Does the FOMC Cycle Still Drive Stock Returns? New Evidence from the US, UK, and Japan

Ali Uppal*

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Abstract

Cieslak et al. (2019) document that between 1994 and 2016, the US equity premium is earned entirely in even weeks of the Federal Open Market Committee cycle, and these even weeks also drive returns internationally. Updating their data, I show this result does not hold out-of-sample, weakening as early as 2004. Their proposed mechanism—informal leaks following biweekly board meetings—ceases after 2004, as meetings are no longer biweekly. Before 2004, outliers appear to drive the result. Finally, I construct central bank cycles for the UK and Japan and show that, when accounting for pre-announcement effects, the international result disappears.

Keywords: Central Banks, Monetary Policy, Stock Returns, Federal Reserve

JEL Codes: E50 and G12

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1 Introduction

If you invested $100 in the stock market at the start of 1994, you would have $768 in 2016. However, if you only held stocks during even weeks of the Federal Open Market Committee (FOMC) cycle—weeks 0, 2, 4, and 6, where week 0 begins the day before a scheduled FOMC announcement—your investment would have reached a striking $1,522. This 'even-week' result was meticulously derived by Cieslak et al. (2019) (hereafter CMVJ), inspired by the earlier work of Lucca and Moench (2015). In this paper, I revisit CMVJ's findings with updated data, critically examining the robustness of the even-week effect and its underlying mechanisms.

Whether the Federal Reserve (the Fed) significantly impacts the stock market, and how it does so, are crucial questions with meaningful implications for monetary policy, central banking, and asset pricing. However, the question is fraught with challenges given the difficulty in identifying monetary policy shocks (Ramey (2016)). Many papers seek identification by exploring the impact of monetary policy around the time of central bank announcements (e.g., Lucca and Moench (2015) and Brusa et al. (2020)).

CMVJ neither use esoteric measures of monetary policy shocks nor the high-frequency approach around announcements. Instead, they focus on the evolution of stock returns over the full cycle of days between scheduled FOMC meetings and find that the equity premium is earned entirely in even weeks of the FOMC cycle, claiming that the FOMC cycle in stock returns appears to be a general phenomenon that is strengthening over time. By methodically ruling out alternative explanations, they claim that the even-week result is *causally* driven by systematic informal communication around biweekly board meetings at the Fed. CMVJ's findings are significant and novel. Indeed, not only have they sparked an important debate on the costs and benefits of informal communication (leaks), they have cautioned the Fed, arguing that "any such benefits must be balanced against the risk of insider trading and informal communication undermining the public's trust in financial markets and the Fed."

Moreover, the novelty and significance of CMVJ's result has both driven momentum into this area of the literature (see, for example, Finer (2018), Laarits (2020), Hu et al. (2022),

Bradley et al. (2023)) and their findings have been widely cited in the broader literature on central bank communication and its impact on asset prices (Ai and Bansal (2018), Brusa et al. (2020), Bianchi et al. (2023), Gorodnichenko et al. (2023), Masciandaro et al. (2024)). However, CMVJ's findings are not only influential in central banks and academia, they have also been reported in the media, with both The Economist[1] and The Wall Street Journal[2] featuring articles dedicated to discussing the even-week result. Lastly, CMVJ show that their findings are also relevant globally. Specifically, they find that the FOMC cycle, in addition to driving US stock returns, also drives international stock returns.

In the context of the findings above, this paper has four key contributions. First, I find that the even-week result does not hold out-of-sample, casting doubt on the claim that it is a general phenomenon. Furthermore, while CMVJ show their result for the period 1994-2016, I show that when using data up to the end of 2023, the even-week result loses statistical significance as early as 2004, with the even-week coefficient often being negative or zero after the financial crisis. I argue that this decline aligns with institutional changes at the Fed, particularly a shift away from biweekly board meetings which are key to CMVJ's proposed mechanism of biweekly leaks. Second, I show that in the much narrower sample of 1994-2003, where the even-week result holds and board meetings are at least biweekly, there appear to be a few important days (rather than weeks) of the FOMC cycle. These days have excess stock returns that are outliers and driven by factors unrelated to the FOMC cycle. Once removing these outliers, I show that even in the 1994-2003 period, the even-week result no longer holds. Third, I find no evidence of an even-week effect in U.S. Treasuries, Fed Fund futures, or Eurodollar futures—markets where one would expect a response if the phenomenon were truly driven by monetary policy leaks. Finally, in the context of the FOMC cycle driving international stock returns, I show that neither UK nor Japanese stock returns are driven by the FOMC cycle when controlling for a pre-announcement effect. Taken together, my results suggest that the even-week result is unlikely to have been driven by systematic biweekly leaks by the Fed for over two decades.

The remainder of this paper is as follows. Section 2 describes the data. Section 3 evaluates

[1] https://www.economist.com/finance-and-economics/2016/09/03/the-long-arm-of-the-fed
[2] https://on.wsj.com/3li9ypk

the robustness of the even-week result. Section 4 inspects the proposed mechanism. Section 5 considers the even-week result in the UK and Japan. Section 6 provides a conclusion.

2 Data

One contribution of this paper is compiling multiple datasets and transforming them to ensure consistency and comparability across central bank cycles of different lengths. While much of my data goes up to 2016, in line with that of CMVJ, the extended data for the US goes up to the end of 2023 which expands CMVJ's original sample by seven years.

2.1 Central Bank Meeting Data

I collect data on central bank meetings for the US, the UK, and Japan. I then compute days in terms of the central bank's cycle time. I use CMVJ's definition of central bank cycle time.

The cycle time captures the rate-setting process of the central bank. CMVJ define the FOMC cycle by having week 0 of the cycle start the day before a scheduled FOMC announcement. The announcement day is considered day 0, therefore week 0 starts on day -1. Their rationale for having week 0 start the day before the announcement rather than the day of the announcement is to capture the pre-announcement effect documented by Lucca and Moench (2015) (i.e., large excess stock returns in advance of FOMC meetings). The definition of cycle time is documented in the table below.

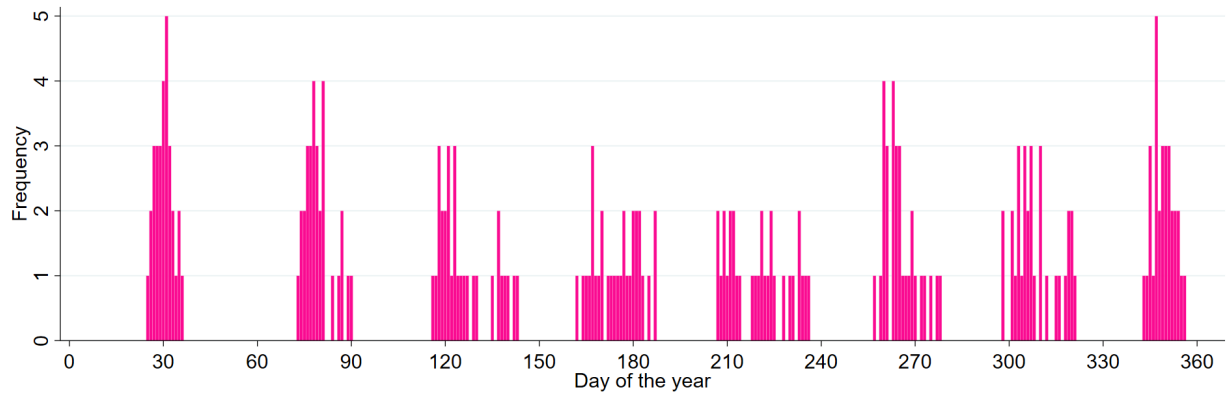
Table 1: Definition of Central Bank Cycle Weeks

Week of the cycle	Days counted under Cieslak et al. (2019)
-1	$-6, \ldots, -2$
0	$-1, \ldots, 3$
1	$4, \ldots, 8$
2	$9, \ldots, 13$
3	$14, \ldots, 18$
4	$19, \ldots, 23$
5	$24, \ldots, 28$
6	$29, \ldots, 33$

2.1.1 Fed Meetings

CMVJ collect FOMC meeting dates from 1982 to 2016. I update their data to include FOMC meetings up to the end of 2023, using the Federal Reserve website. Figure 1 below shows the days on which the meetings took place. As highlighted by CMVJ, the Fed only started publicly announcing its decision following a scheduled FOMC meeting in 1994. Therefore, I focus on the post-1994 period. There are 216 FOMC meetings in total and as can be seen by the peaks in Figure 1 below, the FOMC meets eight times per year.

Figure 1: FOMC Meeting Frequency and Timing

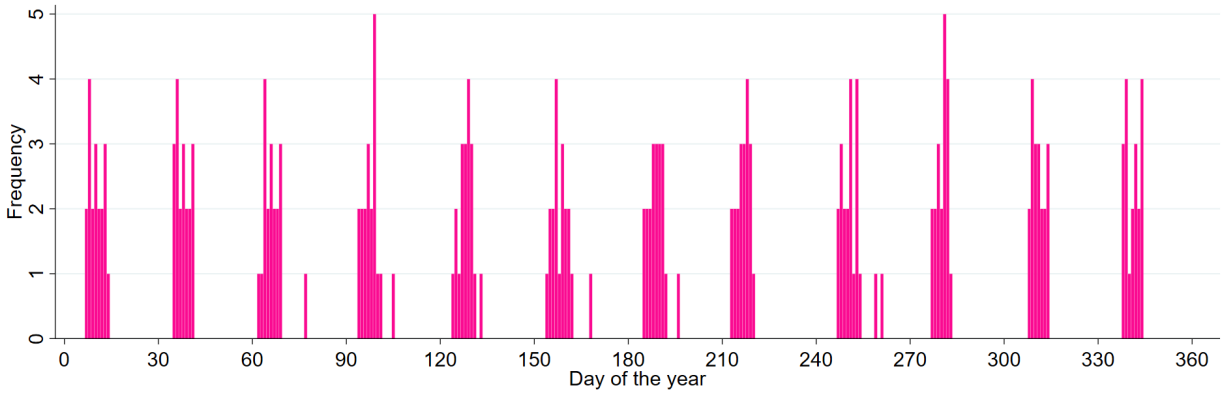


Given the importance of the Fed's board meetings for CMVJ's argument, I also update CMVJ's data to include board meetings up to the end of 2023. These are discussed in greater detail in Section 4.1.

2.1.2 Bank of England (BoE) Meetings

Using the BoE website, I collect information on meetings of the Monetary Policy Committee (I will refer to these as BoE meetings). My sample starts in July 1997 (the BoE gained operational independence in June 1997). Unlike the FOMC, the BoE meets monthly. However, in late 2016, it changed its meeting schedule to an eight-meetings-a-year schedule. Therefore, for consistency, I focus on the period from 1997 to 2016. There are 232 BoE meetings in total and we can see the 12 monthly meetings in Figure 2 below.

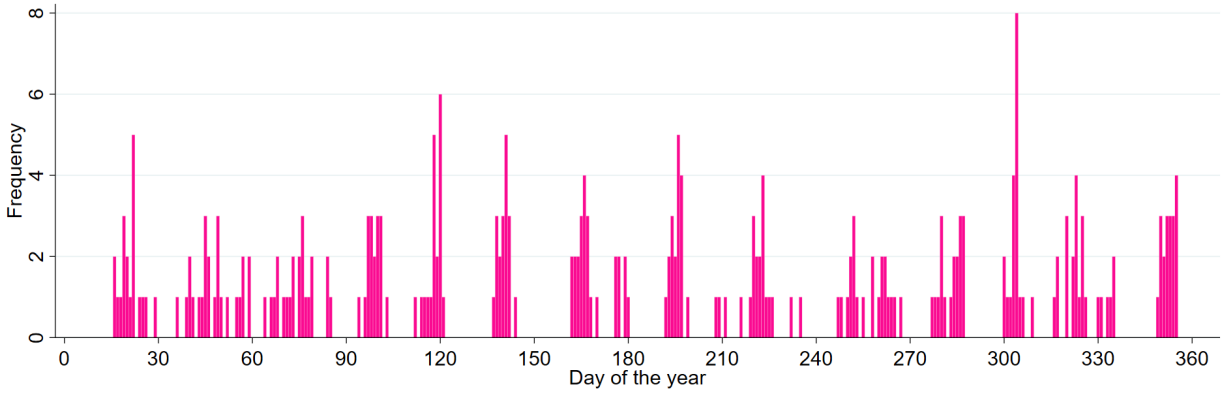
Figure 2: BoE Meeting Frequency and Timing



2.1.3 Bank of Japan (BoJ) Meetings

I collect information on BoJ monetary policy meetings from the BoJ website. Given the BoJ gained independence in April 1998, I start my sample in May 1998. The BoJ's meeting schedule was much less regular than that of either the FOMC or BoE (see Figure 3). In line with CMVJ, I exclude unscheduled meetings. As highlighted by Brusa et al. (2020), up until 2005, the BoJ progressively decreased the number of meetings from 20 per year, before settling on 14 in 2006. Like the BoE, the BoJ decided to shift to an eight-meeting schedule in 2016. I focus on the period from 1998 to 2016 which most closely matches the BoE sample and the FOMC sample of CMVJ. This sample consists of 286 BoJ meetings.

Figure 3: BoJ Meeting Frequency and Timing



2.2 Financial Data

Data on the Fed funds rate is from FRED while data on Fed funds futures contracts and Eurodollar futures contracts is from Bloomberg.

US and Japanese daily excess return data comes from Kenneth French's website while the equivalent for the UK comes from Gregory et al. (2013) with updates from the Xfi Centre for Finance and Investment at the University of Exeter Business School. Table 2 below shows the key summary statistics for these variables.

Table 2: Excess Return Summary Statistics

Variable	Obs	Mean	Std. Dev.	First-Order AC
US Daily Excess Return	7,821	0.04	1.17	-0.07
UK Daily Excess Return	4,864	0.02	1.15	-0.01
Japan Daily Excess Return	4,957	0.02	1.42	-0.06

3 Robustness of the Even-Week Result in the US

This section explores the robustness of the even-week result documented by CMVJ. First, I replicate CMVJ's main results and test their robustness out-of-sample. Then, I examine subsample stability by doing both an expanding window regression and a sample split of the thirty years of data into three ten-year samples (the latter allows me to evaluate the even-week effect prior to and after important institutional changes at the Fed in 2004).

3.1 Out-of-Sample Robustness

CMVJ show that their results are robust out-of-sample. Specifically, they split their sample into two periods: 1994-2013 and 2014-2016. The latter three-year period constitutes an out-of-sample test for CMVJ as the initial draft of their paper only employed data from 1994 to 2013. Not only do they show that their results hold in their out-of-sample period, leading them to conclude that the FOMC cycle in stock returns is a general phenomenon, they further claim that the even-week result is strengthening over time. I replicate CMVJ's results and test whether the even-week result remains robust to a more recent, and substantially longer, out-of-sample period. My out-of-sample period is the seven-year period from the

start of 2017 to the end of 2023. Furthermore, I combine this with CMVJ's out-of-sample period so that I can also test whether the result holds for the ten-year period from the start of 2014 to the end of 2023. Here I obtain my first contribution: the FOMC cycle in stock returns no longer holds out-of-sample in either my out-of-sample or the combined out-of-sample.

Table 3 reports regressions of daily excess US stock returns on FOMC cycle dummies. t-statistics are calculated on the basis of robust standard errors as is the case in the rest of this paper. Columns 1 and 2 of Table 3 replicate the results reported by CMVJ in Table I Panel B of their paper. The interpretation of the results is that, between 1994 and 2013, the average excess return per day is 13.6 bps higher on days that fall in week 0 in FOMC cycle time and 9.9 bps higher on days that fall in week 2, 4, or 6 compared to days that fall in odd weeks in FOMC cycle time. The coefficient on the week 2, 4, or 6 dummy strengthens substantially in the 2014-2016 period. However, column 3 shows that the result does not hold in the 2017-2023 period.[3] The week 0 dummy, although insignificant, is now negative rather than positive while the dummy for even weeks 2, 4, or 6 is indistinguishable from zero. Note that the number of observations in CMVJ's out-of-sample period (783) is much smaller than in mine (1824). Finally, in column 4, I combine the two out-of-sample periods so that there is one larger out-of-sample test with ten years of data from the start of 2014 to the end of 2023. I find that none of the coefficients are statistically significant.

[3] My results remain consistent when using the out-of-sample period 2017-2019, i.e., excluding 2020 onwards given potential concerns regarding the global pandemic.

Table 3: Regressions of Daily Excess U.S. Stock Returns on FOMC Cycle Dummies

	CMV Main 1994 to 2013	CMV OoS 2014 to 2016	New OoS 2017 to 2023	Combined OoS 2014 to 2023
Dummy=1 in Week 0	0.136***	0.174*	-0.139	-0.0450
	(2.76)	(1.92)	(-1.58)	(-0.67)
Dummy=1 in Week 2,4,6	0.0993***	0.176***	-0.00773	0.0475
	(2.65)	(2.67)	(-0.13)	(1.02)
N	5214	783	1824	2607

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

While Table 3 replicates and extends CMVJ's out-of-sample test, it does not test the significance of each individual even-week dummy (i.e., dummy=1 in week 0, 2, 4, 6). Table 4 therefore repeats the exercise in Table 3 but with individual even-week dummies. A few points are worth noting. First, the even-week result appears less significant in CMVJ's out-of-sample period (2014-2016) when using individual even-week dummies. In my out-of-sample period (2017-2023) and the combined out-of-sample period (2014-2023), the results are consistent with those in Table 3: the FOMC cycle in stock returns does not hold out-of-sample.

Table 4: Regressions of Daily Excess U.S. Stock Returns on FOMC Cycle Dummies

	CMV Main 1994 to 2013	CMV OoS 2014 to 2016	New OoS 2017 to 2023	Combined OoS 2014 to 2023
Dummy=1 in Week 0	0.136***	0.174*	-0.139	-0.0450
	(2.76)	(1.92)	(-1.58)	(-0.67)
Dummy=1 in Week 2	0.0811*	0.146*	0.0243	0.0610
	(1.70)	(1.82)	(0.31)	(1.01)
Dummy=1 in Week 4	0.107**	0.200**	-0.0444	0.0291
	(1.99)	(2.41)	(-0.60)	(0.51)
Dummy=1 in Week 6	0.177**	0.325	0.0365	0.104
	(1.98)	(0.52)	(0.25)	(0.62)
N	5214	783	1824	2607

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

The lack of robustness of the even-week result naturally leads to the question of when it stopped being robust. Given that the first draft of CMVJ's paper was available on 23 April 2014,[4] one might expect that the even-week result would be arbitraged away around that time. Indeed, looking at column 4 of Table 3 and Table 4, it would appear the result is no longer significant after the initial draft was made available. While the lack of significance would be consistent with the findings of McLean and Pontiff (2016) who find that investors learn about mispricing from academic publications, it is not conclusive evidence of the even-week result being arbitraged away.

3.2 Subsample Stability

In order to understand when the even-week result began to lose significance, I estimate a regression of the daily excess stock return on the even-week dummy (i.e., dummy=1 in week 0, 2, 4, or 6) using an expanding window going backwards from 2023. First, I do the analysis using CMVJ's time horizon (i.e., 1994-2016) as shown in Figure 4. Then, I use my updated time horizon with data going up until the end of 2023 as shown in Figure 5 (the results are similar when excluding the global pandemic, i.e., ending the sample at end-2019). Each point in the figure represents the even-week regression coefficient estimated for the time horizon along the horizontal axis. For example, the last marker in Figure 4 represents the excess return when estimating the even-week coefficient using data from the start of 2015 to the end of 2016.

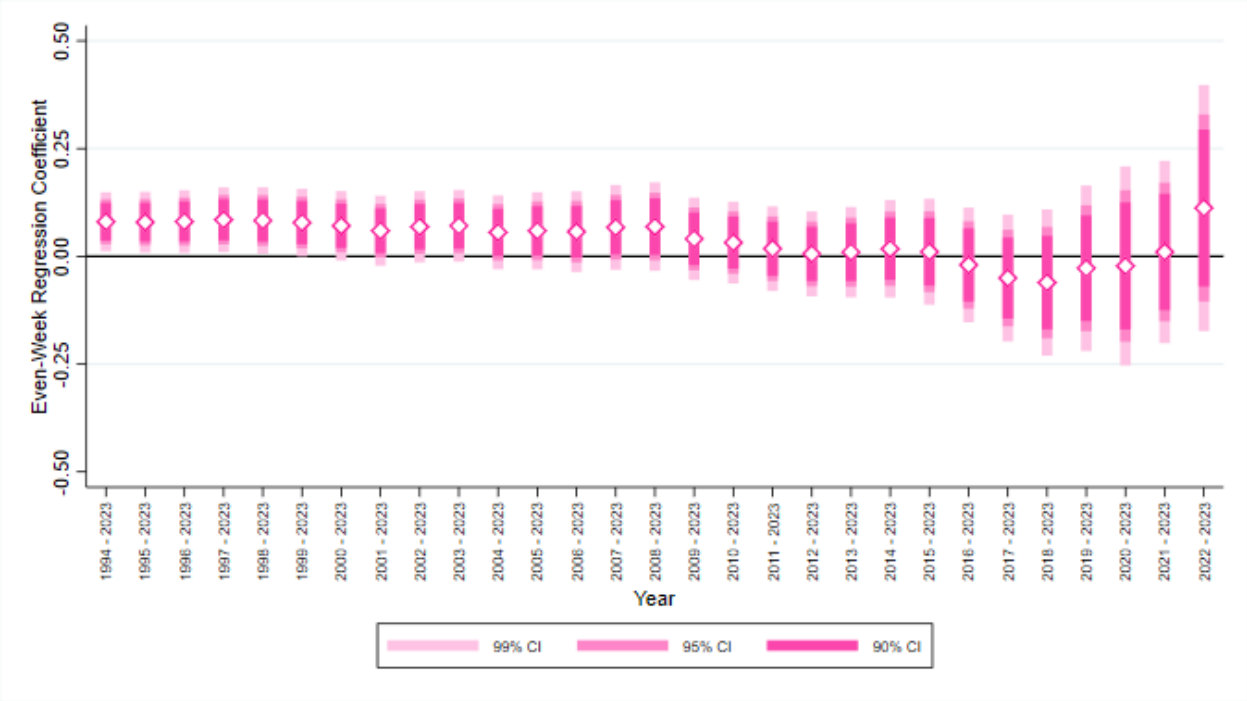
Figure 4 clearly supports the CMVJ interpretation that the even-week effect is robust in their sample period (1994-2016) and it appears to be strengthening over time. CMVJ argue that "the FOMC cycle in stock returns appears to be a general phenomenon, present since 1982, but strengthening over time in economic magnitude." However, Figure 5 tells a surprisingly different story. First, we can see that the result loses most of its statistical significance consistently from as early as 2004 when it is only statistically significant at the ten percent level. Moreover, for any of the samples from 2009 onwards, the result is not statistically significant at all (See Table A in Appendix A for a table with the specific coefficients and t-statistics used in Figure 5). Second, after the global financial crisis, the even-week coefficient

[4] See https://faculty.haas.berkeley.edu/morse/research/papers/cycle_paper_cieslak_morse_vissingjorgensen.pdf

goes from being positive (as in CMVJ) to negative, before yielding an additional positive but very noisy coefficient right at the end of the estimation horizon. Together, these two points suggest that CMVJ's result no longer holds and is not as robust within the CMVJ's sample period when using a longer time horizon.

Figure 4: Expanding Window Regression, 1994-2016

Figure 5: Expanding Window Regression, 1994-2023



While the expanding window regressions suggest a lack of robustness when varying the time horizon, the number of observations is strictly decreasing over time which could lead to larger standard errors. Therefore, I examine subsample stability by splitting the thirty years of data into three ten-year periods: 1994-2003, 2004-2013, and 2014-2023. Not only does this split ensure similar observations across the three periods, it also importantly demarcates the data in a way to reflect important institutional changes at the Fed in 2004. Specifically, prior to 2004, FOMC meeting minutes were published six to eight weeks after a meeting. This changed towards the end of 2004 when the FOMC decided to bring forward the publication of meeting minutes to exactly three weeks after the meeting (Jung (2016)). Moreover, the frequency of board meetings declined substantially after 2004 (see Section 4 for further detail). As in the previous section, I show the results when separating out the week 0 dummy from the week 2,4,6 dummy given the former could be more related to the already-documented FOMC drift (Lucca and Moench (2015)) as well as only individual even-week dummies.

Tables 5 and 6 present these results. As can be seen, the CMVJ result is only statistically significant for ten of the thirty years. Specifically, it only appears to hold consistently

for the 1994-2003 period. Given the sample is smaller, one would expect potentially larger standard errors, but we also see that all the statistically significant coefficients shrink substantially relative to the 1994-2003 period. Interestingly, the 2004-2013 period which is entirely contained within CMVJ's original sample is not statistically significant. Finally, in the 2014-2023 sample, the results are also statistically insignificant and all the coefficients are again smaller, and in some cases even negative.

Table 5: Subsample Stability

	1994 to 2003	2004 to 2013	2014 to 2023
Dummy=1 in Week 0	0.149**	0.123	-0.0450
	(2.47)	(1.57)	(-0.67)
Dummy=1 in Week 2,4,6	0.119**	0.0795	0.0475
	(2.35)	(1.44)	(1.02)
N	2608	2606	2607

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 6: Subsample Stability

	1994 to 2003	2004 to 2013	2014 to 2023
Dummy=1 in Week 0	0.149**	0.123	-0.0450
	(2.47)	(1.57)	(-0.67)
Dummy=1 in Week 2	0.0788	0.0835	0.0610
	(1.18)	(1.23)	(1.01)
Dummy=1 in Week 4	0.151**	0.0674	0.0291
	(2.10)	(0.85)	(0.51)
Dummy=1 in Week 6	0.205*	0.143	0.104
	(1.70)	(1.07)	(0.62)
N	2608	2606	2607

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

The lack of robustness of the week 0 dummy is likely to reflect an already documented finding: the FOMC drift has been disappearing (Kurov et al. (2021)). However, the lack of robustness of the other even-week dummies challenges the robustness of the CMVJ result not only out-of-sample, but also potentially in-sample. Furthermore, it is unlikely that investors learned about the mispricing and subsequently arbitraged away the even-week excess returns as the result stops holding as early as 2004 while the initial draft of the CMVJ paper was released a decade later, in April 2014. Therefore, to understand why the CMVJ result appears to stop holding as early as 2004, one must inspect the proposed mechanisms.

4 Inspecting the Mechanism

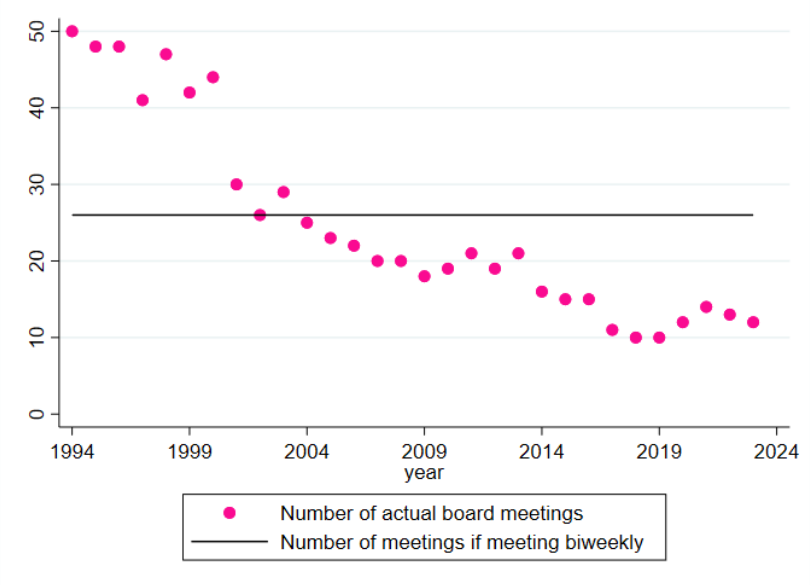
The key mechanism underpinning the CMVJ result is the following. Board members meet during even weeks of the FOMC cycle. There is an information exchange and update during these meetings and, according to CMVJ, such meetings result in information being (informally) leaked. Therefore, they argue, excess stock returns in even weeks are caused by leaks following biweekly board member meetings. CMVJ also note that there was unexpectedly accomodative monetary policy during their sample which may have contributed to the excess returns. However, I show that monetary policy is similarly accomodative, in terms of unexpected changes, over the three ten-year periods between 1994 and 2023. Specifically, in Appendix B, I look at the monetary policy shock series of Bu et al. (2021) as it covers both the CMVJ sample as well as most of my extended sample which stops in September 2023. I show in Figure B.1 that there is little difference between the average shock over the three ten-year periods between 1994 and 2023. In fact, the average shock over the 1994-2003 period is less expansionary than over the 2004-2013 period, when the even-week result no longer holds. In the remainder of this section, I examine the role of board meetings as well as whether other evidence is consistent with CMVJ's mechanism.

4.1 Role of Board meetings

If CMVJ's mechanism holds, one would expect that board meetings are held at least biweekly throughout the year, implying at least 26 annual meetings. While there could be more than 26 meetings, this would not be inconsistent with CMVJ's claim as their claim rests on

biweekly meetings having a special role as they argue such meetings are when information is updated and exchanged. However, if there are significantly fewer than 26 annual board meetings, it would be difficult for CMVJ's mechanism to be true as the board members could not be meeting every two weeks, which is needed for the even-week result. To examine the role of board meetings, I first document the number of annual board meetings in Figure 6.

Figure 6: Number of Board Meetings per year



As can be seen in Figure 6, the annual number of board meetings has been steadily declining. The figure shows a horizontal line at 26 annual meetings which represents biweekly meetings. Interestingly, the number of annual meetings fall below 26 from 2004 onwards. This is precisely when the CMVJ result appears to no longer hold as shown earlier in Tables 5 and 6. For example, years 2014, 2015, 2016 are all within CMVJ's main sample. However, each of these years has no more than 16 annual meetings which implies a meeting frequency of less than one every three weeks. This appears to be inconsistent with the mechanism that even-week excess returns are causally driven by information leaks following biweekly board meetings given the board meetings are simply not biweekly.

This decline in board meetings appears to coincide with a number of institutional changes at the Fed during this period. Jung (2016) documents that in 2002, the Fed began releasing the FOMC statement with a voting record, and in 2004, it introduced press conferences

and shortened the meeting minutes release window from six to eight weeks to three weeks. CMVJ themselves point out that the release of the meeting minutes does not line up with even weeks after 2004 and as I show in the previous section, this is precisely when the even-week result appears to stop holding.

While Figure 6 casts doubt on CMVJ's proposed mechanism, it does not provide conclusive evidence against the mechanism. For example, it could be the case that some meetings were biweekly which lead to excess returns and others were at a much lower frequency, such that the average meeting frequency is not biweekly. In order to test the role of board meetings more precisely, I replicate the regression of CMVJ by regressing excess returns on interaction terms between each of the even-week dummies and a dummy for whether any of days $t-5$ to $t-1$ had a board meeting. A positive value would indicate that the excess returns specifically follow board meetings in even weeks and provide the clearest support for CMVJ's mechanism. In line with CMVJ, I also include two further interaction terms: the interaction between the board meeting dummy and a dummy for even weeks with no board meeting as well as the interaction between the board meeting dummy and an odd-week dummy. As in my prior regressions, I examine these interactions for three periods: 1994-2003, 2004-2013, and 2014-2023. These periods also coincide with changes in the frequency of board meetings in Figure 6.

Table 7 documents my results. Consistent with the results showing that the even-week effect does not hold from 2004 onwards, columns 2 (2004-2013) and 3 (2014-2023) show the interaction between the board meeting dummy and even-week dummy is statically insignificant. The week 0 dummy, while barely significant, is likely to capture the announcement effect rather than represent the biweekly board meetings. Moreover, the coefficients are substantially smaller than those in column 1 (1994-2003). Therefore, columns 2 and 3, when combined with the results presented earlier, provide evidence that the even-week result and the supporting mechanism did not hold, at least since 2004. While column 1 provides evidence consistent with CMVJ's mechanism, if one considers that CMVJ's entire sample is 1994-2016, then this result holds in less than half the sample.

Table 7: Even-Week Effect and Board Meetings

	1994-2003	2004-2013	2014-2023
[Week 0]*[Board meeting in preceding 5 days]	0.274***	0.152*	0.0804
	(3.47)	(1.84)	(0.93)
[Week 2]*[Board meeting in preceding 5 days]	0.273***	0.152	0.0747
	(3.08)	(1.64)	(0.67)
[Week 4]*[Board meeting in preceding 5 days]	0.294***	0.0749	0.0654
	(3.16)	(0.60)	(0.75)
[Week 6]*[Board meeting in preceding 5 days]	0.266*	0.135	-0.267***
	(1.83)	(0.70)	(-7.09)
[Even-week]*[No board meeting in preceding 5 days]	0.0918	-0.00861	-0.00438
	(0.89)	(-0.12)	(-0.08)
[Odd-week]*[Board meeting in preceding 5 days]	0.165**	-0.0790	-0.00767
	(2.48)	(-1.09)	(-0.11)
N	2608	2606	2607

Dummy variables in square brackets, t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

While column 1 of Table 7 provides evidence in support of the role of board meetings from 1994-2003, it is not conclusive. For example, it is possible that board meetings coincided with excess returns in even weeks for reasons unrelated to information leaks by the Fed. As such it is worth exploring whether other evidence is consistent with CMVJ's proposed mechanism that leaks about monetary policy following board meetings caused excess stock returns in even weeks. In particular, is it the case that the even-week effect was a statistical anomaly or that it was true until 2004 after which it disappeared due to structural changes made by the Fed?

4.2 Impact on Fixed Income

Given CMVJ's argument is that leaks following biweekly board meetings systematically push up stock prices in even weeks, one would expect fixed income assets to also display an even-week pattern. Indeed, one might expect the response of fixed income to be even stronger

than that of stocks as they are arguably much more sensitive to news about monetary policy. While CMVJ explore the impact on some fixed income assets, in this section, I will document the robustness of their result to a wider array of fixed income assets. Specifically, I examine the responses of 1-year, 2-year, and 10-year US Treasuries, the second and fourth Fed Funds futures contracts, and the fourth Eurodollar futures contract. I will focus specifically on the period 1994-2003 as I have already shown their even-week result and underlying mechanism does not appear to hold from 2004 onwards.

In Table 8 below, I document the daily change in US Treasury yields for 1-year, 2-year, and 10-year Treasuries in response to even-week dummies.

Table 8: Daily change in Treasury yield, 1994-2003

	1-year Treasuries	2-year Treasuries	10-year Treasuries
Dummy=1 in Week 0	0.000352	0.00208	-0.00167
	(0.13)	(0.61)	(-0.49)
Dummy=1 in Week 2,4,6	0.000208	-0.000445	-0.00191
	(0.09)	(-0.16)	(-0.71)
N	2608	2608	2608

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

As can be seen, there is no meaningful response in any of the US Treasuries. One would expect that indications of accomodative monetary policy which result in excess stock returns would also, and perhaps more strongly, affect US Treasury yields. In Appendix A Table A.2, I show that these results hold for the entire CMVJ sample (1994-2016). CMVJ show similar results for the 2-year and 10-year Treasury. However, they combine the week 0 dummy with the week 2,4,6 dummy which therefore also captures the announcement effect and is a distinct mechanism from Fed leaks following biweekly board meetings.

As an additional test, I explore whether my results for US Treasuries are consistent with the response of Fed Funds (FF) futures and Eurodollar (ED) futures. Again, one would expect futures contracts to react strongly to leaks about monetary policy. Table 9 below

documents the daily change in the yields of the second FF futures contract, the fourth FF futures contract, and the fourth ED futures contract in response to even-week dummies from 1994 to 2003.[5] These specific futures contracts are widely used in the monetary policy shock literature. FF futures in particular are used extensively in estimating monetary policy shock series. For example, Gertler and Karadi (2015) use FF futures from as early as 1991. In relation to ED futures, Gürkaynak et al. (2007) specifically argue that ED futures are the best predictor of the fed funds rate at horizons beyond six months and as effective as predicting the fed funds rate as FF futures at horizons of less than six months.

Table 9: Daily change in futures yield, 1994-2003

	2nd FF Contract	4th FF Contract	4th ED contract
Dummy=1 in Week 0	-0.000251	-0.00104	0.00250
	(-0.18)	(-0.56)	(0.52)
Dummy=1 in Week 2,4,6	-0.00112	-0.000698	-0.00274
	(-0.94)	(-0.46)	(-0.74)
N	2607	2607	2607

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

The results for futures are entirely consistent with those for US Treasuries as they simply do not respond in any statistically significant way to the even-week dummies. In Appendix A Table A.3, I show that these results also hold for the entire CMVJ sample (1994-2016).

Together, Tables 8 and 9 cast doubt on the narrative in CMVJ that leaks following board meetings pushed up stock prices as one would expect these to also impact fixed income assets. However, these tables do not provide conclusive evidence against the CMVJ narrative. If the information leaked following board meetings is a commitment to accommodate *if needed*, then it would likely result in market expectations of a lower Fed Funds rate in bad states of the world. This commitment itself may make bad states less likely which may raise market expectations of the Fed Funds rate. The net effect could therefore be negligible. Indeed,

[5] I do not include the first FF futures contract as it is a current month contract and may expire prior to the subsequent FOMC meeting.

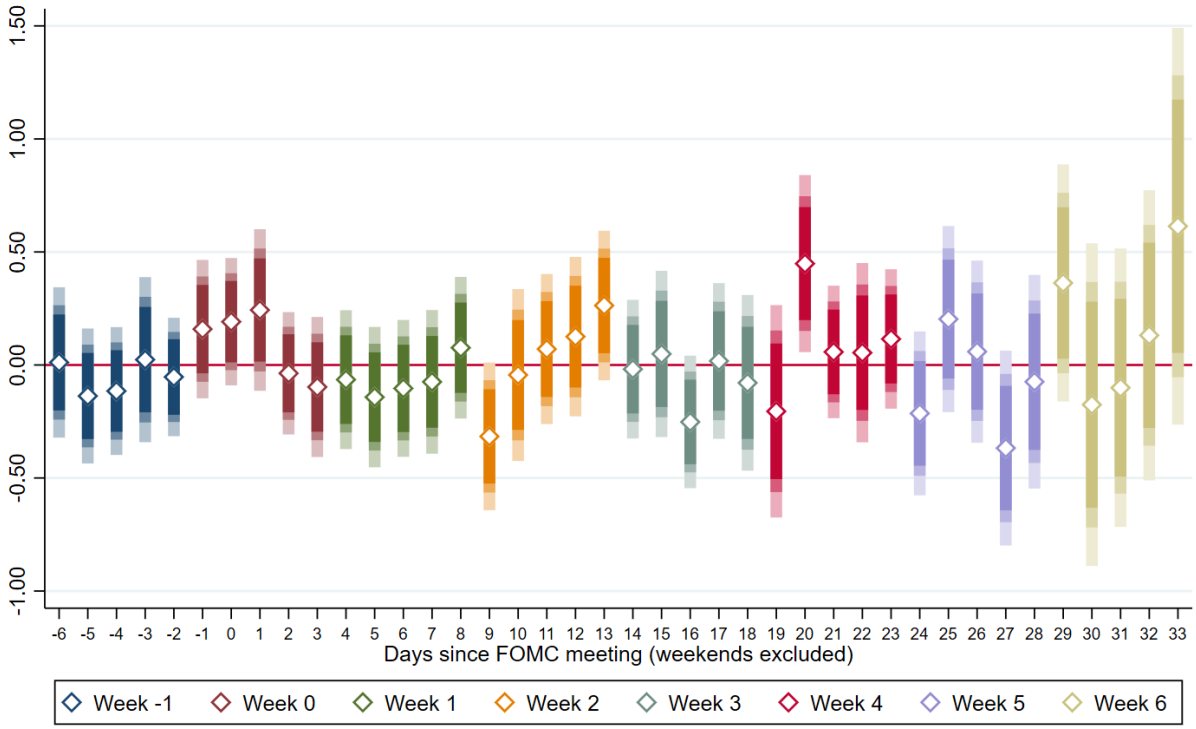
CMVJ make precisely this argument, specifying that these two effects of a commitment to accommodate and a lower probability of bad states would both positively impact stock prices while having an ambiguous effect on future interest rates. Therefore, given the evidence in this section casts some doubt on the CMVJ narrative but is not conclusive, I explore the potential for outliers in the next section.

4.3 Weekly Averaging and Outliers

The even-week effect is calculated based on weekly returns which average over the five business days in a week. This averaging process may result in a lot of important information being lost and may also mask potential outliers. Therefore, in this section, I examine the effect of FOMC cycle *days* rather than weeks and explore the impact of outliers over the period 1994-2003, which as I have shown in previous sections, is the only period in which the even-week result may still hold.

First, I run a separate regression for each day of the cycle where I regress daily excess returns on a dummy for that *day* only. Figure 7 plots the coefficients of each of the regressions as well as their confidence intervals (the underlying regression results are in Appendix A Table A.4). Each CMVJ-defined week is represented by a different colour. Figure 7 shows that only two days during even weeks are significant at the 5% level. Day 13 with a daily excess return of 26 bps and day 20 with a daily excess return of 45 bps. While a few more days are significant at the 10% level, these include the days around the announcement (which is likely related to the announcement effect rather than the even-week effect) and the days at the end of the cycle. Given board meetings are not on exactly the same day of the FOMC cycle throughout time, one might have expected that the individual days that make up even weeks would be consistently positive, even if not highly statistically significant. However, this does not appear to be the case in Figure 7, where a few outliers that occurred during even weeks clearly seem important. Therefore, this analysis suggests that even though the even-week result holds during the period 1994-2003, it may not necessarily be the result of board meetings and Fed leaks.

Figure 7: Regressing Daily Excess Return on Day of the Cycle, 1994-2003



Notes: The 40 regressions underpinning this chart have excess returns as the dependent variable. The only regressors are a constant and the dummy for the specific day of the cycle. The diamonds reflect the coefficient on the day dummy of each regression. The confidence intervals are shown by coloured bars. The darkest shade represents the 99% confidence interval, one shade lighter represents the 95% confidence interval, and the lightest colour represents the 90% confidence interval.

While Figure 7 clearly documents potential outliers, it does not provide evidence that these outliers are important for the even-week result nor that they are unrelated to board meetings. One possible, and indeed valid, counterargument is that these two days, while outliers, were outliers *because* of the biweekly board meetings. Therefore, in order to ascertain whether these outliers were driven by board meetings, I examine financial market developments around day 13 and day 20 in greater detail.

I begin by noting that over the period 1994-2003, the average daily excess return is 0.03%, the average daily excess return for even weeks is 0.10%, the average daily excess return for day 13 is 0.28%, and the average daily excess return for day 20 is 0.47%. The single highest

one-day return during this period occurred on day 20 of the FOMC cycle on 24 July 2002. On this day, the one-day excess return is 5.43%, over 50 times greater than that of the even-week average. The pertinent question is whether this one-day return was the result of a biweekly board meeting that leaked information about accomodative monetary policy.

First, I confirm that there was indeed a board meeting that took place prior to the excess return. Specifically, the meeting was on 22 July 2002, i.e., two days prior to the high return day. However, when examining financial market movements on that day, it appears the excess returns were *unrelated* to the board meetings. For context, as highlighted by the financial press at the time, 22 July 2002 saw the second biggest one-day gain for the Dow Jones industrial average on record. The big move in stocks appeared to be driven by positive progress in relation to the Enron scandal. In fact, in a conference call at the time, J.P. Morgan reassured investors that it would have no problems signing off its account. Moreover, the chief investment officer at Walnut Asset Management commented that "J.P. Morgan's comments this morning were also a good first step toward recovering credibility, you had the Senate and the House agreeing on their fraud policy, and you had the Adelphia executives dragged out in handcuffs."[6]

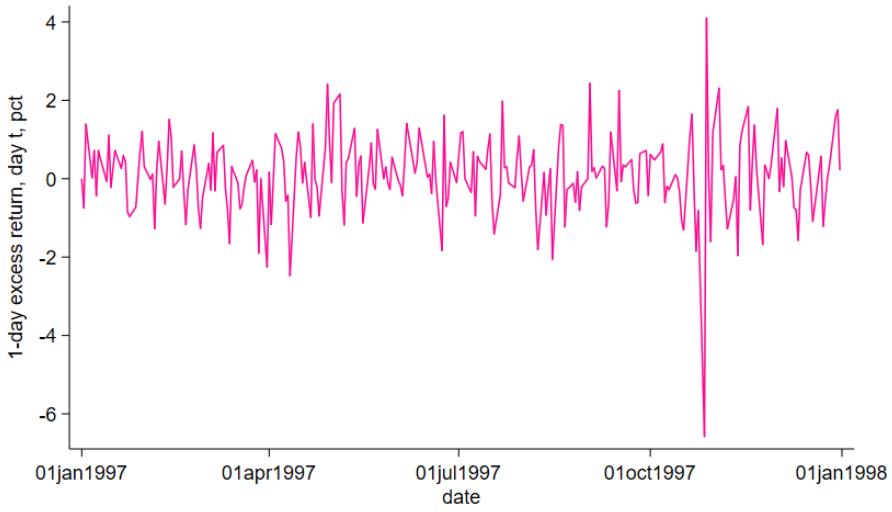
While the events surrounding 22 July 2002 do not appear to be related to the Fed or the board meeting, I also examine Fed communications and behaviour at the time. In the minutes of the FOMC's meeting on 13 August 2002, the FOMC itself noted that "market participants focused their attention on further revelations of corporate malfeasance" in reference to the Enron scandal.[7] In terms of specific actions, the FOMC maintained the policy rate at the same level at both this meeting and the following meeting on 24 September 2002. The Fed's behaviour and the context of financial market movements strongly suggest that the excess return on 22 July 2002 was not due to leaks following the board meeting a few days prior.

Continuing to focus on day 20, its second largest value is 4.1% which is within the top 0.5% of excess returns during the period 1994-2003. This occurred on 28 October 1997, the day after a global stock market crash due to the Asian economic crisis of 1997. Figure 8

[6] https://www.cnn.com/2002/BUSINESS/asia/07/24/wallst.rebound/
[7] https://www.federalreserve.gov/fomc/minutes/20020813.htm

below shows excess returns over the course of 1997.

Figure 8: Excess Returns during 1997



It is evident from Figure 8 that the stock market movements on 27 and 28 October 1997 are outliers. The crash on 27 October was related to the Asian economic crisis and, as the Securities and Exchange Commission noted in its Trading Analysis, the rally on 28 October was simply a rebound "consistent with the widespread view that the bounce-back in share prices reflected broad-based buying by institutional and retail investors."[8] Again, this does not appear to reflect specific Fed-related communication (informal or otherwise). Indeed, the FOMC noted in its minutes on 12 November 1997 that while equity markets were volatile, short-term interest rates registered little change since the September FOMC meeting.[9]

In a similar vein to my analysis of the day 20 outlier, I evaluate financial market developments specific to day 13. While the returns are not as large as those on day 20, the largest day 13 return is still within the top 1% of all returns. Specifically, the largest daily excess return is 3.74% and occurred on 11 October 2002. Moreover, this occurred four days after a board meeting but was still within an even week. Therefore, it would contribute to the even-week effect. As before, the relevant question for this paper is whether the return was due to leaks following the board meeting which would provide evidence supporting CMVJ. Looking at analyst reports and the financial press on this day suggests that the excess return

[8] https://www.sec.gov/news/studies/tradrep.htm
[9] https://www.federalreserve.gov/fomc/minutes/19971112.htm

was *unrelated* to the Fed but rather a response to unexpectedly positive earnings reports from many large firms.[10] The FOMC itself noted that "the subsequent release of better-than-expected news on profits for several major corporations buoyed equity prices" in the minutes of its 6 November 2002 FOMC meeting.[11] The second largest day 13 return is 3.21% on 7 January 2000. Similar to the largest day 13 return, this appeared to be in response to unexpectedly positive earnings reports, with analysts noting little movement in expectations of the Fed Funds rate.[12]

The narrative evidence documented above suggests that some of the most significant returns on day 13 and day 20 were unrelated to the Fed. However, it does not provide evidence that these two days were important for the overall even-week result. Therefore, to test whether these outliers actually drove the even-week effect, I re-estimate the even-week regression of column 1 Table 5 but simply exclude day 13 and day 20. The results are in Table 10 below.

Table 10: The Impact of Outlier Days, 1994-2003

	Full Sample	Excl. Day 13 & Day 20
Dummy=1 in Week 0	0.149**	0.149**
	(2.47)	(2.47)
Dummy=1 in Week 2,4,6	0.119**	0.0568
	(2.35)	(1.05)
N	2608	2460

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 10 has two columns. Column 1 restates the results without any exclusion (i.e., those of column 1 Table 5) for ease of comparison. Column 2 presents the results when day 13 and day 20 are excluded. Specifically, I drop day 13 and day 20 from the data and then run the same even-week regression. Once we exclude these two days, not only is the result no

[10] See https://money.cnn.com/2002/10/11/markets/markets_newyork/index.htm and https://www.wsj.com/articles/SB10343342222879789356

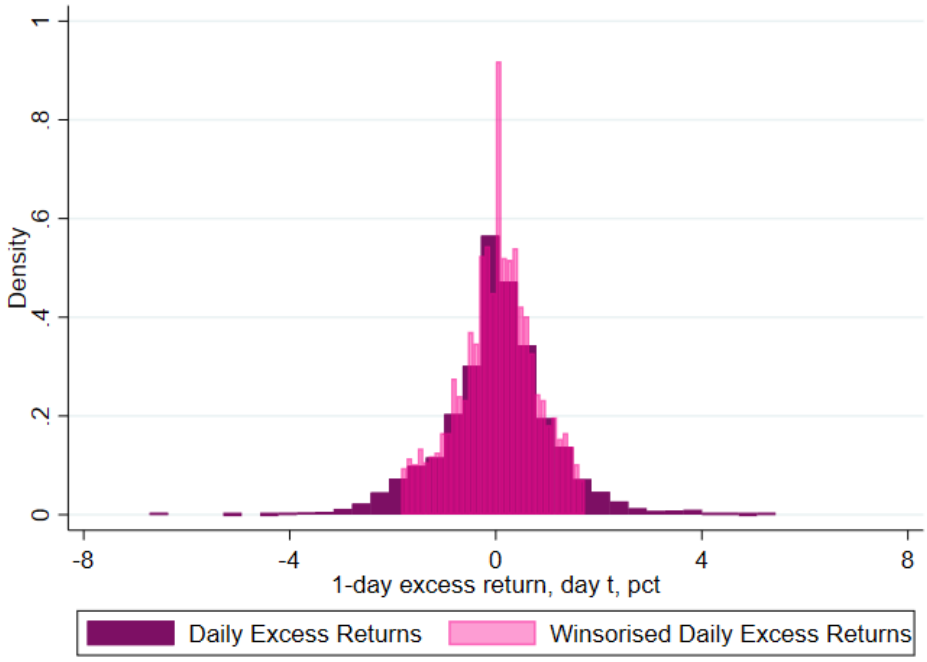
[11] https://www.federalreserve.gov/fomc/minutes/20021106.htm

[12] See https://www.wsj.com/articles/SB947253922454914021 and https://rb.gy/p5655a

longer statistically significant, the coefficient has more than halved. Note that my approach has the effect of reducing the sample size. Therefore, day 13 and day 20 appear necessary for CMVJ's main result. However, the largest returns on those days are inconsistent with CMVJ's proposed mechanism and appear to be statistical outliers.

As an additional robustness test, instead of removing day 13 and day 20, I winsorise the data. Specifically, I remove the top and bottom five percent of outliers. The purpose of this is to simply remove returns that are so large that they are likely the result of market events similar to those documented when examining day 13 and day 20. In Figure 9 below, I plot the distribution of the returns pre- and post-winsoring. While the means of the distribution are similar (0.29 vs 0.27), one can immediately see the long tails have been trimmed.

Figure 9: Histogram of Daily Excess Returns: Full Sample versus Winsorised



Next, in Table 11 below, I document the results of a regression with the winsorised stock returns compared to the full sample returns.

Table 11: The Impact of Outlier Excess Returns, 1994-2003

	Full Sample	Winsorised Sample
Dummy=1 in Week 0	0.149**	0.158***
	(2.47)	(3.58)
Dummy=1 in Week 2,4,6	0.119**	0.0567
	(2.35)	(1.64)
N	2608	2345

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Similar to Table 10, Table 11 shows that the result disappears when removing outliers and the coefficient more than halves.

When considering my finding in relation to outliers, alongside my earlier findings documenting the lack of robustness of both the even-week effect and the proposed mechanism from 2004 onwards, as well as the lack of an effect on fixed income assets, the totality of the evidence appears to suggest that the even-week result may not necessarily capture systematic leaks by the Fed but potentially a statistical anomaly.

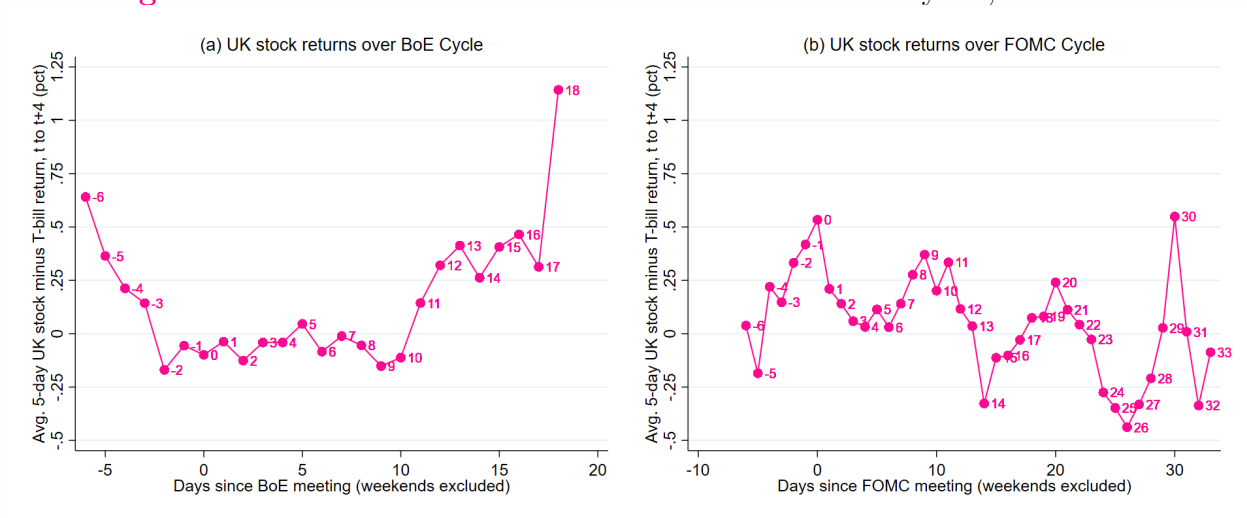
5 The Even-Week Result in an International Context

CMVJ show that international stock market returns also follow the FOMC cycle, though they do not test the robustness of this result in the same way as they do for US stock returns, nor do they explore central bank cycles of other countries. While there is work that explores stock returns around announcements of the domestic central bank for several countries (e.g., Brusa et al. (2020)), I am not aware of any work that explores the central bank cycle in other countries, as CMVJ have done for the US. Therefore, this section has two questions. First, is CMVJ's finding that international stock returns are driven by the FOMC cycle robust? Second, do central bank cycles, like the FOMC cycle, exist in other countries given that such cycles may be the result of important but informal communication. In the case of the UK and Japan, I find that the answer to both questions is no.

5.1 BoE Cycle

Figure 10 provides preliminary answers to the two questions posed above. The chart on the left shows 5-day forward cumulative UK excess stock returns over the BoE cycle. There is no even-week result in the BoE cycle. However, it appears there is a type of pre-announcement drift. The chart on the right shows UK stock returns over the FOMC cycle and appears to confirm CMVJ's finding that international stock returns are driven by the FOMC cycle.

Figure 10: UK Stock Returns over the BoE and FOMC Cycles, 1997-2016



While the above visual evidence is useful, I run regressions to answer the two questions more rigorously. Table 12 shows the results of regressing daily UK excess stock returns on a combination of BoE and FOMC cycle dummies. I control for a type of pre-announcement drift given the evidence in the left chart of Figure 10. The FOMC week dummy is the standard CMVJ even-week dummy. Column 1 shows that only week -1 is significant (i.e., stocks rise in the week leading up to BoE meetings). Column 2 shows UK stock returns seem to spike in even weeks of the FOMC cycle, though the result is marginally significant. While this is consistent with CMVJ's findings, I find that after including the BoE week -1 dummy (i.e., controlling for the pre-announcement effect), the FOMC cycle is no longer significant in predicting UK stock returns (column 3). If CMVJ's hypothesis that the central bank cycle is a result of informal communication and leaks is correct, then this suggests that BoE is perhaps stricter about communication flows.

Table 12: Regressions of Daily Excess UK Stock Returns on BoE/FOMC Cycle Dummies

	(1)	(2)	(3)
Dummy=1 in BoE Week -1	0.143***		0.138***
	(3.74)		(3.59)
Dummy=1 in FOMC Week 0,2,4,6		0.0628*	0.0532
		(1.90)	(1.60)
N	4861	4861	4861

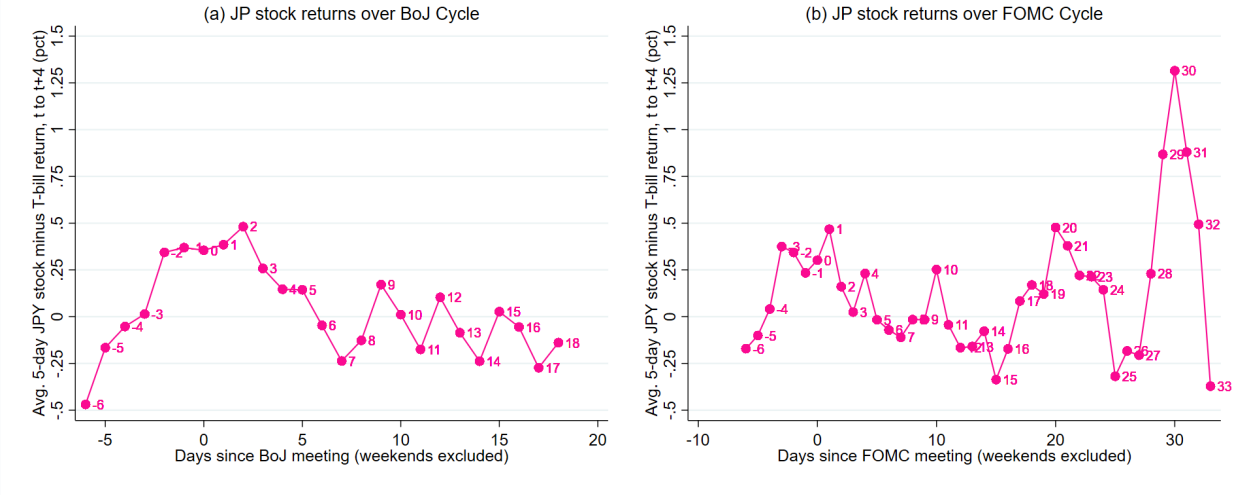
t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

5.2 BoJ Cycle

I repeat the above analysis, but this time in the case of Japan. Given the BoJ had much less consistency in the number of meetings per year, any interpretation should be treated with caution. The chart on the left of Figure 11 shows 5-day forward cumulative excess stock returns over the BoJ cycle. Like the BoE, there is no even-week result for the BoJ. The chart on the right shows Japanese stock returns over the FOMC cycle. While they do not follow the FOMC cycle as closely as UK stock returns, they appear to have even-week spikes.

Figure 11: Japan Stock Returns over the BoJ and FOMC Cycles, 1998-2016



As before, I run regressions to answer the two questions more rigorously. Table 13 shows the results of regressing daily Japanese excess stock returns on a combination of BoJ and FOMC cycle dummies. I test for the pre-announcement effect (i.e., a dummy in BoJ week -1). The FOMC week dummy is the standard CMVJ even-week dummy. Column 1 shows that while week -1 is significant, it is negative. Column 2 shows that even without any controls, Japanese stock returns are not driven by the FOMC cycle. Again, if CMVJ's argument is correct, then the lack of a BoJ cycle suggests that like the BoE, and unlike the FOMC, the BoJ is potentially stricter about information flow.

Table 13: Regressions of Daily Excess JP Stock Returns on BoJ/FOMC Cycle Dummies

	(1)	(2)	(3)
Dummy=1 in BoJ Week -1	-0.156***		-0.156***
	(-3.45)		(-3.45)
Dummy=1 in FOMC Week 0,2,4,6		0.0188	0.0167
		(0.46)	(0.41)
N	4954	4954	4954

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

6 Conclusion

CMVJ's even-week result, both in the US and internationally (i.e., that even weeks of the FOMC cycle predict excess stock returns), is very important in raising necessary questions about the conduct of central banks. Therefore, in this paper, I have evaluated some of CMVJ's key findings and make four key contributions. First, I find that the FOMC cycle does not drive US stock returns after 2004. Specifically, I find that the even-week result is only robust when one concludes the sample for analysis in 2016. When expanding the sample to end-2023, the result stops being robust as early as 2004. My second contribution evaluates the mechanism proposed by CMVJ which is that even-week returns are *causally* driven by leaks following biweekly board meetings at the Fed. I show that after 2004, board meetings were not biweekly, casting doubt on the underlying mechanism. Moreover, I show that before 2004, when the even-week result holds and board meetings are at least biweekly,

there were important outliers that are unrelated to board meetings. When removing these outliers, the even-week effect no longer holds. My third contribution documents that there is no even-week effect in fixed income markets where one might expect a meaningful response to Fed leaks. My fourth contribution relates to evaluating the robustness of CMVJ's even-week result internationally. I find that the FOMC cycle does not drive UK excess stock returns when one controls for potential pre-announcement effects in the UK and that FOMC cycle does not drive Japanese stock returns regardless of whether one includes controls. I further show that neither the BoE or the BoJ, unlike the FOMC, have especially unusual patterns in their cycle.

Regardless of whether there is informal communication as posited by CMVJ, this area of research raises an important question: does informal communication or targeted leaks improve the effectiveness of monetary policy? While CMVJ's result may not be robust, they have raised the profile of this important question.

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Appendix A Additional Tables

Table A.1: Expanding Window Regressions 1994 - 2023

Time Period	Even-Week Regression Coefficient	t statistic	N
1994 - 2023	0.0801***	3.02	7821
1995 - 2023	0.0790***	2.89	7561
1996 - 2023	0.0806***	2.86	7301
1997 - 2023	0.0848***	2.91	7039
1998 - 2023	0.0830***	2.78	6778
1999 - 2023	0.0782**	2.57	6517
2000 - 2023	0.0708**	2.27	6256
2001 - 2023	0.0593*	1.88	5996
2002 - 2023	0.0685**	2.14	5735
2003 - 2023	0.0708**	2.19	5474
2004 - 2023	0.0557*	1.67	5213
2005 - 2023	0.0592*	1.71	4952
2006 - 2023	0.0571	1.57	4694
2007 - 2023	0.0671*	1.76	4434
2008 - 2023	0.0689*	1.73	4173
2009 - 2023	0.0401	1.09	3911
2010 - 2023	0.0318	0.86	3650
2011 - 2023	0.0177	0.47	3389
2012 - 2023	0.0056	0.15	3129
2013 - 2023	0.0097	0.24	2868
2014 - 2023	0.0174	0.40	2607
2015 - 2023	0.0105	0.22	2346
2016 - 2023	-0.0200	-0.39	2085
2017 - 2023	-0.0504	-0.88	1824
2018 - 2023	-0.0710	-0.93	1565
2019 - 2023	-0.0277	-0.37	1304
2020 - 2023	-0.0224	-0.25	1043
2021 - 2023	0.0100	0.12	781
2022 - 2023	0.1120	1.01	520

* p<0.10, ** p<0.05, *** p<0.01

Each line represents a separate regression with the same variables. The only change is the time period. The results in Table 3 differ from those here as the former separates out the week 0 dummy.

Table A.2: Daily change in Treasury yield, 1994-2016

	1-year Treasuries	2-year Treasuries	10-year Treasuries
Dummy=1 in Week 0	-0.000672	0.0000238	-0.00362
	(-0.39)	(0.01)	(-1.56)
Dummy=1 in Week 2,4,6	0.000127	-0.00131	-0.00199
	(0.10)	(-0.83)	(-1.18)
N	5997	5997	5997

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table A.3: Daily change in futures yield, 1994-2016

	2nd FF Contract	4th FF Contract	4th ED contract
Dummy=1 in Week 0	-0.000349	-0.000404	-0.00301
	(-0.39)	(-0.36)	(-1.04)
Dummy=1 in Week 2,4,6	-0.000298	-0.000245	-0.00334
	(-0.49)	(-0.31)	(-1.60)
N	5996	5996	5996

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table A.4: Day of Cycle Regression, 1994-2003

FOMC Cycle Day	Day of Cycle Coefficient	t statistic	N
-6	0.011	0.09	2608
-5	-0.137	-1.19	2608
-4	-0.115	-1.05	2608
-3	0.024	0.17	2608
-2	-0.053	-0.52	2608
-1	0.159	1.33	2608
0	0.191*	1.75	2608
1	0.243*	1.75	2608
2	-0.037	-0.35	2608
3	-0.097	-0.81	2608
4	-0.065	-0.54	2608
5	-0.142	-1.18	2608
6	-0.104	-0.88	2608
7	-0.075	-0.61	2608
8	0.076	0.63	2608
9	-0.316**	-2.49	2608
10	-0.044	-0.30	2608
11	0.070	0.55	2608
12	0.125	0.92	2608
13	0.263**	2.05	2608
14	-0.019	-0.16	2608
15	0.049	0.34	2608
16	-0.252**	-2.22	2608
17	0.018	0.13	2608
18	-0.079	-0.53	2608
19	-0.205	-1.12	2608
20	0.449***	2.95	2608
21	0.058	0.51	2608
22	0.054	0.35	2608
23	0.115	0.96	2608
24	-0.214	-1.52	2608
25	0.203	1.27	2608
26	0.059	0.38	2608
27	-0.368**	-2.20	2608
28	-0.074	-0.40	2608
29	0.363*	1.78	2608
30	-0.176	-0.63	2608
31	-0.101	-0.42	2608
32	0.131	0.53	2608
33	0.614*	1.80	2608

* p<0.10, ** p<0.05, *** p<0.01

Each line represents a separate regression where the x variable is a different FOMC cycle day.

Appendix B Additional Figures

Figure B.1: Bu et al. (2021) Monetary Policy Shock, 1994-2023

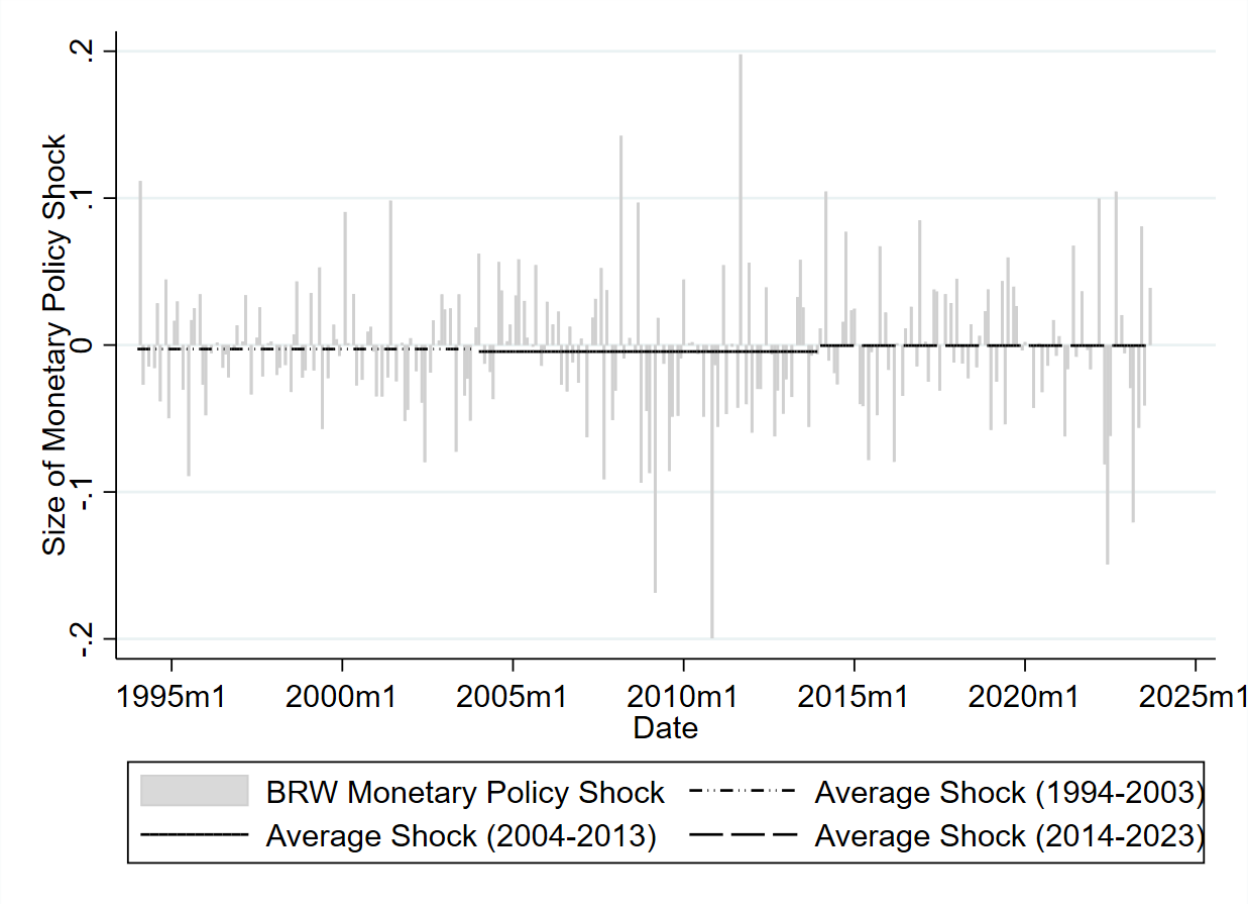
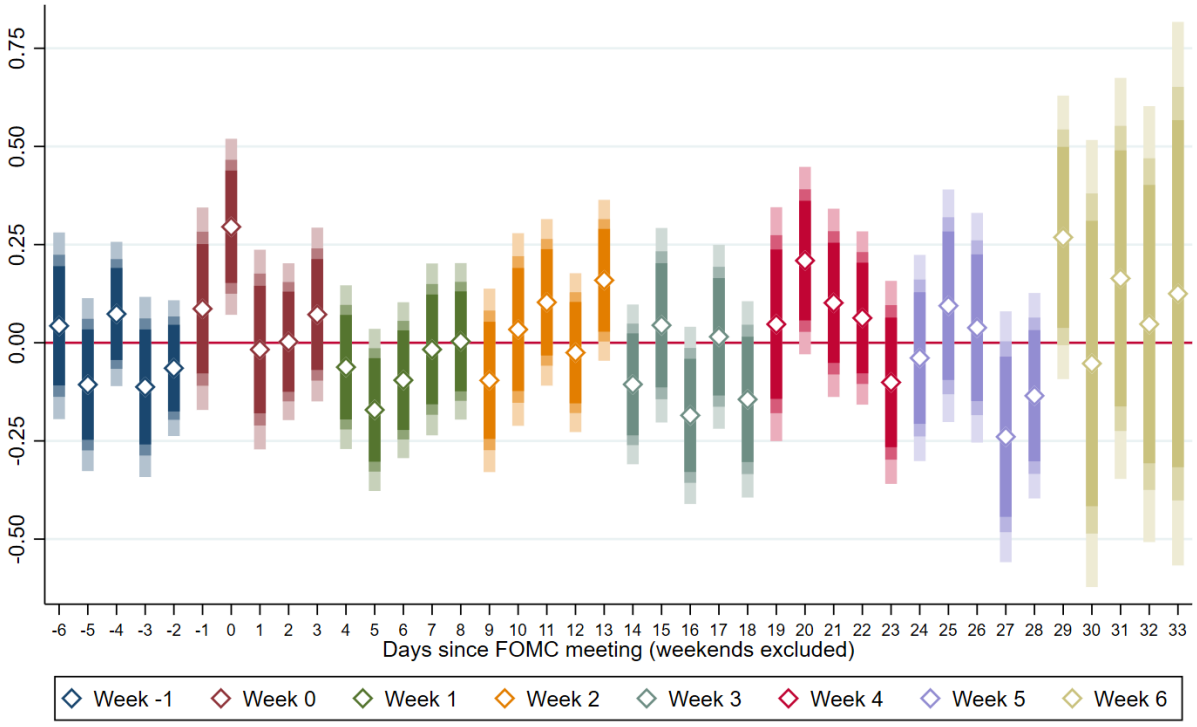


Figure B.2: Regressing Daily Excess Return on Day of the Cycle, 1994-2016



Notes: The 40 regressions underpinning this chart have excess returns as the dependent variable. The only regressors are a constant and the dummy for the specific day of the cycle. The diamonds reflect the coefficient on the day dummy of each regression. The confidence intervals are shown by coloured bars. The darkest shade represents the 99% confidence interval, one shade lighter represents the 95% confidence interval, and the lightest colour represents the 90% confidence interval.