC announcement returns display significant variation over time (thin red line in Figure 3). Here we aim to shed some light on the potential sources of this time variation.[19] As potential driving factors of the size of the pre-FOMC drift, we consider business cycles, monetary policy cycles, and market

[18] Because the liquidity measures are correlated with one another, using them jointly in one regression may mask the statistical significance of liquidity due to possible collinearity. Nonetheless, controlling for multiple liquidity measures represents a more powerful test of whether liquidity can explain the equity drift.

[19] For robustness, the large right-tailed observation (October 29, 2008) that we exclude in Table 4 and marked with an "X" in Figure 3 is also omitted in the regression analysis in this section.

participants' expectations of future Fed policy. Table 11 presents parameter estimates for equation (1) with a constant and controls X_t on FOMC announcement days only.

The first column shows a regression of the returns on a recession dummy which takes on the value of one if the corresponding FOMC announcement day fell into a recession as defined by the NBER and zero otherwise. The point estimates of 62 basis points for the recession dummy and of 33 basis points for the constant imply that pre-FOMC returns have been about 29 basis points higher in recessions than in expansions, indicating that the pre-FOMC announcement returns are somewhat counter-cyclical. However, this difference is only statistically different from zero at the 10% level. The second column of Table 11 shows a regression on changes of the federal funds target rate at the policy meeting as well as dummy variables for periods of monetary policy easing and tightening, respectively.[20] While the pre-FOMC returns are not affected by the actual realized policy action, they are larger in periods of monetary policy easing (which to a good extent overlap with recessions), though the coefficient is not significant. The point estimate on thetightening cycle dummy is essentially zero (both statistically and economically).

The controls in column 2 are ex-post measures of monetary policy stance. One might instead think that pre-FOMC equity returns are related to market participants' expectations about the future path of monetary policy. We consider this conjecture next. We measure the expected stance of monetary policy as the difference between the actual target federal funds rate and the expected target rate one year in the future. Because of term-premia and possible liquidity issues in interpreting market-implied measures, we use survey expectations and, in particular, one year ahead consensus forecasts of the federal funds rate from the BlueChip Financial Forecasts survey.[21] In addition to the expected stance of monetary policy, the uncertainty around these expectations might also be important. We therefore complement the regression with the interquartile range of the distribution of federal funds rate predictions one year ahead from the BlueChip survey. This indicator gives us a rough measure of disagreement among forecasters about future FOMC actions.

The third column of Table 11 summarizes the results of the regression of pre-FOMC returns on our proxies of monetary policy expectations. The BlueChip measure of expected policy stance has a negative coefficient, indicating that pre-FOMC returns tend to be higher when

[20] We define tightening cycles as periods during which the federal funds rate target has been increasing and easing cycles as periods during which the target rate as been falling or during which the Federal Reserve conducted large-scale asset purchase programs.

[21] This survey asks some 40 to 50 participants ranging from broker-dealers to economic consulting firms to provide forecasts of the quarterly average of a variety of economic and financial variables up to two years in the future. The survey is conducted towards the end of a calendar month and published at the beginning of the next month. Based on this timing we select the survey that is closest to the next FOMC meeting.

market participants expect the FOMC to loosen policy.[22] At the same time, the coefficient on the disagreement measure is also negative, suggesting that pre-FOMC equity returns tend to be higher when market participants agree more about what the FOMC is likely going to do. Both coefficients are statistically different from zero at the one percent level, and jointly explain about 10 percent of the time series variation of the pre-FOMC drift. However, the large and statistically significant constant in the regression implies that the two variables fail to explain the average magnitude of pre-FOMC returns.

In sum, these results suggest that the pre-FOMC returns tend to be higher in recessions and, more importantly, at times when investors expect the FOMC to loosen its stance of monetary policy. Below, we attempt to fit these facts with the predictions of models with investor inattention, learning and political risk.

4.2.2 Political Risk

Pastor and Veronesi [2011] proposed a general equilibrium model in which the public sector affects stock returns through a policy decision that occurs at specified dates. In their model, investors demand a risk premium for being exposed to political uncertainty regarding the ex-ante unknown policy action. As a result, expected stock returns are higher in periods when investors receive more signals about likely policy changes. Without these signals, stock prices in the political risk model would follow a martingale prior to the announcement and jump at the announcement (driven by a reduction of uncertainty). Hence, learning about the likely outcome of the announcement distinguishes the political risk story from the pure jump risk explanation that we dismissed above.

As discussed above, Federal Reserve officials are subject to a one week purdah period prior to scheduled FOMC announcements. It is therefore implausible to assume that substantial new information about the upcoming policy decision is being released in the 24 hours prior to FOMC announcements. However, media coverage of the Federal Reserve generally picks up markedly before the meeting as illustrated in Figure 8. This chart plots the time series average of the combined number of articles about the Federal Reserve that appeared each day in the print issues of the *Wall Street Journal* and the *Financial Times* over a ten day window around FOMC announcements. While typically the largest number of articles was published the day after FOMC meetings, the figure shows that media coverage increased significantly on the day of the announcement (meaning that the articles have been published before the announcement). Thus, to the extent that investors use media reports to update their beliefs

[22] We find qualitatively similar results when we use the one-year forward three-month overnight index swap (OIS) rate as our expectation measure.

(rather than, for example, speeches by Fed officials occurring in the prior weeks), they may indeed receive signals about future Fed policy right ahead of FOMC announcements and consequently political uncertainty might indeed increase.[23]

The model by Pastor and Veronesi [2011] has at least three testable implications that are relevant in our context. First, the political risk premium is larger in weak economic conditions. Second, stock returns should be more volatile in times of higher political uncertainty. Third, stock returns should be more cross-correlated prior to policy changes. As we have seen in Section 4.2.1, the pre-FOMC announcement return is indeed economically larger in recessions than in expansions, consistent with the political uncertainty model. However, that effect is statistically not very significant as relatively few observations in our sample fall into NBER recession periods. The model's prediction that stock returns are more volatile in periods of political uncertainty is easily dismissed in our data. Indeed, as seen in Figure 6 above, realized stock return volatility tends to be *lower* on the mornings before FOMC announcements than on other days. However, our finding that a single market factor appears to be able to explain the cross-sectional variation of industry returns on FOMC announcement days appears to be in line with the implication of the political risk model that the cross correlation of stocks should be larger on days of higher political uncertainty.

Even without the assumption of more political uncertainty ahead of FOMC meetings, the Pastor-Veronesi model might qualitatively give rise to a pre-FOMC announcement drift. In fact, in their model investors constantly learn about the upcoming policy decision, and thereby reduce their posterior uncertainty about political risk. This implies a positive, but declining, expected instantaneous return as one gets closer to the policy decision. However, because of the constant learning rate in the model, the mechanical reduction in posterior uncertainty would likely imply a long drift into the meeting, rather than the steep one that we observe in the data. With investor inattention, to which we turn in the next section, the learning rate may be discontinuous instead.

In sum, the political risk premium model of Pastor and Veronesi—or some slight modification that allows for media as issuers of public signals—qualitatively captures some of our empirical findings but appears inconsistent with the pre-FOMC volatility pattern.

[23] Related to this interpretation, Tetlock [2011] provides evidence that stale firm-specific news predict future returns, indicating that investors trade based on media articles which contain old information. Huberman [2001] and Carvalho, Klagge, and Moench [2011] discuss specific examples of the large effects of media reports on individual companies' stock prices.

4.2.3 Investor Inattention and Limited Participation

Lamont and Frazzini [2007] have recently documented a qualitatively similar upward drift in individual stock prices prior to scheduled earnings announcements. The authors discuss "attention grabbing" as a potential behavioral explanation of their finding. According to this explanation, investors are more likely to buy stocks which have attracted their attention through media coverage of forthcoming earnings announcements. Since individual investors are often short selling constrained, their decision to sell stocks is likely less affected by such events than their decision to buy stocks. Consequently, information-grabbing events may induce predictable trading behavior of individual investors. While the pre-earnings announcement drift is qualitatively similar to the pre-FOMC announcement drift, and we cannot exclude that such an effect may be at play, it seems unlikely that a bias of small investors could itself generate such large abnormal returns for the aggregate U.S. and other international stock markets.

However, investor inattention is not necessarily an irrational phenomenon and even more sophisticated investors may exhibit some form of inattention. Indeed, as first discussed by Sims [2003], economic agents may face practical constraints as to how much relevant information they can process in real time. Consequently, they may choose to rationally pay attention to some signals with higher precision than others. Such a framework of rationally inattentive investors has recently been employed for example in Kacperczyk, Nieuwerburgh, and Veldkamp [2009] to explain the business cycle variation in the relative performance of mutual fund managers in picking stocks and timing the market. In their model, investors allocate their attention between a signal about the aggregate and a signal about the idiosyncratic component of cash flows, subject to a constraint. At each point in time, investors optimally focus on shocks that have the largest impact on returns.

Such a model might qualitatively explain some of the empirical findings reported above. Indeed, stock market investors may decide to process information about the likely outcome of the FOMC decision only shortly before the announcement when equity returns are more responsive to news about monetary policy. At other times, instead, equity investors may focus on some of the many other factors that affect equity cash flows. The increased media coverage of the Fed right before FOMC announcements documented above is potentially in line with increased investor attention ahead of the announcement. Hence, provided that the FOMC announcement, on average, has a positive impact on stock returns, the information processing constraint may result in a drift prior to the announcement, as investors focus on the announcement only at that time.[24]

[24]Fixed income investors, instead, may pay attention to the Fed at all times, as the future path of short

But why should equity prices react positively to FOMC announcements? In a model with Bayesian mean-variance investors as in Kacperczyk, Nieuwerburgh, and Veldkamp [2009], stock prices may rise because, after learning the signals, posterior expected mean returns are higher and/or the posterior variance of payoffs is lower. That is, positive signals (relative to investors' prior) about a likely policy easing may push equity prices higher. Alternatively, as investors learn more about the likely policy action, posterior uncertainty is reduced and stock prices increase. The time-series evidence in Section 4.2.1 above suggests that both effects may be at work. Indeed, we find that the pre-FOMC announcement returns are high when market participants expect the Fed to loosen monetary policy and when the uncertainty about future Fed policy (as measured by the disagreement among professional forecasters) is low. Hence, if investors only update their expectations about monetary policy shortly before the FOMC announcement, then these two effects could well be consistent with the drift that we observe.

But even if consistent with the time-series pattern, how likely is it that rational inattention could explain the large unconditional return in our sample? While there may indeed be a reduction of posterior variance ahead of FOMC meetings as investors become better informed about monetary policy, the magnitude of this effect would likely be limited. In addition, it is not clear why a similar effect would not be at play on days of important macroeconomic news announcements, such as the employment report, when investors observe other informative signals about the state of the economy. Indeed, as we saw above, these other announcements do not to feature abnormal returns in our sample.

Can higher posterior mean returns explain the large magnitude of the pre-FOMC announcement drift? Our sample from 1994 through 2011 featured a secular decline of policy rates partly owing to the benign U.S. inflation environment over that period, as well as the effects of the 2007-2009 financial crisis. It is precisely in this sample that some commentators and academic paper have thought of central bank policy as having an asymmetric impact on the financial sector, with limited negative impact in booms and support in busts (see, for example, Diamond and Rajan [2011]). Even if one might be inclined to argue that the 17-year-period has been characterized by such an asymmetry, in a rational expectations equilibrium these investors should not have been consistently surprised. In other words, unless one is willing to assume that the Fed systematically surprised equity investors over a 17 year period, the higher-posterior-means channel with investor inattention is unlikely to explain the pre-FOMC announcement drift.

Investor inattention may also give rise to risk premia through time varying stock market

term interest rates is arguably the most important determinant of fixed income returns.

participation. Duffie [2010] presents a model where inattentive investors trade only infrequently and where frequent investors (specialists) earn a premium for bearing a larger share of overall market risk around certain events. The original model studies price dynamics ahead of anticipated supply and demand shocks. In our setup, we consider a slight modification and assume that inattentive investors are less likely to trade shortly ahead of FOMC announcements because of the risk of being at an informational disadvantage over specialists. A larger share of the market risk would then be borne by the specialists, and in the mean-variance setup of Duffie [2010], they will demand compensation in the form of higher expected returns ahead of the announcement. In contrast with the political risk premium model or the rational inattention setup discussed above, in this framework no additional information or increase in overall uncertainty would be required to boost pre-announcement returns. Instead, the positive excess return would be exclusively driven by a temporary reduction of stock market participation.

Qualitatively, such an explanation is appealing as we find that both instantaneous volatility as well as trading volume are somewhat lower just before FOMC announcements, see Section 4.1.1 above. However, the limited participation model would also predict lower returns on days surrounding FOMC announcements when inattentive investors are still in, or return to, the market. We assess whether this may be true by estimating regression (1) for the five days before and after FOMC announcements. Table 12 summarizes these regressions. While the SPX features some negative returns in the five-day windows before and after FOMC announcement days, none of them are statistically significantly different from zero. Moreover, the cumulative returns on the five days before and on the five days after scheduled FOMC announcements are positive and also statistically insignificant. Thus, subject to the power of our tests, we find the limited participation model to be counterfactual on the persistence of the return. In sum, although we see each of the three theories as somewhat appealing, they appear counterfactual in some dimensions.

5 Conclusion

We have documented that U.S. and international equities experienced large excess returns ahead of scheduled FOMC announcements in the 1994-2011 sample period. These returns, which explain very large fractions of the equity premia, are robust to outliers, subsampling and data-snooping. Other asset classes do not feature a pre-FOMC announcement drift, and other macroeconomic news announcements do not generate analogous returns.

Several risk factors—including liquidity, volatility and jump risk—do not seem to account for

the returns. Moreover, the lack of new FOMC-related information ahead of the announcement (*purdah* period) suggests that informational frictions may be an important factor in understanding the returns.

We discussed three pricing models that could yield a smooth drift ahead of announcements featuring political risk (Pastor and Veronesi [2011]), rationally inattentive investors (Kacperczyk, Nieuwerburgh, and Veldkamp [2009]), and limited stock market participation (Duffie [2010]). None of these models is fully consistent with all our findings. The political risk explanation, with agents learning ahead of the announcement, appears at odds with the lower volatility of stock returns in the hours before the FOMC announcement. Rationally inattentive investors that optimally focus on FOMC-relevant information only shortly ahead of the events may generate a drift either because of lower (posterior) variance, as agents update their beliefs through signals, or because of higher (posterior) mean returns following positive signal realizations (that is, when signals point to accommodative policy). We show both effects to be consistent with the time series evidence of pre-FOMC returns. In terms of the unconditional return, however, the magnitude of the variance-reduction channel is to be quantitatively assessed and is prima-facie at odds with the evidence on other major macroeconomic announcements. For the higher mean return channel to explain the unconditional return, instead, agents would have had to be consistently surprised in one direction in the 17-year sample period, which is at odds with rational expectations. Finally the time-varying limited market participation model, which matches the return and liquidity findings, predicts that the abnormal returns ahead of the announcement are reversed after the event. Instead, we find the pre-FOMC drift to be persistent. In sum, as of this paper's writing, the pre-FOMC announcement drift is a puzzle.

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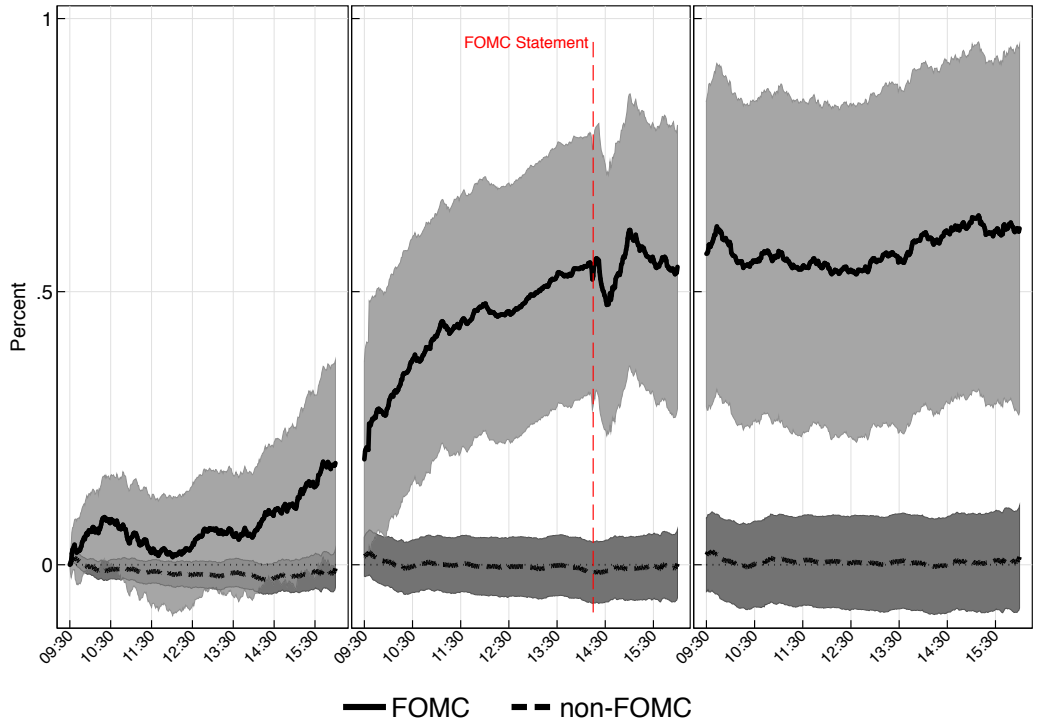
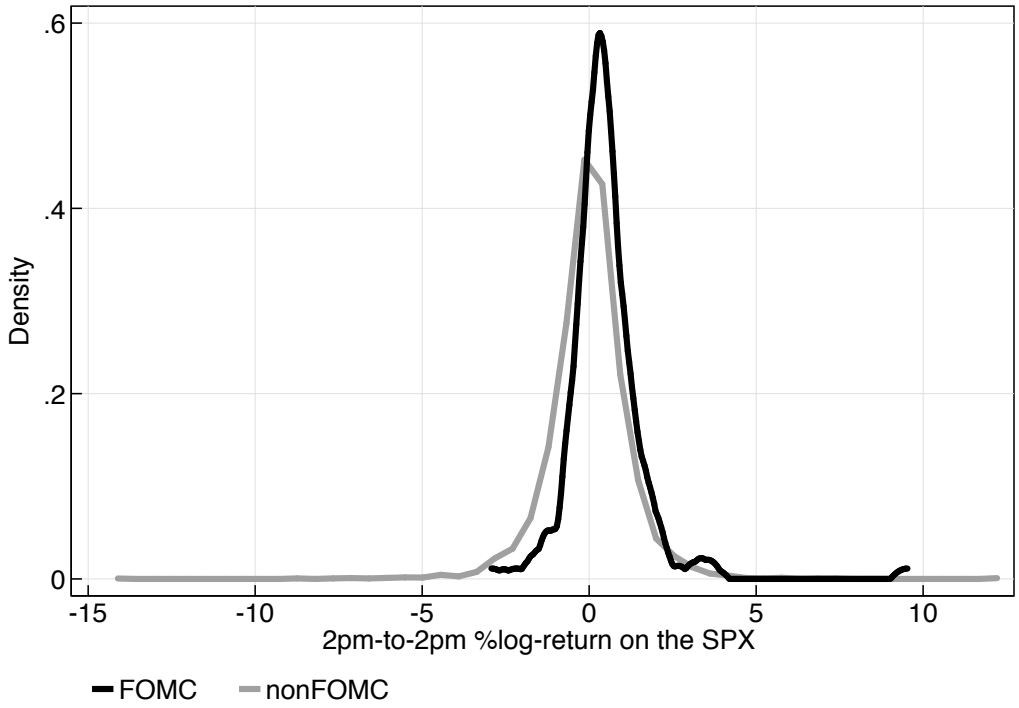
Figure 1: Cumulative Returns on the SPX



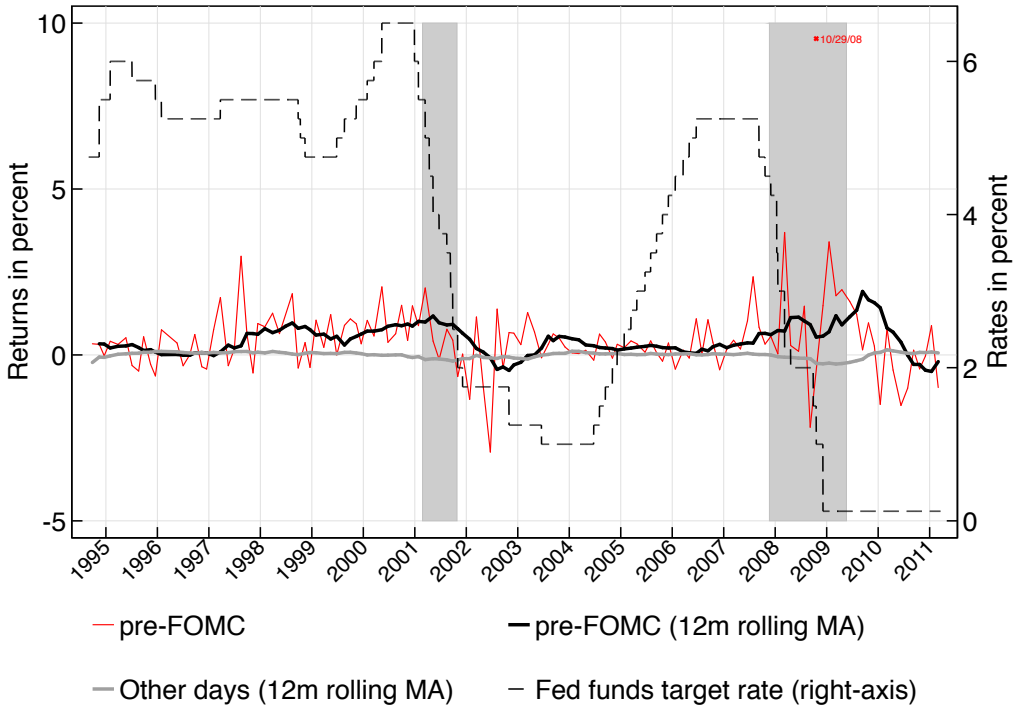
NOTES: This chart plots the average cumulative one-minute return on the S&P500 index (SPX) over a three day window. The solid black line shows the average cumulative return on the SPX from 9:30 a.m. EST on the days before scheduled FOMC announcements until 4:00 p.m. on days after scheduled FOMC announcements. The dashed black line shows the cumulative return on the SPX over all other three day windows. The gray shaded areas denote the pointwise 95% confidence bands around the two means, respectively. The sample period is from September 1994 through March 2011. The dashed vertical red line is set at 2:15 p.m. EST, the time when FOMC announcements were typically released during that period.

Figure 2: Empirical Densities of 2pm-to-2pm SPX Returns



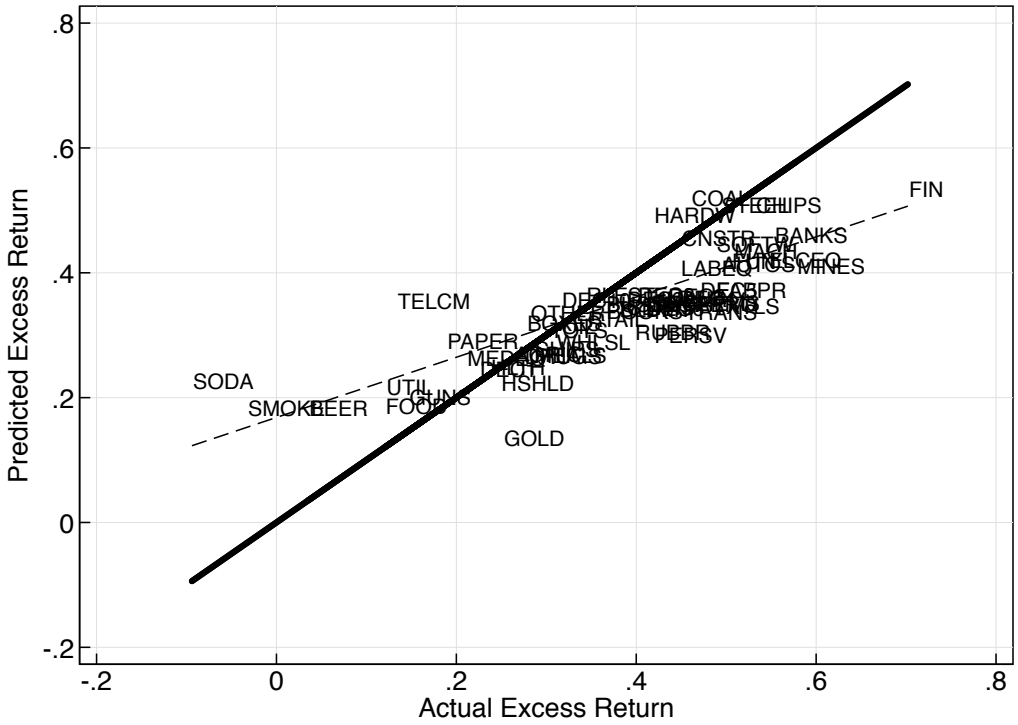
NOTES: This chart plots empirical densities of the 2pm-to-2pm return on the SPX. The solid black line shows the return on days ahead of scheduled FOMC announcements and the gray line shows the return on average cumulative return all other days. The sample period is from September 1994 through March 2011.

Figure 3: Time Series of pre-FOMC Announcement Returns on the SPX



NOTES: This chart plots the time series of 2pm-to-2pm pre-FOMC announcement returns on the SPX. The solid black line shows the one-year moving average of these returns. The sample period is from September 1994 through March 2011.

Figure 4: CAPM for Industry and Size Portfolios on FOMC Announcement Days

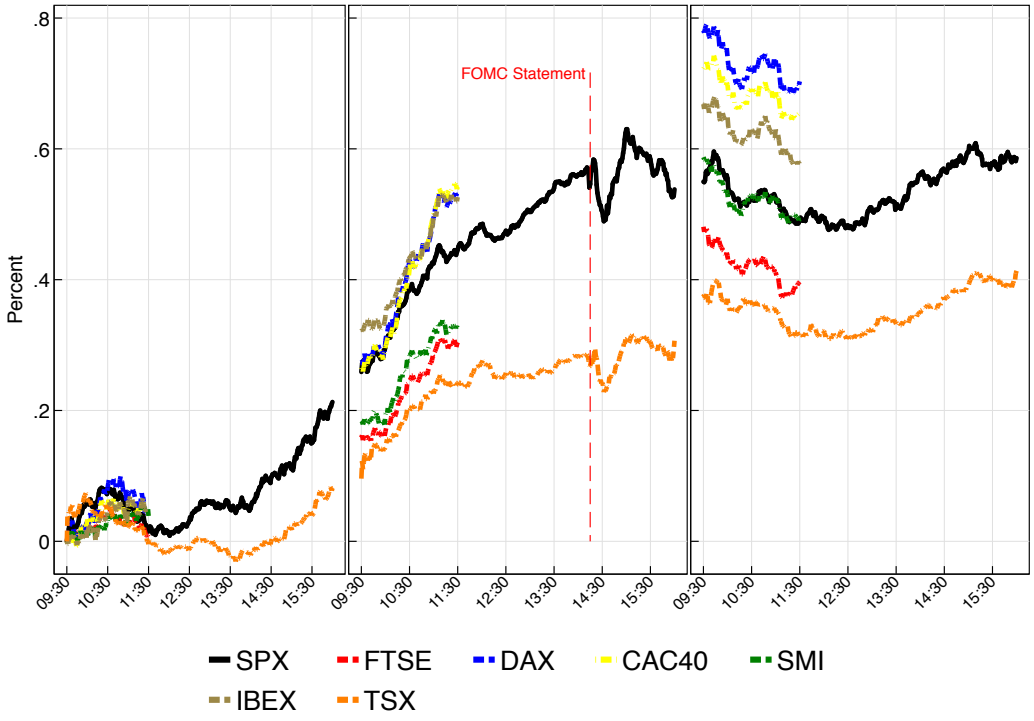


NOTES: This chart documents the fit of the CAPM for the 49 Fama-French industry portfolios and the ten size decile portfolios on FOMC announcement days. For each portfolio, the horizontal axis shows the average excess return earned on scheduled FOMC announcement days (in percent) whereas the vertical axis shows the excess return implied by the CAPM. The sample period is from September 1994 through December 2010. The betas are estimated from a regression of the portfolio's excess return on the excess return of the market portfolio at the daily frequency (using all days in the sample). The result from the second stage cross sectional regression is

$$\bar{R}_{FOMC} = -.099_{[0.10]} + 0.468_{[0.149]}\hat{\beta}$$

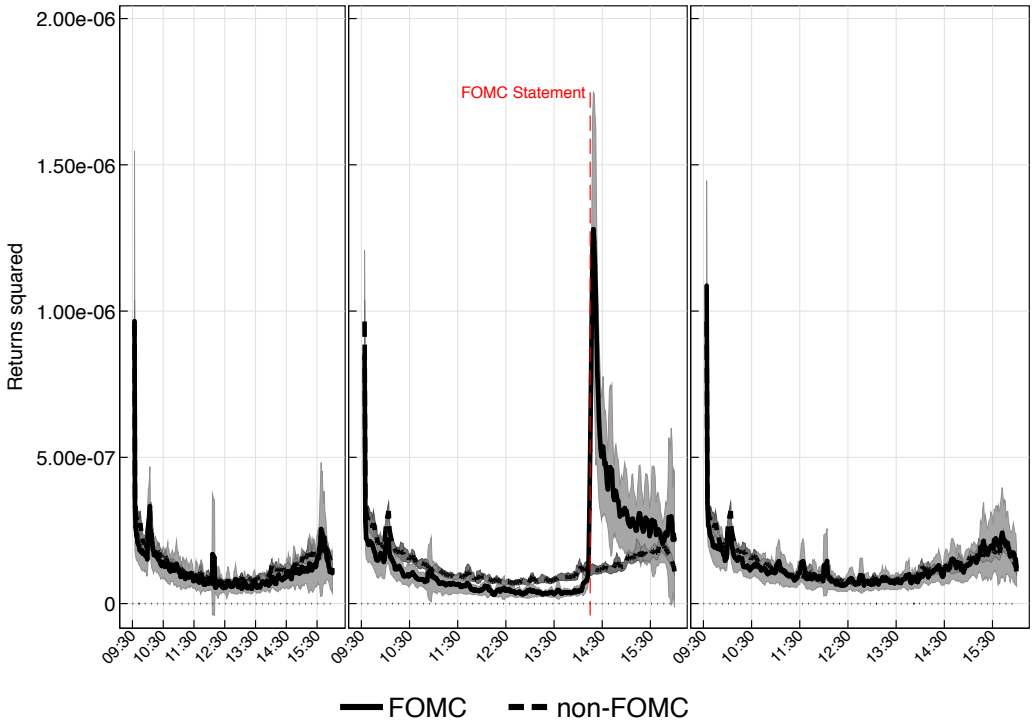
where the standard errors are adjusted for the estimation error in betas following Shanken [1992]. The R^2 of the regression is 65%. The dashed line shows the estimated regression line and the solid black line shows the 45 degree line.

Figure 5: Cumulative Returns on International Stock Market Indexes Around FOMC Announcements



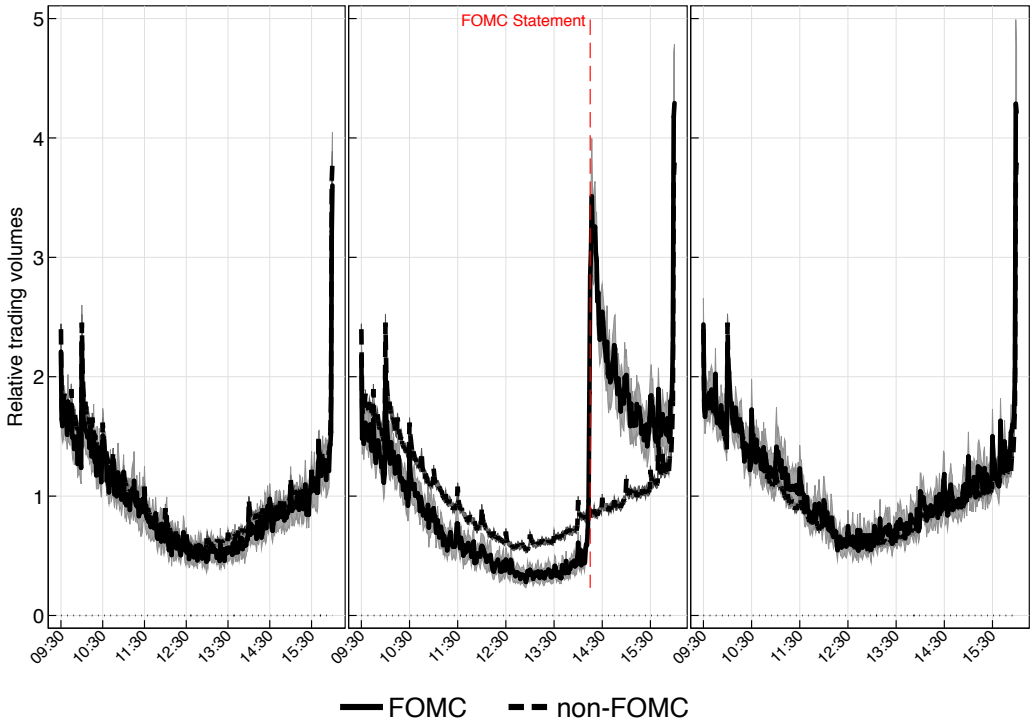
NOTES: This chart plots the average cumulative one-minute return on the SPX and other major international equity market indexes over the three day window around scheduled FOMC announcements. The solid black line shows the average cumulative return on the SPX from 9:30 a.m. EST on the days before scheduled FOMC announcements until 4:00 p.m. on days after scheduled FOMC announcements. The colored dashed lines show the cumulative returns on the German DAX, the U.K.'s FTSE100, the French CAC40, the Spanish IBEX, the Swiss SMI, and the Canadion TSX over the same three day window. All stock indexes are only shown during hours of trading on the respective exchanges. The sample period is from January 1996 through March 2011. The dashed vertical red line is set at 2:15 p.m. EST, the time when FOMC announcements were typically released during that period.

Figure 6: Intraday Realized Volatility of SPX Returns



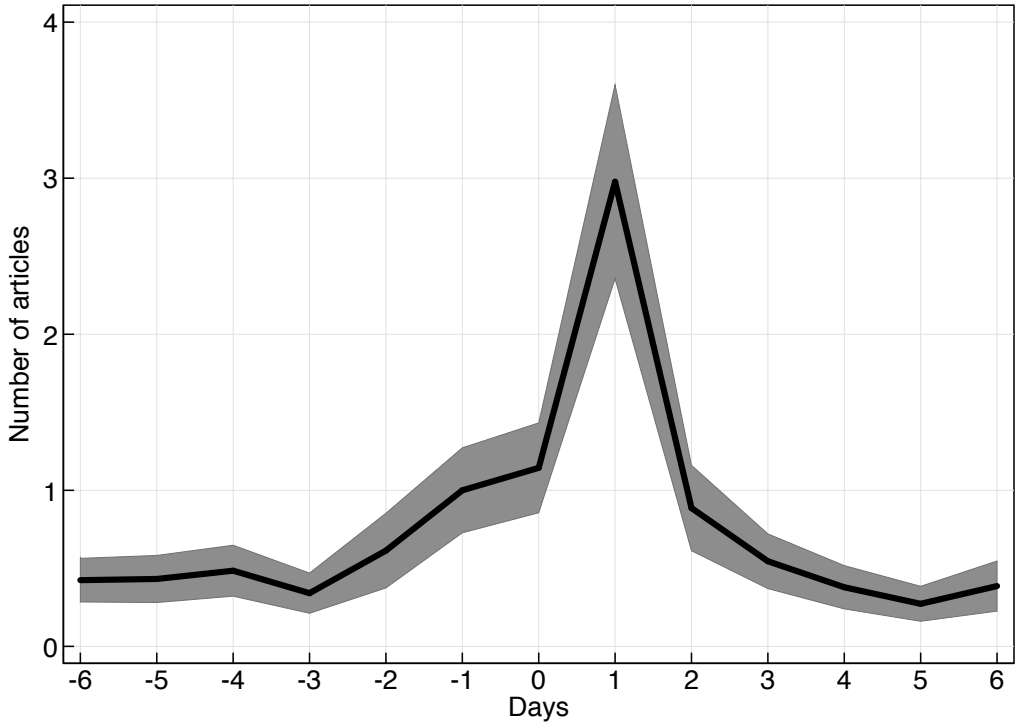
NOTES: This chart documents the pattern of intraday realized volatility over the three day window around scheduled FOMC announcements. The solid black line shows the five minute rolling sum of squared tick-by-tick returns on the SPX from 9:30 a.m. EST on the days before scheduled FOMC announcements until 4:00 p.m. on days after scheduled FOMC announcements. The sample period is from September 1994 through March 2011. The dashed black line shows the same object over all other three day windows. Shaded areas represent pointwise 95% confidence bands around the mean.

Figure 7: Intraday Trading Volumes for the E-mini SP500 Future



NOTES: This chart documents the pattern of intraday trading volume of E-mini SP500 futures over the three day window around scheduled FOMC announcements. The solid black line shows the five minute rolling average of the number of contracts traded from 9:30 a.m. EST on the days before scheduled FOMC announcements until 4:00 p.m. on days after scheduled FOMC announcements. The sample period is from January 1996 through March 2011. The dashed black line shows the same object over all other three day windows. Shaded areas represent pointwise 95% confidence bands around the mean.

Figure 8: Number of Fed-related articles in WSJ&FT around FOMC Announcement Days



NOTES: This chart plots the average number of articles that appear in the print issues of the *Wall Street Journal* and the *Financial Times* on each day around days of scheduled FOMC announcements. The gray shaded area shows the two standard error deviation bands around the average. The sample period is from February 1994 through March 2011.

Table 1: Scheduled FOMC meeting dates and times 1994-2011

year	1st	2nd	3rd	4th	5th	6th	7th	8th
1994	4-Feb-94[e]	22-Mar-94[e]	17-May-94[e]	6-Jul-94[e]	16-Aug-94[e]	27-Sep-94	15-Nov-94	20-Dec-94
	[11:05]	[14:20]	[14:26]	[14:18]	[13:17]	[14:18]	[14:20]	[14:17]
1995	1-Feb-95	28-Mar-95	23-May-95	6-Jul-95	22-Aug-95	26-Sep-95	15-Nov-95	19-Dec-95
	[14:14]	[14:13]	[14:13]	[14:15]	[14:13]	[14:14]	[14:16]	[14:15]
1996	31-Jan-96	26-Mar-96[e]	21-May-96	3-Jul-96	20-Aug-96	24-Sep-96	13-Nov-96	17-Dec-96
	[14:16]	[11:39]	[14:16]	[14:14]	[14:17]	[14:14]	[14:17]	[14:16]
1997	5-Feb-97	25-Mar-97	20-May-97	2-Jul-97	19-Aug-97	30-Sep-97	12-Nov-97	16-Dec-97
	[14:13]	[14:14]	[14:15]	[14:15]	[14:15]	[14:13]	[14:12]	[14:15]
1998	4-Feb-98	31-Mar-98	19-May-98	1-Jul-98	18-Aug-98	29-Sep-98	17-Nov-98	22-Dec-98
	[14:12]	[14:14]	[14:13]	[14:14]	[14:12]	[14:17]	[14:19]	[14:13]
1999	3-Feb-99	30-Mar-99	18-May-99	30-Jun-99	24-Aug-99	5-Oct-99	16-Nov-99	21-Dec-99
	[14:12]	[14:12]	[14:11]	[14:15]	[14:14]	[14:12]	[14:16]	[14:13]
2000	2-Feb-00	21-Mar-00	16-May-00	28-Jun-00	22-Aug-00	3-Oct-00	15-Nov-00	19-Dec-00
	[14:14]	[14:15]	[14:13]	[14:15]	[14:14]	[14:12]	[14:12]	[14:16]
2001	31-Jan-01	20-Mar-01	15-May-01	27-Jun-01	21-Aug-01	2-Oct-01	6-Nov-01	11-Dec-01
	[14:15]	[14:13]	[14:15]	[14:12]	[14:13]	[14:15]	[14:20]	[14:14]
2002	30-Jan-02	19-Mar-02	7-May-02	26-Jun-02	13-Aug-02	24-Sep-02	6-Nov-02	10-Dec-02
	[14:16]	[14:19]	[14:14]	[14:13]	[14:14]	[14:12]	[14:14]	[14:13]
2003	29-Jan-03	18-Mar-03	6-May-03	25-Jun-03	12-Aug-03	16-Sep-03	28-Oct-03	9-Dec-03
	[14:16]	[14:15]	[14:13]	[14:16]	[14:15]	[14:19]	[14:14]	[14:14]
2004	28-Jan-04	16-Mar-04	4-May-04	30-Jun-04	10-Aug-04	21-Sep-04	10-Nov-04	14-Dec-04
	[14:14]	[14:15]	[14:16]	[14:18]	[14:15]	[14:15]	[14:15]	[14:15]
2005	2-Feb-05	22-Mar-05	3-May-05	30-Jun-05	9-Aug-05	20-Sep-05	1-Nov-05	13-Dec-05
	[14:17]	[14:17]	[14:16]	[14:15]	[14:17]	[14:17]	[14:18]	[14:13]
2006	31-Jan-06	28-Mar-06	10-May-06	29-Jun-06	8-Aug-06	20-Sep-06	25-Oct-06	12-Dec-06
	[14:14]	[14:17]	[14:17]	[14:16]	[14:14]	[14:13]	[14:13]	[14:14]
2007	31-Jan-07	21-Mar-07	9-May-07	28-Jun-07	7-Aug-07	18-Sep-07	31-Oct-07	11-Dec-07
	[14:14]	[14:15]	[14:15]	[14:14]	[14:14]	[14:15]	[14:15]	[14:15]
2008	30-Jan-08	18-Mar-08	30-Apr-08	25-Jun-08	5-Aug-08	16-Sep-08	29-Oct-08	16-Dec-08
	[14:14]	[14:14]	[14:15]	[14:19]	[14:13]	[14:14]	[14:17]	[14:11]
2009	28-Jan-09	18-Mar-09	29-Apr-09	24-Jun-09	12-Aug-09	23-Sep-09	4-Nov-09	16-Dec-09
	[14:14]	[14:17]	[14:16]	[14:18]	[14:16]	[14:16]	[14:18]	[14:15]
2010	27-Jan-10	16-Mar-10	28-Apr-10	23-Jun-10	10-Aug-10	21-Sep-10	3-Nov-10	14-Dec-10
	[14:17]	[14:14]	[14:14]	[14:16]	[14:15]	[14:15]	[14:16]	[14:15]
2011	26-Jan-11	15-Mar-11	27-Apr-11[e]	22-Jun-11[e]	9-Aug-11[e]	20-Sep-11[e]	2-Nov-11[e]	13-Dec-11[e]
	[14:16]	[14:13]	[12:34]	[12:27]	[14:18]	[14:23]	[12:33]	[14:12]

NOTES: This table reports dates of scheduled FOMC meetings. The marker "[e]" denotes meetings that are excluded from our sample. The time of the announcements, reported in square brackets, from 1994 to 2004 are from Fleming and Piazzesi [2005] and are based on the time-stamp of Bloomberg or Dow Jones newswires. We update this list for the remaining sample using the same method.

Table 2: Descriptive Statistics

	FOMC					non-FOMC				
	Mean	St.Dev.	Max	Min	N.Obs.	Mean	St.Dev.	Max	Min	N.Obs.
SPX-2pm	.488	1.215	9.531	-2.927	131	.004	1.218	12.064	-13.962	4011
SPX	.338	1.144	5.006	-2.571	132	.009	1.262	10.953	-9.464	4034
MKTVW	.365	1.118	5.168	-2.593	132	.01	1.25	10.898	-9.43	4043
MKTEW	.31	.949	4.657	-2.063	132	.061	1.063	10.196	-8.376	4043
DAX	.472	1.251	4.43	-3.232	130	.011	1.536	10.798	-7.439	4064
FTSE100	.341	1.204	7.742	-3.494	132	-.003	1.215	9.385	-9.264	4052
CAC40	.528	1.42	8.84	-2.526	131	-.003	1.469	10.601	-9.466	4073
IBEX	.511	1.346	9.009	-3.453	131	.01	1.466	13.502	-9.58	4033
SMI	.301	1.141	5.993	-3.014	132	.015	1.245	10.788	-8.106	4019
TSX	.225	.982	3.753	-2.07	131	.015	1.144	9.37	-9.78	4016
NIKKEI	.008	1.805	7.463	-11.146	125	-.017	1.557	13.24	-12.104	3947
FF1	.001	.053	.48	-.155	131	-.001	.039	.48	-.985	3905
FF2	-.004	.051	.21	-.165	131	-.001	.032	.47	-.52	3905
ED4	-.012	.086	.225	-.25	120	-.002	.08	.735	-.475	3670
Tsy2Y	-.006	.071	.226	-.231	131	-.001	.061	.367	-.469	3838
Tsy10Y	-.002	.074	.194	-.516	130	-.001	.061	.334	-.275	3810
EURUSD	-.065	.57	1.228	-2.961	132	-.001	.641	3.003	-4.621	4036
YENUSD	.075	.626	1.864	-1.958	132	-.007	.725	3.24	-5.63	4037
AMIHUD	.00002	.00005	.0004	0	120	.00002	.00005	.001	0	3686
VOLUME	.825	.351	2.675	.294	120	1.041	.419	5.283	.129	3686
lVIX-2pm	23.613	9.541	75.52	11.04	120	23.005	9.004	76.63	9.82	2995
VIXres-2pm	0	1.467	5.565	-6.3	118	0	1.669	19.936	-12.24	2930

NOTES: This table reports summary statistics for the variables used in this paper on FOMC days and non-FOMC days. The sample period is 1994:09-2011:03. SPX-2pm denotes the cum-dividend log excess return on the S&P500 index from 2pm the previous day to 2pm the current day. SPX denotes the close-to-close log excess return on the S&P500 index. MKTVW is the value-weighted market return from CRSP and MKTEW is the corresponding equally-weighted return. DAX, FTSE100, CAC40, IBEX, SMI, TSX and NIKKEI denote the close-to-close cum-dividend log excess returns German, British, French, Spanish, Swiss, Canadian, and Japanese benchmark stock indexes, respectively. FF1, FF2, and ED4 are the daily rate changes implied by the first and second Federal funds futures contract as well as the fourth Eurodollar contract. Tsy2Y and Tsy10y are the daily rate changes for the on-the-run Treasury notes for the 2-year and 10-year maturity. EURUSD and YENUSD are the daily log change in the spot exchange rate of the US Dollar with respect to the EURO and the YEn, respectively. AMIHUD is the daily Amihud price impact measure (absolute price change divided by total number of shares traded) for the SPY exchange traded fund. VOLUME denotes the trading volume (number of shares traded) for the SPY relative to its past 21-day moving average. lVIX is the level of the VIX at 2 pm on the previous day and VIXres-2pm is the estimated residual of regression 2.

Table 3: Main Regression Table: Daily SPX excess returns

Dependent Variable: SPX %log-excess-return					
Type of return:		2pm-to-2pm	2pm-to-close	close-to-close	
FOMC dummy	0.488	0.484	0.002	0.330	0.049
	[0.11]***	[0.11]***	[0.09]	[0.10]***	[0.06]
Const.		0.004		0.009	0.015
		[0.02]		[0.02]	[0.01]
Annual ex-return FOMC		3.89		2.70	0.62
Annual ex-return non-FOMC		0.89		2.03	3.65
FOMC Sharpe Ratio		1.14		0.84	0.20
Obs.		4142		4166	6066
N. of FOMC		131		132	236
Dates		Sep94-Mar11		Sep94-Mar11	Feb70-Jan94

NOTES: Standard errors in brackets. *** significant at 1%, ** significant at 5%, *significant at 10%. Robust standard error shown in brackets. FOMC Sharpe Ratio are annualized Sharpe-ratios on FOMC dates.

Table 4: Summary Statistics: 2pm-to-2pm SPX log-excess returns

	All Observations		**Excl. top/bottom 1**	
	FOMC	nonFOMC	FOMC	nonFOMC
Mean	.488	.004	.445	.009
	[.11]	[.02]	[.08]	[.02]
St. Dev.	1.22	1.22	.88	.99
Skew	3.18	-.24	.61	-.16
Kurtosis	25.61	15.91	5.22	3.71
Max	9.53	12.06	3.69	3.08
Min	-2.93	-13.96	-2.18	-3.25
Obs.	131	4011	129	3931

NOTES: This table reports summary statistics for the 2pm-2pm log excess returns on the SPX on FOMC days and non-FOMC days. Standard errors for the mean reported in square brackets. The sample period is Sep, 1 1994 to Mar 31, 2011.

Table 5: CRSP Size Portfolio Regressions

Dependent Variable: %Log-excess-return of CRSP portfolio index						
Portfolio:	Value Weighted	Equal Weighted	1st Decile	2nd Decile	3rd Decile	4th Decile
FOMC dummy	0.36	0.25	0.20	0.40	0.42	0.44
	[0.10]***	[0.08]***	[0.08]**	[0.12]***	[0.12]***	[0.11]***
Const.	0.01	0.06	0.02	0.02	0.01	0.01
	[0.02]	[0.02]***	[0.02]	[0.02]	[0.02]	[0.02]
Annual ex-return FOMC	2.91	2.47	1.79	3.31	3.46	3.55
Annual ex-return non-FOMC	2.24	15.37	5.49	3.49	3.44	2.15
FOMC Sharpe Ratio	0.92	0.92	0.71	0.85	0.93	0.98
Portfolio:	5th Decile	6th Decile	7th Decile	8th Decile	9th Decile	10th Decile
FOMC dummy	0.46	0.40	0.39	0.39	0.37	0.31
	[0.11]***	[0.10]***	[0.10]***	[0.10]***	[0.10]***	[0.10]***
Const.	0.01	0.01	0.02	0.01	0.02	0.01
	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]
Annual ex-return FOMC	3.75	3.27	3.27	3.19	3.09	2.52
Annual ex-return non-FOMC	2.59	3.45	4.29	3.21	3.63	1.73
FOMC Sharpe Ratio	1.07	1.03	1.05	0.99	0.98	0.80

NOTES: Standard errors in brackets. *** significant at 1%, ** significant at 5%, *significant at 10%. Robust standard error shown in brackets. Sample starts on Sep 1, 1994 and ends on Mar 31, 2011 (4166 daily observations).

Table 6: CRSP Value-Weighted Industry Portfolio Regressions

Dependent Variable: %log-excess-return of CRSP industry portfolio							
Industry Portfolio:	AGRIC	FOOD	SODA	BEER	SMOKE	TOYS	FUN
FOMC dummy	0.24	0.10	−0.14	0.01	−0.07	0.32	0.50
	[0.17]	[0.08]	[0.22]	[0.09]	[0.15]	[0.12]**	[0.19]***
FOMC Sharpe Ratio	0.39	0.37	−0.10	0.09	−0.06	0.61	0.66
Industry Portfolio:	BOOKS	HSHLD	CLTHS	HLTH	MEDEQ	DRUGS	CHEMS
FOMC dummy	0.37	0.23	0.38	0.24	0.19	0.26	0.44
	[0.12]***	[0.09]**	[0.13]***	[0.11]**	[0.10]*	[0.10]***	[0.12]***
FOMC Sharpe Ratio	0.73	0.67	0.77	0.57	0.54	0.72	0.98
Industry Portfolio:	RUBBR	TXTLS	BLDMT	CNSTR	STEEL	FABPR	MACH
FOMC dummy	0.39	0.51	0.38	0.43	0.50	0.51	0.49
	[0.12]***	[0.16]***	[0.13]***	[0.18]**	[0.16]***	[0.19]***	[0.13]***
FOMC Sharpe Ratio	0.80	0.77	0.70	0.63	0.78	0.64	0.98
Industry Portfolio:	ELCEQ	AUTOS	AERO	SHIPS	GUNS	GOLD	MINES
FOMC dummy	0.52	0.51	0.45	0.25	0.13	0.26	0.56
	[0.14]***	[0.14]***	[0.15]***	[0.14]*	[0.13]	[0.22]	[0.16]***
FOMC Sharpe Ratio	0.97	0.86	0.79	0.49	0.29	0.28	0.89
Industry Portfolio:	COAL	OIL	UTIL	TELCM	PERSV	BUSSV	HARDW
FOMC dummy	0.40	0.29	0.10	0.13	0.42	0.36	0.40
	[0.27]	[0.12]**	[0.09]	[0.12]	[0.13]***	[0.10]***	[0.17]**
FOMC Sharpe Ratio	0.43	0.67	0.34	0.28	0.83	0.93	0.63
Industry Portfolio:	SOFTW	CHIPS	LABEQ	PAPER	BOXES	TRANS	WHLSL
FOMC dummy	0.48	0.54	0.44	0.18	0.27	0.45	0.30
	[0.15]***	[0.16]***	[0.13]***	[0.10]*	[0.12]**	[0.11]***	[0.10]***
FOMC Sharpe Ratio	0.80	0.82	0.83	0.46	0.57	0.99	0.78
Industry Portfolio:	RTAIL	MEALS	BANKS	INSUR	RLEST	FIN	OTHER
FOMC dummy	0.33	0.27	0.56	0.42	0.35	0.69	0.30
	[0.12]***	[0.11]**	[0.19]***	[0.14]***	[0.16]**	[0.19]***	[0.12]***
FOMC Sharpe Ratio	0.74	0.64	0.72	0.77	0.52	0.92	0.61

NOTES: Standard errors in brackets. *** significant at 1%, ** significant at 5%, *significant at 10%. Robust standard error shown in brackets. Sample starts on Sep 1, 1994 and ends on Mar 31, 2011 (4166 daily observations).

Table 7: International Stock Market Index Regressions

Dependent Variable: %log-excess-return of stock market index							
Stock Market Index:	DAX	FTSE100	CAC40	IBEX	SMI	TSX	NIKKEI
FOMC dummy	0.46	0.34	0.53	0.50	0.29	0.21	0.02
	[0.11]***	[0.11]***	[0.13]***	[0.12]***	[0.10]***	[0.09]**	[0.16]
Const.	0.01	−0.00	−0.00	0.01	0.02	0.01	−0.02
	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]
Annual ex-return FOMC	3.69	2.71	4.15	4.05	2.41	1.79	0.06
Annual ex-return non-FOMC	2.63	−1.17	−1.68	1.31	2.34	3.20	−4.08
FOMC Sharpe Ratio	1.07	0.80	1.05	1.07	0.75	0.65	0.01
Obs.	4194	4184	4204	4164	4151	4147	4072
N. of FOMC	130	132	131	131	132	131	125

NOTES: Standard errors in brackets. *** significant at 1%, ** significant at 5%, *significant at 10%. Robust standard error shown in brackets. Sample starts on Sep 1, 1994 and ends on Mar 31, 2011.

Table 8: Other Macroeconononomic Announcements

Dependent Variable: %close-to-close SPX log-excess-return										
Event:	NFPAY		INCLM		GDPADV		ISM		IP	
Event_t Dummy	0.10		−0.01		0.02		0.23		0.05	
	[0.09]		[0.05]		[0.16]		[0.10]**		[0.09]	
Event_{t+1} Dummy		−0.09		−0.01		0.10		−0.04		0.01
		[0.09]		[0.05]		[0.14]		[0.09]		[0.10]
No. of events		199		856		60		202		199
Event:	HSTART		PPI		CPI		PI		ALL	
Event_t Dummy	0.05		0.04		0.04		0.03		0.04	
	[0.09]		[0.10]		[0.09]		[0.09]		[0.04]	
Event_{t+1} Dummy		0.13		−0.11		−0.07		−0.00		−0.01
		[0.09]		[0.08]		[0.10]		[0.09]		[0.04]
No. of events		200		201		202		199		1976

NOTES: Standard errors in brackets. *** significant at 1%, ** significant at 5%, *significant at 10%. Robust standard error shown in brackets. Sample starts on Sep 1, 1994 and ends on Mar 30, 2011 (4386 daily observations). The table does not report the coefficient on a constant, which is included in each regression. The events are: Employment Report (NFPAY), Initial Claims (INCLM), Advance GDP (GDPADV), ISM manufacturing index (ISM), Industrial Production (IP), Housing Starts (HS), Producer Price Index (PPI), Consumer Price Index (CPI), Personal Income (PI), All economic releases (ALL).

Table 9: Other Asset Classes

Dependent Variable:	%Δ Yields in					%ΔLog Exchange Rates	
Instrument:	FF-1	FF-2	ED-4	TREAS-2Y	TREAS-10Y	USD-EURO	USD-YEN
FOMC dummy	0.002	−0.003	−0.011	−0.005	−0.001	−0.064	0.083
	[0.00]	[0.00]	[0.01]	[0.01]	[0.01]	[0.05]	[0.06]
Const.	−0.001	−0.001	−0.002	−0.001	−0.001	−0.001	−0.007
	[0.00]*	[0.00]**	[0.00]	[0.00]	[0.00]	[0.01]	[0.01]
Obs.	4036	4036	3790	3969	3940	4168	4169
N. of FOMC	131	131	120	131	130	132	132

NOTES: Standard errors in brackets. *** significant at 1%, ** significant at 5%, *significant at 10%. Robust standard error shown in brackets. Sample starts on Sep 1, 1994 and ends on Mar 30, 2011. FF-1 and -2 are rates implied by the first and second fed funds futures contracts. ED-4 is the 4th eurodollar implied rate. Treas-2y and -10y are yields on the 2- and 10-y benchmark Treasuries. USD-EURO and USD-YEN and exchange rates in percent

Table 10: Controlling for Liquidity and Volatility Risk

Dependent Variable: %Log returns of 2pm-to-2pm SP500 index				
Liqu. defined on:	SPY		SP500 E-mini	
FOMC dummy	0.55	0.53	0.54	0.53
	[0.12]***	[0.07]***	[0.13]***	[0.07]***
Amihud Illiquid.		547.32		97.91
		[300.99]*		[49.30]**
Bid-Ask		0.31		0.34
		[0.27]		[1.25]
Relat. Trade Vols		−0.03		−0.10
		[0.04]		[0.03]***
VIX(lag)		0.00		0.00
		[0.00]		[0.00]
VIX(innovat.)		−0.60		−0.60
		[0.02]***		[0.02]***
Const.	0.00	−0.06	−0.01	−0.06
	[0.02]	[0.07]	[0.02]	[0.31]
Obs.	3574	3574	3189	3189
N. of FOMC	117	117	107	107
Dates	199601.201103	199601.201103	199709.201103	199709.201103

NOTES: *** significant at 1%, ** significant at 5%, *significant at 10%. Robust standard error shown in brackets. FOMC Sharpe Ratio are annualized Sharpe-ratios on FOMC dates.

Table 11: Time-series regressions

Dependent Variable: %2pm-to-2pm SPX log-excess-return			
	(1)	(2)	(3)
NBER	0.62∗		
	[0.33]		
Ease Cycle		0.47	
		[0.43]	
Tight Cycle		0.07	
		[0.26]	
FFtarget		−0.045	
		[0.81]	
Stance			−0.38∗∗∗
			[0.14]
Disagreement			−1.03 ∗ ∗
			[0.42]
Constant	0.33∗∗∗	0.33∗∗∗	1.13∗∗∗
	[0.08]	[0.11]	[0.26]
Observations	130	130	130
Adjusted R^2	0.05	0.01	0.09

NOTES: Standard errors in brackets. *** significant at 1%, ** significant at 5%, *significant at 10%. Robust standard error shown in brackets. The sample starts on Sep 1, 1994 and ends on Mar 30, 2011. The dependent variable is the cum dividend log excess return on the S&P500 from 2pm on the day before a scheduled FOMC announcement to 2 pm on that day. NBER is a dummy variable that takes on the value of one when the corresponding FOMC day refers into a recession as defined by the NBER and zero otherwise. Ease Cycle and Tight Cycle are dummy variables that take on the value of one if the corresponding observation can be classified as falling into a period of monetary loosening or tightening, respectively. FFTarget is the target federal funds rate on the day before the corresponding FOMC day. Stance is the difference between the consensus federal funds rate expectation one year ahead from the BlueChip Financial Forecast Survey and the current target rate. Disagreement is the interquartile range of fed funds expectations one year ahead from the cross section of forecasters in the BlueChip survey.

Table 12: SP500 return before and after announcement

Dependent Variable: %2pm-to-2pm SPX log-excess-return		
$\mathbb{1}(FOMC_{t+5})$	-0.054	[0.09]
$\mathbb{1}(FOMC_{t+4})$	-0.087	[0.10]
$\mathbb{1}(FOMC_{t+3})$	0.085	[0.09]
$\mathbb{1}(FOMC_{t+2})$	-0.029	[0.10]
$\mathbb{1}(FOMC_{t+1})$	0.077	[0.08]
$\mathbb{1}(FOMC_{t})$	0.488	[0.11]***
$\mathbb{1}(FOMC_{t-1})$	-0.003	[0.13]
$\mathbb{1}(FOMC_{t-2})$	0.062	[0.09]
$\mathbb{1}(FOMC_{t-3})$	0.078	[0.11]
$\mathbb{1}(FOMC_{t-4})$	-0.024	[0.10]
$\mathbb{1}(FOMC_{t-5})$	-0.076	[0.08]
$\sum_{i=1}^{5} \mathbb{1}(FOMC_{t+1})$	0.010	
P-value	0.961	
$\sum_{i=1}^{5} \mathbb{1}(FOMC_{t-1})$	0.044	
P-value	0.844	

NOTES: Standard errors in brackets. *** significant at 1%, ** significant at 5%, *significant at 10%. Robust standard error shown in brackets. The sample starts on Sep 1, 1994 and ends on Mar 30, 2011. Number of observations is 4,142. The dependent variable is the cum dividend log excess return on the S&P500 from 2pm on the day before a scheduled FOMC announcement to 2 pm on that day. $\mathbb{1}(FOMC_{t+h})$ denotes a dummy variable which takes on a value of one h days before a scheduled FOMC announcement day. $\sum_{i=1}^{5} \mathbb{1}(FOMC_{t+1})$ denotes the sum of the coefficients on the dummy variables for the five days before FOMC announcements while $\sum_{i=1}^{5} \mathbb{1}(FOMC_{t-1})$ denotes the sum of coefficients on the dummy variables for the five days after FOMC announcements.