The FOMC Announcement Premium Asymmetry

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Abstract

Excess equity returns around Federal Open Market Committee (FOMC) meetings are concentrated in recessions. On FOMC announcement days, the difference between stock returns in recessions and expansions is 73–119 basis points (bps). For reference, the unconditional difference between the announcements and all other trading days is 21 bps. The asymmetry remains statistically significant after accounting for the elevated volatility in economic downturns. The pre-announcement drift and the compensation for bearing risk on announcement days are also much more pronounced in recessions. Overall, the state-dependent equity market behavior around FOMC news releases reflects the asymmetric risk accumulation over the business cycle.

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1 Introduction

The business cycle directly influences the Federal Open Market Committee (FOMC) and its handling of the economy. The Fed declares its plans after the conclusion of a scheduled meeting, usually eliciting a strong response from the equity market. In this paper, I empirically demonstrate the joint influence of economic cyclicality and FOMC meetings on the stock market returns. I find that three notable features of the FOMC announcements — magnitude of the equity market response (Savor and Wilson (2013)), risk-return relationship captured by the CAPM beta (Savor and Wilson (2014)), and the pre-announcement drift (Lucca and Moench (2015)) — are all concentrated in recessions. Recessions are rare and represent a severe deterioration of macroeconomic fundamentals. The FOMC meetings are also infrequent and command attention from the stock market. As a result, the combination of downturns and high-impact events alters the market movements. Above all, the difference between equity returns in recessions and expansions on FOMC announcement days is 73 to 119 basis points. To put this into perspective, the difference between announcement and non-announcement days is 21 bps.

The magnitude of the asymmetry, 73–119 bps, closely matches size and timing of the realized equity premium. According to Cieslak et al. (2019), the equity premium ranges from 72 bps to 107 bps, and is "earned on a small number of days". By accounting for the priced-in risk, I demonstrate that these are the FOMC announcement days in recessions. Moreover, the equity premium consists of the risk-free rate and the compensation for bearing it. There is almost no dissimilarity in the stock market's response to increases, decreases, or inaction (no change) in the unexpected component of the interest rate shifts (Bernanke and Kuttner (2005)). However, I find that the state of the business cycle influences the risk-return relationship around FOMC meetings. There exists a very high compensation (216 bps for a unit increase in CAPM beta) for holding riskier equities on the announcement days during recessions. The corresponding increase during expansions is an order of magnitude lower (14.2 bps). The difference comes from the total amount of risk and uncertainty. In downturns, depressed macroeconomic fundamentals contribute to the risk pool, in turn elevating the

premium for bearing it. Similarly, intraday price movements also reflect the accumulation of risk during economic declines. I find that the pre-announcement drift is much more pronounced in recessions. During recessions, the announcement day returns rise by 75 bps over the trading hours. During expansions, the corresponding movement is only 6 bps, indistinguishable from the market microstructure noise.

Furthermore, the compensation for bearing risk and its dependence on the state of the business cycle affect conditional magnitude of the equity market's response to the announcements. On the FOMC announcement days, standard deviation of realized returns stands at 212 bps in downturns, and at 105 bps in upturns. From this perspective, comparing the equity market's response to the Fed's announcements between economic states does not take the priced-in risk into account. The excess return asymmetry might be, at least partially, due to the volatility differences across the business cycle. To assess the influence of time-varying volatility, I model it using a GARCH(1,1) process. GARCH(1,1) performs well in various financial settings (Hansen and Lunde (2005)) and is leptokurtic (Bollerslev (1986)), thus capturing some of the volatility clustering and tail risks. Still, the asymmetry between the economic phases remains, even after removing the volatility-compensated portion of the announcement premium. The estimated difference in excess returns between recessions and expansions shrinks from 73–119 bps to 36–45 bps, and remains statistically significant.

Time-variation in volatility also shows that the equity market's reaction to FOMC news spans more than one day. Elevated volatility around the announcements represents the corresponding market activity,[3] and is asymmetric with respect to the business cycle. During recessions, standard deviations of returns on the preceding, announcement, and succeeding days are 330, 212, 326 bps respectively; it is 234 bps on the remaining trading days. During expansions, only the succeeding days demonstrate moderately higher volatility (126 bps) compared to the days outside of FOMC±1 window (101 bps). Similarly, Boyarchenko et al. (2023) find that the magnitude of overnight returns before announcements is "large and positive". This after-hours trading is a component of returns on the surrounding days. Returns

[3]See Bollerslev et al. (2018) for a detailed description of the relationship.

on the preceding days are positive during recessions (33.5 bps) and expansions (12.1 bps). On the other hand, returns on the succeeding days are positive during recessions (15 bps) but are negative during expansions (−9.6 bps). Taken altogether, volatility and magnitude of the realized returns on surrounding days are a part of the equity market's response to the Fed's decisions. Moreover, they contribute to the state dependency of FOMC events.

I capture the entire three-day response by averaging the returns on announcement, preceding, and succeeding days. However, it is initially unknown whether the inclusion of surrounding days retains the informational content of FOMC announcements. The correlation between the arithmetic average time series and the announcement day returns is 0.46. It is positive and lower than 1, reflecting that the series are related, but not identical. To further validate a connection between the three-day average and the FOMC events, I exploit the pre-announcement drift dynamics. Lucca and Moench (2015) find that there is "no evidence of pre-FOMC returns before 1980", hinting at a potential structural break. To formally test the hypothesis using the three-day average series, I rely on the supF test and a procedure proposed in Kurozumi and Tuvaandorj (2011). The supF test identifies two prominent breaks: one in 1979 (matches the emergence of the pre-FOMC returns) and another in 1982.[4] Additionally, these dates also align with the changes in the Fed's behavior. Between 1979 and 1982, the Volcker Fed targeted monetary aggregates to combat then rampant inflation. Similarly, Huizinga and Mishkin (1986) also obtain 1979 and 1982 as the turning points by focusing on the real interest rate processes. The coincidence is unexpected — the same mean shifts are identified using two seemingly unrelated time series. They only share timing: stock market returns are averages on the days around the FOMC meetings, which is exactly when the interest rates are adjusted. From this perspective, averaging returns over the preceding, announcement, and succeeding days captures the equity market behavior due to the monetary policy events.

After incorporating surrounding days into the estimate, the difference between equity returns in recessions and expansions is 59–77 bps, and it declines to 31–37 bps after the

[4]These dates correspond to the breaks identified using equal and value-weighted three-day average returns respectively. Consistently with the overall findings in this paper, volatility matters a lot.

GARCH(1,1) volatility adjustments. These estimates are only slightly lower than the ones based solely on the announcement days, indicating that net anticipation and reversal are insufficient to offset the asymmetry. The sign of the change (negative) demonstrates that the impact of FOMC events on the equity market has a short-term, diversifiable component. The remaining difference represents systematic, long-term net effect of FOMC meetings. I also check whether there exists an asymmetric change in inflation, counterbalancing the difference in the stock market's reaction. On the day after the announcement, the difference in breakeven inflation over the economic phases is 6 bps. While the inflation acts against the equity market's asymmetry (the increase is in recessions), it is not large enough to eliminate the premium.

Finally, I show that the asymmetric market reaction to FOMC announcements is heterogeneous, and then identify the largest contributors. Using individual industry indices, I calculate the volatility-adjusted difference between equity returns in recessions and expansions in the three-day setting. Acyclical (with respect to demand) sectors (such as wholesale, meals, transportation, utilities, and clothing) demonstrate the above-market asymmetry, as high as 47 bps.[5] For the procyclical sectors (such as firearms, tobacco, coal, and oil), the corresponding difference ranges from -2 bps to 14 bps. The influence of demand indicates that the monetary policy alone does not cause the difference in FOMC premium between recession and expansions. I test this hypothesis by replacing the NBER recession indicator with the yield curve inversions. Negative spreads represent an immediately observable extreme monetary policy that does not overlap with recessions. If the Fed alone is responsible for the premium, then the magnitude of the asymmetry under the inversions should be different from zero. However, for all industries, the magnitude of the asymmetry is statistically indistinguishable from zero at 5% level. Therefore, the monetary policy is only one of the components of the difference in FOMC premium between recession and expansions. Put differently, macroeconomic fundamentals as a whole need to deteriorate in order to affect the equity market's reaction to the announcements.

[5]For reference, the corresponding broad market asymmetry is 31.5 bps.

2 Business Cycle and the Pre-Announcement Drift

2.1 Business Cycle and the Magnitude of the Drift

The equity prices rise noticeably prior to the release of the Fed's decision, a phenomenon known as the pre-announcement drift (Lucca and Moench (2015)). Following Lucca and Moench (2015), I focus on the intraday cumulative returns preceding scheduled FOMC news releases, but consider the recessions and expansions separately.[6] Figure 1 shows intraday stock market behavior on the scheduled FOMC meetings.[7] In recessions, prices rise before the FOMC announcements and continue to do so until the closing. In expansions, the equity market barely moves after the opening. As a result, it is immediately clear that the pre-announcement drift is asymmetric with respect to the business cycle and is a feature of economic downturns. Furthermore, the gap between recessions and expansions (92 bps) exceeds the corresponding difference between announcements and regular days (21 bps) by a wide margin. The intersection of business cycle and macroeconomic announcements significantly influences the equity market, more so than the news alone. It is reasonable for the asymmetry associated with the economic phases to exceed the announcement effect. After all, the business cycle is a systematic feature that affects the entire economy, while the FOMC announcements, however important, are comparatively limited in impact and scope.

The drift occurs when there is a gradual shift in investment conditions over a short period of time. In this context, recessions play a dual role. First, the downturns supply the macroeconomic risk that is incrementally lowered on the announcement days. Second, the sensitivity to news and uncertainty is much higher in recessions than expansions (Bloom (2014)). Table 1 displays the intraday market reaction on the FOMC meeting days. Reflecting much riskier state, cumulative returns are significantly larger during recessions than expansions at every point over the trading hours (positive "Rec.−Exp." row). Over the entire day, the difference in returns around the FOMC announcements conditional on the economic cycle is 92 bps. The announcement premium in recessions is 104 bps, and in ex-

[6] Recession indicator is NBER USRECD throughout the whole paper, unless explicitly noted otherwise.
[7] See Appendix A1 for the detailed description of sample collection and validation.

pansions it is 10 bps. Actually, at every trading hour, irrespective of the economic phase, cumulative returns on the meeting days exceed those on the rest of the trading days. The difference, however, is pronounced only during recessions. During expansions, the premium goes from 3.68−(−0.78)=4.46 bps (10 AM) to 10.12−(−0.16)=10.28 bps (3 PM) over the course of the trading. During recessions, the corresponding excess returns are significantly higher, 27.23−(−0.34)=27.57 bps (10 AM) and 102.11−(−2.33)=104.44 bps (3 PM). Outside of downturns, it might be difficult to source enough uncertainty to make the incremental declines noticeable. From this perspective, the state of the business cycle controls the supply of risk and is the main determinant of the announcement premium.

Figure 1: **Cumulative Hourly Returns on the FOMC Announcement Day**

The chart includes average cumulative hourly returns (in basis points) on the FOMC meeting days (and the remaining days, labeled exFOMC) split by the business cycle. Shaded region encapsulates the FOMC announcement time. Data (S&P 500 futures) covers 2000-2019. Recession indicator is NBER USRECD.

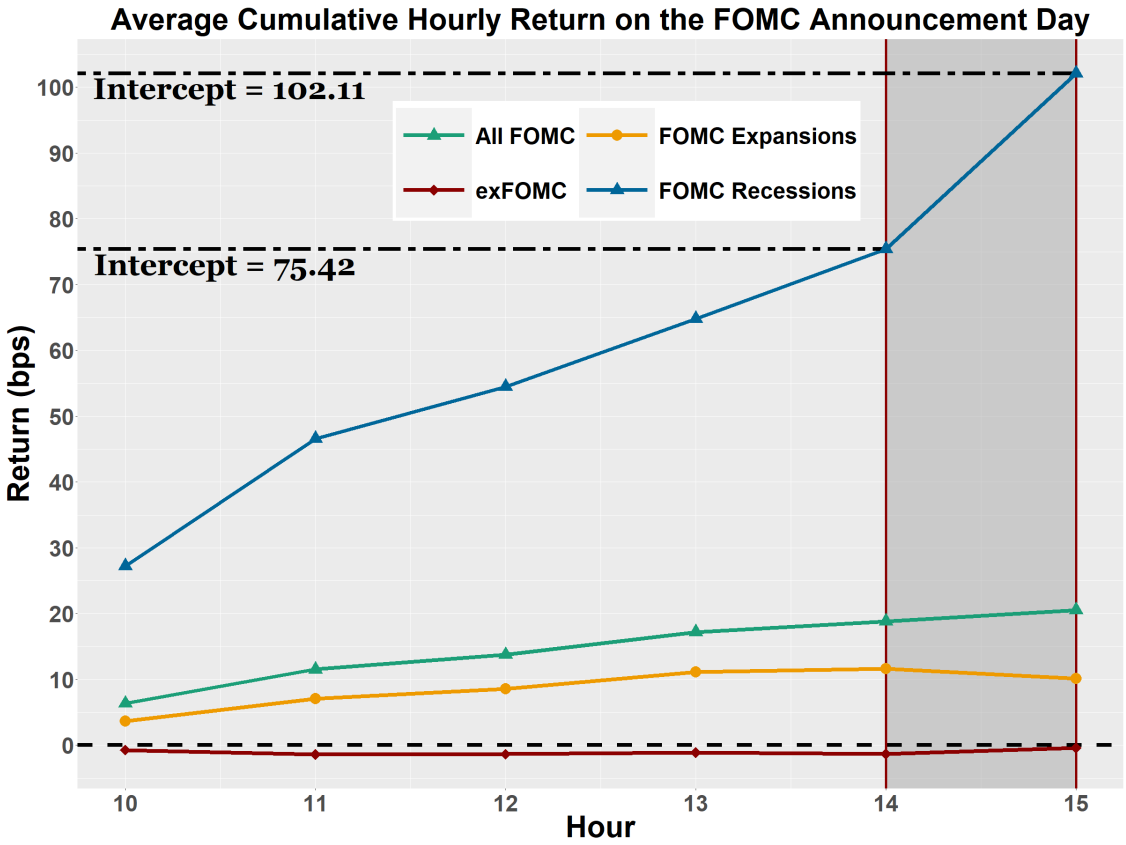


Table 1: **Market Reaction on the FOMC Meeting Days**

This table presents cumulative returns and associated statistics (in basis points) on the FOMC meeting days partitioned by the business cycle. Bottom panel presents reference values for all days without the FOMC announcements. Data (S&P 500 futures) covers 2000-2019. Recession indicator is NBER USRECD. Difference in means p-value is computed using Welch's t-test. Reported means and standard deviations are cross-sectional within a group (FOMC announcement days or all remaining trading days).

	10	**11**	**12**	**13**	**14**	**15**
	FOMC Meeting Days					
Mean, All	6.35	11.53	13.74	17.18	18.85	20.55
Mean, Rec.	27.23	46.61	54.49	64.81	75.42	102.11
Mean, Exp.	3.68	7.04	8.53	11.10	11.61	10.12
Rec.−Exp.	23.55	39.56	45.96	53.71	63.81	91.99
p-value	0.02	0.003	0.002	0.002	0.004	0.01
StDev, All	26.89	36.57	43.98	46.62	57.27	89.90
StDev, Rec.	37.68	45.83	49.25	60.65	78.75	121.33
StDev, Exp.	24.10	32.80	40.60	40.96	49.86	79.83
	All Days Excluding FOMC					
Mean, All	-0.73	-1.42	-1.37	-1.12	-1.32	-0.41
Mean, Rec.	-0.34	-2.83	-4.89	-6.54	-6.95	-2.33
Mean, Exp.	-0.78	-1.24	-0.91	-0.42	-0.59	-0.16
StDev, All	35.26	51.45	60.00	65.99	73.86	85.86
StDev, Rec.	62.55	88.27	100.31	114.27	127.28	149.71
StDev, Exp.	29.98	44.53	52.57	56.80	63.75	73.68

2.2 Out-of-Sample Validity

Conditioning on the business cycle also eliminates the out-of-sample validation issues raised in Cieslak et al. (2019). According to Cieslak et al. (2019), "neither the main result of Bernanke and Kuttner (2005) nor that of Lucca and Moench (2015) is significant in post-publication data". Statistical significance may be affected by either the emergence of the announcement premium in expansions or the disappearance in recessions. However, neither scenario is likely. The intraday analysis in this paper has nine more years of data than the

sample in Lucca and Moench (2015). So far, the issue has not manifested.[8] Moreover, the state dependency of the magnitude explains the post-publication disappearance of statistical significance in Lucca and Moench (2015) and Bernanke and Kuttner (2005). The announcement day premium is a weighted average of returns across economic phases. The premium on the announcement days in expansions is not statistically significantly different from the non-FOMC trading days. As the analysis window widens, the share of expansions increases. Consequently, the estimates of the announcement premium in Lucca and Moench (2015) and Bernanke and Kuttner (2005) decrease and approach the non-announcement trading days. Paradoxically, and in stark contrast to Lucca and Moench (2015) and Bernanke and Kuttner (2005), the significance of results in this study improves as the window expands. Including more low magnitude expansionary days only widens the gap[9] between the magnitude of FOMC premium in recessions and expansions.

2.3 Econometric Robustness

Intraday data contains market microstructure noise, which peaks "at the time of regularly scheduled macroeconomic news announcements" (Bollerslev et al. (2008)). Specifically, order size, timing, and quality of execution affect individual transactions. To address this issue, I use hourly block-sampled prices to construct the returns.[10] For example, I take the mean of all transactions between 9 AM and 10 AM as the 9 AM price. Similarly, the price at 10 AM is obtained by shifting the window to 10 and 11 AM. Returns based on the coarsely averaged prices enable a robust comparison between the states of the business cycle. By the central limit theorem, the returns are asymptotically normally distributed, satisfying the assumptions behind Welch's t-test. Importantly, Welch's t-test accounts for the difference in variances between groups, reflecting properties of the intraday returns on the FOMC announcement days. For instance, at 3 PM, standard deviations of the realized cumulative

[8] After transitioning to the daily data, the sample in this paper expands further, to 1994-2022. The expanded data includes one more (coronavirus) recession. The magnitude of the difference remains significant.

[9] There is an econometric channel as well. The number of degrees of freedom is non-decreasing with the number of observations. Group size penalty is smaller than the gain from an additional data point.

[10] Based on the S&P 500 futures traded on the Chicago Mercantile Exchange, obtained from Finnhub.

returns in downturns and upturns are 121.3 bps and 79.8 bps respectively. The inference is robust when the Student's t-distribution has sufficiently heavy tails (see sections 2 and 3 in Ibragimov et al. (2015)), determined by the number of degrees of freedom. In this application, the number[11] is kept conservatively low to penalize the sample size and the relative rarity of recessions.

According to Bollerslev et al. (2018) and Zhu (2023), realized volatility is closely linked to the order flow on FOMC meetings days. Consequently, coarse averaging designed to capture the overall trend comes at a cost. The variance of realized returns reflects both liquidity and risk at the same time. Additionally, Zhu (2023) finds that "illiquidity measured by the absolute order imbalance significantly increased ahead of FOMC announcements". There might not be enough trading to ensure sufficiently frictionless market entry and exit. Assuming rationality, market makers (or other potential counterparties) would absorb short-term losses only if there are none long-term. Alternatively, trading fees should be sufficiently high to offset them. For that reason, volatility does not solely represent a financial risk associated with the news or downward price movement, but is also entangled with investors' ability to access the market. Taken altogether, it is possible to conclude that the pre-announcement drift is asymmetric; after all, the prices rise much more noticeably in recessions. However, the magnitude of the premium (or a portion of it) may also be a compensation for volatility or represent trading costs.

2.4 Implications for Modeling the Pre-Announcement Drift

State dependence of the FOMC announcement premium provides empirical evidence consistent with some of the theoretical mechanisms behind the pre-announcement drift. For example, Ai and Bansal (2018) demonstrate that the drift may arise as a result of information leakage. The leakage may be more likely in recessions; opportunities to earn alpha are few and far between in downturns, so the marginal benefit from exploiting private infor-

[11] It is calculated using the Welch-Satterthwaite equation. As a result, the number of degrees of freedom is bound from below by the smallest number of observations in a group minus one.

mation is higher. Ai et al. (2021a) relies on a gradual information asymmetry reduction to generate the pre-announcement drift. Recessions are a low wealth state making the information even less accessible for some. Additionally, the equity market's sensitivity to news and uncertainty is countercyclical and elevated around macroeconomic announcements, making the information asymmetry even more pronounced (Bloom (2014), Elenev et al. (2017)). Cocoma (2017) uses disagreement to explain the pre-announcement drift. During recessions, which are unobservable and determined ex-post, the investors may hold opposing views on the state of macroeconomic fundamentals. On the other hand, during expansions, a steady stream of positive returns may align the outlook. In Ying (2020) model, market makers demand risk compensation and contribute to the pre-announcement drift. The asymmetry with respect to the business cycle is a reasonable motive for them to do so. There is less trading in recessions, so the market makers should expect to be compensated for their services. Additionally, if there is relatively more informed trading in recessions, then the bets are likely to be unidirectional, resulting in an even higher risk for the market makers.

3 State-Dependent Price of Risk

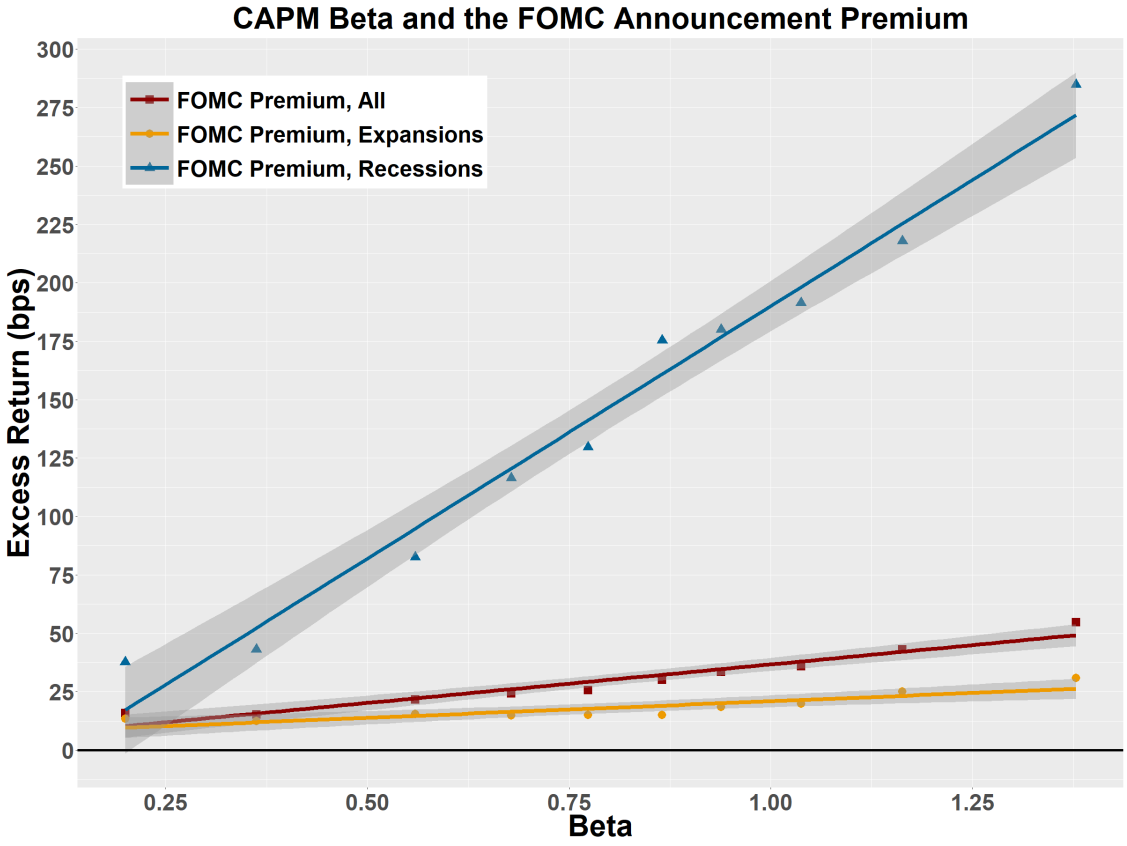
Unconditionally, on macroeconomic announcement days, there exists a risk-return relationship between the CAPM beta and the excess returns (Savor and Wilson (2014)). Following Savor and Wilson (2014), I calculate the average excess return[12] for the beta-sorted portfolios[13] and then plot it as a function of CAPM beta,[14] but split recessions and expansions apart. Figure 2 displays the risk-return relationship on the FOMC announcement days conditional on the business cycle. Table 2 accompanies Figure 2 and includes numerical estimates of the risk pricing. Compensation for the additional risk, represented by a positive slope, exists on the FOMC meeting days in all economic states. However, the magnitude of the beta risk premium differs greatly and is asymmetric with respect to the business cycle. Dur-

[12]The difference between the mean return across the FOMC meetings and all remaining trading days.
[13]CRSP Beta Deciles (Daily)
[14]Relative to the CRSP value-weighted index.

ing recessions, market participants demand more return for the same level of portfolio risk. On the FOMC announcement days in recessions, a unit increase in beta requires 216 bps of return. The corresponding compensation in expansions is only 14 bps. This difference in risk pricing shows that the investors are more sensitive to the FOMC news during economic declines. Consequently, the influence of business cycle is sufficiently strong to prominently affect the risk-return relationship itself.

Figure 2: **CAPM Beta and Business Cycle**

The figure shows a linear relationship (Premium= α + k*Beta) between the FOMC premium (difference in returns between the announcement and non-announcement days) and the CAPM beta ("Beta" in the equation above). The estimates are computed for 10 portfolios ranked by realized CAPM beta. The unconditional premium is labeled "All", and the conditional premium is labeled according to the economic state ("Rec" or "Exp"). Recession indicator is NBER USRECD. Data covers 1994-2022.



In expansions, the announcement premium barely changes between 1^{st} and 6^{th} deciles, going from 13.5 bps to 15.1 bps respectively. Only between 7^{th} and 10^{th} deciles it moves

from 18.4 bps to 31 bps. As a result, during upturns, the entire relationship comes from relatively riskier portfolios. On the other hand, in recessions, there is a robust progression of the premium for every portfolio, steadily increasing from 37.8 bps to 284.8 bps (Table 2). This pattern is consistent with the importance of total risk. Irrespective of the state of the business cycle, as soon as the required level is reached (which is easier during more volatile downturns), there is an associated premium for each additional increase in beta. Beta risk sensitivity is higher in recessions than expansions, in line with Elenev et al. (2017), who find "a countercyclical sensitivity of the stock market to news across a wide range of macroeconomic news announcements". Setting the beta to zero results in a 33 bps gap in the premium (Table 2). It is an estimate of the difference between equity returns in recessions and expansions while ignoring the beta risk altogether.

Table 2: **Beta-Sorted Portfolios, Risk-Return Relationship**

This table includes the FOMC announcement premium (in basis points, defined as a difference in returns between the announcement and non-announcement days) for the beta-sorted portfolios. Data covers 1994-2022. The unconditional premium is labeled "All", and the conditional premium is labeled according to the economic state ("Rec" or "Exp"). Recession indicator is NBER USRECD. The table also includes estimates of the linear relationship between premium and beta (Premium= α + k*Beta + ϵ). ***, **, * denote significance (based on the OLS standard errors) at 1%, 5%, and 10% respectively.

	Decile										**Coefficients**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	$\boldsymbol{\alpha}$	$\boldsymbol{k}$
Beta	0.20	0.36	0.56	0.68	0.77	0.87	0.94	1.04	1.16	1.38		
	Premium											
All	15.8	15.3	21.7	24.2	25.7	30.0	33.5	35.9	43.0	54.6	3.7	33.0***
Rec	37.8	43.1	82.7	116.4	129.7	175.3	180.1	191.5	217.9	284.8	-26.0**	216.0***
Exp	13.5	12.4	15.5	14.8	15.0	15.1	18.4	19.9	25.0	31.0	6.8**	14.2***

The intercept is statistically equal to zero only unconditionally. Coupled with the positive slope, it creates an illusion of CAPM relevancy. In reality, any empirical test of the CAPM validity is subject to Roll's critique. Beyond that, an interesting explanation for the phenomenon is presented in Andrei et al. (2023), who claim that "empiricist retrieves a stronger CAPM on days when public information reduces disagreement among investors",

using the FOMC meetings as one of the examples. The asymmetry with respect to the business cycle provides additional context. The Fed officials release information in both recessions and expansions. However, the intercept changes signs between economic phases (Table 2), and is statistically different from zero in both states (−26 bps in recessions and 6.8 bps in expansions). Without accounting for the business cycle, announcement days as a whole represent a mixed signal, a weighted average of expansions and recessions. Individually, however, the CAPM fails in recessions and expansions despite the release of public information. Alternatively stated, the unconditional intercept is coincidentally zero; a ratio of days in expansions and recessions is not fixed.

4 Differences in Volatility over the Business Cycle

4.1 Modeling Volatility: GARCH(1,1)

There exists a compensation for taking on risk, so excess returns alone are insufficient to establish the asymmetry. Recessions are far more volatile than expansions and the announcement premium should reflect the elevated risk during economic downturns. The estimate of interest is a risk-adjusted difference in returns over the states of the business cycle, best illustrated using a hypothetical example. Suppose mean return on the FOMC announcement days is 20% during recessions and 10% during expansions. Corresponding standard deviations are 20% and 10% respectively. The nominal excess return is 20%−10%=10%, but it declines to 0% after factoring in volatility.

I use GARCH(1,1) process to estimate the conditional variance of daily returns. Using the estimate of conditional variance, I create a volatility-adjusted time series by rescaling the observed returns, $Adj.R_t = R_t/\hat{\sigma}_t$. By construction, standard deviation of the $\{Adj.R_t\}$ time series is 1. This approach captures time-variation in volatility and, by extension, the difference between the states of the business cycle. According to Hansen and Lunde (2005), GARCH(1,1) excels in a variety of financial settings, thus making it appropriate for modeling the baseline risk-return relationship. It is a heavy-tailed process (Bollerslev (1986))

that reflects volatility clustering, in turn mirroring large consecutive return swings during recessions. GARCH(1,1) is also deterministic with respect to parameters and observed data. Therefore, it is immune to data snooping and reflects the information available immediately prior to the event. A forward-looking bias would result in a stronger risk-return relationship than could be observed at the time. However, there is an econometric trade-off. Adjusting returns adds an additional stage to the estimation procedure. Scaling is a source of additional uncertainty, and it is not fully reflected in standard errors (Murphy and Topel (1985)).[15]

$$
\begin{aligned}
Ret_t = \mu_t + \epsilon_t; \quad \sigma^2_{t+1} = \omega + \alpha_1 \epsilon^2_t + \beta_1 \sigma^2_t \\
\sigma^2_t \equiv Var(\epsilon_t) \\
Adj.R_t = R_t / \hat{\sigma}_t
\end{aligned}
$$

This procedure is agnostic to the transmission channel. It does not matter how information gets to the market, for as long as there is a change in the magnitude or the volatility of returns. Neither intentional nor unintentional leakage should impact the estimate. Assuming there is a leak (or a revelation of an accurate prediction), the information would become public prior to the announcement, and then immediately incorporated into the market returns. There would be no abnormal reaction at the official release time, especially in excess of historical risk-return relationship. Accordingly, this approach accommodates private information, coming from either superior forecasting (as suggested in Kurov et al. (2018)) or information leakage (both intentional and unintentional). The Fed uses an informal communication channel to provide advance information and vet a potential market reaction (Cieslak et al. (2019)). According to Bernile et al. (2016), there is also "evidence consistent with informed trading during embargoes of Federal Open Market Committee (FOMC) scheduled announcements". The leaks are informative, as some insider trading activity[16] involves high-ranking Fed officials. These are not isolated incidents, central banks other than the Fed are also known to leak information before the official announcements (Michaelides et al. (2015)).

[15] I present a potential solution (bootstrap) in the next section while discussing the significance of results.
[16] Raphael Bostic Discloses Violations of Fed Trading Rules in 2022; Wall Street Journal, June 15, 2023.

4.2 Size Dependence

I partition the market by firm size to demonstrate the effect of GARCH(1,1) volatility adjustments on the conditional magnitude of equity market's response to the FOMC announcements. Realized volatility scales inversely with the firm size, demonstrating the interaction between return adjustments, variance, and the business cycle. Table 3 includes the baseline estimates of equity market's response to FOMC events.[17] Before volatility adjustments, smaller companies display higher realized returns on the announcement days in recessions, in line with the previously documented risk-return relationship. Firms in the 1^{st} and 2^{nd} deciles return 135.4 and 207.6 bps respectively and decline monotonically thereafter, reaching 75.6 bps in the 10^{th} decile. Accounting for the volatility shrinks the range to 45.7–63.4 bps and breaks the direct correspondence between the size and the relative level of return. Expansions provide additional evidence supporting the effectiveness of the GARCH(1,1) process. During upswings, the risk is disconnected from the return on the announcement days. As a result, returns before and after the adjustment are similar (12.3–23.1 bps before and 12.1–21.3 bps after).

Positive returns spanning more than the announcement days are unique to the large firms and exist even after accounting for the volatility. In recessions, with or without the adjustments, stock returns increase from the 1^{st} to the 10^{th} deciles. Furthermore, only portfolios in the 9^{th} and 10^{th} deciles post positive returns (12.0 bps, 36.7 bps, 6.6 bps, and 11.6 bps). A broad market index returns 33.5 bps on the preceding day, closely mirroring the large companies. Arguably, it is an artifact of earlier uncertainty resolution, coming either from trading index-linked investment products or more comprehensive analyst coverage. Broad value-weighted indices are, by construction, less representative of smaller firms. Therefore, transactions involving securitized products (such as liquid options and ETFs) facilitate additional price discovery, but only for the top constituents. Besides, larger firms receive more coverage from analysts further tilting the informational imbalance.

[17] Ten portfolios formed on size, obtained from Ken French's data library.

Table 3: **FOMC Premium and Firm Size, 1994-2022**

The table presents summary statistics (means, in basis points) of the portfolio returns formed on size (10 market capitalization deciles, ranked from the least to greatest), both raw and volatility-adjusted, on and around the FOMC announcement. ±1 denote the day before and after the FOMC announcement respectively. 3Days are returns inside the FOMC window (FOMC±1 day) returns. ex3D are returns not within the window. Recession indicator is NBER USRECD.

	Recessions					**Expansions**				
	−1	**FOMC**	**+1**	**3Days**	**ex3D**	**−1**	**FOMC**	**+1**	**3Days**	**ex3D**
	Unadjusted Value-Weighted Returns									
1^{st} Dec.	-58.41	135.36	1.77	29.68	-9.63	-3.24	12.26	-10.36	-0.45	5.74
2^{nd} Dec.	-34.32	207.64	-19.05	56.78	-9.97	0.70	22.11	-15.50	2.44	5.99
3^{rd} Dec.	-34.27	192.32	3.32	60.52	-11.09	0.46	20.24	-16.27	1.48	6.11
4^{th} Dec.	-30.82	184.73	19.09	64.14	-11.15	5.78	19.79	-12.57	4.33	5.20
5^{th} Dec.	-26.45	171.64	22.59	63.88	-11.86	2.82	23.07	-14.70	3.73	5.62
6^{th} Dec.	-31.59	149.95	23.27	54.54	-9.85	2.32	20.44	-14.55	2.74	5.54
7^{th} Dec.	-23.14	126.86	32.23	52.26	-11.33	2.38	22.02	-11.67	4.24	5.87
8^{th} Dec.	-4.45	118.36	37.59	57.26	-12.67	4.79	20.24	-7.94	5.69	5.72
9^{th} Dec.	11.95	95.64	22.27	51.42	-12.47	7.62	20.62	-7.70	6.85	5.70
10^{th} Dec.	36.64	75.64	19.05	50.85	-11.17	13.84	19.99	-8.51	8.44	4.71
	Volatility-Adjusted Value-Weighted Returns									
1^{st} Dec.	-29.99	52.71	12.40	12.30	-3.22	2.30	12.07	-4.29	3.36	6.79
2^{nd} Dec.	-3.96	59.87	4.68	21.10	-3.59	6.49	16.58	-5.39	5.89	4.70
3^{rd} Dec.	-6.42	61.61	13.97	24.19	-5.44	4.58	16.28	-7.53	4.45	4.51
4^{th} Dec.	-7.38	63.41	20.49	26.70	-6.02	10.01	15.71	-3.02	7.56	3.68
5^{th} Dec.	-7.28	61.84	22.84	27.25	-6.91	6.67	19.16	-6.96	6.29	4.00
6^{th} Dec.	-9.90	60.07	22.35	25.45	-6.59	6.19	18.77	-5.44	6.51	4.45
7^{th} Dec.	-9.59	58.53	25.06	26.02	-7.44	6.92	20.13	-4.90	7.38	5.17
8^{th} Dec.	-5.04	54.11	29.29	27.51	-8.49	7.97	19.69	-1.11	8.85	4.94
9^{th} Dec.	6.57	49.27	23.12	27.96	-8.95	10.12	20.49	-1.81	9.60	5.32
10^{th} Dec.	11.59	45.74	20.26	27.36	-9.09	13.55	21.33	-5.78	9.70	4.69

5 Days Before and After FOMC Announcements

5.1 Intertemporal Ripple Effect

The influence of FOMC events on the market lasts for multiple days. The shock is so significant that it also impacts preceding and succeeding days. Figure 3 presents a time series of

yearly excess returns[18] on the days before and after FOMC announcements. Market behavior on the surrounding days, specifically the magnitude and volatility of returns, is comparable to those on the meeting day itself. Furthermore, mean and variance of the returns on the days before and after the announcements are much more extreme than on the remaining trading days (Table 4). For example, the unconditional average return on the preceding and succeeding days is 14.1 bps and -7.3 bps respectively, surpassing 2.8 bps outside. Standard deviation of returns on the days surrounding the announcements is also disproportionately high: 139 bps and 155 bps on the days before and after, compared to 117 bps during regular trading. After conditioning on the state of the business cycle, the difference between returns within FOMC$\pm$1 window and outside of it becomes even more acute. For instance, in recessions, the average return is 33.5 bps on the days before FOMC announcements compared to -12.4 bps during regular trading. Similarly, standard deviations of returns on the preceding and succeeding days are 330 bps and 326 bps respectively — much higher than 234 bps otherwise.

Market movements outside of the preceding and succeeding days affect the announcement premium asymmetry and, additionally, incorporate the after-hours trading. Boyarchenko et al. (2023) find that a substantial portion of return comes from non-trading night hours — "the largest positive returns are between 2:00 a.m. and 3:00 a.m. U.S. eastern time". Daily returns are close-to-close, so the change in prices attributed to the announcement days incorporates trading on the prior night. Likewise, returns on the succeeding day capture transactions happening overnight after the news release. Moreover, succeeding days further contribute to the difference in FOMC announcement premium between recessions and expansions (Table 4). In recessions, the day-after return is large and positive, standing at 15 bps. In expansions, it is -9.6 bps. Unconditionally, the day-after return is -7.3 bps so the reversal is a feature of expansions.[19] Table 5 contains the outcome of testing the pairwise similarity of return distributions on the days surrounding FOMC announcements.[20] In ex-

[18] Return on the day of interest minus average return on the remaining trading days, all in the same year.
[19] The results are robust to return weighting. See Appendix A3 for details.
[20] Based on a non-parametric two sample Anderson-Darling test (Scholz and Stephens (1987)).

pansions, p-values from comparing distributions on FOMC and FOMC+1 days are 0.046 and 0.069, indicating that the reversal is statistically significant. In recessions, the corresponding p-values are 0.406 and 0.324, demonstrating that the market behavior on the FOMC announcement days continues either overnight or spills into the next trading day.

Figure 3: **Returns on the Days Before and After the FOMC Announcement**

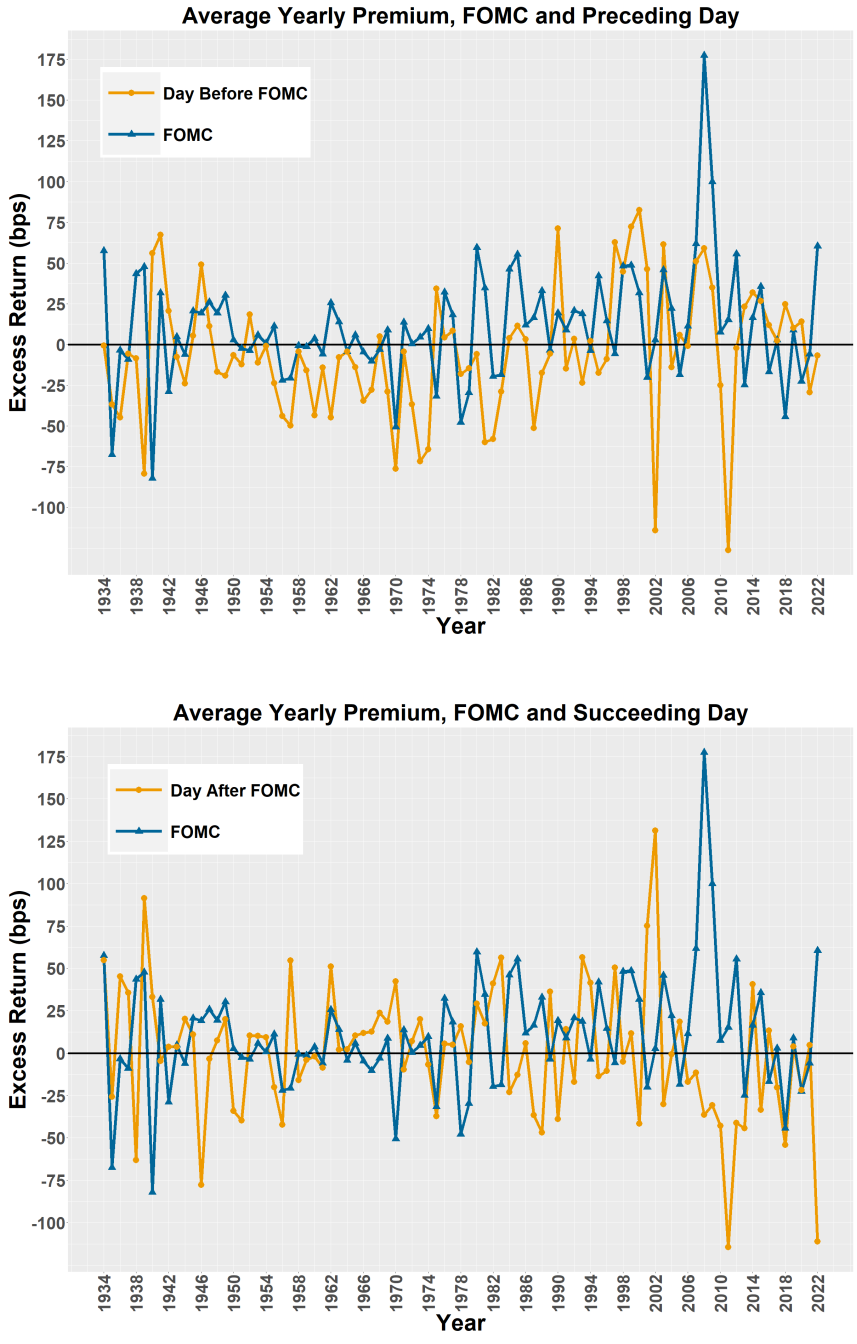


Table 4: **Market Response to the FOMC Announcements, 1994-2022**

The table presents summary statistics (in basis points) of the value-weighted returns on and around the FOMC announcement day. ±1 denote the day before and after the FOMC announcement respectively. 3Days are returns inside the FOMC window (FOMC±1 day). ex3D are returns on the rest (not within the window) of the days. Recession indicator is NBER USRECD.

	−1	FOMC	+1	3Days	ex3D	All
			Mean			
All	14.12	24.45	-7.28	11.06	2.80	3.60
Recessions	33.46	79.38	15.03	49.95	-12.37	-5.45
Expansions	12.13	18.80	-9.57	7.12	4.11	4.39
			Standard Deviation			
All	138.79	119.53	154.55	137.89	116.92	119.13
Recessions	330.33	212.09	325.62	287.25	234.14	241.12
Expansions	102.23	104.81	125.87	111.96	100.64	101.77
			Count of Observations			
All	236	236	236	707	6,595	7,302
Recessions	22	22	22	65	521	586
Expansions	214	214	214	642	6,074	6,716

Table 5: **Distribution Similarity, 1994-2022**

The table contains p-values from pairwise return distribution similarity testing (non-parametric two sample Anderson-Darling test, as in Scholz and Stephens (1987)). Comparisons using the value-weighted returns are above the diagonal, equal-weighted are below. Null hypothesis: samples were drawn from the same distribution. FOMC±1 are the announcement, preceding and succeeding days. ex3D are days outside of the FOMC window. Recession indicator is NBER USRECD.

	Recessions					**Expansions**				
	−1	**FOMC**	**+1**	**ex3D**		**−1**	**FOMC**	**+1**	**ex3D**	
−1	1	0.474	0.737	0.638	**−1**	1	0.575	0.053	0.183	**Value**
FOMC	0.286	1	0.406	0.058	**FOMC**	0.346	1	0.046	0.042	
+1	0.814	0.324	1	0.143	**+1**	0.064	0.069	1	0.039	
ex3D	0.868	0.018	0.130	1	**ex3D**	0.358	0.083	0.051	1	
						Equal				

5.2 Validating Return Averaging

Redefining the FOMC event as an arithmetic average of returns on the preceding, announcement, and succeeding days is a simple way to account for the trading on surrounding days. However, it is possible that the averaging would dilute the FOMC signal and make the three-day return less representative of the Fed's behavior. In this section, I demonstrate that the three-day average return retains the informational content and reflects the transmission of FOMC decisions to the equity market. Figure 4 depicts two time series: the three-day and the announcement day yearly average excess returns.[21] Overall, they look similar and are positively correlated (0.46). Nonetheless, including days before and after the announcement reduces magnitude of the excess returns spikes, making the three-day average series appear less volatile. Regardless of the specification, both one and three-day yearly excess returns peak in 2008. Alignment with the 2007–2008 financial crisis reflects the dependence of both series on the business cycle. The Fed (and other central banks) provided unprecedented support during that time, eliciting strong equity market reaction. There is one more key difference of economic significance. The excess return on FOMC meeting days (blue line) is almost never deeply negative, particularly since 1994. On the other hand, the three-day average time series (orange line) demonstrates reversals. This behavior mirrors the post-announcement patter described in Lucca and Moench (2015), "while equity market investors have at times been surprised by the FOMC decision (Bernanke and Kuttner (2005)), these surprises average out to zero in our sample period". As a result, it is immediately clear that the expanded window incorporates at least one known property of the succeeding days and keeps the connection with the business cycle.

Time-variation in volatility shows that the Fed's decisions historically[22] carried different weight. The volatility behavior is particularly interesting between 1944, when the Bretton-Woods system was established, and 1970, approximately[23] the year of the collapse. In the

[21] Return on the days of interest (FOMC or FOMC±1) minus average return on the remaining trading days, all in the same year.

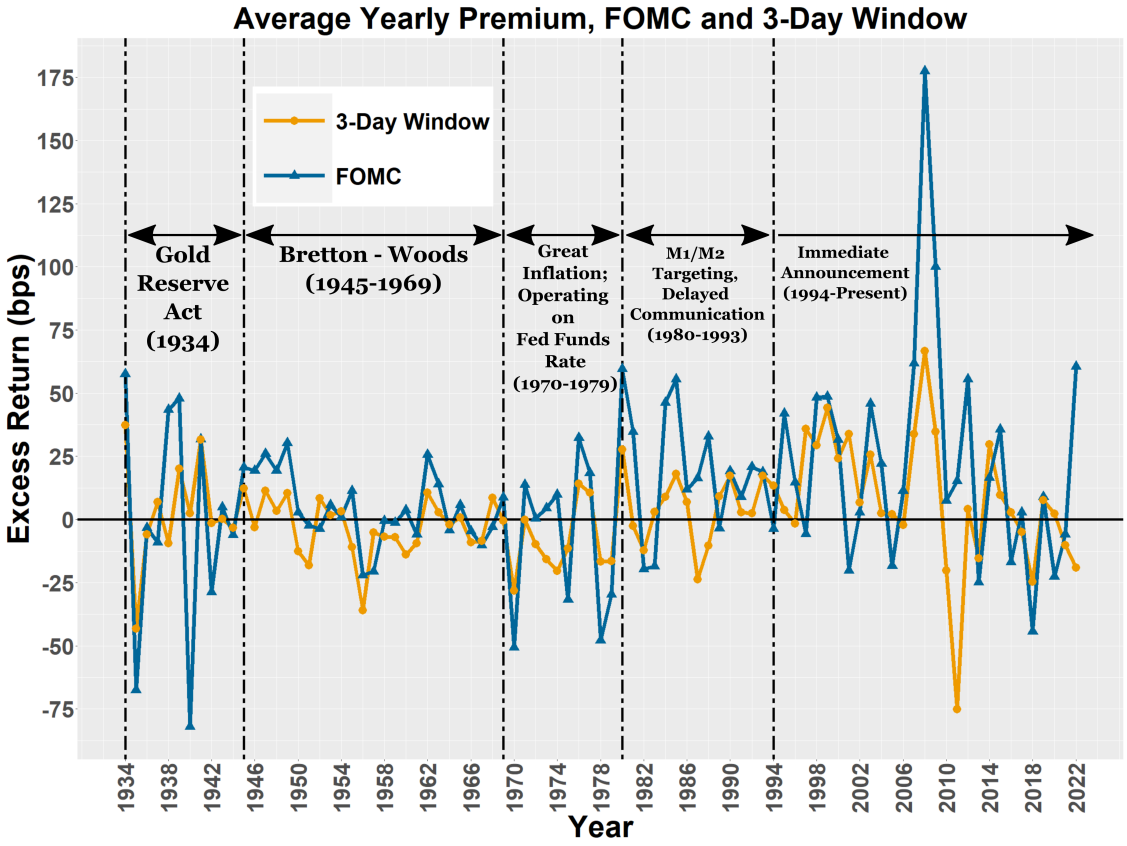
[22] See Appendix A2 for a comprehensive overview of the FOMC timeline.

[23] The exact date is hard to pinpoint. The International Monetary Fund acknowledges it, writing "The system dissolved between 1968 and 1973".

Bretton-Woods era, the volatility is much lower than otherwise (see Figure 4); plausibly due to a system of international counterbalances. Major currencies were pegged to the dollar, which, in turn, was convertible into gold. Furthermore, the monetary policy adjustments were executed with the open market operations. As a result, foreign central banks had the capacity to oppose[24] the Fed's decisions — a point of discontent that actually contributed to the regime's demise. After the system crumbled, the dollar became the sole international safe asset, and so the Fed's actions started to carry more weight.

Figure 4: **Returns on the FOMC Announcement Day and 3-Day Window**

The figure depicts yearly excess return (in basis points) on the FOMC announcement day and within the 3-day window (announcement, preceding and succeeding days). Periods between major economic and FOMC policy changes are separated using the dashed lines.



[24]For example, France exploited the convertibility for its own goals (Lamoreaux and Shapiro (2019)).

In a similar vein, Brusa et al. (2019) speculate that the Fed's dominant role might stem from the dollar's status:

"*For example, if all other central banks must to some extent manage the value of their currencies against the dollar, while the Fed does not have to manage the dollar against other currencies, we would expect the Fed to enjoy a special freedom of action, its policies to have impact beyond just the USA, and for other central banks to follow Fed's lead.*" (Brusa et al. (2019)).

This line of reasoning shows that the magnitude of the response is tied to the influence the Fed exerts on the stocks. Both one and three-day series reflect the collapse of the Bretton-Woods and, therefore, capture the interaction between the FOMC meetings and the equity market. From this perspective, it is not surprising that the macroeconomic announcement premium is the largest for the FOMC events — it's decisions affect the sole global safe asset and do so without any recourse. For the same reason, the pre-announcement drift did not exist before the 1980s (Lucca and Moench (2015)); the Fed exerted far less global influence resulting in a lower sensitivity to the news.

Furthermore, domestic equities were not the only major asset class that demonstrated a notable increase in the realized volatility after the Bretton-Woods failure. For example, Mussa (1986) documents the same behavior for the real exchange rates between the dollar and the other major currencies.[25] Nakamura and Steinsson (2018) present a compelling argument for the causal link between the monetary policy and the relative asset prices:

"*The switch from a fixed to a flexible exchange rate is a purely monetary action. In a world where monetary policy has no real effects, such a policy change would not affect real variables like the real exchange rate.*" (Nakamura and Steinsson (2018)).

This reasoning directly applies to the three-day average and the announcement day return time series as well. The only commonality between the equity return time series and the exchange rates are the FOMC meetings. The equity time series are constructed from the equity returns surrounding the FOMC events. Consequently, for as long as there are no discontinuities among other equity return determinants, it is difficult to rationalize the drastic increase

[25]Volatility of the real interest rates also increased, see Garcia and Perron (1996).

in volatility independently from the Fed's behavior. Therefore, equity returns around the FOMC events are dominated by the Fed. Averaging the preceding, announcement, and succeeding days retains the connection.

Additional evidence supporting the informativeness of the three-day series comes from the pre-announcement drift dynamics. Lucca and Moench (2015) document that there is "no evidence of pre-FOMC returns before 1980", thus providing an additional setting to empirically test the connection between the FOMC events and the three-day average time series. If the returns are smooth around 1980, then the averaging dilutes the influence of FOMC on the three-day series. Otherwise, there is an additional similarity between the three-day series, the announcement day returns, and the Fed's meetings. I construct three-day average time series from both value and equal weighted returns to account for a possibility of size-dependent behavior.[26] Then, I test if there are any structural breaks in these return series using a supF test and a procedure proposed in Kurozumi and Tuvaandorj (2011). However, unlike the supF test, Kurozumi and Tuvaandorj (2011) accounts for the possibility of multiple breaks. The Kurozumi and Tuvaandorj (2011) procedure has good finite sample properties and is robust to heteroskedasticity and autocorrelation — features particularly important given the sample size (960 FOMC events in 1934-2022 window) and continuity of the Fed's policies. More formally, structural breaks within a mean-shift model, $Ret(3Days)_t = \mu + \epsilon_t$, $t \in \{FOMC\}$, are of interest. The goal is to identify dates at which the average returns around FOMC events sharply increased or decreased.

The supF test identifies July 11, 1979 and July 1, 1982 as the most prominent breaks (Table 6). Both are sufficiently close to 1980, and can be viewed as the starting points for the pre-announcement drift. After all, it is not known precisely when the prices started to rise prior to the official release. There were no announcements before 1994 and the Fed's decisions had to be recovered from the open market operations.[27] Additionally, 1979 and 1982 correspond to the changes in the Fed's policies. To tame the inflation, the Volcker

[26] Following Perron and Yamamoto (2015), a data trimming parameter is set to 0.1 for all break identification procedures. All estimation is performed using the "mbreaks" R package.

[27] See Appendix A2 for the details of how the FOMC communication evolved over time.

Fed targeted monetary aggregates between 1979 and 1982. Huizinga and Mishkin (1986) also find that the real interest rate process has breaks in October 1979 and October 1982, near the mean shifts detected here. A small[28] discrepancy (July compared to October) in the break dates can likely be attributed to data frequency differences. I use daily data to construct the three-day average equity returns but Huizinga and Mishkin (1986) use monthly real interest rates. The three-day averages of value and equal weighted returns have only one shared trait with the real interest rates. Equity returns are selected from around the FOMC events, exactly when the Fed adjusts the monetary policy. Therefore, the three-day average series captures the equity market's response to FOMC events.[29]

Table 6: **Structural Breaks**

This table lists structural breaks in FOMC events identified using the SupF test and Kurozumi and Tuvaandorj (2011) procedure. FOMC event is defined as a mean of the market return on the FOMC announcement, preceding, and succeeding days. Two separate series are constructed using both value-weighted and equal-weighted returns.

Returns	**Method**	**Break(s)**
Value	supF	1982-07-01
Equal	supF	1979-07-11
Value	KT	1955-09-14; 1975-09-16; 1997-02-05; 2009-11-04
Equal	KT	1955-09-14; 1968-04-30; 1975-11-18; 1997-03-25; 2009-11-04

6 Magnitude of the Asymmetry

6.1 Baseline Estimates

An estimate of the asymmetry with respect to the business cycle should account for the difference in returns on the days outside of the event window, best demonstrated with a simple example. Suppose the event return is 35 bps in both economic states. On the rest of the

[28] For reference, in Garcia and Perron (1996) the difference in identified break dates is as large as 15 months, depending on the data set and the procedure.

[29] See Appendix A5 for an additional connection between the identified breaks and the financial distress.

days, the return is 10 bps in expansions and −20 bps in recessions. The asymmetry is zero (35−35=0) without state-dependent reference points. After accounting for the remaining trading days, the estimate is 30 bps (35−(−20)=55, 35−10=25, 55−25=30). In this example, ignoring market returns outside of the event dilutes the countercyclicality, although the opposite is also possible. Double differencing fully reflects the interaction between the economy and the market, leading to the following specification.

$$\textbf{Ret}=\beta_0 + \beta_1 \mathbf{1}_{\boldsymbol{Event}} + \beta_2 \mathbf{1}_{\boldsymbol{Rec.}} + \beta_3 \mathbf{1}_{\boldsymbol{Event*Rec}} + \boldsymbol{\epsilon}$$

Ret is a time series of equity market returns. The definition of **Event** varies depending on whether one or three-day specification is of interest. In a one-day scenario, it is a set of the announcement days. In a three-day setting, the event is a combination of FOMC, preceding, and succeeding days. The intercept, β_0, represents a reference point — returns outside of the event window in expansions. The **Event** coefficient, β_1, is the effect of FOMC meetings. Similarly, β_2 (**Rec**) is the impact of recessions. Finally, the coefficient of interest is β_3 (**Event*Rec**), which is the magnitude of the difference between recessions and expansions on the event days.

Table 7 displays the difference in returns on FOMC announcement days across the business cycle (one-day setting). Before volatility adjustments, the magnitude of the asymmetry (β_3) is 73–119 bps. It is remarkably similar to a long–short strategy described in Hu et al. (2021). Hu et al. (2021) sort the FOMC meetings based on uncertainty, resulting in a 91.2 bps premium. However, there are differences in statistical significance, coming mostly from the sample size. In the one-day setting used here, p-values range from 0.029 to 0.130, while the premium in Hu et al. (2021) is significant at 1% level. On the other hand, recessions are rigidly specified, but the size of a high group can be arbitrarily selected. Hu et al. (2021) define the long portion as "the top 20% of the announcements with the largest reduction in VIX" (38 observations), and the short end is all remaining FOMC meetings (152). For reference, even though the time frame is wider in this paper (01/1994–12/2022 compared to 09/1994–05/2018 in Hu et al. (2021)), there are only 22 FOMC meetings in recessions (236

total, 214 in expansions). In this context, FOMC meetings during downturns can be viewed as a subset of days with exceedingly high uncertainty. The NBER recession indicator captures, ex-post, a deterioration of macroeconomic fundamentals and associated uncertainty accumulation. Nevertheless, uncertainty alone does not cause market-wide downturns, while depressed fundamentals do.

Table 7: **Return on the FOMC Announcement Day across the Business Cycle**

The table presents the outcome of estimating $\mathbf{Ret} = \beta_0 + \beta_1 \mathbf{1}_{\boldsymbol{FOMC}} + \beta_2 \mathbf{1}_{\boldsymbol{Rec.}} + \beta_3 \mathbf{1}_{\boldsymbol{FOMC*Rec}} + \boldsymbol{\epsilon}$ model. The data covers 1994-2022. Recession indicator is NBER USRECD. Reported estimates are in basis points. exFOMC are all days excluding the FOMC announcement day. Volatility-adjusted daily returns are obtained by fitting GARCH (1,1) model with a constant mean ($\boldsymbol{Ret_t = \mu_t + \epsilon_t}$) and time-varying volatility ($\boldsymbol{\sigma^2 = \omega + \alpha_1 \epsilon_t^2 + \beta_1 \sigma_t^2}$, $\boldsymbol{\sigma_t^2 \equiv Var(\epsilon_t)}$). Adjusted returns are then $\boldsymbol{Adj.R_t = R_t/\sigma_t}$, where $\boldsymbol{\sigma_t}$ is estimated in the previous step. All p-values are Newey and West (1987) with 8 lags.

	Unadjusted				**Volatility-Adjusted**			
	Value		**Equal**		**Value**		**Equal**	
	Est.	**p-value**	**Est.**	**p-value**	**Est.**	**p-value**	**Est.**	**p-value**
	FOMC vs exFOMC							
Intercept	3.919	0.001	4.704	0.0001	3.775	0.001	4.198	0.001
FOMC	14.883	0.042	11.276	0.137	16.067	0.026	12.300	0.089
Recession	-12.682	0.125	-12.958	0.209	-11.130	0.007	-10.533	0.021
FOMC*Rec	73.262	0.130	119.268	0.029	36.654	0.121	44.449	0.052
	GARCH(1,1) Parameters							
	Value				**Equal**			
	$\boldsymbol{\mu}$	$\boldsymbol{\omega}$	$\boldsymbol{\alpha_1}$	$\boldsymbol{\beta_1}$	$\boldsymbol{\mu}$	$\boldsymbol{\omega}$	$\boldsymbol{\alpha_1}$	$\boldsymbol{\beta_1}$
Estimate	0.001	0	0.117	0.869	0.001	0	0.117	0.870
t-stat	8.564	0.463	2.794	17.030	8.259	0.480	2.892	18.555

The estimate declines to 36.7–44.4 bps after accounting for the volatility. Importantly, it reflects the asymmetry and not the tail risk premium. Jacobs et al. (2022) demonstrate that on FOMC announcement days kurtosis captures "investors' expectation of the tails of the return distribution" beyond those already reflected in the volatility. GARCH(1,1) process is heavy-tailed, and the excess kurtosis is positive for as long as $0 \leq \alpha_1 + \beta_1 < 1$. After that, double differencing eliminates the remaining higher moment effects common to both recessions and expansions, leaving only the asymmetry intact. It is also unlikely that replacing GARCH(1,1) with another model would tangibly affect the magnitude. For

example, using state-dependent scaling[30] barely affects (3-4 bps) the estimate. Moreover, sample standard deviation is only know ex-post, so the effect may just as likely be caused by a look-ahead bias (snooping future risk-return relationship). As a result, a combination of time-varying volatility and double differencing results in a good approximation of true asymmetry.

Volatility adjustments affect statistical significance of the magnitude. It improves slightly for the estimate obtained using value-weighted returns (p-value goes from 0.130 before the return scaling to 0.121 after) but worsens with the equal-weighting (p-value changes from 0.029 to 0.052). The extent and direction of the change depend on the financial context. Risk compensation explains a higher proportion of the difference in premium when the returns are equally weighted (1-44.4/119.3≈63%) compared to the value-weighting (1-36.7/73.3≈50%). Equal-weighted returns also have higher variance, implying that the volatility is priced more consistently past a certain threshold. As a result, the trade-off between variance reduction and decrease in magnitude is non-uniform and depends on the strength of a risk-return relationship. Similarly, there exists a compensation for elevated volatility across the business cycle. During recessions, total risk is both high and priced-in. Equal weighting emphasizes smaller, more volatile companies. In both cases, the accumulation of risk and uncertainty causes market participants to demand strong compensation for bearing it.

6.2 Main Estimates

Table 8 contains the estimates of asymmetry in the three-day setting. Compared to the one-day specification, expanding the window around FOMC events lowers magnitude of the premium. Without volatility adjustments, the magnitude decreases from 73.3 bps to 59.3 bps (value-weighted returns) and 119.3 bps to 76.5 bps (equal-weighted). With the adjustments, the corresponding changes are 36.7 bps to 31.5 bps (value) and 44.4 bps to 36.6 bps (equal). These declines indicate that the impact of FOMC events on the equity market has a short-

[30]Separately calculating realized standard deviation in recessions and expansions, then adjusting each observation depending on the economic state.

term, diversifiable component. Additionally, time-varying volatility accounts for a lower portion of the premium. Using value-weighted returns, in the three-day (one-day) setting, the volatility model explains $1-31.5/59.3\approx46.9\%$ (50%) of the asymmetry. Similarly, using equal-weighted returns, it accounts for $1-36.6/76.5\approx52.2\%$ (63%). The spread between value and equal weighting also declines from $63\%-50\%\approx13\%$ to $52\%-47\%\approx5\%$, linking the short-term component of the premium to the firm size. The remaining asymmetry represents systematic, long-term net effect of FOMC meetings.

Table 8: **Net FOMC Premium across the Business Cycle**

The table presents the outcome of estimating $\mathbf{Ret} = \beta_0 + \beta_1 \mathbf{1}_{\boldsymbol{3Days}} + \beta_2 \mathbf{1}_{\boldsymbol{Rec.}} + \beta_3 \mathbf{1}_{\boldsymbol{3Days*Rec}} + \boldsymbol{\epsilon}$ model. The data covers 1994-2022. Recession indicator is NBER USRECD. 3Days are FOMC announcement ±1 day. Reported estimates are in basis points. Three sets of p-values are presented, ordinary least squares (OLS), Newey and West (1987) with 8 lags (NW), and generalized least squares where the variance depends on the business cycle (separate estimates for the recessions and expansions). Volatility-adjusted daily returns are obtained by fitting GARCH (1,1) model with a constant mean ($\boldsymbol{Ret_t = \mu_t + \epsilon_t}$) and time-varying volatility ($\boldsymbol{\sigma^2 = \omega + \alpha_1 \epsilon_t^2 + \beta_1 \sigma_t^2}$, $\boldsymbol{\sigma_t^2 \equiv Var(\epsilon_t)}$). Adjusted returns are then $\boldsymbol{Adj.R_t = R_t/\sigma_t}$, where $\boldsymbol{\sigma_t}$ is estimated in the previous step. All p-values for the adjusted returns are Newey and West (1987) with 8 lags.

	Unadjusted Daily Returns							
	Value-Weighted				**Equal-Weighted**			
		p-value				**p-value**		
	Est.	**OLS**	**NW**	**GLS**	**Est.**	**OLS**	**NW**	**GLS**
Intercept	4.105	0.007	0.001	0.002	5.182	0.001	0.0001	0.0001
3Days	3.017	0.541	0.502	0.475	-1.238	0.814	0.791	0.773
Recession	-16.471	0.002	0.056	0.121	-16.884	0.003	0.117	0.166
3Days*Rec	59.298	0.0003	0.052	0.063	76.508	0.00001	0.030	0.037

	Volatility-Adjusted Daily Returns								
	Regressions					**GARCH(1,1) Parameters**			
	Value		**Equal**			**Value**		**Equal**	
	Est.	**p-value**	**Est.**	**p-value**		**Est.**	**t-stat**	**Est.**	**t-stat**
Intercept	3.827	0.002	4.342	0.001	$\boldsymbol{\mu}$	0.001	8.564	0.001	8.259
3Days	4.819	0.280	2.590	0.553	$\boldsymbol{\omega}$	0	0.463	0	0.480
Recession	-13.226	0.002	-12.897	0.005	$\boldsymbol{\alpha_1}$	0.117	2.794	0.117	2.892
3Days*Rec	31.456	0.023	36.624	0.010	$\boldsymbol{\beta_1}$	0.869	17.030	0.870	18.555

Equity market returns are split into two groups: affected and unaffected by FOMC events. The meetings influence preceding, succeeding, and announcement days, so expanding the window makes the segmentation more accurate. As a result, based on Newey and West (1987) standard errors, the three-day setting improves statistical significance of the estimates. The inference also benefits from increased number of observations in the affected group. Without volatility adjustments, magnitude of the asymmetry is significant at either 10% (p-value is 0.052) level using value-weighted returns, or 5% (0.030) using equal-weighted returns. Furthermore, from financial perspective, removal of the short-term, diversifiable component improves the uniformity of risk compensation. As a result, and in contrast to the one-day specification, the adjustments act in the same direction for value and equal-weighted returns. With the adjustments, the estimates are significant at 5% level; p-values are 0.023 and 0.01 for value and equal-weighted returns respectively.

Newey and West (1987) p-values are robust in this application despite some undesirable statistical properties of the data and the estimation procedure. Without volatility adjustments, the difference in volatility across the business cycle affects the significance. To account for it, I estimate the same model with the generalized least squares (GLS), allowing the variance to depend on economic state. GLS validity relies on two major assumptions: strict exogeneity and applicability of additional information. While strict exogeneity is arguable, it is indisputable that the variance of realized returns is different between recessions and expansions. The resulting GLS p-values are slightly larger than the Newey and West (1987), but insignificantly so. Additionally, I include the regular ordinary least squares (OLS) p-values. At the very least, they demonstrate the cumulative effect of penalties imposed by the GLS or the Newey and West (1987) methods. At best, the OLS p-values are just as useful for the inference. For example, Freedman (2006) argues that when "the model is nearly correct, so are the usual standard errors, and robustification is unlikely to help much".

Return scaling unitizes the variance but introduces an extra stage into the estimation procedure. As a result, standard errors do not account for the uncertainty of the model (Murphy and Topel (1985)). I bootstrap the business cycle to demonstrate that the Newey

and West (1987) p-values remain robust. There are three recessions between 1994 and 2022: the early 2000s (167 trading days), the Great Recession (378), and the coronavirus (44). I randomly select three non-overlapping blocks of 167, 378, and 44 trading days, mark them as placebo recessions, and recompute the estimates of the asymmetry. The bootstrap procedure is repeated 10,000 times. Figure 5 displays the resulting empirical cumulative distribution function along with the actual (NBER recessions) estimates. Observed asymmetry is greater than in 97.1% (value-weighted returns) or 99.5% (equal-weighted returns) of the simulations; corresponding bootstrapped p-values are 0.058 and 0.01.[31] Statistical significance derived from the bootstrap almost exactly matches the Newey and West (1987) inference, so the influence of the model uncertainty is negligible.[32] Economically, the bootstrap highlights the influence of the business cycle[33] on the equity market's response to FOMC events. Otherwise, the observed magnitude of the asymmetry would have been near the median simulation.

In the three-day setting, the estimate of the asymmetry with respect to the business cycle is is an upper bound on the FOMC premium.[34] Liu et al. (2022) provide an alternative by relying on options expiring within 48 hours of FOMC announcements (83 observations). Notably, this is even wider window and lower sample size than the three-day setting here. On average, Liu et al. (2022) find the announcement premium to be between 32 bps and 36 bps depending on the risk aversion (γ=7.5 and γ=10 respectively), both higher than 31.5 bps estimated in this paper. However, 31.5 bps represent the premium in excess of the risk-return relationship, while Liu et al. (2022) approximation is utility-dependent. As a result, the asymmetry with respect to the business cycle provides a clear explanation for the premium dynamics in Liu et al. (2022). Near zero values are attained in expansions, and high levels in recessions, reflecting the state of macroeconomic fundamentals.

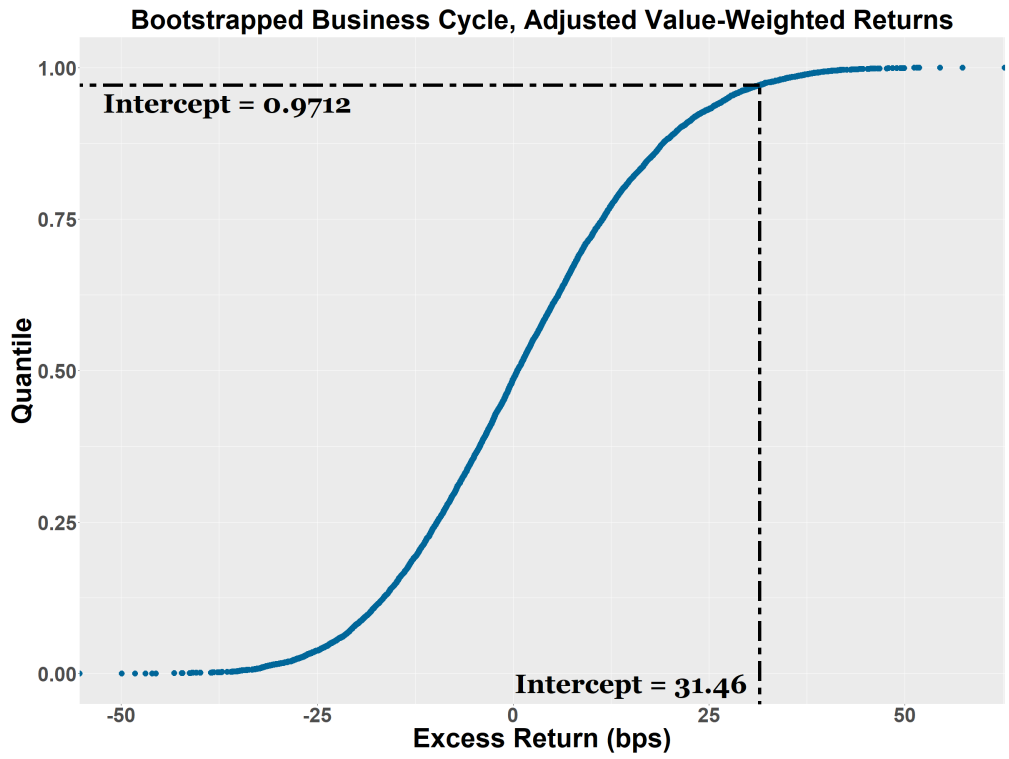
[31]The test is two-tailed, so: (1−0.971)*2≈0.058, (1−0.995)*2≈0.01.

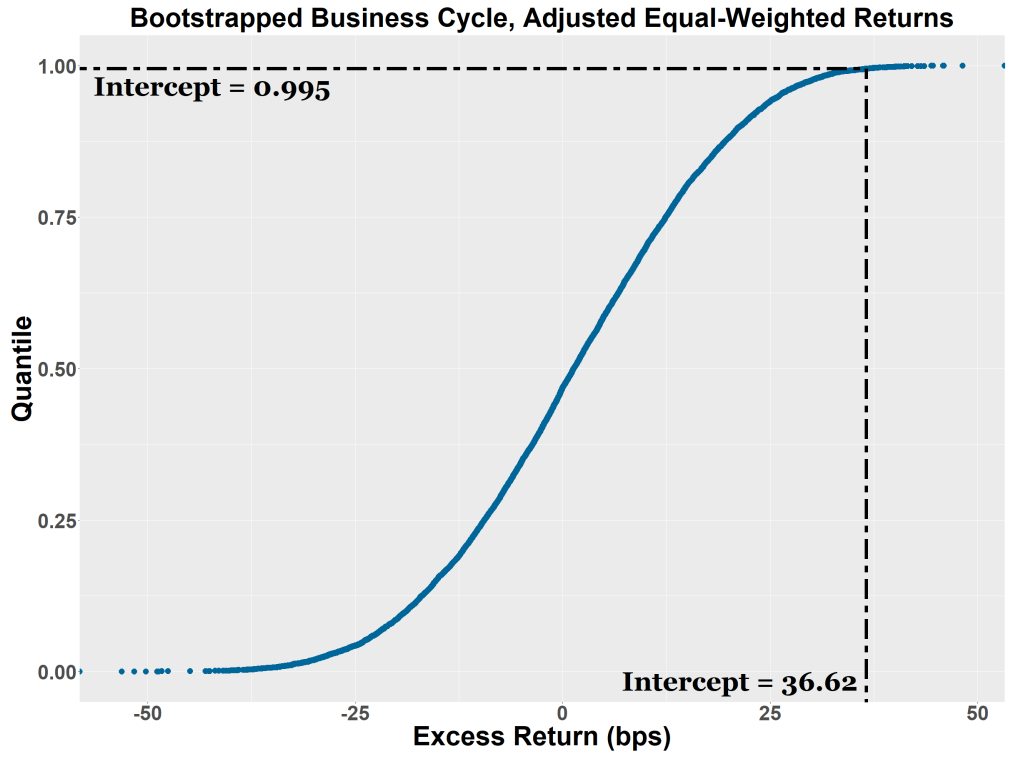
[32]This is expected. Recessions are very different from expansions, GARCH(1,1) fit is very good, so the uncertainty is likely smaller than the measurement error and is part of the statistical noise.

[33]See Appendix A4 for the economic robustness. The difference in FOMC premium between recessions and expansions (with or without volatility adjustments) exists in portfolios sorted on book-to-market, investment, operating profitability, short-term reversal, momentum, and long-term reversal.

[34]In expansions, there is no tangible difference between average returns on the days within the three-day window and those outside, see Table 4.

Figure 5: **Adjusted Daily Returns, Bootstrapped Business Cycle**





6.3 Breakeven Inflation

A part of the announcement premium may be offset by a change in inflation expectations. The Fed's mandate includes maintaining long-run price stability. Additionally, inflation and its handling depend on macroeconomic fundamentals, with stark differences between the downturns and the upturns. Arguably, the Fed acts against the market in both economic states, but the outcomes vary. For example, in recessions, the overall sentiment is negative and the equity risk premium is high. The FOMC's main goals are preventing deflation, restarting growth, and countering pessimistic outlook. A series of rate cuts would further these aims, immediately boost asset prices, but also set higher inflation expectations. In expansions, inflation only begins to recede when firms are compelled to make adjustments in response to an excessively high cost of capital. Correspondingly, when the labor market is strong, consumers may tolerate higher prices or demand wage increases. As a result, the change in inflation expectations could conceivably be dependent on the business cycle and partially neutralize the asymmetry in the equity market's reaction to the Fed's meetings.

Table 9 presents the changes in breakeven inflation rates around FOMC releases. The underlying measures are derived from the daily yields of constant maturity treasuries and their inflation-indexed counterparts. First difference in levels is a coarse proxy for the change in expected inflation.[35] Expansions are a normal economic state; on the regular trading days the fluctuations are, on average, small and positive (0.021–0.062 bps). On the other hand, recessions are an abnormal contractionary state often triggered by a shock. The expectations decline for the most part, ranging from −0.302 bps to −0.544 bps. Consequently, a possibility of deflationary spiral is well-founded; the accumulation of negative changes might stymie the real economic activity, leading to the Fed's intervention. Following the announcements, inflation expectations rise by 2.1–5.8 bps during downturns. Bekaert and Engstrom (2010) mirror this view, documenting that "high expected inflation coincides with periods of high risk aversion and/or economic uncertainty".

[35] According to the St. Louis Fed, the "breakeven inflation rate represents a measure of expected inflation". See the series and their descriptions (T5YIE, T10YIE, T5YIFR) for more details.

Table 9: **Asymmetric Breakeven Inflation**

The table presents summary statistics (means, in basis points) grouped by business cycle and the outcome of estimating $\mathbf{\Delta BrkEvenInfl} = \beta_0 + \beta_1 \mathbf{1_{P1}} + \beta_2 \mathbf{1_{Rec.}} + \beta_3 \mathbf{1_{P1*Rec}} + \boldsymbol{\epsilon}$ model. ΔBrkEvenInfl is a change ($\text{BrkEvenInfl}_t - \text{BrkEvenInfl}_{t-1}$) in breakeven inflation rate (5-Yr., 10-Yr., and delayed 5-Yr.; FRED series T5YIE, T10YIE, T5YIFR respectively). The data covers 2003-2022. Recession indicator is NBER USRECD. P1 denotes a day after the FOMC announcement. exP1 denotes all days except the P1. Newey and West (1987) procedure with 8 lags is used to determine statistical significance.

	Recessions (n=17)				**Expansions (n=147)**			
	−1	**FOMC**	**+1**	**exP1**	**−1**	**FOMC**	**+1**	**exP1**
Δ5-Year	-1.647	1.824	5.765	-0.544	0.483	0.102	0.178	0.062
Δ10-Year	0.235	0.647	3.882	-0.422	0.041	0.395	-0.041	0.042
Δ5-Year, 5-Fwd	2.118	-0.588	2.059	-0.302	-0.401	0.687	-0.260	0.021
	Intercept		**P1**		**Recession**		**P1*Rec**	
	Est.	**p-val**	**Est.**	**p-val**	**Est.**	**p-val**	**Est.**	**p-val**
Δ5-Year	0.062	0.262	0.116	0.796	-0.606	0.394	6.193	0.041
Δ10-Year	0.042	0.362	-0.083	0.813	-0.463	0.256	4.387	0.100
Δ5-Year, 5-Fwd	0.021	0.688	-0.281	0.510	-0.323	0.599	2.642	0.424

In recessions, changes in long-run inflation expectations materialize on the days after the announcements. In line with the elevated news sensitivity during downturns, the magnitude of the changes is much higher in declines compared to upswings. More formal (double difference regression, the coefficient of interest is P1*Rec) comparison shows that the shifts in inflation expectations are concentrated in recessions. The magnitude of the difference across the business cycle ranges from 2.6 bps to 6.2 bps. Two largest estimates, 6.2 bps and 4.4 bps, are statistically significant at 5% and 10% levels respectively. From this perspective, the asymmetric response to the Fed's announcements is not exclusive to the equity market. Deterioration of macroeconomic fundamentals affects stocks, inflation, and sensitivity to news. Still, the change in inflation expectations, while asymmetric and acting against the stock movements, is much lower than the magnitude of the difference in equity market's response. The lowest estimate of the stock market's reaction, computed in excess of risk-return relationship, is 31.5 bps. The highest offsetting change in inflation expectations is 6.2 bps, sufficient to counterbalance at most 6.2/31.5≈19.7% of the asymmetry.

6.4 Premium Heterogeneity

By construction, a broad market index is a weighted sum of underlying constituents. It inherits properties from groups of closely related companies, such as those operating in the same line of business. Within an industry, firms usually respond similarly to the business cycle, inflation, and monetary policy adjustments. Between industries, perhaps due to the differences in risk-return relationship, the corresponding reaction varies wildly. In this light, the FOMC premium is heterogeneous, with some economic sectors contributing more than others. However, disparate risk pricing across sectors, reflected in the variance of realized returns, invalidates a direct comparison among them. In order to address the variation in volatility, I focus on within-industry returns. For each industry, I separately fit the GARCH(1,1) process, re-scale the returns, and estimate the double-difference ($Adj.R_t = \beta_0 + \beta_1 1_{3Days} + \beta_2 1_{Rec.} + \beta_3 1_{3Days*Rec} + \epsilon$) between recessions and expansions. Modeling time-varying volatility individually for each sector removes the risk-compensated part of the premium, placing the remaining excess returns on the same scale. The coefficient of interest is β_3 (see Table 10).[36] It represents a standardized sector-level contribution to the market-wide asymmetry.

The magnitudes are considerably disparate, even after explicitly modeling risk-return relationship within each industry. Wholesale, meals, and transportation display the highest levels of asymmetry, at 46.9 bps, 42.8 bps, and 42.1 bps respectively. Soda (4.3 bps), tobacco (1.4 bps), agriculture (-0.3 bps), and oil (-1.9 bps) are on the other end of the spectrum. However, volatility compensation does not directly account for the output, another sector-level characteristic influenced by the business cycle. There are stark differences in demand patterns across these industries. For instance, wholesale, meals, and transportation are acyclical. Conversely, soda, tobacco, agriculture,[37] and oil are procyclical and strongly influenced by economic fluctuations. Alternatively stated, sectors attuned to the business cycle contribute more to an economy-wide output gap. Additionally, "periods of peak stock

[36] Returns within each individual industry index are value-weighted. Using equal-weighted indices does not tangibly affect the results, which are available in Appendix A4.

[37] See Producer Price Index by Commodity: Farm Products.

return sensitivity coincide with periods during which the output gap is large and negative" (Elenev et al. (2017)). As a result, in recessions, a drop-off in demand across procyclical industries coincides with the heightened sensitivity to macroeconomic announcements. Consequently, in downturns, uncertainty is higher for procyclical sectors than acyclical. From this perspective, the equity market's response to FOMC meetings reflects expected revenue generation by placing a premium on certainty, especially so during crises.

The connection between industry-level FOMC premium and demand implies that monetary policy is only one of the components of the asymmetry. I directly test this hypothesis by replacing the NBER recessions with the yield curve inversions. Like recessions, negative spreads are rare and represent unusual economic conditions. On the contrary, inversions are solely determined by the interest rates, are immediately observable, and do not overlap with recessions. As a result, this setting completely decouples monetary policy from downturns. In fact, it assesses the equity market's response to the opposite extreme. If the null is true (monetary policy alone causes the asymmetry), then the magnitude and statistical significance of results would be similar to the baseline, perhaps with the sign of the magnitude reversing.[38] Comparing 3Days*Rec and 3Days*Inv columns (Table 10) demonstrates that this is not the case — abnormal, inverted term structure of interest rates is insufficient to cause equivalent levels of asymmetry. Apart from oil (significant at 10% level), there is no difference between recessions and expansions.

However, the influence of demand is noticeable even in the alternative setting. The equity market consistently places a premium on the positive output gap and penalizes negative. The spreads are often negative when the Fed combats an overheated economy. Booms benefit procyclical industries relatively more, and it is reflected in the cross-industry asymmetry under the inversions. Oil (29.0 bps), agriculture (14.6 bps), aerospace (11.5 bps), construction (10.2 bps), etc. all react strongly to the announcements when the spreads are negative. Additionally, utilities (22.5 bps), food (18.8 bps), and household items (14.0 bps) display

[38]This setting also validates the previous bootstrap and p-values. Even cherry-picked extreme monetary policy is insufficient to generate results equivalent to the observed asymmetry. Model uncertainty is far smaller than the influence of economic forces.

economically high levels of asymmetry under both specifications. One plausible explanation for this phenomenon stems from the predictive power of the term structure. Some investors use inversions to forecast recessions, correspondingly allocating a higher share of wealth to the crisis-proof sectors such as utilities. In this context, the asymmetry is a form of insurance premium associated with a particular sector rotation strategy. Long-term performance is by no means assured; acyclical industries share similar risks, leading to a concentrated portfolio exposed to potential tail events. Such a strategy also offers far less upside during upturns, resulting in a much higher cost of forecast errors compared to more diversified portfolios. This view is consistent with the observed performance of diversified index funds exceeding that of active sector rotation strategies. For example, between September 30, 2020 and September 30, 2023, a tactical sector rotation ETF (ticker: XLSR) underperformed S&P 500 by 3.5% per year (on a risk-adjusted basis) while also having a high 0.70% expense ratio.

Finally, sorting equities using monetary policy sensitivity and creating a long-short portfolio "produces an average announcement-day return of 31.40 basis points" (Ai et al. (2021b)). This return is far lower than a simple difference in asymmetry between the top and the bottom industries here ($46.9-(-1.9)\approx 48.8$ bps). Industries most sensitive to the monetary policy are "banking, pharmaceutical, trading, and insurance"; the least sensitive sectors are "computers, business service, utilities, aircraft, and computer software" (Ai et al. (2021b)). Neither of these lists resembles the hierarchy in this paper. Taken altogether, these empirical findings demonstrate that the monetary policy alone is unlikely to cause the cross-sectional differences in FOMC announcement premium asymmetry. In order to elevate the uncertainty and the market price of risk, a confluence of macroeconomic fundamentals needs to deteriorate sufficiently strongly. With this in mind, it is not surprising that the industries facing uncertain demand benefit less from the announcements than the acyclical sectors which able to sell products during turmoil. Therefore, during economic upheavals, the equity market simultaneously prices expected output and responds to the Fed's actions.

Table 10: **FOMC Premium Asymmetry by Industry**

The table presents the estimates of $\boldsymbol{Adj.R_t} = \beta_0 + \beta_1 \mathbf{1}_{\boldsymbol{3Days}} + \beta_2 \mathbf{1}_{\boldsymbol{Rec.}} + \beta_3 \mathbf{1}_{\boldsymbol{3Days*Rec}} + \boldsymbol{\epsilon}$ model. Volatility-adjusted daily returns ($\boldsymbol{Adj.R_t}$) are obtained by separately fitting GARCH(1,1) model with a constant mean ($\boldsymbol{Ret_t = \mu_t + \epsilon_t}$) and time-varying volatility ($\boldsymbol{\sigma^2 = \omega + \alpha_1 \epsilon_t^2 + \beta_1 \sigma_t^2}$, $\boldsymbol{\sigma_t^2 \equiv Var(\epsilon_t)}$) to each industry. Adjusted returns are then $\boldsymbol{Adj.R_t = R_t/\sigma_t}$, where $\boldsymbol{\sigma_t}$ is estimated in the previous step. The data (49 Fama-French value-weighted industry portfolios) covers 1994-2022. Two recession indicators are used: NBER USRECD (labelled **Rec**) and a spread between 10-Yr. and 3-Month treasuries (1 if negative, labelled **Inv** for inversion). 3Days are FOMC announcement ±1 day. Reported estimates are in basis points. Newey and West (1987) procedure with 8 lags is used throughout. ***, **, * denote significance at 1%, 5%, and 10% respectively.

	3Days*Rec	**3Days*Inv**		**3Days*Rec**	**3Days*Inv**
Market	31.47**	4.32	**Other**	27.81**	12.58
Wholesale	46.94***	-1.86	**Med. Eqp.**	27.37*	-6.73
Meals	42.76***	2.58	**Steel**	26.86**	-14.35
Transport.	42.10***	-5.23	**Real Estate**	26.84**	1.44
Clothes	38.63***	-7.55	**Books**	26.72**	-9.19
Build. Mat.	38.47***	-7.88	**Financials**	25.76**	3.40
Telecom.	37.69**	-11.25	**Semiconductors**	24.48*	-4.04
Banks	37.38***	11.20	**Automotive**	23.84*	-2.66
Bus. Svc.	37.15***	-1.44	**Mines**	23.22	0.14
Fun	36.86***	-13.12	**Lab. Eqp.**	21.50	4.93
Toys	36.70***	-21.52	**Utilities**	20.68	22.48
Textiles	36.61***	-4.35	**Boxes**	20.23	6.99
Rubber	36.04**	-21.51	**Drugs**	19.39	9.72
Paper	35.15**	-10.18	**Chemicals**	15.82	9.50
Beer	34.22**	7.50	**Machinery**	14.84	-1.53
Pers. Svc.	34.15**	-1.96	**Guns**	14.21	-2.04
Food	33.81**	18.79	**Elec. Eqp.**	14.16	-14.20
Insurance	33.49**	5.94	**Coal**	12.30	0.45
Household	33.02**	14.04	**Ships**	11.88	-6.00
Software	32.94**	-1.65	**Gold**	10.24	4.69
Retail	32.24**	-4.87	**Aerospace**	8.63	11.51
Hardware	30.81**	-10.22	**Soda**	4.30	3.89
Fabr. Prod.	29.35**	9.42	**Smoke**	1.39	7.58
Healthcare	29.30*	3.02	**Agriculture**	-0.29	14.58
Construction	27.92*	10.15	**Oil**	-1.94	28.95*

7 Conclusion

I find that the difference between equity returns on FOMC announcement days in recessions and expansions is 73–119 basis points; it declines to 37–44 bps after accounting for time-varying volatility. The premium comes from recessions, there is no compensation for the announcements in expansions. Similarly, the price of risk varies with the business cycle. During economic downturns, an increase in volatility results in higher returns. During upswings, this relationship is nonexistent. Moreover, a single FOMC news release affects multiple trading days. The shock is so substantial that it influences the announcement, preceding, and succeeding days. As a result, stock returns on the days before and after the announcement are much higher and more volatile than on the regular trading days. Expanding the analysis window to incorporate the surrounding days demonstrates that there is a short-term, diversifiable component of the premium. The remaining long-run difference between excess equity returns in recessions and expansions is 31–37 bps. A corresponding increase in inflation expectations is 6 bps, insufficient to offset it. Finally, the FOMC announcement premium asymmetry varies across industries. It is high among sectors with acyclical demand, such as transportation and clothing. On the other hand, irrespective of the business cycle, the asymmetry is minimal for procyclical industries (soda, tobacco, etc.).

Such market behavior is consistent with the state-dependent information sensitivity and risk accumulation. Around FOMC announcement days, equity prices are much more receptive to news than they are otherwise. The total amount of risk is high during downturns, leaving ample uncertainty to resolve. As a result, every increment of the reduction corresponds to a price increase. From this perspective, it is not surprising that the pre-announcement drift accompanies the stock market's response only in recessions. On the other hand, during expansions, there is only a limited amount of excess uncertainty. Consequently, the equity market does not react to the resolution. Likewise, premium heterogeneity comes from the asset-class specific volatility and uncertainty, which are inherently different across industries, and also depend on the demand cyclicality. Overall, the business cycle acts as a source of risk, and the attention to FOMC events amplifies the equity market's response.

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Appendix A1: FOMC Date Retrieval

The analysis in this study starts in 1934 (the first full year after the enactment of the Banking Act of 1933, which established the FOMC). As a result of a long window, there is a need to obtain the meeting days in a consistent manner to enable a valid historical comparison. Consequently, the FOMC meeting dates are obtained from FRASER, "Federal Open Market Committee Meeting Minutes, Transcripts, and Other Documents" section[39] which is the most comprehensive and frequently updated repository of the FOMC materials. However, likely because of the long and broad coverage, the meetings are not consistently labeled and some are wrongly dated. The following procedure has been used to clean the information.

1. Obtain from FRASER a full set of links to the FOMC events spanning 1934-2022.
2. Visit every link and save the full listing of documents. This is a key step. Not all individual meetings have an event entry, some (between 1940 and 1970) are only listed as a document attached to a different meeting. For example, see December 8, 1952 entry.[40] It also includes executive committee minutes for the October and November meetings which are missing from the event list.
3. For every document, retrieve recorded beginning and ending dates.
4. Filter out telephone conferences, unscheduled and cancelled meetings.
5. Manually verify the dates. For example, January 27-28, 2009 meeting is listed as January 28-29, 2009. November 20, 1936 has a wrongly recorded year, 1930.
6. Use the recorded ending date as an announcement day.

The resulting list of dates has been cross-checked with those used in Lucca and Moench (2015). The match is perfect for all dates. However, Lucca and Moench (2015) exclude February 4, 94; March 22, 1994; May 17, 1994; July 6, 1994; August 16, 1994; March 26, 1996 meetings because of the announcement time irregularities. Intraday analysis in this study starts in 2000 making the exclusions unnecessary. Precise minute-level announcement timing does not affect the daily data which underpins most of the analysis here. A full list of the FOMC dates is included along with the replication code for this study.

[39] Federal Open Market Committee Meeting Minutes, Transcripts, and Other Documents
[40] FRASER, December 8, 1952 Meeting

Appendix A2: Historical Timeline

Adapted from the official Federal Reserve history published by the St. Louis Fed and a declassified record of the central bank communication (A Modern History of FOMC Communication: 1975-2002 by David E. Lindsey).

Date	Event
June 16, 1933	Enactment of the Banking Act of 1933. Established the FOMC.
January 30, 1934	Enactment of the United States Gold Reserve Act. Restricted dollars-for-gold redemptions.
August 19, 1935	The Banking Act of 1935. Defined the role of FOMC in conducting open market operations.
July 1-22, 1944	The Bretton Woods Conference. Established the Bretton Woods system of international currency exchange and gold convertibility.
March 4, 1951	The Treasury-Federal Reserve Accord. Restored Fed's independence from the Treasury and decoupled government debt management from the monetary policy decisions.
August 15, 1971	The Nixon shock. Ended dollars-for-gold convertibility. Severely undermined the Bretton Woods system.
January 7–8, 1976	The Jamaica Accords. Formally terminated the Bretton Woods system.
November 16, 1977	The Federal Reserve Reform Act of 1977. Formally defined the Fed's objectives and established the initial transparency and accountability framework.
October 6, 1979	Beginning of the M1 control era. The Fed starts operating on the non-borrowed reserves.
March 31, 1980	Depository Institutions Deregulation and Monetary Control Act. Established the initial reserve requirements.
February 10, 1987	The annual M1 range has been abandoned in favor of the M2.
November 22, 1989	Open market operations to accommodate the seasonal reserve needs were misinterpreted by the market and media as further easing.
October 8, 1992	Initial request asking to disclose the information about potential advance leaks of the monetary policy decisions and direction.
February 4, 1994	Introduction of the immediate monetary policy announcement.
May 18, 1999	Addition of the change in tilt to the post-meeting information.
January 19, 2000	Introduction of the balance of risks announcement.
March 19 , 2002	Immediate announcement of the FOMC decision votes.
January 25, 2012	Initial issuance of the FOMC framework statement covering long-run goals and potential implementation.
June 13, 2018	Establishment of the press conference after every meeting.
August 27, 2020	Major revision of the Fed's framework statement updating the long-run goals and implementation of the monetary policy.
September 2021	Discovery of a potential insider trading within the Fed.
February 18, 2022	Adoption of the disclosure and investment transparency rules for the high ranking Fed members.

Appendix A3: Robustness, Market Response

This table is a complement to the Table 2 in the main study. It is identical, except all statistics here are computed using equal-weighted returns. Importantly, the asymmetric behavior of the day succeeding the announcement (FOMC+1) is independent from the return weighting. Additionally, this table demonstrates that there are differences in both returns and realized volatility depending on the return weighting scheme. This also reinforces the importance of the volatility modeling. The variation in standard deviations between equal-weighted and value-weighted returns becomes irrelevant (estimates are effectively identical) after the GARCH(1,1) adjustments, as shown in Tables 4 and 5 of the main paper. This implies that the market properly compensates for the volatility differences, at least those stemming from the weighting scheme, on the FOMC meeting days.

Table 1: **Market Response to the FOMC Announcements, 1994-2022**

The table presents summary statistics (in basis points) of the equal-weighted returns on and around the FOMC announcement day. ±1 denote the day before and after the FOMC announcement respectively. 3Days are returns inside the FOMC window (FOMC±1 day). ex3D are returns on the rest (not within the window) of the days. Recession indicator is NBER USRECD.

	−1	FOMC	+1	3Days	ex3D	All
			Mean			
All	8.22	25.89	-7.62	9.43	3.85	4.39
Recessions	16.89	122.29	29.85	63.57	-11.70	-3.35
Expansions	7.32	15.98	-11.47	3.94	5.18	5.06
			Standard Deviation			
All	146.79	130.63	166.87	148.52	124.10	126.67
Recessions	359.05	248.26	383.98	331.18	269.33	277.55
Expansions	105.15	108.13	126.59	114.09	102.42	103.58
			Count			
All	236	236	236	707	6,595	7,302
Recessions	22	22	22	65	521	586
Expansions	214	214	214	642	6,074	6,716

Appendix A4: Robustness, Premium Heterogeneity

This appendix includes a battery of robustness checks demonstrating that the split between recessions and expansions is truly a function of the business cycle and does not depend on a potentially omitted variable or alternative return weighting. The split in the returns on the FOMC announcement day (or including preceding and succeeding days) is pronounced regardless of the portfolio sorting.

Univariate sorting based on the corporate variables such as book-to-market, investment, operating profitability does not affect the difference between recessions and expansions on (or around) the FOMC announcement. The FOMC announcement premium is all coming from recessions. The same is true for the sorting on the return characteristics such as short-term reversal, momentum, and long-term reversal. Again, all excess return on the FOMC announcement days is concentrated in recessions. These facts hold regardless of whether raw, unadjusted, or volatility-adjusted (using GARCH(1,1)) returns are used to compute the difference across the business cycle. The same difference between recessions and expansions exists for the univariate sorting when equal-weighted returns are used instead.

The penultimate (Table 6) table in this appendix demonstrates that there is some dependence between the magnitude of the FOMC recession premium and the firm size. The effect is not statistically significant for the small firms. It is important because the smallest firm that is included in the CRSP index is still relatively large. There are smaller firms that are traded on local exchanges and not included in the CRSP index. Very small firms, such as "mom-and-pop" shops, also exist. If the FOMC effect is treated as the Fed's help in recessions, then a very valid question is what happens to even smaller enterprises. The last table (Table 7) shows that the industry-level conclusions do not depend on the returns and hold for the equal-weighted industry portfolios as well.

Table 1: **FOMC Premium and Book-to-Market Sorting**

The table presents summary statistics (means, in basis points) of the portfolio returns formed on book-to-market, both raw and volatility-adjusted, on and around the FOMC announcement. ±1 denote the day before and after the FOMC announcement respectively. 3Days are returns inside the FOMC window (FOMC±1 day) returns. ex3D are returns not within the window. Recession indicator is NBER USRECD.

	Recessions					**Expansions**				
	−1	**FOMC**	**+1**	**3Days**	**ex3D**	**−1**	**FOMC**	**+1**	**3Days**	**ex3D**
	Unadjusted Value-Weighted Returns									
Negative	-24.18	123.36	52.05	57.46	-15.17	-1.31	20.83	-6.86	4.22	5.35
1^{st}*Dec.*	23.82	86.41	51.73	60.78	-9.82	14.46	24.27	-5.64	11.03	4.48
2^{nd}*Dec.*	33.50	50.91	20.27	43.35	-8.21	12.25	19.11	-6.98	8.12	5.38
3^{rd}*Dec.*	39.18	87.59	26.05	57.77	-12.68	8.68	19.54	-6.00	7.41	5.36
4^{th}*Dec.*	11.55	90.55	21.09	46.42	-12.34	11.29	16.64	-9.71	6.07	5.42
5^{th}*Dec.*	8.32	109.59	-14.36	44.23	-10.58	10.35	16.35	-13.24	4.48	5.62
6^{th}*Dec.*	6.05	116.05	6.36	50.83	-13.41	6.50	18.89	-13.07	4.10	6.19
7^{th}*Dec.*	-9.45	113.18	9.64	43.05	-19.05	7.30	16.74	-13.73	3.44	5.08
8^{th}*Dec.*	-5.59	171.14	-51.14	45.42	-15.68	5.04	17.76	-9.39	4.47	6.25
9^{th}*Dec.*	7.41	142.32	-43.36	44.55	-7.37	-0.43	13.73	-16.90	-1.20	6.83
10^{th}*Dec.*	-17.18	201.36	-17.82	62.20	-16.96	-4.51	27.80	-17.31	1.99	6.77
	Volatility-Adjusted Value-Weighted Returns									
Negative	-10.83	52.36	34.75	26.89	-9.63	0.81	18.12	2.14	7.02	5.03
1^{st}*Dec.*	5.53	43.47	30.16	27.83	-7.28	10.74	23.61	-0.67	11.23	4.29
2^{nd}*Dec.*	5.74	40.52	16.72	22.80	-6.93	14.05	18.65	-4.58	9.37	5.05
3^{rd}*Dec.*	13.86	59.89	21.73	33.45	-10.38	8.28	19.76	-1.74	8.76	5.08
4^{th}*Dec.*	-0.96	49.13	20.47	23.96	-8.97	13.62	18.29	-5.44	8.82	4.78
5^{th}*Dec.*	9.46	54.24	13.00	27.47	-8.80	12.09	17.51	-8.22	7.12	5.24
6^{th}*Dec.*	5.08	63.26	11.79	28.32	-9.32	12.35	18.70	-8.46	7.53	5.87
7^{th}*Dec.*	1.47	49.62	10.40	21.50	-11.57	11.83	18.35	-8.43	7.25	4.49
8^{th}*Dec.*	4.97	57.08	4.40	23.50	-9.64	10.22	19.36	-4.01	8.52	5.55
9^{th}*Dec.*	11.01	43.18	-2.69	18.54	-4.56	7.03	14.52	-8.14	4.47	5.70
10^{th}*Dec.*	10.13	60.04	4.44	25.89	-7.50	4.00	22.90	-4.16	7.58	5.17

Table 2: **FOMC Premium and Investment Sorting**

The table presents summary statistics (means, in basis points) of the portfolio returns formed on investment, both raw and volatility-adjusted, on and around the FOMC announcement. ±1 denote the day before and after the FOMC announcement respectively. 3Days are returns inside the FOMC window (FOMC±1 day) returns. ex3D are returns not within the window. Recession indicator is NBER USRECD.

	Recessions					**Expansions**				
	−1	**FOMC**	**+1**	**3Days**	**ex3D**	**−1**	**FOMC**	**+1**	**3Days**	**ex3D**
	Unadjusted Value-Weighted Returns									
$\mathbf{1^{st}Dec.}$	15.55	66.00	1.23	35.92	-7.87	14.26	19.00	-6.56	8.90	5.78
$\mathbf{2^{nd}Dec.}$	19.68	108.68	-9.82	47.54	-9.91	9.34	18.30	-13.66	4.66	6.25
$\mathbf{3^{rd}Dec.}$	35.18	58.64	22.14	48.08	-11.39	11.93	19.18	-6.67	8.15	5.40
$\mathbf{4^{th}Dec.}$	8.50	78.32	36.00	46.06	-11.09	11.07	15.42	-9.81	5.56	5.36
$\mathbf{5^{th}Dec.}$	24.73	97.86	2.91	47.97	-9.29	7.58	15.63	-8.50	4.90	5.52
$\mathbf{6^{th}Dec.}$	15.59	81.41	10.91	42.38	-12.19	7.52	15.47	-9.19	4.60	5.47
$\mathbf{7^{th}Dec.}$	24.27	72.95	0.09	42.74	-11.35	18.50	16.14	-6.82	9.27	5.07
$\mathbf{8^{th}Dec.}$	22.50	99.59	23.14	55.91	-9.99	13.61	20.91	-8.86	8.55	5.52
$\mathbf{9^{th}Dec.}$	20.05	113.73	37.68	63.12	-10.81	8.68	29.50	-7.13	10.35	5.15
$\mathbf{10^{th}Dec.}$	7.91	124.14	50.09	66.25	-14.12	7.85	26.54	-7.85	8.85	3.40
	Volatility-Adjusted Value-Weighted Returns									
$\mathbf{1^{st}Dec.}$	2.55	40.43	13.45	20.56	-5.53	16.83	14.61	-1.75	9.90	5.01
$\mathbf{2^{nd}Dec.}$	11.70	58.53	11.13	28.93	-7.34	12.50	16.59	-7.07	7.34	5.66
$\mathbf{3^{rd}Dec.}$	18.25	46.87	23.14	31.39	-9.03	13.83	21.47	-4.81	10.16	5.34
$\mathbf{4^{th}Dec.}$	-1.43	55.78	18.51	25.38	-8.75	13.79	16.24	-6.00	8.01	5.06
$\mathbf{5^{th}Dec.}$	16.55	55.86	5.62	27.30	-6.37	8.49	16.07	-5.43	6.38	5.26
$\mathbf{6^{th}Dec.}$	6.59	41.62	17.64	23.21	-8.86	9.32	17.10	-5.34	7.02	5.51
$\mathbf{7^{th}Dec.}$	9.93	41.75	12.75	23.48	-8.86	19.93	16.16	-2.15	11.31	4.54
$\mathbf{8^{th}Dec.}$	8.75	41.58	23.23	25.96	-7.17	12.57	19.16	-5.11	8.87	4.80
$\mathbf{9^{th}Dec.}$	-0.64	51.26	23.57	26.07	-7.94	7.09	26.26	-1.26	10.70	4.85
$\mathbf{10^{th}Dec.}$	0.82	51.37	27.88	27.85	-9.10	7.13	23.31	-1.40	9.68	2.87

Table 3: **FOMC Premium and Operating Profitability Sorting**

The table presents summary statistics (means, in basis points) of the portfolio returns formed on operating profitability, both raw and volatility-adjusted, on and around the FOMC announcement. ±1 denote the day before and after the FOMC announcement respectively. 3Days are returns inside the FOMC window (FOMC±1 day) returns. ex3D are returns not within the window. Recession indicator is NBER USRECD.

	Recessions					**Expansions**				
	−1	**FOMC**	**+1**	**3Days**	**ex3D**	**−1**	**FOMC**	**+1**	**3Days**	**ex3D**
	Unadjusted Value-Weighted Returns									
$\mathbf{1^{st}Dec.}$	-14.27	146.73	32.86	58.78	-16.91	3.08	25.01	-18.67	3.14	3.51
$\mathbf{2^{nd}Dec.}$	3.09	149.95	30.14	66.17	-17.98	1.70	25.38	-13.05	4.68	4.07
$\mathbf{3^{rd}Dec.}$	1.73	115.77	42.91	60.05	-14.79	0.28	18.33	-5.02	4.53	4.81
$\mathbf{4^{th}Dec.}$	11.14	122.95	-2.55	52.37	-13.79	3.78	19.19	-10.03	4.31	5.30
$\mathbf{5^{th}Dec.}$	12.36	125.86	18.91	59.83	-13.88	10.07	23.01	-11.76	7.11	5.88
$\mathbf{6^{th}Dec.}$	28.00	76.59	6.45	45.42	-14.91	10.70	20.13	-9.15	7.23	5.05
$\mathbf{7^{th}Dec.}$	38.14	73.18	9.14	48.22	-9.77	6.14	20.21	-13.95	4.13	4.86
$\mathbf{8^{th}Dec.}$	11.68	88.41	37.73	51.63	-7.97	15.26	17.23	-5.91	8.86	5.45
$\mathbf{9^{th}Dec.}$	34.05	78.41	26.91	52.46	-9.55	15.88	23.07	-5.04	11.31	4.96
$\mathbf{10^{th}Dec.}$	24.59	63.23	9.55	41.94	-6.22	16.52	13.78	-7.59	7.57	5.42
	Volatility-Adjusted Value-Weighted Returns									
$\mathbf{1^{st}Dec.}$	-5.90	47.32	18.90	20.89	-9.06	5.61	17.73	-4.17	6.39	2.30
$\mathbf{2^{nd}Dec.}$	4.25	52.98	26.10	28.82	-11.74	6.68	21.14	-3.72	8.03	3.72
$\mathbf{3^{rd}Dec.}$	4.93	62.24	27.20	32.81	-9.66	6.46	17.53	-0.18	7.93	4.26
$\mathbf{4^{th}Dec.}$	0.43	62.30	11.18	26.35	-9.46	4.94	19.28	-3.07	7.05	4.21
$\mathbf{5^{th}Dec.}$	1.14	54.34	20.60	26.86	-8.53	10.25	22.06	-5.44	8.96	5.57
$\mathbf{6^{th}Dec.}$	16.06	42.48	10.95	24.76	-10.65	11.32	21.21	-4.09	9.48	4.84
$\mathbf{7^{th}Dec.}$	14.64	42.40	18.32	26.76	-8.50	7.56	19.77	-8.90	6.15	4.53
$\mathbf{8^{th}Dec.}$	2.45	52.12	29.27	29.21	-6.50	16.22	17.38	-3.18	10.14	5.21
$\mathbf{9^{th}Dec.}$	1.90	35.59	20.21	20.49	-7.05	14.29	22.56	-1.92	11.65	4.75
$\mathbf{10^{th}Dec.}$	13.20	43.79	11.72	24.82	-4.65	16.12	16.38	-3.76	9.58	5.45

Table 4: **FOMC Premium and Return Sorting**

The table presents summary statistics (means, in basis points) of the raw, unadjusted portfolio returns formed on return characteristics (short-term reversal, momentum, and long-term reversal), on and around the FOMC announcement. ±1 denote the day before and after the FOMC announcement respectively. 3Days are returns inside the FOMC window (FOMC±1 day) returns. ex3D are returns not within the window. Recession indicator is NBER USRECD.

	Recessions					**Expansions**				
	−1	**FOMC**	**+1**	**3Days**	**ex3D**	**−1**	**FOMC**	**+1**	**3Days**	**ex3D**
	Short-Term Reversal; Unadjusted Value-Weighted Returns									
1^{st}Dec.	-76.32	314.86	102.23	113.26	-0.68	13.57	29.86	-4.61	12.94	9.55
2^{nd}Dec.	-20.82	201.45	67.09	85.31	-8.74	13.69	19.22	-11.62	7.10	6.58
3^{rd}Dec.	8.09	159.55	54.00	75.94	-4.14	12.87	24.29	-9.97	9.07	5.68
4^{th}Dec.	9.91	132.91	75.18	75.72	-5.41	11.98	18.93	-16.43	4.83	4.96
5^{th}Dec.	7.45	88.59	56.50	56.69	-9.55	10.43	18.56	-11.97	5.67	4.88
6^{th}Dec.	34.59	90.77	58.45	67.45	-6.70	9.86	18.10	-5.52	7.48	5.30
7^{th}Dec.	22.32	89.36	9.73	48.25	-13.55	9.44	20.73	-5.90	8.09	5.24
8^{th}Dec.	24.00	100.18	28.64	58.29	-9.80	5.09	18.35	-10.73	4.24	4.18
9^{th}Dec.	7.36	103.41	12.18	49.77	-12.72	2.93	17.14	-10.04	3.34	4.06
10^{th}Dec.	-24.68	120.23	-30.95	28.28	-23.55	-3.45	17.39	-11.20	0.91	0.33
	Momentum; Unadjusted Value-Weighted Returns									
1^{st}Dec.	-57.95	329.09	82.14	121.92	-13.34	-8.68	13.44	-29.10	-8.11	3.28
2^{nd}Dec.	-6.14	240.18	21.91	92.28	-10.85	2.56	12.92	-15.93	-0.15	5.13
3^{rd}Dec.	46.55	167.82	26.32	85.88	-14.27	3.67	11.05	-16.95	-0.74	6.06
4^{th}Dec.	40.18	146.77	-2.09	66.80	-11.37	1.90	11.95	-16.54	-0.90	5.71
5^{th}Dec.	36.23	122.18	-17.18	54.11	-5.79	6.46	13.69	-13.65	2.17	4.93
6^{th}Dec.	51.27	86.86	1.18	54.06	-6.08	8.08	16.90	-13.17	3.94	5.40
7^{th}Dec.	51.00	101.18	16.14	63.32	-8.68	9.24	21.47	-6.93	7.93	4.60
8^{th}Dec.	25.82	59.82	24.09	45.25	-9.21	11.10	22.29	-8.04	8.45	5.69
9^{th}Dec.	6.64	61.50	8.14	32.71	-12.81	15.11	25.46	-8.24	10.78	4.68
10^{th}Dec.	-37.32	69.45	18.36	23.60	-11.28	12.61	36.64	-3.30	15.32	6.12
	Long-Term Reversal; Unadjusted Value-Weighted Returns									
1^{st}Dec.	26.50	146.45	3.14	65.97	-14.32	1.48	35.10	-23.98	4.20	7.06
2^{nd}Dec.	40.32	98.00	20.59	56.94	-13.13	-0.33	18.02	-11.12	2.19	6.04
3^{rd}Dec.	17.55	102.82	9.91	50.45	-8.81	6.33	16.43	-8.31	4.82	6.23
4^{th}Dec.	13.59	111.36	15.36	54.31	-12.13	4.13	16.89	-10.93	3.36	5.66
5^{th}Dec.	11.23	112.77	-14.00	45.66	-11.99	10.79	14.50	-6.44	6.29	4.97
6^{th}Dec.	28.45	77.91	2.18	42.95	-5.79	13.24	14.38	-8.01	6.54	5.99
7^{th}Dec.	34.59	64.09	-21.91	33.29	-9.53	11.90	15.13	-9.43	5.87	5.50
8^{th}Dec.	9.32	83.05	2.14	40.20	-8.77	11.48	14.66	-8.81	5.77	5.05
9^{th}Dec.	2.86	75.45	7.27	35.22	-11.18	9.41	21.71	-5.21	8.64	5.53
10^{th}Dec.	-9.27	129.95	71.09	70.40	-13.11	13.66	33.22	-3.43	14.48	5.25

Table 5: **FOMC Premium and Return Sorting with Volatility Adjustments**

The table presents summary statistics (means, in basis points) of the volatility-adjusted portfolio returns formed on return characteristics (short-term reversal, momentum, and long-term reversal), on and around the FOMC announcement. ±1 denote the day before and after the FOMC announcement respectively. 3Days are returns inside the FOMC window (FOMC±1 day) returns. ex3D are returns not within the window. Recession indicator is NBER USRECD.

	Recessions					**Expansions**				
	−1	**FOMC**	**+1**	**3Days**	**ex3D**	**−1**	**FOMC**	**+1**	**3Days**	**ex3D**
	Short-Term Reversal; Volatility-Adjusted Value-Weighted Returns									
$\mathbf{1^{st}Dec.}$	-11.13	47.28	35.72	24.17	-4.45	11.10	21.31	3.26	11.89	5.95
$\mathbf{2^{nd}Dec.}$	8.65	44.51	26.86	27.21	-6.82	13.23	17.17	-5.82	8.19	4.56
$\mathbf{3^{rd}Dec.}$	11.69	54.03	30.29	32.59	-4.43	11.67	25.16	-3.42	11.14	4.56
$\mathbf{4^{th}Dec.}$	5.77	50.37	32.13	30.10	-5.75	12.77	16.75	-11.80	5.91	4.40
$\mathbf{5^{th}Dec.}$	6.14	48.78	30.38	29.53	-7.40	12.89	18.23	-8.89	7.41	4.56
$\mathbf{6^{th}Dec.}$	18.93	50.21	38.31	37.19	-5.45	12.58	18.59	-2.11	9.69	5.33
$\mathbf{7^{th}Dec.}$	8.65	47.41	7.31	22.63	-10.43	12.27	21.89	-0.63	11.17	5.10
$\mathbf{8^{th}Dec.}$	11.64	54.94	21.57	30.98	-7.90	9.41	18.56	-6.18	7.26	4.06
$\mathbf{9^{th}Dec.}$	0.44	53.78	13.00	24.37	-9.82	6.88	17.66	-4.66	6.63	3.65
$\mathbf{10^{th}Dec.}$	-19.96	47.13	-3.56	9.40	-12.18	3.33	14.97	-3.15	5.05	0.18
	Momentum; Volatility-Adjusted Value-Weighted Returns									
$\mathbf{1^{st}Dec.}$	-14.03	53.48	33.92	25.17	-8.52	-0.63	9.11	-5.71	0.92	1.34
$\mathbf{2^{nd}Dec.}$	-1.89	51.48	18.36	23.90	-8.74	8.47	12.12	-1.18	6.47	3.17
$\mathbf{3^{rd}Dec.}$	17.32	44.44	24.09	29.76	-9.99	7.06	13.99	-6.27	4.93	5.07
$\mathbf{4^{th}Dec.}$	14.08	50.67	18.11	28.70	-8.79	6.16	12.99	-6.85	4.10	4.87
$\mathbf{5^{th}Dec.}$	17.74	51.62	8.16	27.37	-5.86	9.64	14.09	-7.42	5.44	4.43
$\mathbf{6^{th}Dec.}$	28.71	45.13	17.91	32.29	-6.36	12.41	19.27	-8.16	7.84	4.96
$\mathbf{7^{th}Dec.}$	24.19	64.74	19.18	37.70	-6.61	11.55	23.26	-2.28	10.84	4.43
$\mathbf{8^{th}Dec.}$	15.81	49.14	20.74	30.47	-7.98	12.71	21.28	-4.19	9.93	5.52
$\mathbf{9^{th}Dec.}$	6.77	49.64	4.50	21.81	-9.17	15.29	22.12	-5.78	10.54	3.81
$\mathbf{10^{th}Dec.}$	-14.72	36.37	11.34	12.16	-6.89	9.68	25.09	2.88	12.55	4.48
	Long-Term Reversal; Volatility-Adjusted Value-Weighted Returns									
$\mathbf{1^{st}Dec.}$	18.80	49.46	7.94	26.62	-6.15	8.11	23.84	-9.59	7.46	4.32
$\mathbf{2^{nd}Dec.}$	21.87	52.64	18.53	32.05	-8.59	5.44	15.32	-2.89	5.96	4.75
$\mathbf{3^{rd}Dec.}$	10.62	51.37	18.30	28.31	-5.27	10.30	16.90	-4.28	7.64	5.50
$\mathbf{4^{th}Dec.}$	9.73	57.85	29.35	33.87	-8.98	9.25	18.31	-5.62	7.31	5.16
$\mathbf{5^{th}Dec.}$	21.70	61.21	18.10	35.54	-8.19	16.91	16.02	-2.59	10.11	4.91
$\mathbf{6^{th}Dec.}$	18.49	57.82	17.88	32.95	-5.21	16.53	16.74	-4.81	9.49	5.94
$\mathbf{7^{th}Dec.}$	13.92	48.78	-9.05	19.54	-7.37	13.37	16.09	-9.29	6.72	5.66
$\mathbf{8^{th}Dec.}$	2.11	47.59	13.09	22.69	-5.78	11.13	14.32	-6.06	6.46	4.99
$\mathbf{9^{th}Dec.}$	-6.28	37.77	13.84	16.38	-7.89	10.01	19.67	-3.12	8.85	4.77
$\mathbf{10^{th}Dec.}$	-15.27	38.59	30.07	19.00	-6.95	10.21	26.47	1.88	12.85	3.95

Table 6: **Estimating the Dependence of FOMC Effect on Market Capitalization**

The table presents the outcome of estimating $\boldsymbol{Adj.R_t} = \beta_0 + \beta_1 \mathbf{1}_{\boldsymbol{3Days}} + \beta_2 \mathbf{1}_{\boldsymbol{Rec.}} + \beta_3 \mathbf{1}_{\boldsymbol{3Days*Rec}} + \boldsymbol{\epsilon}$ model. The data covers 1994-2022. Recession indicator is NBER USRECD. 3Days are FOMC announcement ±1 day. Reported estimates are in basis points. Volatility-adjusted daily returns are obtained by separately fitting GARCH (1,1) model with a constant mean ($\boldsymbol{Ret_t} = \boldsymbol{\mu_t} + \boldsymbol{\epsilon_t}$) and time-varying volatility ($\boldsymbol{\sigma^2} = \boldsymbol{\omega} + \boldsymbol{\alpha_1}\boldsymbol{\epsilon_t^2} + \boldsymbol{\beta_1}\boldsymbol{\sigma_t^2}$, $\boldsymbol{\sigma_t^2} \equiv \boldsymbol{Var(\epsilon_t)}$) to each of the ten portfolios. Adjusted returns are then $\boldsymbol{Adj.R_t} = \boldsymbol{R_t}/\boldsymbol{\sigma_t}$, where $\boldsymbol{\sigma_t}$ is estimated in the previous step. All p-values for the adjusted returns are Newey and West (1987) with 8 lags.

	Intercept		**3Days**		**Recession**		**3Days*Rec**	
	Est.	**p-val**	**Est.**	**p-val**	**Est.**	**p-val**	**Est.**	**p-val**
$\mathbf{1^{st}}$***Dec.***	6.792	0.00002	-3.429	0.448	-10.008	0.094	18.943	0.170
$\mathbf{2^{nd}}$***Dec.***	4.698	0.001	1.195	0.784	-8.283	0.121	23.490	0.042
$\mathbf{3^{rd}}$***Dec.***	4.514	0.001	-0.067	0.987	-9.950	0.048	29.691	0.015
$\mathbf{4^{th}}$***Dec.***	3.676	0.005	3.888	0.366	-9.694	0.051	28.824	0.024
$\mathbf{5^{th}}$***Dec.***	4.001	0.002	2.290	0.602	-10.914	0.026	31.869	0.018
$\mathbf{6^{th}}$***Dec.***	4.454	0.001	2.056	0.637	-11.047	0.024	29.987	0.029
$\mathbf{7^{th}}$***Dec.***	5.169	0.0001	2.211	0.622	-12.609	0.010	31.250	0.026
$\mathbf{8^{th}}$***Dec.***	4.935	0.0001	3.919	0.377	-13.422	0.006	32.077	0.024
$\mathbf{9^{th}}$***Dec.***	5.316	0.00002	4.284	0.331	-14.267	0.002	32.632	0.025
$\mathbf{10^{th}}$***Dec.***	4.686	0.0001	5.018	0.263	-13.773	0.001	31.427	0.022

Table 7: **FOMC Effect by Industry, Equal-Weighted Returns**

The table presents the estimates of $\boldsymbol{Adj.R_t} = \beta_0 + \beta_1 \mathbf{1}_{\boldsymbol{3Days}} + \beta_2 \mathbf{1}_{\boldsymbol{Rec.}} + \beta_3 \mathbf{1}_{\boldsymbol{3Days*Rec}} + \boldsymbol{\epsilon}$ model (in the second specification **Rec** is replaced with **Inv**). Volatility-adjusted daily returns ($\boldsymbol{Adj.R_t}$) are obtained by separately fitting GARCH(1,1) model with a constant mean ($\boldsymbol{Ret_t = \mu_t + \epsilon_t}$) and time-varying volatility ($\boldsymbol{\sigma^2 = \omega + \alpha_1 \epsilon_t^2 + \beta_1 \sigma_t^2}$, $\boldsymbol{\sigma_t^2 \equiv Var(\epsilon_t)}$) to each industry. Adjusted returns are then $\boldsymbol{Adj.R_t = R_t/\sigma_t}$, where $\boldsymbol{\sigma_t}$ is estimated in the previous step. The data (49 Fama-French equal-weighted industry portfolios) covers 1994-2022. Two recession indicators are used: NBER USRECD (labelled **Rec**) and a spread between 10-Yr. and 3-Month treasury (1 if negative, labelled **Inv** for inversion). 3Days are FOMC announcement ±1 day. Reported estimates are in basis points. Newey and West (1987) procedure with 8 lags is used throughout. ***, **, * denote significance at 1%, 5%, and 10% respectively.

	3Days*Rec	**3Days*Inv**		**3Days*Rec**	**3Days*Inv**
Market	36.65***	1.16	**Other**	25.10*	-2.84
Transport.	44.62***	-8.68	**Utilities**	24.50	16.71
Meals	41.97***	-10.92	**Automotive**	24.12*	-18.92
Clothes	39.65***	-21.97	**Toys**	23.10*	-31.26*
Construction	38.52*	1.31	**Hardware**	20.34	-15.83
Health	36.90**	-3.11	**Textiles**	19.81	-8.39
Wholesale	36.81**	-16.18	**Paper**	19.54	-24.18*
Retail	35.67**	-13.94	**Fabr. Prod.**	19.47	0.07
Household	34.31**	-16.53	**Financials**	19.26	-9.47
Pers. Svc.	32.68**	-16.38	**Rubber**	19.01	-12.65
Med. Eqp.	32.49**	-10.40	**Gold**	18.97	5.82
Drugs	31.89**	-9.63	**Steel**	18.65	-15.23
Banks	31.64**	-4.98	**Ships**	18.03	-11.88
Insurance	31.05**	8.95	**Chemicals**	18.01	-1.07
Software	30.98**	-7.51	**Guns**	17.09	-18.01
Semiconductors	30.62**	-15.21	**Mines**	16.80	-8.73
Bus. Svc.	29.53**	-15.95	**Beer**	16.65	-17.59
Telecom.	29.03*	-18.77	**Boxes**	16.13	-0.12
Build. Mat.	28.68**	-11.39	**Coal**	15.96	1.30
Lab. Eqp.	28.41**	1.18	**Machinery**	14.97	-2.61
Food	28.06*	5.48	**Aerospace**	13.21	-2.03
Fun	27.38*	-15.24	**Elec. Eqp.**	11.65	-4.66
Books	26.99**	-17.58	**Soda**	3.34	-11.72
Agriculture	26.66**	7.13	**Smoke**	-2.06	3.97
Real Estate	25.38*	2.79	**Oil**	-3.54	27.78

Appendix A5: Supplemental Materials

This appendix provides further evidence that there are structural breaks in the magnitude of FOMC announcement premium but the monetary policy is not solely responsible for the asymmetry. For all break identification procedures, data trimming parameter is set to 0.1, as in Perron and Yamamoto (2015); all estimation is performed using the "mbreaks" R package. Table 1 demonstrates testing against a fixed number of structural changes. Regardless of return weighting, there are five shifts. Testing against the null (Table 1) shows that there are at least two structural breaks. Two most significant breaks are in 1979 and 1982 – exactly when the global behavior of the interest rates started to change from increasing to decreasing (see Figure 1). The significance of the two most prominent breaks is reaffirmed in Table 2, which demonstrates that there is strong statistical evidence for the existence of at least two mean shifts. Taken altogether, this testing reinforces the notion expressed in the main study: market returns around the FOMC announcements are dominated by the Fed's actions.

Additionally, all seven unique breaks identified with the supF and Kurozumi and Tuvaandorj (2011) tests align with either a recession or a period of financial distress. September 14, 1955 is an aftermath of the 1953 recession; April 30, 1968 matches with the start of the Bretton-Woods decline (collapse of the London Gold Pool); September 16, 1975 is the endpoint of the 1973–1975 recession. July 11, 1979 corresponds to the Volcker Fed, the 1979 oil crisis, and the early 1980s recession; July 1, 1982 is the endpoint for the early 1980s recession and the monetary aggregates targeting. March 25, 1997 precedes the Asian financial crisis by a few months, and November 04, 2009 signifies the end of the Great Recession. Additionally, the break dates align with the inflection points in Moody's Baa bond yields (Figure 1). The alignment is notably worse with the treasuries, providing additional evidence that the monetary policy is not a sole driver of the difference in premium. A company-level factor such as demand is also in play; the dependence on credit quality reflects the uncertainty in revenue generation. As a result, the business cycle reflects the deterioration of macroeconomic fundamentals, which induce the equity market's response.

Table 1: **supF Tests Against a Fixed Number of Breaks, 3-Day Event**

	Number of Breaks									
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
	supF, Value-Weighted Returns					**supF, Equal-Weighted Returns**				
	8.463	10.985	8.097	7.746	7.041	5.251	9.032	7.405	7.718	6.984
	Critical Values									
10%	7.420	6.930	6.090	5.440	4.850	7.420	6.930	6.090	5.440	4.850
5%	9.100	7.920	6.840	6.030	5.370	9.100	7.920	6.840	6.030	5.370
2.5%	10.560	8.900	7.550	6.640	5.880	10.560	8.900	7.550	6.640	5.880
1%	13.000	10.140	8.420	7.310	6.480	13.000	10.140	8.420	7.310	6.480

Table 2: **supF(l+1|l) Tests Under the Null, 3-Day Event**

	supF(Alternative|Null)									
	1|0	**2|1**	**3|2**	**4|3**	**5|4**	**1|0**	**2|1**	**3|2**	**4|3**	**5|4**
	Seq. supF, Value-Weighted Returns					**Seq. supF, Equal-Weighted Returns**				
	8.463	9.819	2.973	4.724	2.279	5.251	11.832	4.345	7.372	3.509
	Critical Values									
10%	7.420	9.050	9.970	10.490	10.910	7.420	9.050	9.970	10.490	10.910
5%	9.100	10.550	11.360	12.350	12.970	9.100	10.550	11.360	12.350	12.970
2.5%	10.560	12.370	13.460	14.130	14.510	10.560	12.370	13.460	14.130	14.510
1%	13.000	14.510	15.440	15.730	16.390	13.000	14.510	15.440	15.730	16.390

Figure 1: **Structural Breaks and Historical Interest Rate Behavior**