

What happens when equity investors disagree with the FOMC committee?

Lucia Milena Murgia¹

January, 2020

ABSTRACT:

In this paper I study how the stock market is affected by investor disagreement at time of Federal Open Market Committee (FOMC) announcements. My evidence shows that investor expectations formulated prior to FOMC announcements have a significant impact on equity prices and that particularly when expectations are not aligned with the FOMC committee decision. Furthermore, when monetary policy is neutral, I present evidence that investor disagreement is a further layer of uncertainty in the dynamics of equity markets. My results reconcile past findings on the monetary policy surprise literature and more recent empirical findings on the effect of FOMC announcements on equity markets. Moreover, as I find no effect on equity returns when the FOMC committee decision is anticipated by the market, a practical implication of my study is that monetary policy authorities should take into account market expectations when formulating disclosure policy in order to improve alignment with financial market expectations and smooth out their economic consequences.

¹ [Economics School, Norwich Research Park, University of East Anglia, NR47TJ, United Kingdom. Contact: L.Murgia@uea.ac.uk.](#)

* This paper is part of my Doctoral Dissertation and I'm grateful for guidance to Apostolos Kourtis and Raphael Markellos. I also thank for their helpful and insightful comments Stefan Franz Schubert, as well participants at the 1st Financial Symposium in Kissamos 2018 (Crete) and seminars at Norwich Business School. All errors are mine.

1. INTRODUCTION

...The effect of monetary policy on the economy today depends not only, or even primarily, on the FOMC's current target for the federal funds rate or the quantity of assets on its balance sheet, but rather on how the public expects the Federal Reserve to set the paths of these variables in the future.

(Remarks by Janet Yellen, Vice-Chair of Board of Governors of the Federal Reserve System, November 13, 2012)

As stated by Janet Yellen, the level of alignment of market expectations regarding future monetary policy decisions with the actual decisions reflects the effectiveness of monetary policy practices. As financial markets are a fundamental part of the monetary policy channel, they are inevitably influenced by it. This study addresses the following question: does disagreement of investors towards monetary policy announcements affect the dynamics of equity markets? To investigate this question I develop a single framework to analyze the FOMC announcements and their effect on the equity market, with respect to expectations of investors, developed prior to the announcement dates.

The methodology employed is inspired by the pioneer research of Kuttner (2001) and further employed by Kuttner & Bernanke (2005). Kuttner (2001) analyzed the interest rate changes deliberated by the FOMC to disentangle the expected from the unexpected component using the Federal Funds Futures and the Effective Federal Funds Rate. I extend this methodology by converting the differential between the Federal Funds Futures and the Effective Federal Funds Rate into a "probability", assigned by the investors, of a change in the Federal Funds Target rate. These probabilities are singularly computed each day, for the whole week before the FOMC announcements. This time period, the week before, is also defined as "*blackout period*", during which policy makers are forbidden from disclosing information on the

upcoming FOMC announcement. Investors should be therefore developing their expectations free from the influence of other monetary policy updates from official sources.

Considering the expectations of investors in the form of probabilities for the whole week before the FOMC announcements deviates from the methodology of Kuttner (2001), who computes the “surprise”, in the interest rate change, the day before the meeting. Different from Kuttner (2001) it’s also how I identify “disagreement” during a specific FOMC announcement. I postulate, that, during a specific FOMC announcement, investors expect a change in the Target Rate, when the probability of an interest rate change is higher than 50% across the majority of the days. Further, I identify “disagreement”, when investors expected a change in the interest rate and the change doesn’t occur (vice versa also applies).

“Disagreement” takes then the form of a dummy variable that takes value 1, for every FOMC announcements where I observe disagreement and zero elsewhere.

To investigate the effect of disagreement I run a dummy model regression, analogous to the model employed by Lucca & Moench (2015) and I find, that FOMC announcement, where investors disagree with the decision is associated with an equity returns of almost 40 basis points (bps) across my whole sample period (2000–2016), depending also on the outcome of the meeting. Lucca & Moench (2015) find that the pre – announcement drift is associated with almost 50 bps, claiming that the announcement itself is not the real trigger of the equity reaction. Their results is partially in line with mine, as I employ daily equity returns that partially includes the pre-announcement drift discovered by Lucca & Moench (2015). Their analysis, although, argued that the Kuttner (2001) and Kuttner & Bernanke (2005) surprise is statically influential in their analysis. My analysis considers the pre – announcement effect and the effect of the monetary policy surprises all together.

To give a reasonable explanation to my findings, that position themselves in between the literature of monetary economists (Cochrane and Piazzesi, 2002; Rigobon and Sack, 2004; Ehrmann and Fratzscher, 2004; Bernanke and Kuttner, 2005; Kontonikas, Mac Donald and Saggi, 2013; Fausch and Sigonius, 2018) and the more recent literature on FOMC and macroeconomic announcements (Savor and Wilson, 2013; Lucca and Moench, 2015; Ai and Bansal, 2018; Wachter and Zhu, 2018), I analyze the time series of equity returns on FOMC announcement days. The time series analysis, yields both results in line with the macroeconomic announcements literature and the monetary economists literature. In line with Lucca & Moench (2015), I find only weak evidence that the time series of equity returns during FOMC announcements days is countercyclical and partially “mean – reverting” with respect to the average returns on the previous meeting.

In line with Kurov (2012) and Kontonikas, Mac Donald and Saggi (2013), I find that the magnitude of the response is linked to the state of the economy. A particular relevant results is related to the monetary policy surprise documented by Bernanke and Kuttner (2005). I re-compute the monetary policy surprise and I investigate the effects on equity returns, finding a statistical significance 16 bps response on the overall sample (2000–2016).

Differently, when I subsample the equity returns and investigate separately the FOMC announcement returns based on my variable, I find that the monetary policy surprise is only statistically significant when I observe disagreement. Moreover, the equity returns where I observe disagreement are not effectively influenced by economic cycle dummy variables. On the contrary, when I analyze the remaining FOMC equity returns (where the decision of the FOMC is in line with the expectations of investors) I find that the equity returns are strongly linked to economic outlook.

The common ground between the two strands of the literature is that FOMC announcements are associated with a drift in stock prices. Monetary economists attribute this additional return to the unexpected component of interest rate changes. The other side of the literature attributes the additional returns to the premium required by equity investors for bearing non-diversifiable risk (Lucca and Moench, 2015) and the risk that is realized on announcements days, that concerns the probability of a rare negative event in the economy (Wachter and Zhu, 2018). This paper reconciles these findings and proposes an alternative explanation to the observed dynamics of equity returns on the FOMC announcements days. These results allow me to conclude that the expectations of investors and the surprise of interest rate changes has definitely an impact on FOMC announcements equity returns, in line with the monetary economists literature. At the same time, different from the findings of Bernanke & Kuttner (2005), the results are only applicable to specific FOMC announcements and are in line with the macroeconomic announcements literature, which postulates that the impact of the prior expectations is realized on the announcement day and not prior to it.

To further corroborate these findings, I investigate a specific setting, generally overlooked in the literature, the Neutral Monetary Policy (NMP) Regime. The NMP Regime includes all the FOMC announcements, where no interest rate change occurs. The NMP Regime is a natural environment to investigate two fundamental aspects of my research questions: the power of expectations and the announcement effect. Since no interest rate change is announced, the economic condition remains unchanged, however, investors might disagree with this decisions and further, unchanged interest rate level also implies important information on the state of the economy. When I replicate my analysis, considering only the NMP regime FOMC announcements, I

found that disagreement around FOMC meetings when no interest rate change was voted has an even stronger impact (of almost 50 bps) than in the general case.

When analyzing the NMP regime equity returns I also report two important findings that corroborate my previous results. When I include all the NMP FOMC announcements, the Kuttner surprise is statistically insignificant. Conversely, the Kuttner surprise is strongly significant and high in magnitude, across all the events where I observe disagreement, corroborating my hypothesis that the expectations of investors are the real trigger of the equity returns on FOMC announcement days. If investors were, in fact, merely reacting to the announcement or to a change in the level of interest rate, the NMP announcements shouldn't have any impact on equity markets. These results document an additional level of uncertainty in unexpected neutrality which could be interpreted as follows; intuitively, unexpected monetary policy neutrality leads to additional uncertainty. If investors were expecting a rise in interest rates, unexpected neutrality, can be perceived both as a sign that the economy is not sufficiently strong to absorb it and as worsening debt conditions for companies are delayed in time. Conversely, assuming markets expecting a loosening of monetary policy and a subsequent NMP regime takes place, the equity market reaction will be positive as investors will forecast a state of the economy that could overcome the ups and downs without central bank interest rate interventions. Moreover, unexpected NMP leaves the debate on when the FOMC committee will change the level of interest rates open for discussion.

Further, I investigate whether the reaction is in line with the CAPM predictions and proportional to the systematic risk exposure of stock portfolios. I also explore my hypothesis among FOMC announcements, when no interest rate change had occurred. My results, in line with past findings, highlight that disagreement associated to the FOMC decision has a substantial effect on equity returns, realized at the FOMC

announcement day. When disagreement is observed prior to FOMC announcements, I estimate a market average impact of 40 basis points on equity returns. However, when sorting on market beta, my findings show that the effect of disagreement is on average 80 basis points for high beta portfolio (average beta is 1.7), whereas is only 28 basis points for low beta portfolio (average beta is 0.2). Bernanke and Kuttner (2005) find a similar result when investigating the impact of monetary policy surprises on the Fama-French 10 industries portfolios. Their findings highlight a high degree of proportionality, with respect to the market beta, in the way different economic sectors market prices respond to monetary policy surprises. My results are also consistent with Savor and Wilson (2014) and Wachter and Zhu (2018). These recent researches find that despite its poor performance in explaining the cross section of equity returns, overall, the CAPM is a good fit to explain equity returns at the time of macroeconomic announcements.

These findings could also be interpreted as a natural experiment for the Efficient Market Hypothesis. When investigating the effects of FOMC announcements where investors agree with the FOMC committee decisions I found no statistical significant effect on equity returns. The announcements where investors agree can be interpreted as “anticipated events”, when no additional information reaches the financial market. My result corroborates this hypothesis in showing no significant impact when the event is entirely in line with the opinions of investors. This result implies that, as anticipated information doesn't have a significant impact on the financial market, the alignment of monetary policy makers agenda with the expectations of investors is likely to reduce the prior and post uncertainty raised by the announcements. This result features past findings on the importance of monetary policy institutions communication policy (Blinder, et al. 2001; Faust and Svensson, 2001; Blinder, et al. 2008). As investors take stance regarding the future path of monetary policy decisions,

the task of policy makers should be to take into account this information, adjusting their disclosure policy to improve quality and smooth the economic consequences of their expectations.

All together, the main contribution of this paper is to provide an additional explanation to the additional equity returns associated with the FOMC announcements and reconcile the findings the between the monetary economists and the macroeconomic announcements literature. The surprise component of the interest rate changes, is a partially satisfactory explanation for this equity returns, although by extending the methodology I find that the expectations of investors are formulated long before the FOMC announcements and realized on the announcement day. The announcement effect adds the final trigger to equity reaction, conditioned to expectations prior formulated. The present study also contributes further to the existing literature, in two other different ways.

First, I find investigate specifically FOMC announcements where no interest rate change occurs and find that an even higher equity return is associated with these announcements, which is in line with the macroeconomic announcements literature and partially difficult to reconcile with standard asset pricing models (Savor & Wilson, 2013; Ai & Bansal, 2018). Lastly, I confirm past results of Savor & Wilson (2014) and Wachter & Zhu (2018) that the CAPM, although failing to explain the cross section of asset returns in many occasions, does a fairly good job in explaining the additional equity returns around FOMC announcements, particularly when these announcements are not associated with a change in interest rate.

2. HYPOTHESIS DEVELOPMENT

Building up on two different strands of the literature, the motivation of this paper relies on understanding the additional equity return associated with FOMC announcements. The seminal papers of Kuttner (2001) and Bernanke & Kuttner (2005) have directed the literature to understanding that investors react to the unexpected component of a change in Federal Funds Rate, rather than on the interest rate change. Their methodology effectively disentangle the expected from the unexpected component of the interest rate changes and further evaluate the effect on stock returns. The “surprise” component is retrieved with the differential value between the Federal Funds Futures and the Effective Federal Funds rates, evaluated for the number of days influenced by this difference. As acknowledge in the literature futures are an effective instruments to investigate the market expectations, given their forward looking nature.

Their results features an important finding: the expectations of investors are developed in the period prior to the FOMC announcement. The methodology of Kuttner (2001) and Bernanke & Kuttner (2005), investigate, in fact, the surprise the day prior to the announcement. What this methodology doesn't allow is to identify the FOMC announcements as distinguished events among themselves, with respect to the expectations of investors and the outcome of the announcement. The outcome of the FOMC announcement and the information effect are, in fact, not specifically investigated in their seminal research.

On the other hand, more recent research has specifically focused on the information effect of announcement, acknowledging that macroeconomic announcement days, are overall characterized by higher returns and generally lower volatility (Savor & Wilson,

2013; Lucca & Moench, 2015; Ai & Bansal, 2018). Their research features that the average return on the S&P500 of days with macroeconomic announcements is around 11 bps, considerably higher than the 1.3 bps on non - announcement days (Ai & Bansal, 2018).

Both stream of the literature give different explanations to the same event: the FOMC announcement. To explain the motivation and the hypothesis to my study I will first recall some stylized facts, found in both streams of the literature:

1. FOMC announcements are associated with considerably higher stock returns than the average trading day.
2. FOMC announcements convey information on the future conduct of monetary policy, as well as on the outlook of the economy.
3. FOMC announcements are (since 1994) pre – scheduled, therefore investors are perfectly aware of the exact time and date of the release.
4. The expectations on the FOMC announcements are developed in advance.
5. The reaction of investors is state dependent.

Based on this “*facts*”, the main motivation of my study is to understand the common ground between these findings. The main hypothesis of my research is, in fact, on whether the reaction of investors to FOMC announcements is given by their previous expectations on the conduct of monetary policy and further modulated by the announcements, which convey not only information about the monetary policy, but also about the current and perspective economy outlook. The “disagreement” of investors, defined as the case when the FOMC committee takes a decision regarding the future of monetary policy, which is totally in contrast with the expectations of investors, might be a plausible explanation for the strong reaction on FOMC announcement days.

In order to shed light on whether the expectations of investors, combined with the outcome of FOMC announcements are the trigger of the equity excess returns, I postulate the following hypothesis:

H1: The disagreement of investors regarding FOMC meetings outcomes affects stock market returns.

3. MEASURING DISAGREEMENT

This section will present the methodology that I employ to test the hypothesis formulated in section 2. First, I will present the methodology that I have developed to build my measure of “disagreement” of investors with respect to the FOMC announcement. The measure of “disagreement” is built upon the findings and the pioneer methodology of Kuttner (2001) and Bernanke & Kuttner (2005). To measure disagreement, I will firstly compute the probabilities, assigned by investors, to a potential monetary policy innovation the week before the upcoming meeting. Next, I combine, for each meeting, the estimated probability with decision adopted at FOMC meeting. My approach allows me to compute the ex-ante degree of disagreement with FOMC decisions.

3.1 METHODOLOGY ASSUMPTIONS

To compute market expectation probabilities and combining them with FOMC meeting data I make the following three assumptions. First, in line with institutional setting, FOMC meeting dates are scheduled well in advance and financial markets have perfect knowledge of meeting timetable. Second, there exists only one change of the Federal Funds Target Rate per month. Third, market expectations probabilities are on a potential rate change only, and no other information is provided on the direction or

magnitude of a change in interest rates. The three assumptions are reasonable as, firstly, the FED has started to inform markets on meeting timetable since 1994 and only during the peak of US financial crisis in 2008 the Fed held two unexpected intra-month meetings. However, as past research has highlighted Federal Funds Futures rates models can only help to predict a potential rate change, but are not effective in forecasting the direction or the magnitude of a rate change (Krueger & Kuttner, 1996; Owens & Webb, 2001; Kuttner, 2001; Bernanke & Kuttner, 2005; Kontonikas, Mac Donald & Saggi, 2013).

3.2 MARKET BASED PROBABILITIES

Kuttner (2001) and Bernanke & Kuttner (2005) postulate that a convenient market based method to identify expectations on funds rate changes is through the prices of federal funds futures contracts. Federal funds futures contracts embody, in fact, the expectations of Effective Federal Funds rate averaged over the settlement month.

To infer the expectations of investors on the outcome of the upcoming FOMC meeting I, firstly, estimate the Federal Fund Target Interest Rate *expected* by investors *after* the FOMC meeting. To compute this *expected* interest rate, I firstly compute the difference in the monthly average Effective Fed Funds Rate ($R_{s,t}$) and the Future Federal Funds Rate ($f_{s,t}$).

$$\Delta r_t^e = R_{s,t} - f_{s,t} \quad [1]$$

The *expected* interest rate, *after* the FOMC meeting, (r_t^e) can be subsequently computed by adding the Δr_t^e component to the current Federal Fund Target Interest Rate (r_t).

$$r_t^e = \Delta r_t^e + r_t \quad [2]$$

Following (Owens and Webb 2001), the expected Federal Fund Target Interest Rate, *after* the FOMC meeting (r_t^e), can be also re - written as the weighted probability \mathbf{p} of the current rate r_t plus the average change applied by the FOMC committee (Δr^T)² and the probability $(1 - \mathbf{p})$ of the current rate remaining unchanged:

$$r_t^e = \mathbf{p}(r_t + \Delta r^T) + (1 - \mathbf{p}) r_t \quad [3]$$

Consequently,

$$\mathbf{p} = (r_t^e - r_t) / \Delta r^T \quad [4]$$

Where \mathbf{p} , is the implied probability, associated to the Federal Funds Target rate after the FOMC meeting, which represents in my analysis the “market expectations” variable of FOMC meeting decisions. To infer the expectations of investors, \mathbf{p} is computed for each day during the trading week before the FOMC announcement. The trading week before the FOMC announcement day was chosen based on the interval known as “*blackout period*”. FOMC members are used to give information on interest rate changes and the economy condition during speeches and interviews that occur in – between the FOMC announcements, they refrain from these discussions during the week before the meeting.

Figure 1 presents an example of the estimate FED Funds target rate *after* the FOMC meeting (computed following equations 3 and 4), the related probabilities of a change in the Fed Funds target rate, and the level of the Federal Funds Target Rate. Panel A presents the case, when investors were expecting a change in the current level of the target interest rate and the change occurred (“Expected Change in Interest Rate”).

² The average change applied by the FOMC is 0.25%. As common in the literature and in the industry.

Panel B presents the case when the market was expecting a change in the current level of the target interest rate, but the change didn't occur ("Unexpected Neutrality"). Differently from the methodology outlined in (Kuttner, 2001), the Estimated FED Funds Target Rate Interest Rate after the meeting and the related probabilities are both computed considering the 5 trading days before the meeting.

It's interesting to notice, that the views of investors are formulated relatively in advance with respect to the meeting date. In both cases, but more evidently in the case of the "Unexpected Neutrality" the probabilities range in the same distribution quantile through the whole week before the meeting. This statistics corroborates my hypothesis that investors formulate well in advance their opinion on what should be the future level of the Fed Funds Target Interest Rate.

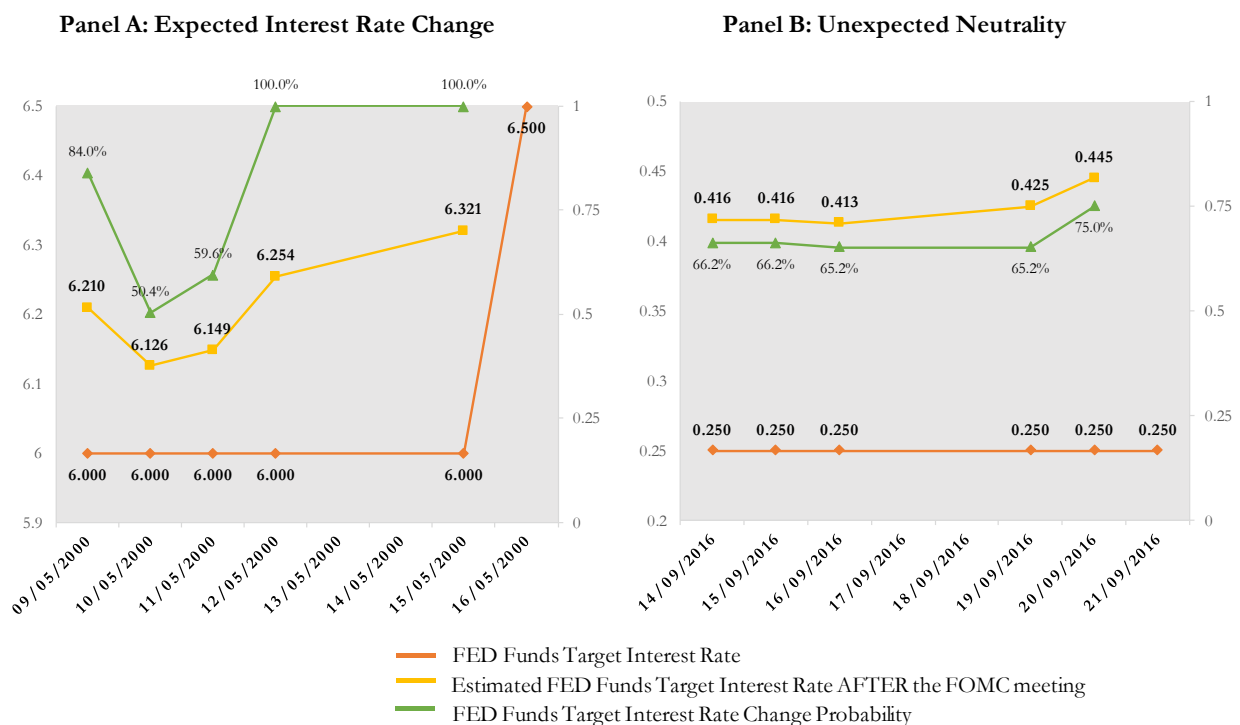


Figure 1: Expected FED Funds Target Interest Rate after FOMC announcement
 The figure plots the Federal Funds Target Interest rate, the Expected Federal Funds Target Interest rate after the FOMC announcement and the related probabilities of a change in the Federal Funds Target Interest rate. *Source:* Federal Reserve Website, www.federalreserve.gov, Quandl dataset.

3.1.1 Combining Expectations and FOMC decisions

My measure of disagreement, I_t^D , is then constructed by combining the market expectations, on the FOMC decisions and the market expectations on the outcomes of the meetings. When I consider the daily probabilities, assigned by investors, of an interest rate change, I postulate that if the number of days when the market is expecting a rate change is more than 50% of the total (the count of 5 trading days before the meeting date), then I assume the market expects a change in the Federal Funds Target Rate. On the contrary, if the number of days when the probability of a rate change is less than the 50%, then I assume financial markets are not expecting a monetary policy innovation. I_t^D is equal to 1 when dis-alignment between the FOMC announcement and the expectations of investors is observed (e.g investors expected the FOMC committee to rise interest rates and the FOMC left the interest rate level unchanged) and zero elsewhere.

4. DATA AND EMPIRICAL RESEARCH DESIGN

In this section, I present the data used in my research and the empirical methodology followed to test my main hypothesis.

4.1 DATA AND SAMPLE DESCRIPTION

My sample period covers from 2000 till 2016. The selected time period was chosen based on the FED communication policy developments of the last two decades. After 1994, the FED has, in fact, started to schedule the meetings and to give appropriate details of the discussion and FOMC Committee decision. From 1994 till 1999, the statement was declared only when a change in the interest rate occurred. Starting in

May 1999, the statements of the FOMC committee pre-scheduled meeting were realized regardless of the decision of the committee. Based on my methodology assumptions, my sample has to include only pre-scheduled meetings, where appropriate discussion was given afterwards, regardless of the outcome.

I retrieve data on the FOMC meeting dates and the related committee decisions from the Federal Reserve Website (www.federalreserve.gov). I exclude from the sample two meetings that were considered emergency meetings and responded to two specific events, that were independent from the current economic situation. In particular I exclude the meeting of the 17th September 2001, as that the day's rate cut occurred following the terrorist attack of September 11th, I also excluded the emergency meeting of the 16th March 2008, called in response to the meltdown at Bear Stearns. Altogether, the sample contains 143 observations. Out of the 143 observations, 43 included an interest rate change.

Years	Total Meetings	Meetings with no IR change	Meetings with IR change
2000	8	6	2
2001	11	1	10
2002	9	7	2
2003	8	7	1
2004	8	3	5
2005	8	0	8
2006	8	4	4
2007	8	5	3
2008	12	5	7
2009	8	8	0
2010	7	7	0
2011	9	9	0
2012	8	8	0
2013	8	8	0
2014	8	8	0
2015	7	7	0
2016	8	7	1
Total	143	100	43

Sources: The Federal Reserve website, www.federalreserve.gov

To construct my measure of disagreement I imply the Effective Federal Funds Rates and the Federal Funds Rate Future prices. The Effective Federal Funds Rates are obtained from the Federal Reserve Bank of New York (apps.newyorkfed.org) website. The daily data on Federal Funds Rate future prices are from Quandl Database (www.quandl.com). After computing my disagreement variable I have identified 55 meetings where the investors disagree with the FOMC meeting decisions. This statistic is relevant to rule out any potential sample bias, the “disagreement events” represent in fact only 38% of the FOMC meetings.

Table 2: Disagreement Dummy Variable Samples

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2000		1	1										2
2001	2			1		1		1			1		6
2002											1		1
2003						1							1
2004						1			1				2
2005		1			1	1			1		1		5
2006	1					1							2
2007										1			1
2008	1		1	1									4
2009											1		1
2010	1												1
2011				1		1		2	1		1	1	7
2012	1		1										2
2013						1	1		1	1		1	5
2014	1		1	1		1	1		1	1		1	8
2015	1		1									1	3
2016							1		1		1	1	4
Total	9	2	5	4	1	8	3	3	6	3	6	5	55

Sources: The Federal Reserve website, www.federalreserve.gov, Quandl dataset.

For my empirical analysis, the equity returns are computed with the CRSP – Value Weighted Index. The data are retrieved from the CRSP dataset on the Wharton Dataset. The daily return is computed as the:

$$R_t = \log (\text{Adj. Close Price} / \text{Open Price}) \quad [5]$$

The summary statistics for the market returns are presented in Table 3.

Table 3: Summary statistics of market returns (CRSP Value Weighted Index) with respect to FOMC meeting days

			n	μ	σ	median	min	max	skew	k
Period 2000-2016	CRSP Value Weighted Index	All FOMC days	143	0.317	1.471	0.167	-5.818	5.099	0.348	3.033
		All NON FOMC days	4015	0.005	1.231	0.045	-9.005	11.513	-0.012	8.676

Sources: The Federal Reserve website, www.federalreserve.gov, CRSP Dataset, Wharton Database.

The present summary statistics reported in Table 3, presents the average daily returns of the CRSP Value Weighted Index for all the FOMC announcements, in comparison to all the other days included in the sample period (2000–2016). In line with findings on macroeconomic announcements (Savor & Wilson, 2013; Ai & Bansal, 2018), FOMC announcement days are associated with a substantially higher returns than non announcement days. The average return on FOMC announcement days is 30 bps, whereas the returns on all the other days included in the sample period have an average return closer to zero. To analyse further the difference between the FOMC announcement days and non – FOMC announcement days I also report the average returns for the CRSP Value Weighted Index by year.

Table 4: Summary Statistics per year (2000 - 2016) - CRSP Value Weighted Index

Panel A: Pre - Crisis					Panel B: Post – Crisis				
Year	Days	n	μ	σ	Year	Days	n	μ	σ
2000	FOMC	8	0.261	1.149	2008	FOMC	12	0.579	3.121
	NON FOMC	242	-0.058	1.410		NON FOMC	233	-0.204	2.573
2001	FOMC	11	0.593	2.207	2009	FOMC	8	1.064	1.389
	NON FOMC	234	-0.062	1.304		NON FOMC	235	0.086	1.647
2002	FOMC	9	-0.071	1.320	2010	FOMC	7	0.255	0.429
	NON FOMC	242	-0.093	1.648		NON FOMC	234	0.039	1.136
2003	FOMC	8	0.395	0.935	2011	FOMC	9	0.160	2.138
	NON FOMC	244	0.089	1.077		NON FOMC	235	0.013	1.454
2004	FOMC	8	0.254	0.760	2012	FOMC	8	0.606	0.902
	NON FOMC	239	0.035	0.694		NON FOMC	233	0.027	0.790
2005	FOMC	8	-0.171	0.643	2013	FOMC	8	0.045	1.062
	NON FOMC	236	0.019	0.636		NON FOMC	235	0.087	0.671
2006	FOMC	8	0.168	0.880	2014	FOMC	8	0.182	0.928
	NON FOMC	234	0.057	0.613		NON FOMC	235	0.041	0.719
2007	FOMC	8	0.606	1.569	2015	FOMC	8	0.349	0.969
	NON FOMC	234	-0.014	0.989		NON FOMC	235	-0.018	0.975
					2016	FOMC	8	-0.111	0.729
						NON FOMC	235	0.044	0.828

Sources: The Federal Reserve website, www.federalreserve.gov, CRSP Dataset, Wharton Database.

Consistently with the findings of Kontonikas, Mac Donald & Saggi (2013) the descriptive statistics are different in magnitude from the pre – crisis period with respect to the aftermath of the crisis. The highest average return on FOMC announcement is observed in year 2009 (1.11%), after a series of interest rates cut, therefore consistent with economic theory and past findings. On the contrary, 2005, during the pre – crisis period, where interest rates were consistently hiked the FOMC announcement returns are on average negative. With exception of 2005 and 2016, although FOMC announcement show a consistent higher average return of all the

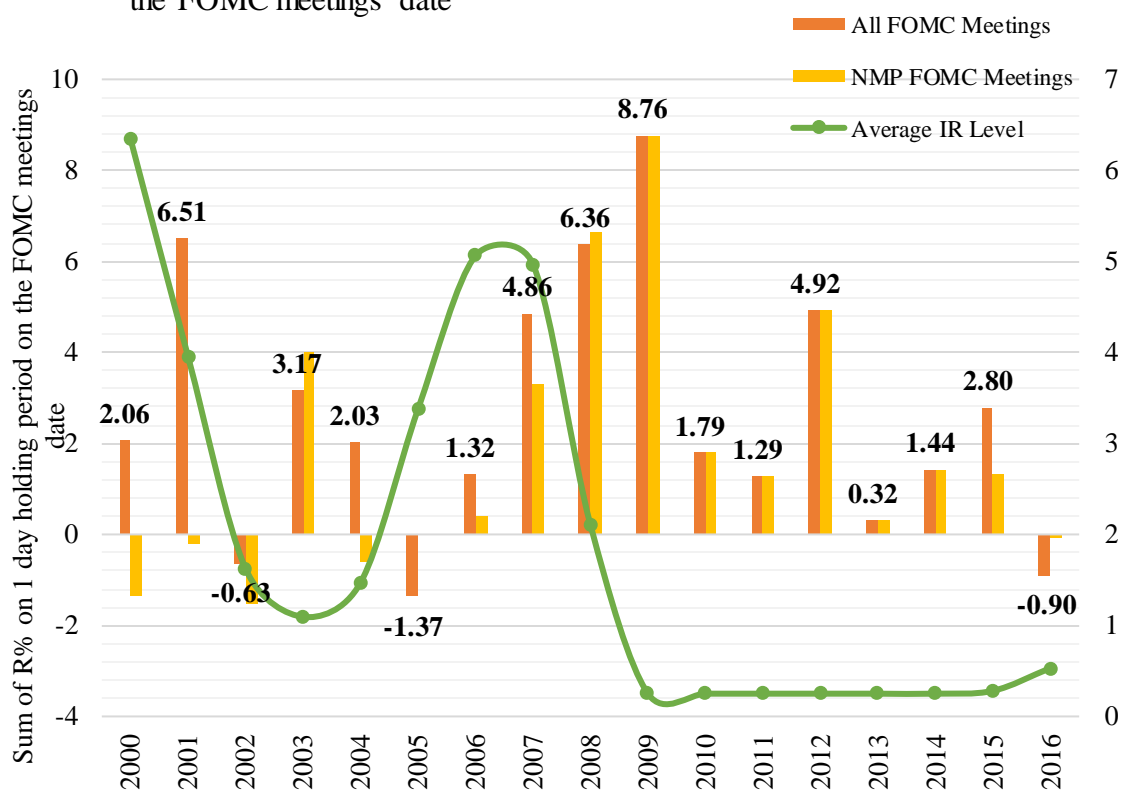
other. Furthermore, I report the distribution of the FOMC meeting daily returns cumulated yearly.

Figure 2 shows the returns cumulated across the all FOMC meetings year, compared with the returns yearly cumulated for the FOMC meetings where no interest rate change occurred, the Neutral Monetary policy (NMP) regime³. The cumulated yearly returns peak across the recession and immediately post recession period in 2008 and 2009, following a period of repeated cuts in the Federal Funds Target interest rate. During 2008, the higher equity returns could be logically explained by the consistent cuts in the interest rate. During 2009, although, during the FOMC meetings interest rates were maintained low, and no further action on the Federal Funds Target interest rate level was taken.

³ This particular case of FOMC announcements, the Neutral Monetary Policy (NMP) Regime will be further explained in section 4.3

The graph again, confirms the theory that FOMC announcements are yearly associated with large cumulated returns. A simple holding strategy of buying the stock market index on the opening of the FOMC announcement day and selling the index on the closing price with have yield across the year an average of 3%, peaking in 2009 at 8.8% cumulated.

Figure 2: Distribution of CRSP Value Weighted Index 1- day return on the FOMC meetings date



Sources: The Federal Reserve website, www.federalreserve.gov, CRSP Dataset, Wharton Database

4.2 EMPIRICAL METHODOLOGY

This section presents my empirical methodology to investigate the effect of my “FOMC disagreement” variable on equity returns. To formally assess the magnitude equity returns on my “FOMC disagreement” variable, and thus investigate empirically my main hypothesis, I run a simple dummy variable model:

$$H_t = \beta_0 + \beta^D I_t^D + \beta^X X_t + \varepsilon_t \quad [6]$$

The dependent variable H_t represents the 1 day return of the CRSP-value weighted index. In the main specification, the explanatory variable is my dummy variable I_t^D , that takes value 1, when investors disagree with the FOMC committee decision (as outlined in the Methodology section 3) on the FOMC announcement days and zero otherwise. In additional specifications of the analysis, other control variables are included, to take into account information that might jointly affect the stock returns on the FOMC announcement days, and are denoted by the vector of controls X_t . In the regression excluding the vector of controls X_t , the coefficient β^D is the mean returns on FOMC meetings where “disagreement” is realized and the constant β_0 is omitted. This methodology mirrors the methodology followed by Lucca & Moench (2015) to assess the magnitude of the pre –FOMC announcement equity drift.

Further, I investigate possible other determinants of equity returns on FOMC announcement days. To this purpose, I conduct a time series analysis on FOMC announcements returns against several control variables that include economic and financial market variables. The details of the control variables and the test results are presented in section 5.3.1 Differently from past studies on monetary policy surprises (Bernanke & Kuttner, 2005; Kontonikas, MacDonald & Saggi, 2013; Gertler & Karadi, 2015; Karadi & Jarocinski, 2019), my methodology allows me to differentiate the single announcements based on the prior developed expectations of investors, I am, therefore, able to investigate separately the determinants of stock returns when investors disagree and agree with the FOMC committee decisions.

Following the findings of Bernanke & Kuttner (2005) on the Fama & French Industry portfolios, and the more recent findings of Savor & Wilson (2014) and Wachter & Zhu

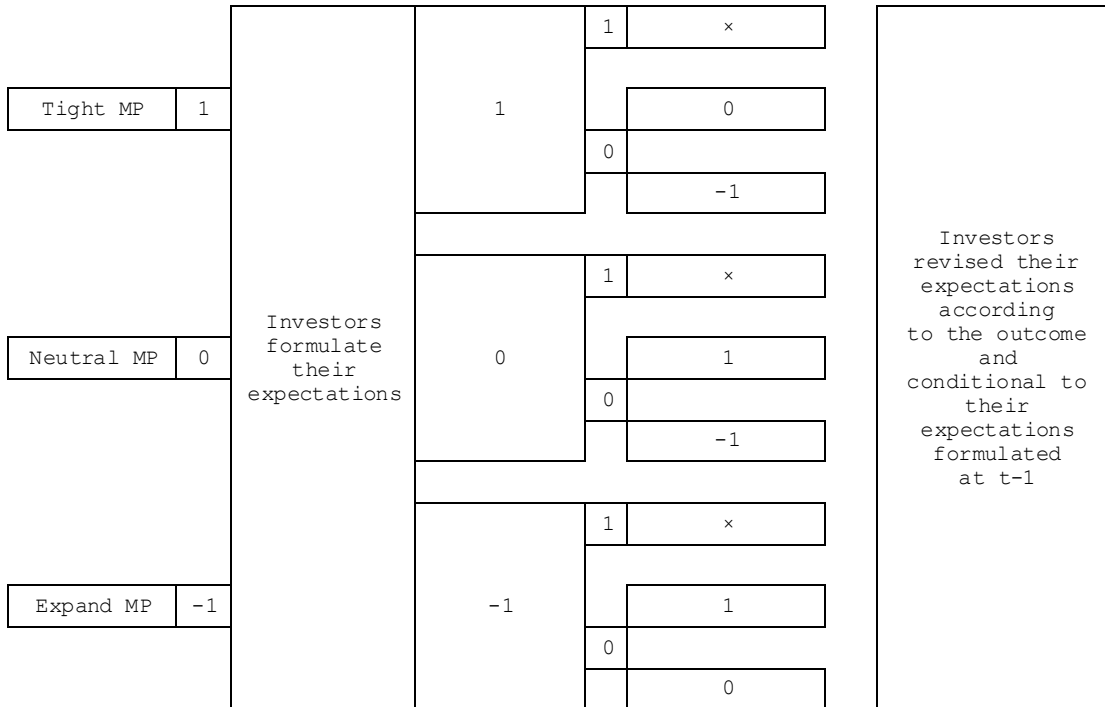
(2019), I investigate whether the response of the stock returns is in line with the CAPM predictions. Savor & Wilson (2014) provide, in fact, empirical evidence, that during macroeconomic announcement days the beta is strongly related to the average returns. I will therefore conduct my analysis (equation 6) on different market portfolios, sorted according to the industry sector and their market beta.

4.3 WHEN NO ACTION IS STILL AN ACTION: THE NEUTRAL MONETARY POLICY REGIME (NMP)

This section presents a “special case” of my hypothesis the “Neutral Monetary Policy Regime” (NMP). The methodology outlined in section 3, allows me to investigate separately the events with respect to the decision taken by the FOMC committee. The NMP regime considers all the FOMC meeting dates where no interest rate change was voted. It’s surprising how the literature on monetary policy surprises has been underestimating the information content incorporated in a non-rate decision meeting.⁴ And that is even more striking if one considers that the information transmission literature has been always indicating that “no news” should be considered a signal to markets. As Tetlock (2011) shows stale information still affect stock prices. The reasoning behind it, doesn’t, in fact, only rely the outcome of the FOMC meetings, but also the interpretations of investors, which are conditional to the expectation that they formulate ex – ante the meeting date.

⁴ Bernanke and Kuttner (2005) highlight that their methodology is not suitable to investigate separately the effect of monetary policy surprises with respect to the FOMC decision as, they disentangle the expected from the unexpected component of the interest rate change within the same event.

Potential Outcomes	Meeting Outcome	Market Opinions on the Outcome*	Combined Market Expectations with Meeting's Outcome**
t -1	t	t + 1	



* 1 = market agrees, 0= market disagrees

**0 = market disagrees and expected neutrality, -1= market disagrees and expected a cut, 1=market disagrees and expected a hike, x = market agrees, therefore no other scenarios are in place

Figure 3: Monetary Policy Outcome and Market Opinions

Figure 3 displays, the link between FOMC meeting outcomes and investors opinions regarding it. At t-1 investors are aware of the potential outcomes, tight monetary policy (1), expansionary monetary policy (-1) and neutrality (0). Between t-1 and t, investors formulate their opinions on the possible outcomes. At time t (the meeting date) the outcome is public. When combining market opinions with the outcomes there are two additional path to consider, market agreement (1) and market disagreement (0). When the market agrees, we expect the reaction of the meeting to be embedded already in stock prices, therefore the node closes (x). If the market disagree, there are two further paths to consider, related to the outcome that the market actually expected at t - 1. The further market reaction is in fact based on market interpretation of the outcome at time t, conditional to expectations formulated at time t-1.

As shown in figure 3 , at time $t - 1$ investors are aware of the potential outcomes, tight monetary policy (1), expansionary monetary policy (-1) and neutrality (0). The likelihood of occurrence of three possible FOMC decision is, however, rationally distributed only on two possible combinations: a hike and neutrality, or a cut and neutrality. This assumption is based on the fact that the probability of the outcome is

based also and on the current state of the economy. In other words, is highly unlikely that within the same meeting both an interest rate hike and a cut could be expected. Between time $t - 1$ and t (the meeting date), investors formulate their opinions on the possible outcomes. At time t the outcome is public.

When combining market opinions with the outcomes there are two additional paths to consider, market agreement (1) and market disagreement (0). When the market agrees, we expect the reaction to the announcement to be embedded already in stock prices, therefore the node closes (x). If the market agrees with the outcome of the meeting the impact should be close to irrelevant, according to the EMH, as the expectations of the market should be already embedded in stock prices.

If the market disagrees, there are two further paths to consider, conditional to the expectations formulated at time $t - 1$. When the FOMC committee votes an interest rate hike, and the market disagrees, the alternative is that the market hoped for neutrality. Similarly, if an interest rate cut is voted, the alternative is that the market hoped for neutrality. When the market disagrees with an interest rate hike, potentially it considers the economy not yet enough “strong” to absorb less favourable debt conditions. Similarly, an “unwanted” interest rate cut could be interpreted as a current worst economic condition than expected. The first case be positively interpreted as a better current economic conditions, although worsening in the future. The second case is a worst current economic conditions but a more positive forward looking scenario. Regardless which one is the case, both send a signal to market on the current state of the economy and resolve the question: “When is the central bank going to change the level of interest rates?”

Conversely, disagreement on neutrality, leaves investors with an additional level of uncertainty. Investors will, in fact, not only question the current and future state of the

economy, but also debate on when the central bank will change the level of interest rates. If the market disagrees with neutrality, two cases have to be considered. If the market was expecting an interest rate hike, and the FOMC votes for neutrality, it could be interpreted as a bad signal. In other words, the economy is not yet strong enough to absorb an interest rate hike, therefore the current situation is worse than expected and a future hike will mean even worse conditions for stock prices are expected in the future. If the market was expecting a cut, but neutrality is voted, it might be considered that the current economy condition is better than expected.

To investigate this special case, I estimate equation 6, including only the events where no interest rate change occurred. In my sample period (2000 – 2016) 100 out of 143 meetings were meetings where the FOMC committee has decided to leave the level of interest rate unchanged. The results of these analyses are presented in section 5.3

5 EMPIRICAL RESULTS

In this section, I present the results of the hypothesis postulated in section 2, following the empirical methodology outlined in section 4. First, I present the results related to my first main hypothesis, on whether “FOMC disagreement” affects equity returns. Further to this, several other empirical analyses are conducted to provide a plausible explanation to the main result and reconcile it to past findings.

5.1 MAIN RESULTS

The following table 5 presents results on my core hypothesis (see equation 6):

Table 5: Main Results	
y = CRSP Value Weighted Index	
I_t^D	0.350* [0.201]
Obsv (# FOMC meetings)	143
Avg Ret (FOMC)	0.317
# FOMC disagreement	55

Note: This table presents the results for the dummy regression analysis presented in equation 6. The dependent variable is represented by the daily returns on the CRSP Value Weighted Index, computed as presented in equation 5. The dummy variable (I_t^D) is computed following the methodology outlined in section x. The event study encompasses the 2000-2016 period and includes 143 FOMC meetings, with an average daily return of 31 basis points. For completeness, the number of meetings where disagreement is observed is reported. Standard Errors are presented in brackets.

Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1

Source : Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites.

To correctly interpret these results two important descriptive statistics need to be recalled. The number of events where investors disagree with the FOMC committee decisions (e.g $I_t^D=1$) are 55, therefore the FOMC announcements when disagreement emerges are not the majority among the meetings sample. This statistic is relevant in ruling out any potential sample bias. My findings indicate that the FOMC decisions, which show a marked dissimilarity with investors' expectations, have a significant and economically important excess return of 35 basis points at the announcement day.

These results reconcile the monetary policy surprise literature, as Bernanke & Kuttner (2005) study and the more recent empirical papers on the effect of the FOMC announcement effect on the equity market (Savor & Wilson, 2013; Lucca & Moench, 2015; Ai & Bansal, 2018; Wachter & Zhu, 2018). Monetary economists attribute these equity excess returns with the unexpected component of the interest rate change, whereas the other stream of the literature argues that the additional returns are a

premium required by equity investors for bearing non-diversifiable risk (Lucca & Moench, 2015). Furthermore, the uncertainty on risk pricing is resolved at the FOMC announcement day, similar to what (Wachter & Zhu, 2018) indicate as the resolution of the uncertainty of a rare negative event in the economy.

My results are consistent with monetary economics view, but they go one-step further by including investors' expectations *before* FOMC announcements. At the same time, my findings corroborate recent empirical papers, which include the stock market reaction to FOMC announcements. At FOMC announcement dates, both market expectations and investors' heterogeneous opinions converge and that is quantified by market reaction through that single day excess return. However, my results indicate an alternative explanation for the observed equity returns at FOMC announcement day. They are novel in highlighting that stock market reaction to FOMC announcements are conditional to investors' expectations on FOMC decision.

The intuition behind that interpretation relies on the assumption that investors elucidate the contents of FOMC announcement, and that rethinking very much depends on their information set they possessed before the announcement day. Whatever the FOMC meeting decision, if stock market investors disagree, they compel to update their available information and opinions, which will be subsequently reflected in equity prices (Roll & French, 1986).

5.2 PERSISTENCE

The previous section presents the results for my “disagreement” dummy variable (I_t^D) and equity returns, which accounts for a large fraction of realized returns across the 2000–2016 sample period. Such analysis, similarly to the analysis provided by Lucca & Moench (2015), assumes that the equity return should not be reversed on

subsequent days and further are not offset with statistically significant negative returns on the day before, that partially also includes the pre – announcement FOMC return. Table 6 summarizes the results for equation 6, where the dependent variable are the daily returns on the CRSP Value Equity Index the day before and the subsequent 3 days after the FOMC announcement day.

The results show that the variable is not statistically significant on the day before and the days after the FOMC announcement day, consistent with expectations and past literature (Lucca & Moench, 2015). This result corroborates that the additional equity returns on “FOMC disagreement” is not reverse in other days around the FOMC meeting day.

y = CRSP Value Weighted Index	I_t^D			Obsv
	-1	-0.052	[0.212]	
0	0.350*	[0.201]		
+1	-0.076	[0.196]	143	
+2	0.035	[0.169]		
+3	-0.050	[0.182]		

Note: This table reports results for dummy variable regression (equation 6) for average returns on the CRSP Value Weighted Index on the day prior and on after the FOMC meeting dates. The sample ranges (2000-2016), analogously to the main analysis. The day “0” represents the FOMC meeting date. The result is reported for comparison and completeness.

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1

Source : Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites.

An important element should be acknowledge to correctly evaluate this test. The daily stock returns are computed as shown in equation 5 and therefore partially inclusive of the pre– FOMC announcement drift in stock returns of Lucca & Moench (2015). The pre– announcement stock drift, in fact, includes the returns from the 2pm of the day before of the FOMC announcement day and the 2pm of the announcement day, excluding the outcome of the meeting. My result (denoted in table 6 as day “0”) partially include this “pre – drift”, which remains in line with my analysis, as Lucca &

Moench (2015) acknowledge that this drift can be due to the resolution of uncertainty and the economic outlook that will be released on the announcement.

5.3 TIME SERIES ANALYSIS OF THE FOMC MEETINGS DATES

The literature provides different explanations to FOMC days equity returns, ranging from the surprise component of the interest rate changes (Fausch & Sigonius, 2004; Ehrmann & Fratzscher, 2004; Bernanke & Kuttner, 2005) to the information content on the future economic outlook and realization of uncertainty (Savor & Wilson, 2013; Lucca & Moench, 2015, Ai & Bansal, 2018). In this section, before turning to one of the possible explanations, I investigate the determinants of FOMC announcement days returns. Specifically, I regress the FOMC announcement days returns on a series of control variables, to account for the state of the economy and the financial market.

Table 7 presents the results of this test. To account for the state of the economy, I regress the FOMC announcement days returns on the unemployment change (denoted in table 7 as Unemployment Δ), the NBER dummy, a tightening cycle dummy variable (denoted in table 7 “Tightening”), an easing cycle dummy variable (denoted in table 7 “Easing”) and the “Kuttner Surprise”.

The unemployment change variable is computed as the variation of the unemployment rate from the last FOMC meetings. The unemployment rate is usually reported closely to the FOMC announcement, and it is known to be one of the most influential macroeconomic announcement. Boyd, Hu, & Jagannathan (2005) analyzed the effect on unemployment news, finding a strong positive reaction of stock returns on rising unemployment during economic expansion and negative during economic contractions. A possible explanation for this result is closely related to the mandate of the FED. The FOMC has, in fact, often declared that unemployment is a major

indicator for the conduct of monetary policy. A rise in unemployment during contractionary state of the economy, could potentially lead to an interest rate cut and more favourable discount rate conditions in the future. The change in unemployment rate is positively associated with CRSP Value Weighted returns and statistically significant, in line with expectations and the past results of Boyd, Hu, & Jagannathan (2005). The fact that unemployment change is positive and statistically significant on FOMC announcement returns poses the accent on the fact that these returns are affected by the information on economic outlook that are also revealed along with the monetary policy conduct, in line with Savor & Wilson (2013) and Ai & Bansal (2018).

Table 7: Time series analysis of FOMC meetings returns

y = CRSP Value Weighted Index						
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment	0.082**					
Δ	[0.037]					
NBER dummy		0.653*				
		[0.332]				
Tightening			0.404*			
			[0.213]			
Easing			0.273*			
			[0.151]			
Kuttner Surprise				0.153**		
				[0.071]		
Vix Lag					0.024*	
					[0.013]	
Avg _{FOMC}						1.171***
						[0.281]
Constant	0.307**	0.212		0.304**	-0.189	-0.066
	[0.121]	[0.133]		[0.122]	[0.310]	[0.148]
R ²	0.033	0.027	0.046	0.032	0.022	0.213
Observations	143	143	143	143	143	143

Note: This table reports the time-series regressions of FOMC meetings date on returns on various explanatory variables discussed in section x. “NBER Dummy” is a dummy recession indicator. “Tightening Cycle” and “Easing Cycle” are dummies variable that take value 1 if the corresponding FOMC meeting date can be classified as falling into a period of monetary tightening or loosening respectively. “Kuttner Surprise” is a monetary policy surprise computed as Bernanke & Kuttner (2005). The “Vix Lag” is the level of the VIX Index the day before the FOMC meeting date. The “Avg_{FOMC}” is the moving average of the FOMC meeting dates returns over the past 8 meetings. The dependent variable, H_t , is represented by the 1-day return of the CRSP Value Weighted Index computed as presented in equation 5. Standard Errors are presented in brackets. The sample period is (2000-2016) and includes all the FOMC meeting dates.

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1.

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, Federal Reserve Bank of St.Louis – Economic Research website, fred.stlouisfed.org

The “NBER dummy” is a recession dummy variable and it is positive and statistically significant across the 2000–2016 sample period, similar to the result of Lucca & Moench (2015) for the 1994 – 2011 sample period. This result, added with the result related to the unemployment change will lead to think that on average FOMC announcement returns are countercyclical. To analyse this aspect further, I include

two additional variables for the state of the economy the “Tightening” and “Easing” cycle variables. The two variables, “Tightening” and “Easing” are dummy variables that take value 1, when the observation fall in a monetary policy tightening period and take value 0, when the observation fall in a monetary policy easing period, respectively. Both variables are statistically significant, posing a limit on the inference that FOMC announcements returns are counter cyclical.

Further, I control for the surprise component of interest rate change including the “Kuttner Surprise”, which is the Bernanke & Kuttner (2005) interest rate surprise, which is positive and statistically significant, in line with the literature and expectations. As the purpose of my study is to bring together different explanations for the FOMC announcements returns, the fact that the Kuttner Surprise is positive and significant corroborates the assumption that investors develop expectations prior to the FOMC meeting date.

Further to this, I assess whether the FOMC returns are associated with the uncertainty of the equity market, by including the level of the VIX the day before the FOMC meeting date (denoted as “Vix Lag” in table 7). As shown in column (5) the VIX the day before is statistically significant, although the magnitude of the relevance is rather small. To assess whether there is some returns predictability into the FOMC time series returns, I regress the returns on the rolling average of the returns over the last 8 meetings. The rolling average is positive and strongly statistically significant, leading to conclude that FOMC returns are more likely to be positive when the past returns have been positive.

As my methodology allows me to distinguish among FOMC meetings, where disagreement is realized and vice versa, I replicate the analysis on all the FOMC meetings where my variable I_{t^D} takes value 1 and separately to all the remaining event. The same economic control variables and market control variables are included in

these two alternative analysis. The results of the analysis on the FOMC announcement where I_t^D takes value 1, which account only for 38% of the overall sample is presented in table 8. Table 9 presents the same analysis including only the event where my variable I_t^D takes value 0.

The unemployment change is positive and statistically significant only in the sample where investors “agree” with the FOMC committee decisions, likewise for the other economic outlook variables (NBER Dummy, Tightening and Easing cycle). A plausible explanation for this result is that across FOMC announcement where the market is informed of an unexpected outcome, investors have to re-update their outlook on the economy. On the contrary, when investors face an expected decision from the FOMC committee, their reaction is linked directly to the further upcoming information on the economic outlook.

An important result is featured in this analysis. The “Kuttner Surprise” is statistically significant only among the events where investors disagree with the FOMC committee decision, which corroborates the main assumption to build my variable. The “Kuttner surprise” is statistically non-significant on all the other events, which goes slightly in contrast with the Bernanke & Kuttner (2005) results. Bernanke & Kuttner (2005) find in fact, average response to the interest rate surprise, across the all the FOMC meetings, which I also partially find in table 7. Although, when differentiating the events on the basis of my variable, which differently from the Bernanke & Kuttner (2005) methodology, includes the expectations of investors the entire week before the FOMC meeting (as detailed explained in methodology section 4), the Kuttner Surprise is only statistically significant among the events where I_t^D takes value 1.

Table 8: Time series analysis of FOMC meetings returns (disagreement)

y = CRSP Value Weighted Index						
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment	-0.009					
	[0.066]					
NBER dummy		-0.219				
		[0.560]				
Tightening			0.477			
			[0.327]			
Easing			0.278			
			[0.247]			
Kuttner Surprise				0.154**		
				[0.073]		
Vix Lag					0.070***	
					[0.025]	
Roll Avg _{FOMC}						1.202***
						[0.390]
Constant	0.345*	0.382*		0.333*	-1.052*	0.181
	[0.201]	[0.214]		[0.190]	[0.536]	[0.182]
R ²	0.000	0.003	0.060	0.079	0.128	0.203
Observations	55	55	55	55	55	55

Note: This table reports the time-series regressions of FOMC meetings date on returns on various explanatory variables discussed in section x. “NBER Dummy” is a dummy recession indicator. “Tightening Cycle” and “Easing Cycle” are dummies variable that take value 1 if the corresponding FOMC meeting date can be classified as falling into a period of monetary tightening or loosening respectively.”Kuttner Surprise” is a monetary policy surprise computed as Bernanke & Kuttner (2005). The “Vix Lag” is the level of the VIX Index the day before the FOMC meeting date. The “Avg_{FOMC}” is the moving average of the FOMC meeting dates returns over the past 8 meetings. The dependent variable, H_t , is represented by the 1-day return of the CRSP Value Weighted Index computed as presented in equation 5. Standard Errors are presented in brackets. The sample period is (2000-2016) and includes only the FOMC meetings where disagreement is observed ($I_t^D=1$).

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1.

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, Federal Reserve Bank of St.Louis – Economic Research website, fred.stlouisfed.org

A further relevant result is the comparison on the “VIX Lag” variable in the “disagreement” and “agreement” FOMC announcements (column 5 in table 8 and column 5 in table 9, respectively). A higher and statistically significant volatility is associated with all the events where investors disagree with the FOMC decisions, in

line with expectations. The “VIX Lag” variable is statistically non–significant in all the FOMC announcements where the investors agree with the FOMC decisions which is line with the macroeconomic announcements literature (Savor & Wilson, 2013; Ai & Bansal, 2018), although I believe that, the explanation for this result can rely in the Efficient Market Hypothesis. If investors expect the decision from the FOMC their expectations are already embedded in stock prices, and therefore, this announcements should not prompt any additional reaction from the market, thus the market volatility remains “unchanged”. On the contrary, “FOMC disagreement” announcements provoke a reaction in the market, reflected in a statistically significant volatility.

Table 9: Time series analysis of FOMC meetings returns (agreement)						
<i>y</i> = CRSP Value Weighted Index						
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment	0.132***					
	[0.045]					
NBER dummy		1.137***				
		[0.407]				
Tightening			0.351			
			[0.283]			
Easing			0.271			
			[0.194]			
Kuttner Surprise				0.144		
				[0.223]		
Vix Lag					0.009	
					[0.016]	
Roll Avg FOMC						1.194***
						[0.408]
Constant	0.227	0.102		0.287*	0.094	-0.070
	0.154	0.168		0.160	0.387	0.158
R ²	0.090	0.083	0.039	0.005	0.004	0.230
Observations	88	88	88	88	88	88

Note: This table reports the time-series regressions of FOMC meetings date on returns on various explanatory variables discussed in section x. “NBER Dummy” is a dummy recession indicator. “Tightening Cycle” and “Easing Cycle” are dummies variable that take value 1 if the corresponding FOMC meeting date can be classified as falling into a period of monetary tightening or loosening respectively.”Kuttner Surprise” is a monetary policy surprise computed as Bernanke & Kuttner (2005). The “Vix Lag” is the level of the VIX Index the day before the FOMC meeting date. The “Avg_{FOMC}” is the moving average of the FOMC meeting dates returns over the past 8 meetings. The dependent variable, H_t , is represented by the 1-day return of the CRSP Value Weighted Index computed as presented in equation 5. Standard Errors are presented in brackets. The sample period is (2000-2016) and includes only the FOMC meetings where agreement is observed ($I_t^D = 0$).

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1.

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, Federal Reserve Bank of St.Louis – Economic Research website, fred.stlouisfed.org

Overall, several conclusions can be derived by this analysis. First, I find only weak evidence that FOMC announcements returns are countercyclical, given the controversial results on the “NBER” and the “Tightening” and “Easing” dummies. This

result is line with the findings of Lucca & Moench (2015), who also find weak evidence of countercyclical stock returns. The “NBER dummy”, combined with the results on the unemployment rate, although shows that equity returns around FOMC announcements are influenced by the state of the economy. The “NBER dummy” takes, in fact, value 1 during recession period displaying therefore that equity returns on FOMC announcements are higher during recession period. Furthermore, also the unemployment rate coefficient is contemporary positive, in line with the results of Boyd, Hu, & Jagannathan (2005) and Kontonikas, Mac Donald, & Saggi (2013).

5.4 THE NEUTRAL MONETARY POLICY REGIME

In this section, I present the results related to the NMP regime. The NMP regime, as detailed earlier in section 4.3, is my empirical setting where only the meeting dates, where no interest rate changes were voted, are considered when computing the control variables. Within this framework, I test my first main hypothesis (equation 6), to examine whether the impact of the disagreement of investors differs from previous results. Following earlier discussion and hypotheses predictions, I expect the variable I_t^D to have a stronger impact on equity returns, both in terms of magnitude and statistical significance, particularly when compared to estimates of the empirical model that includes all FOMC meetings.

My sample has 100 NMP-type FOMC meetings out of 143. In 70% of cases of NMP-type meetings, market expectations were aligned with FOMC decisions, and only in the remaining 30% market expectations diverged from subsequent FOMC decisions. These statistics are relevant to exclude any potential bias arising from the sample selection. The fact that on whole sample period, only 30% of the cases represents the

variable I_t^D gives an additional validation to its results. The results are presented in Table 10.

Table 10: Whole Sample - Neutral Monetary Policy (2000 -2016)	
y = CRSP Value Weighted Index	
I_t^D	0.496* [0.219]
(# FOMC meetings with no interest rate change)	100
Avg Ret (FOMC)	0.306
# FOMC disagreement	31

Note: This table presents the results for the dummy regression analysis presented in equation 6. The dependent variable is represented by the daily returns on the CRSP Value Weighted Index, computed as presented in equation 5. The dummy variable (I_t^D) is computed following the methodology outlined in section x. The event study encompasses the 2000-2016 period and includes only the FOMC meetings, where no interest rate change occurred, the NMP regime. For completeness the number of meetings where disagreement is observed is reported.
Standard Errors are presented in brackets.
Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1
Source : Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites.

As predicted, regression estimates on the I_t^D variable are larger when compared to those of baseline empirical model (see Table 5). More specifically, disagreement on neutrality is associated with almost 50 basis points. These results are significant in pointing out, that market opinions and expectations are the real trigger of market reactions to monetary policy decisions. The average return of FOMC announcements days in the NMP regime are around the magnitude of 30 bps, therefore the effect of investors' deceived expectations accounts for almost 20 bps of the daily return.

Disagreement on neutrality opens the discussion for alternative interpretations, as current conditions are known, whereas outlook is uncertain. Assuming that investors were expecting a positive monetary policy innovation, unexpected neutrality could be negatively perceived, as the economy is "unexpectedly" weak and unable to absorb major changes in interest rates. Further, such FED decision clearly has consequences

by worsening debt market conditions to the real sector. On contrary, assuming investors were expecting an interest rate cut, unexpected neutrality is a positive news. Thus the economy is not yet or not anymore in need of institutional support. However, better conditions for real sector in debt markets are delayed further.

The interpretation of this result relies entirely on the assumptions presented in section 4.3. NMP is the only outcome which has always a probability higher than 0 to occur. Market disagreement on neutrality may increase future uncertainty, and investors will frequently debate the following question: when is monetary policy innovation occurring? That uncertainty is a plausible explanation for the stronger equity reactions and the need of investors to revise their views. This section results provide further support to the hypothesis that only central bank meeting decisions that are unexpected have a statistically and economically significant impact on stock returns.

The results on this section are difficult to reconcile with the monetary economists literature, or more precisely to the literature that focuses on the interest rate changes and the equity returns, as no actual change in monetary policy occurs. FOMC announcements, where no change actually occurs in the monetary policy conduct, still remains a macroeconomic announcements and therefore, the results are in line with the literature on announcements and the empirical evidence provided by Savor & Wilson (2013) and Ai & Bansal (2018). Additionally, it also needs to be recalled that both the streams of the literature (monetary economists and macroeconomic announcements) have mostly focused on the FOMC announcements at an aggregate level, and FOMC announcements have not been subsampled on the basis of the outcome of the announcements⁵. To shed light on the reasoning presented in section 4.3 and the result presented in table 10, I replicate the time series analysis of FOMC

⁵ To the best of my knowledge.

returns on the NMP Regime, excluding therefore all the meetings where an interest rate change occurs. The results of this analysis are presented in the next sub-section.

5.4.1 Time Series of FOMC returns (NMP Regime)

Thanks to the methodology developed in this study, I am able to “dis-aggregate” the FOMC announcements, on the basis of the outcome of the announcements and furthermore also on the basis of the market expectations, formulated by investors prior to the announcement date. In section 4.3, I present several argumentations that point out that the NMP regime is characterized by additional uncertainty. This uncertainty arises especially when the market participants disagree with the FOMC decisions, because, not only they need to revise and re – update their views on the economic outlook, they are also left with the question, on “when” the monetary policy conduct will be revised.

Table 11 presents the time series analysis for FOMC announcements where no interest rate change occurred, including all the FOMC meetings. Tables 12 and 13 present the time series analysis when I split the sample into the FOMC meetings where my variable I_t^D takes value 1 and when takes value 0, respectively. The results are comparatively similar to the time series analysis presented in the previous section, in line with expectations, as NPM regime represents the majority of the events (100 out of 143 announcements). When analysing all the NMP regime announcements aggregately, the unemployment change (“Unemployment”) is positive and statistically significant, analogously to the NBER dummy. The NBER dummy is although, strongly statistically significant and the magnitude of the coefficient as doubled in size with respect to the previous time series analysis (table 7, column 2). Which means that stock returns are likely to be higher during recession period, when institutions leave the interest rate level unchanged. This result is also in line with the result on the “Tightening” and

“Easing” variable. Showing, that during loosening monetary policy (normally associated with recession period), returns are more likely to be higher.

The “Kuttner surprise” is statistically non – significant at an aggregate level, in line with expectations. As mentioned this particular setting, is more difficult to reconcile with monetary economists results, if the expectations of market participants are excluded from the analysis.

Table 11: Time series analysis of FOMC meetings returns - NMP Regime

y = CRSP Value Weighted Index						
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment	0.085**					
	[0.037]					
NBER dummy		1.282***				
		[0.380]				
Tightening			0.365			
			[0.301]			
Easing			0.295**			
			[0.132]			
Kuttner Surprise				0.698		
				[0.434]		
Vix Lag					0.037**	
					[0.015]	
Roll Avg FOMC						1.062***
						[0.149]
Constant	0.310***	0.177		0.267**	-0.471	-0.018
	[0.118]	[0.121]		[0.122]	[0.339]	[0.108]
R ²	0.051	0.105	0.062	0.026	0.058	0.343
Observations						100

Note: This table reports the time-series regressions of FOMC meetings date on returns on various explanatory variables discussed in section x. “NBER Dummy” is a dummy recession indicator. “Tightening Cycle” and “Easing Cycle” are dummies variable that take value 1 if the corresponding FOMC meeting date can be classified as falling into a period of monetary tightening or loosening respectively.”Kuttner Surprise” is a monetary policy surprise computed as Bernanke & Kuttner (2005). The “Vix Lag” is the level of the VIX Index the day before the FOMC meeting date. The “Avg_{FOMC}” is the moving average of the FOMC meeting dates returns over the past 8 meetings. The dependent variable, H_t , is represented by the 1-day return of the CRSP Value Weighted Index computed as presented in equation 5. Standard Errors are presented in brackets. The sample period is (2000-2016) and includes all the FOMC meetings where no interest rate change occurred, the “NMP Regime”.

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1.

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, Federal Reserve Bank of St.Louis – Economic Research website, fred.stlouisfed.org

The result is, in fact, fundamentally different, when the expectations of investors are included and I split the sample according to my variable I_t^D . Mirroring the results of the previous time series analysis, when sub – setting the sample, the “Kuttner Surprise” is statistically significant and high in magnitude with investors disagree with

the FOMC decision. The “Kuttner surprise” shows that, even though no interest rate change occurs, stock returns are 4.8% higher. This result can be interpreted in two ways. If neutrality is unexpected against a possible interest rate cut, this is a positive news for the market, as the economy is potentially strong enough and an interest rate cut is not needed. On the other hand, if the neutrality is unexpected against an interest rate hike, this should be a bad news, in the long run for the economy, assuming that the economy is not strong enough to absorb an interest rate hike, but a positive news in the short run as worsen conditions for companies are delayed in time. In my sample period (2000–2016), although NMP is mostly observed on the aftermath of the financial crisis, when investors, aware of the economic conditions, were trusting the support of the institutions in pushing forward the economy. This explanation is supported by the findings of Kurov (2012), who claimed that the state dependence in the stock market’s response to monetary policy statements is explained by the effect of the FOMC announcements on cash flow expectations and the equity premium in recessionary periods.

Table 12: Time series analysis of FOMC meetings returns – NMP Regime - (disagreement)

y = CRSP Value Weighted Index						
Unemployment	-0.005					
	[0.123]					
NBER dummy		1.479				
		[1.075]				
Tightening		1.753				
		[1.040]				
Easing		0.274				
		[0.273]				
Kuttner Surprise			4.799**			
			[1.941]			
Vix Lag				0.065**		
				[0.031]		
Roll Avg FOMC					1.897***	
					[0.385]	
Constant	0.363	0.274	0.353	-0.926	0.001	
	[0.313]	[0.273]	[0.248]	[0.674]	[0.215]	
R ²	0.000	0.061	0.117	0.174	0.129	0.455
Observations						31

Note: This table reports the time-series regressions of FOMC meetings date on returns on various explanatory variables discussed in section x. “NBER Dummy” is a dummy recession indicator. “Tightening Cycle” and “Easing Cycle” are dummies variable that take value 1 if the corresponding FOMC meeting date can be classified as falling into a period of monetary tightening or loosening respectively.”Kuttner Surprise” is a monetary policy surprise computed as Bernanke & Kuttner (2005). The “Vix Lag” is the level of the VIX Index the day before the FOMC meeting date. The “AvgFOMC” is the moving average of the FOMC meeting dates returns over the past 8 meetings. The dependent variable, H_t , is represented by the 1-day return of the CRSP Value Weighted Index computed as presented in equation 5. Standard Errors are presented in brackets. The sample period is (2000-2016) and includes all the FOMC meetings where no interest rate change occurred, the “NMP Regime” and disagreement is observed ($I_t^D = 1$).

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘.’ 1.

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, Federal Reserve Bank of St.Louis – Economic Research website, fred.stlouisfed.org

On the other hand, the results on the FOMC announcements where neutrality was in line with the expectations of investors display results in line with the literature with macroeconomic announcements and expectations. When during NMP, investors are

aligned with the FOMC decisions, the “Kuttner Surprise” is statistically non-significant and the stock returns are strongly associated with the investors’ beliefs on the future economic outlook, as shown by the coefficient on unemployment change, the NBER dummy and Easing dummy variable.

As already mentioned, NMP leaves open the question on when the institution will change the monetary policy conduct, therefore “bad news” on the unemployment are positively interpreted, as they might be associated with future interest rate cuts. The same reasoning applies to the NBER dummy. If NMP falls in recession period, the likelihood of loosening monetary policy is higher, which will contribute to further better conditions for companies in the future (Kurov, 2012; Kontonikas, Mac Donald, & Saggu, 2013)

Table 13: Time series analysis of FOMC meetings returns – NPM Regime - (agreement)

y = CRSP Value Weighted Index						
Unemployment	0.114***					
	[0.035]					
NBER dummy	1.255***					
	[0.367]					
Tightening	0.167					
	[0.283]					
Easing	0.306**					
	[0.144]					
Kuttner Surprise	0.431					
	[0.400]					
Vix Lag	0.023					
	[0.017]					
Roll Avg FOMC					0.881***	
					[0.146]	
Constant	0.220*	0.130		0.243*	-0.211	-0.036
	[0.121]	[0.126]		[0.131]	[0.381]	[0.115]
R ²	0.136	0.150	0.069	0.017	0.027	0.356
Observations						69

Note: This table reports the time-series regressions of FOMC meetings date on returns on various explanatory variables discussed in section x. “NBER Dummy” is a dummy recession indicator. “Tightening Cycle” and “Easing Cycle” are dummies variable that take value 1 if the corresponding FOMC meeting date can be classified as falling into a period of monetary tightening or loosening respectively. “Kuttner Surprise” is a monetary policy surprise computed as Bernanke & Kuttner (2005). The “Vix Lag” is the level of the VIX Index the day before the FOMC meeting date. The “Avg_{FOMC}” is the moving average of the FOMC meeting dates returns over the past 8 meetings. The dependent variable, H_t , is represented by the 1-day return of the CRSP Value Weighted Index computed as presented in equation 5. Standard Errors are presented in brackets. The sample period is (2000-2016) and includes all the FOMC meetings where no interest rate change occurred, the “NMP Regime” and agreement is observed ($I_t^D=0$).

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1.

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, Federal Reserve Bank of St.Louis – Economic Research website, fred.stlouisfed.org

5.5 PORTFOLIOS ANALYSIS

Early studies (Black, Jensen & Scholes, 1972; Black, 1972; Black, 1993; Fama & French, 1993) find very small relation with equity excess returns and the beta, even though the beta should be an important determinant of the risk premium. Bernanke & Kuttner (2005) also propose an analysis on industry portfolios (Fama & French Industry Portfolios), although they don't find a strong relation with the average portfolios beta and the response to interest rate changes surprises.

On the contrary, more recent studies on macroeconomic announcements find that the behaviour of asset prices during these days is much easier to reconcile with standard asset pricing theories. Savor & Wilson (2014) found compelling evidence that stock market betas are strongly economically and statistically significant related to returns around macroeconomic announcement days and specifically on pre-scheduled FOMC announcements. More recently, Wachter & Zhu (2018) developed a theoretical model to explain this relation, proposing different explanations. They infer, that as macroeconomic announcements convey information on the economic outlook, therefore these additional information update the investors on the future economic risk, therefore investors require an additional risk premium, to hold the equity during these days. A second explanation proposed is that these days might create the risk themselves by reflecting the competence of the Federal Reserve. They conclude that the security market line appears on days with macroeconomic announcements.

Building on these findings, I investigate my main hypothesis (equation 6) on stock Market Value Weighted portfolios, sorted based on their betas and on the Fama & French 10 industry portfolios. Disagreement against the FOMC decisions should arise additional uncertainty and perhaps associated with additional systematic risk that

could be reflected in higher equity returns around the FOMC announcements where disagreement is observed.

5.5.1 Market Beta Portfolios

This section presents the results for equation 6 where the dependent variable H_t is represented by the daily returns of ten different stock portfolios sorted on beta deciles. The results of this analysis are presented in table 14. As “disagreement” should bring additional uncertainty on the market, as shown by the statistically significant higher volatility around these announcements (see table 8 and 12), I expect to find a higher returns around FOMC announcements where disagreement is observed with respect to the rest of the FOMC announcements.

Regression estimates to the I_t^D variable show a high level of proportionality in the disagreement response. In particular, when estimated the coefficients from the 7th to the 1st decile portfolio, both the magnitude and statistical significance is almost monotonically aligned with CAPM predictions and so proportional to portfolio market beta. This result is line with recent findings of Savor & Wilson (2014), who demonstrate that the CAPM holds well for announcement , but not for non – announcement .

The results in table 14 show, that in line with the literature and expectations the response of equity returns to FOMC announcements is strongly related to the stock betas. Column 1 reports the average returns for the portfolios on FOMC announcement days, column 2 reports the average portfolios’ betas. The coefficients for my test (equation 6) are presented in column 3. In line with expectations and literature the magnitude of the response is strongly related to the average portfolios’ beta. Although, variable I_t^D shows a higher statistical significance on low betas portfolios, along with a

higher difference with the overall returns of the FOMC announcements. This result can be ascribed to the interpretation of the I_t^D variable itself.

When disagreement is observed ($I_t^D = 1$) investors have to re-update their beliefs on the future economic outlook, which they would also do around all the FOMC announcements. The main difference between these two situations is that, if disagreement is observed, investors have wrongly interpreted the information collected before the meeting on the state of the economy, which could result in them perceiving additional risk that can be reflected in future expectations on risk-free rate and expectations on future companies' cash flows (Kontonikas, Mac Donald, & Saggi, 2013). This result can be ascribed also to the high idiosyncratic risk, that could result in stocks being more impacted by future uncertain expectations on cash flows.

This explanation is supported by the difference between the average FOMC announcements returns (column 1) and FOMC announcements returns when $I_t^D = 1$. On average the magnitude of the coefficients when $I_t^D = 1$ is higher on average, although the difference between the two is particularly prominent on low beta portfolios. Portfolio 10 has an average return around FOMC announcements of 16 bps, whereas for FOMC announcements where $I_t^D = 1$ the coefficient is almost 30 bps.

Table 14: Beta Portfolio Analysis - Whole Sample (2000-2016)

Portfolios	(1)	(2)	(3)	(4)	Obsv
	μ FOMC	β	I_t^D		
			<i>Est</i>	<i>SE</i>	
1	0.760	1.7	0.746*	[0.386]	
2	0.608	1.4	0.671**	[0.303]	
3	0.457	1.2	0.480*	[0.262]	
4	0.403	1.0	0.409*	[0.240]	
5	0.334	0.9	0.350	[0.217]	143
6	0.291	0.8	0.331*	[0.191]	
7	0.258	0.7	0.321*	[0.175]	
8	0.212	0.6	0.296**	[0.144]	
9	0.145	0.4	0.246**	[0.095]	
10	0.168	0.2	0.292***	[0.070]	

Note: This table presents the results of the dummy variable regression reported in equation 6 where the dependent variable is represented by the returns on CRSP Value Weighted Market Portfolios sorted on their beta. The portfolios are ordered from the 1st till the 10th beta deciles. The control variable are represented by my measure of disagreement (I_t^D) The first column presents the estimate of each variable (*Est*) with respect to the equity portfolio, along with the significant code. The column *SE* presents the standard error of the estimate in brackets. Along with the empirical results, the average returns on the FOMC meeting dates are reported in the “ μ FOMC” column for comparison, along with average portfolio beta. The sample period (2000-2016) includes all the FOMC meeting dates.

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1

Source : Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites

Further to this, to investigate the “announcement effect”, I replicate the analysis on the NMP regime setting. The results of this test are presented in table 15. This test confirms the past results of table 14, showing although a much stronger response in the coefficients magnitude. In column (1), I report the average FOMC announcements return around the NPM regime. The magnitude in the difference between the average FOMC announcements return and the FOMC announcement where disagreement is observed is higher with respect to the previous results (table 14). The difference ranges between 15 to 20 bps, peaking in the low stock beta portfolios (21 bps). Again the I_t^D

variable is statistically significant across all the portfolios, although more strongly again in low beta portfolios.

Table 15: Beta Portfolio Analysis - NMP (2000-2016)

Portfolios	(1)	(2)	(3)	(4)	Obsv
	μ FOMC	β	I_t^D		
			<i>Est</i>	<i>SE</i>	
1	0.734	1.7	0.929*	[0.497]	100
2	0.534	1.4	0.790**	[0.386]	
3	0.427	1.2	0.629*	[0.334]	
4	0.355	1.0	0.509*	[0.306]	
5	0.318	0.9	0.467*	[0.276]	
6	0.295	0.8	0.494**	[0.240]	
7	0.251	0.7	0.472**	[0.224]	
8	0.206	0.6	0.403**	[0.187]	
9	0.132	0.4	0.334**	[0.130]	
10	0.131	0.2	0.332***	[0.102]	

Note: This table presents the results of the dummy variable regression reported in equation 6 where the dependent variable is represented by the returns on CRSP Value Weighted Market Portfolios sorted on their beta. The portfolios are ordered from the 1st till the 10th beta deciles. The control variable are represented by my measure of disagreement (I_t^D) The first column presents the estimate of each variable (*Est*) with respect to the equity portfolio, along with the significant code. The column *SE* presents the standard error of the estimate in brackets. Along with the empirical results, the average returns on the FOMC meeting dates are reported in the “ μ FOMC” column for comparison, along with average portfolio beta. The sample period (2000-2016) includes all the FOMC meeting dates where no interest rate change occurred, the NMP regime.

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1

Source : Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites

Overall the results feature two important findings. First, in line with the literature and expectations the response of equity returns to the FOMC announcements shows a high degree of proportionality with respect to the market beta (Savor & Wilson, 2014; Wachter & Zhu, 2018). Second, FOMC meetings where disagreement is observed shows an even higher degree of response, particularly in the NMP regime, which is a natural environment to test the announcement effects. Last, but not least, the impact of disagreement is statistically more significant in stocks, bearing a plausible higher

idiosyncratic, showing that investors require an additional risk premium for bearing additional risk on stocks with a higher likelihood of uncertainty on future cash flows (Jensen & Mercer, 2002; Ehrmann & Fratzscher, 2004).

5.5.2 FF Industry Portfolios

Following the reasoning of the previous section on the results of Bernanke & Kuttner (2005), I replicate the previous analysis of Fama & French 10 industry portfolios⁶, constructed from the CRSP Value Weighted Index. The results of the analysis covering all the FOMC announcements are presented in table 16, whereas table 17 presents the results when only the NMP regime is considered.

Bernanke & Kuttner (2005) found that the most responsive industries to interest rate surprises are high-tech and telecommunications, with coefficients half again as large as that of the overall Value-Weighted CRSP Index. I investigate my main hypothesis (equation 6), where the dependent variable is computed as the daily return (equation 5) of the market portfolios sorted by sector. In table 16, I present the average returns for FOMC announcements days (column 1), the average beta of the portfolios (computed as in Bernanke & Kuttner (2005), in column 2), regressing the returns of the industry portfolios over the CRSP Value Weighted Index returns) and the coefficients for my dummy variable I_t^D (column 3), along with robust standard errors (column 4).

The results presented are virtually similar to the results of Bernanke & Kuttner (2005), when considering the “Telecommunications” industry. The results of this industry are particularly interesting, as not only the coefficient is strongly statistically significant at 5% level and the response is almost 70 bps, about double of the results on overall CRSP

⁶ The Fama & French Industry Portfolios are available from French’s webpage (mba.tuck.dartmouth.edu/pages/faculty/ken.french/)

Value-Weighted Index. The Non-Durable sector responds quiet in line with the overall index (35 bps), the Health Care slightly above and the Energy sector slightly below. The response of the Energy sector is on average in line with the estimated beta of the industry portfolios, whereas the strong response of the Telecommunication is slightly higher than its beta.

The response, compared to the average returns during the FOMC announcements days, are quiet heterogeneous too.

Table 16: FF industry Portfolios Analysis - Whole Sample - 2000 -2016

Portfolios	(1)	(2)	(3)	(4)	Obsv
	μ FOMC	β	I_t^D		
			<i>Est</i>	<i>SE</i>	
Non-Durables	0.058	0.61	0.350*	[0.201]	
Durables	0.421	1.16	-0.016	[0.138]	
Manufacturing	0.359	0.98	0.265	[0.27]	
Energy	0.294	0.99	0.336*	[0.194]	
High - Tech	0.482	1.20	0.155	[0.231]	
Telecommunications	0.215	0.98	0.689**	[0.306]	143
Wholesale / Retail	0.337	0.86	0.282	[0.213]	
Health Care	0.172	0.73	0.364*	[0.206]	
Utilities	0.121	0.66	0.144	[0.159]	
Other	0.468	1.16	0.119	[0.187]	

Note: This table presents the results related to main hypothesis on the Fama & French 10 Industry portfolios. The beta of the portfolios is estimated by regressing the portfolios returns over the market returns, represented by the CRSP Value Weighted Index. This analysis is comparable to the Bernanke & Kuttner (2005) analysis. The control variable are represented by my measure of disagreement (I_t^D) The first column presents the estimate of each variable (*Est*) with respect to the equity portfolio, along with the significant code. The column *SE* presents the standard error of the estimate in brackets.

Signif. codes: '****' 0.01 '***' 0.05 '**' 0.1 '*' 1

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, French website (mba.tuck.dartmouth.edu/pages/faculty/ken.french/), CRSP Database, Wharton.

Particularly in the case of the Telecommunication industry, the average return during the FOMC announcements days, is around 20 bps, and it's more then tripled when disagreement is observed. Similarly, the response of Health Care is more then doubled when disagreement is observed. Although non-significant, the coefficient of the Durables industry portfolio is the only that displays a negative returns with respect to

the disagreement dummy variable. Similarly, the response of Manufacturing and High-Tech is negatively impacted by disagreement.

This results can be, perhaps ascribe to the disagreement around changes in expected future dividends and changes in the companies debt conditions. Bernanke & Kuttner (2005) although ascribe the results on monetary policy surprises to the expected future dividends. The macroeconomic announcements literature ascribe the results, in relation to stock market beta, to the additional risk that investors bear during the announcement days (Savor & Wilson, 2014; Ai & Bansal, 2018; Wachter & Zhu, 2019). Taking a hint from the time series analysis performed in table 7, the time series of the index returns display mild countercyclical returns with respect to the unemployment rate changes and the NBER dummy. The explanation of this results lies again, perhaps, in the middle. Future expectations on dividend are surely relevant in interpreting the overall responses of industry portfolios to monetary policy, although the difference among the average return on all the FOMC announcements days compared to when disagreement is realized, has to be ascribed to other elements. Sectors, which have been largely impacted by the financial crisis, responds perhaps harshly to monetary policy uncertainty and institutions decisions (Kontonikas, Mac Donald, & Saggi, 2013).

To investigate further this explanation, I replicate the test on the NMP regime. The explanation related to expected future dividends is difficult to reconcile in this case, as no actual change in the economic conditions occur, however, is likely to be ascribed in the case of the energy and health care sectors. The energy and health care sector don't show any statistical significance when analyzed in the NMP regime setting. Conversely, non – durables and telecommunications remain highly statistical significance. The coefficient on the telecommunications sector is slightly lower, showing although that almost 37 bps (the difference between the average return

around neutral FOMC announcements and return when $I_t^D = 1$) of the reaction can be attributed to the disagreement of investors in regards to the FOMC announcements. Similarly, non – durables remained stastical significant showing that almost 27 bps of daily returns can be ascribed to investors' deceived expectations.

Table 17: FF industry Portfolios Analysis - NMP Regime - 2000 -2016

Portfolios	μ FOMC	β	I_t^D		Obsv
			<i>Est</i>	<i>SE</i>	
Non–Durables	0.107	0.61	0.369*	[0.219]	100
Durables	0.382	1.16	0.047	[0.164]	
Manufacturing	0.315	0.98	0.158	[0.338]	
Energy	0.381	0.99	0.295	[0.235]	
High - Tech	0.387	1.20	0.346	[0.286]	
Telecommunications	0.203	0.98	0.566**	[0.261]	
Wholesale / Retail	0.239	0.86	0.290	[0.242]	
Health Care	0.216	0.73	0.250	[0.227]	
Utilities	0.250	0.66	0.251	[0.191]	
Other	0.460	1.16	0.371	[0.226]	

Note: Table X presents the results related to main hypothesis on the Fama & French Industry portfolios. The beta of the portfolios is estimated by regressing the portfolios returns over the market returns, represented by the CRSP Value Weighted Index. This analysis is comparable to the Bermanke & Kuttner (2005) analysis. The control variable are represented by my measure of disagreement (I_t^D) The first column presents the estimate of each variable (*Est*) with respect to the equity portfolio, along with the significant code. The column *SE* presents the standard error of the estimate in brackets.

Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites

5.6 DISCUSSION

In the previous subsection several analysis were presented to validate the hypothesis postulated in section 3. In this section, I summarize the interpretations and possible explanations for the results. The main result, showed in table 5 point out a relevant equity premium associated with FOMC announcement days, where the market disagree with the outcome decided by the FOMC. The dummy model shows an average of 35 bps returns around these days, in comparison to the 30 bps yield on normal

FOMC announcement days. Lucca & Moench (2015) found that the pre-announcement stock drift, which materializes during the trading day before the actual meeting time (they include intraday return 24 hours before the meeting time, which on average occurs around 2pm), is of about 50 bps. They associate the announcement stock drift to several explanation that could apply also the present study. Lucca & Moench (2015) infer that the additional equity premium associated with the upcoming FOMC announcement is explained by the additional information, conveyed in the announcement on the future economic outlook and the additional risk compensation that investors require to hold the stock during the day. To interpret my results, in relation to their findings, I analyse the time series of FOMC announcements returns against a series of economic, monetary policy surprise and market based variables. The result presented in table 7, 8 and 9 feature important findings, which are in part in line with the findings of Lucca & Moench (2015) and partially in line with the findings of the seminal paper of Bernanke & Kuttner (2005).

When analysing the whole stock returns series, I find only weak evidence that FOMC announcement returns are countercyclical and perhaps driven by the returns previously realized in the past 8 meetings, in line with Lucca & Moench (2015). Although when I differentiate the time series on the basis of my variable I_t^D , including therefore only the FOMC announcements where disagreement is observed, I found that the Kuttner surprise is statistically significant and the economic variables lose their relevance. Fostering the hypothesis that the expectations of the investors, materialized on the announcement day, are the main driver of the equity premium. A possible explanation for this result can be found in the literature on disagreement among investors and its effect on stock market prices, trading volume and volatility. Investors update their beliefs upon information arrival (Roll & French, 1986), although FOMC announcements are among the most highly anticipated

announcements around the world, leading to infer that investors would also react to content of the announcements influenced by their prior beliefs on the state of the economy. An extensive theoretical literature on disagreement (Varian, 1985; Varian, 1989; Abel, 1989) implies that disagreement and divergence of opinions should lead to a positive risk premium. Carlin, Longstaff & Matoba (2014) find recent empirical evidence that disagreement among financial market participants is associated with higher expected return, volatility and trading volume. The literature on macroeconomic announcements (Savor & Wilson, 2013; Lucca & Moench, 2015) doesn't provide evidence on additional market volatility during FOMC announcements. On the contrary, my analysis of the FOMC announcement returns shows that, when subsampling the time series with respect to the expectations of market participants, the volatility variable shows an interesting asymmetric result, more in line with the results of Carlin, Longstaff & Matoba (2014).

The results are further fostered by the analysis on the "NMP regime". This analysis is novel in the literature on macroeconomic announcements (Savor & Wilson, 2013; Lucca & Moench, 2015; Ai & Bansal, 2018), which differentiates among macroeconomic and monetary policy announcements, although FOMC announcements haven't been analyzed on the basis of the announcement content. The NMP regime, represents a natural setting to investigate the announcement effect, without any change in the current economic condition. My results on this subsample, feature a higher equity premium associated with these days. When investors disagree with the FOMC on neutrality, the equity premium associated with these announcements is on the magnitude of 50 bps, similar in magnitude to the findings of Lucca & Moench (2015).

When I analyze the time series of neutral FOMC announcement returns, the magnitude of response of the Kuttner Surprise is on the order of 500 bps magnitude

and highly statistically significant. On the contrary is statistically insignificant in all the other announcement. This result in part confirms the results of Bernanke & Kuttner (2005) and in part revises them. The “Kuttner surprise” has a significant impact on the equity returns, but not on the whole FOMC announcements. This contradictory result can be ascribed also to the changes in the FOMC communication strategy. In the past two decades, the Federal Reserve has gone through major communication reforms and embraced the “transparency” framework, which has been largely debated among practitioners and academics (Blinder, et al. 2001; Faust and Svensson, 2001; Blinder, et al. 2008). The transparency of the FOMC has reduced the unexpected component of the changes in interest rates, which makes the Kuttner Surprise only relevant in specific cases. Although, my results show that these “cases” still exists and therefore, the FOMC communication strategy could still be amended to smooth their short term effects on the financial markets.

In favor of the risk – based explanation are my results on the portfolio analysis. Following Bernanke & Kuttner (2005), Savor & Wilson (2014) and Wachter & Zhu (2018), I find a high degree of proportionality in the equity response with respect to their systematic risk factor, in line with the CAPM predictions. The magnitude of the response is in line with past findings, the significance of the response shows although a relevant asymmetry between high and low beta portfolios. This result is marginally also in line with the findings on the sector analysis. The response of portfolios sorted by sector (the Fama & French 10 Industry Portfolios) is heterogeneous and not consistently in line with the average beta of the portfolio. This asymmetry could, perhaps be imputed to the considered sample (2000 – 2016), that encompasses the financial crisis and the subsequent zero – lower bound interest rate period. Industries who have been more impacted by the financial crisis would react more strongly on upcoming information (even more disappointing information) on the future of the

monetary policy. The findings of Boyd, Hu, & Jagannathan (2005), Kurov (2012) and Kontonikas, Mac Donald, & Saggi (2013), link in fact the equity reaction to macroeconomic announcements to the state of the economy and business cycle. This explanation applies specifically to industry sector, even more to those characterized by seasonality in cash flows (Ehrmann & Fratzscher, 2004).

To summarize the results show, in line with the explanations provided in the literature, that the expectations of investors on the content of the FOMC announcements play an important role in the equity premium associated with these days. This equity premium is strongly associated with expectations on the future economic outlook, which are partially dependent on the state of the economy. These results place themselves in between the literature on monetary policy surprises and on macroeconomic announcements.

6 ROBUSTNESS

6.1 LIQUIDITY AND VOLATILITY RISK

Lucca & Moench (2015) assess the role of volatility and liquidity, to the specific purpose of understanding why most of the returns are realized in advance to the announcement. My sample period (2000 – 2016) partially includes the pre-announcement effect, therefore, I also assess the role of the liquidity and volatility risk. My explanation for this additional equity premium is given by the expectations of investors, formulated prior to the meeting, therefore I decompose the measures of liquidity and volatility into an innovation given by these expectations and a $t-1$ measurable component using simple univariate AR(1) models. The results of this analysis are shown in table 18. As a benchmark, in this time series analysis the dummy variable I_t^D is positive and statistically significant at a 5% confidence level with an

average response of 34 bps, in line with previous results. The “Vix Lag” is the level of the VIX index on the before trading day, similarly the “Volume Lag” is the logarithm of the total volume of the day before. The variables “Vix I_t^D Inn” and “Volume I_t^D Inn” are the decompose measure of innovation for volatility and liquidity. When controlling for all these measures conjointly (column 5) the coefficient drops of 0.2 bps and remains highly statistically significant. The two measures of innovations are both statistically significant, negative in the case volatility and positive in the case of volumes.

The two variables show therefore that part of the returns associated with FOMC announcements, conditional to the expectations on FOMC announcements are explained by a lower volatility and higher market liquidity. Still a large component of the returns remains unexplained, as perhaps the lower volatility is given by the realization of uncertainty, subsequent to the announcement and higher liquidity is given by investors re-updating the views.

Table 18: Liquidity and Volatility Risk

y = CRSP Value Weighted Index (M2:2000 - M12:2016)

	(1)	(2)	(3)	(4)	(5)
I_t^D	0.339** [0.168]	0.341** [0.168]	0.339** [0.168]	0.335** [0.168]	0.337*** [0.097]
Vix Lag		0.005** [0.002]		0.006** [0.002]	0.005* [0.001]
Vix I_t^D Inn					-0.608*** [0.007]
Volume Lag			-0.001 [0.099]	-0.106 [0.107]	-0.071 [0.062]
Volume I_t^D Inn					0.325*** [0.007]
Constant	0.011 [0.019]	-0.093* [0.049]	0.023 [0.892]	0.841 [0.948]	0.539 [0.546]
R^2	0.001	0.002	0.001	0.002	0.67
Observations					4158
#FOMC Meetings					143
#FOMC Meetings $I_t^D = 1$					55

Note: The table presents the results for the regression in equation 6, at a daily frequency, when controlling for measures on liquidity and volatility. Column 1 presents the results for the time series daily analysis including the disagreement dummy variable (I_t^D). The “Vix Lag” is the lagged value of the Vix on the previous day. The “Vix (I_t^D inn)” is the residual from an AR(1) regression of the daily Vix Index on a constant, the value of the Vix the day before and the disagreement dummy variable (I_t^D). The “VolumeLag” is denotes the logarithm of the trading volume on the day before. The “Volume (I_t^D inn)” is the residual from an AR(1) regression of the logarithm of the daily volume on a constant, the logarithm of the volumes the day before and the disagreement dummy variable (I_t^D).

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1

Source : Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites, Bloomberg.

6.2 WHAT ABOUT AGREEMENT?

To explore other plausible explanations for this results and to confirm that the results are related to the I_t^D variable, I construct another variable (I_t^A) that I define “agreement” FOMC announcement variable. This variable takes value 1, when I_t^D takes value 0 and vice versa. This variable, in representing the opposite of I_t^D variable represent the events in which investors expectations are in line with the FOMC decisions. I therefore substitute in the test (equation 6) the variable I_t^A and I also add additional control variables in the event study test represented by the unemployment change and the Kuttner surprise.

Table 2.19 shows the results for this analysis. In column 1, I re-propose the event study analysis adding the additional control variables. When adding the “Unemployment” as control variable and the “Kuttner surprise”, the dummy variable (I_t^D), that represents the average equity return on FOMC announcement days where disagreement is observed, maintains its statistical significance and an average returns of almost 40 bps.

In column 1, the unemployment change, computed as the unemployment change that occurred just after the previous FOMC announcement days and previous to the FOMC announcement considered is positive and statistical significance, confirming the results of Boyd, Hu, & Jagannathan (2005). A 1% positive variation in the unemployment change is associated with a positive reaction on the equity market of almost 10 bps. Boyd, Hu, & Jagannathan (2005) ascribe this countercyclical result to the state of the economy in which the unemployment change occurs. During recession period, growing unemployment change has a positive effect on equity returns. A possible explanation for this result could rely on the relevance of unemployment news on the US equity market. The unemployment rate announcements are considered among the most influential macroeconomic announcements (Ai & Bansal, 2018) as they reveal important information on the economic outlook. Further to this, full employment, is the second mandate of the Federal Reserve, which has, in multiple occasions, reiterated the relevance of the unemployment level, in their monetary policy decisions. During recession period, a grow in unemployment rate, could therefore potentially lead to future interest rate cut, which is good news for equity returns in the future (Bernanke & Kuttner, 2005).

Table 19: Robustness Event Study - Agreement			
y= CRSP Value Weighted Index			
	(1)	(2)	(3)
I_t^D	0.384*		0.380*
	[0.195]		[0.194]
I_t^A		0.241	0.238
		[0.156]	[0.154]
Unemployment	0.098***	0.101***	0.091**
	[0.037]	[0.037]	[0.037]
Kuttner surprise	0.169**	0.172**	0.165**
	[0.070]	[0.071]	[0.070]
FOMC meetings	143	143	143
# event	55	88	
R ²	0.10	0.09	0.114

Note: The table presents the results for the event study dummy variable, when adding additional control variables, the Unemployment and the Kuttner Surprise. The variable “Unemployment” is computed as the unemployment change from the FOMC announcement day till the FOMC announcement considered. Furthermore, I replicate the analysis including an “agreement” dummy variable (I_t^A), which takes value 1, when my “disagreement” (I_t^D) dummy variable takes value 0 and vice versa.

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites, Bloomberg.

Combined, with the Kuttner surprise, economic conditions and deceived investors expectations, explain 10% of the variance of stock returns around this days. When replicating the analysis with the agreement dummy variable (I_t^A), the variable is statistically insignificant. In column 3, I include both the dummies variables and the results are virtually unchanged. To further foster this analysis, I replicate the test presented in table 19 in the NMP regime and present the results in table 20.

Table 20: Robustness Event Study – Agreement – NMP regime

y= CRSP Value Weighted Index	(1)	(2)	(3)
I_t^D	0.483* [0.216]		
I_t^A		0.192 (0.150)	0.185 (0.147)
Unemployment	0.093** [0.039]	0.068* [0.039]	0.088** [0.039]
Kuttner surprise	0.723* [0.425]	0.637 [0.443]	0.602 [0.434]
FOMC meetings	100	100	100
# event	31	69	
R ²	0.121	0.091	0.136

Note: The table presents the results for the event study dummy variable, when adding additional control variables, the Unemployment and the Kuttner Surprise. In this table, only the FOMC announcements where no interest rate change occurred are considered. The variable “Unemployment” is computed as the unemployment change from the FOMC announcement day till the FOMC announcement considered. Furthermore, I replicate the analysis including an “agreement” dummy variable (I_t^A), which takes value 1, when my “disagreement” (I_t^D) dummy variable takes value 0 and vice versa.

Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘ ’ 1

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites, Bloomberg.

The results presented in table 20 foster the results previously found. The “Unemployment” coefficients remain the same, although a particular different results is related to Kuttner surprise. In line with the time series analysis performed in the main results section 5.1, when considering the average returns on “agreement” FOMC announcements the Kuttner surprise is statistically insignificant along with the I_t^A dummy variable. Reiterating the findings on the NMP regime, this specific setting represents a natural environment to investigate the announcement effect of the FOMC announcements. Agreement around NMP FOMC announcements represents the “closing node” in figure 3.

If the economic outlook is “clear” from the perspective of investors and no change in the monetary policy occurs, investors are not keen to revise their expectations neither

on the operate of the FOMC, nor on the future economic outlook. This assumption is in line with the insignificance of both my agreement variable I_t^A and the Kuttner surprise.

Lastly, I perform a daily time series analysis, across the whole sample 2000–2016 to investigate the validity of my assumption against the general assumption that the macroeconomic announcements overall affect positively the equity market. To prove the validity of my assumption, that the expectations of investors are the real trigger of the additional equity returns, I perform a time series analysis considering three different dummy variables. The results of this tests are presented in table 21.

First, I quantify the average returns of the equity market around general FOMC announcements. The variable “FOMC”, is a dummy variable that takes value 1, on all those days where and FOMC announcements occurs. The variables I_t^D and I_t^A are my “disagreement” and “agreement” variables previously described. Again a statistic that needs to be recalled, is that FOMC announcements where disagreement is observed represent the minority of the events (55 out of 143, against 88 out of 143) with respect to the “agreement” events.

The results presented show clearly that the FOMC announcement are associated with statistically significant equity returns on their whole. Although, the disagreement dummy variable (I_t^D), even though represents the minority of the events in the sample, displays the highest coefficient. The difference in average returns between agreement and disagreement is around 6 bps (higher then the average returns on non – announcement days accordingly to Ai & Banasal, 2018)).

Table 21: Robustness Time Series Analysis

FOMC	0.312*** [0.105]		
I_t^D		0.339** [0.168]	
I_t^A			0.286* [0.134]
Constant	0.005 [0.020]	0.011 [0.019]	0.010 [0.019]
# Events	143	55	88
Observations			4,158
R ²	0.002	0.001	0.001

Note: This table presents the results for the time series analysis that compares the average returns on general FOMC announcements (FOMC takes value 1 in all the days where an FOMC announcement occurred), FOMC announcements where disagreement is observed ($I_t^D = 1$) and FOMC announcements where agreement is observed ($I_t^A = 1$).

Signif. codes: '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1

Source: Federal Reserve website, www.federalreserve.gov, Quandl dataset, Wharton - CRSP Database, US Labor Statistics websites, Bloomberg.

This result is in line with the macroeconomic announcement literature (Savor & Wilson, 2013; Ai & Bansal, 2018), although the difference in coefficient magnitude, considering that the by construction both the dummy variables I_t^D and I_t^A are within the FOMC dummy variable can be ascribe to the content of the announcements and on the identification of the events. Overall, the results related to these robustness checks foster the results previously find, which impute the equity excess returns to a combination of the announcement effect and the expectations of investors formulated previous to the announcement day.

6.3 ENDOGENEITY

Given the forward-looking nature of monetary policy and the contemporaneity of effects between monetary policy and the economy, endogeneity is one of the main issues in literature, when studying the relationship between financial markets and monetary policy.

As my empirical strategy is constructed to analyse the influence of pre – event expectations to post – event equity returns, endogeneity doesn't affect my results for three main reasons. First, there is no evidence in literature of a simultaneous effect between stock prices and monetary policy. For example, there is no clear cut evidence that a drop-in equity prices leads to an interest rate cut (Bernanke & Kuttner, 2005). Secondly, I control for unemployment rate changes that were released before the FOMC meeting and could potentially affect the opinions of investors on the state of the economy and the upcoming meeting decisions. The sample of unemployment rate changes was carefully constructed to match the FOMC meeting dates and released after the last meeting and in advance of next meeting. Third, literature has been frequently discussing issues of using monthly data and the conjoint effect of more than one meeting per month. In my analysis I imply the 1-day return on the meeting date. Therefore I can infer that the impact is strongly associated with the specific event.

7 CONCLUSIONS

This paper shows in a novel way how disagreement regarding FOMC committee decisions impacts the equity markets. When the market agrees with FOMC decisions I find small or no significant impact on stock market excess returns. We can think of these cases as FOMC meetings are similar to “anticipated events” that we observe in many other instances in the continuous evolution of financial markets. Thus, consistent with market efficiency theory as well as with a vast empirical literature, information contained in the FOMC subsequent meeting release is largely incorporated in equity returns, resulting in no meaningful consequences on market outcomes. Differently, when investors disagree with FOMC committee decisions I find the effects on stock excess returns highly significant. Furthermore, my results

highlight that are the market expectations that play an important role in the post – meeting reaction, rather than a monetary policy innovation. This result is particularly evident when analysing the NMP regime. Although, no action is taken from the FOMC committee, the impact is strong and consistent when market was actually expecting them to take a stand. The NMP regime setting is a natural experiment that further confirm predictions of Efficient Market Theory. As no change in interest rates occurs, the effects I find are entirely to be credited to ex-ante price quality and investors information set. As this study shows, anticipated information doesn't have a significant impact on financial market metrics. Thus, central bank institutions could improve their disclosure policy particularly during economic downturns, when the risks of announcing unexpected decisions could bring unpleasant consequences on financial market stability and investors' trust.

8 REFERENCES

- Abel, A. B. (1989). Asset Prices under Heterogenous Beliefs: Implications for the Equity Premium. Philadelphia, PA: University of Pennsylvania.
- Ai, H., & Bansal, R. (2018). Risk Preferences and the Macroeconomic Announcement Premium. *Econometrica*, 86(4), 1383-1430.
- Bernanke, B. S., & Kuttner, K. N. (2005). What Explains the Stocks Market's Reaction to Federal Reserve Policy? *Journal of Finance*, 60(3), 1221-1257.
- Black, F. (1972). Capital Market Equilibrium with Restricted Borrowing. *Journal of Business*, 45(3), 444-455.
- Black, F. (1993). Beta and Return. *Journal of Portfolio Management*, 20(1), 8-18.
- Black, F., Jensen, M. C., & Scholes, M. (1972). The Capital Asset Pricing Model: Some Empirical Tests. Studies in the Theory of Capital Markets, Michael C. Jensen, ed., Praeger Publishers Inc., 1-52.
- Blinder, A. S., Ehrmann, M., Fratzscher, M., De Haan, J., & Jansen, D.-J. (2008). Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence. *Journal of Economic Literature*, 46(4), 910-945.
- Blinder, A., Goodhart, C., Hildebrand, P., Lipton, D., & Wyplosz, C. (2001). How Do Central Banks Talk? Centre for Economic Policy Research, London: Geneva Reports on the World Economy.

- Boyd, J. H., Hu, J., & Jagannathan, R. (2005). The Stock Market's Reaction to Unemployment News: Why Bad News is usually good for Stocks. *Journal of Finance*, 60(2), 649-672.
- Carlin, B. I., Longstaff, F. A., & Matoba, K. (2014). Disagreement and asset prices. *Journal of Financial Economics*, 114(2), 226-238.
- Cochrane, J. H., & Piazzesi, M. (2002). The Fed and Interest Rates - A High - Frequency Identification. *American Economic Review*, 92(2), 90-95.
- Crowe, C., & Meade, E. E. (2008). Central bank independence and transparency: Evolution and effectiveness. *European Journal of Political Economy*, 24(4), 763-777.
- Diether, K. B., Mallow, C. J., & Scherbina, A. (2002). Differences of Opinion and the Cross Section of Stock Returns. *Journal of Finance*, 57(5), 2113-2141.
- Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3-56.
- Fama, E. F., & French, K. R. (2007). Disagreement, tastes, and asset prices. *Journal of Financial Economics*, 83(3), 667-689.
- Fausch, J., & Sigonius, M. (2018). The impact of the ECB monetary policy surprises on the German stock market. *Journal of Macroeconomics*, 55(1), 46-63.
- Faust, J., & Svensson, L. E. (2001, May). Transparency and Credibility: Monetary Policy with Unobservable Goals. *International Economic Review*, 42(2), 369-397.
- Faust, J., Swanson, E. T., & Wright, J. H. (2004). Do Federal Reserve Policy Surprises Reveal Superior Information about the Economy? *The B.E. Journals in Macroeconomics*, 4(1), 1-31.
- Flannery, M. J., & Protopapadakis, A. A. (2015). Macroeconomic Factors Do Influence Aggregate Stock Return. *Review of Financial Studies*, 15(3), 751-782.
- Karadi, P., & Jarocinski, M. (2019). Deconstructing monetary policy surprises - The role of information shocks. Forthcoming in *American Economic Journal: Macroeconomics*, 1-62.
- Kontonikas, A., Mac Donald, R., & Saggi, A. (2013). Stock market reaction to fed funds rate surprises: State dependence and the financial crisis. *Journal of Banking & Finance*, 37(11), 4025-4037.
- Krueger, J. T., & Kuttner, K. N. (1996). The Fed Funds futures rate as a predictor of Federal Reserve Policy. *Journal of Futures Markets*, 16(8), 865-879.
- Kurov, A. (2012). What determines the stock market's reaction to monetary policy statements? *Review of Financial Economics*, 21(4), 175-187.
- Kuttner, K. N. (2001). Monetary policy surprises and interest rates: Evidence from the Fed Funds futures market. *Journal of Monetary Economics*, 47(3), 523-544.
- Lucca, D. O., & Moench, E. (2015). The Pre- FOMC Announcement Drift. *Journal of Finance*, 70(1), 329-371.
- Owens, R. E., & Webb, R. H. (2001). Using the Federal Funds Futures Market to Predict Monetary Policy Actions. *Business Economics*, 36(2), 44-48.

- Rigobon, R., & Sack, B. (2003). Measuring the reaction of monetary policy to the stock market. *Quarterly Journal of Economics*, 118(2), 639-669.
- Rigobon, R., & Sack, B. (2004). The impact of monetary policy on asset prices. *Journal of Monetary Economics*, 51(8), 1553-1575.
- Roll, R., & French, K. R. (1986). Stock return variances: The arrival of information and the reaction of traders. *Journal of Financial Economics*, 17(1), 5-26.
- Savor, P., & Wilson, M. (2013). How Much Do Investors Care About Macroeconomic Risk? Evidence from Scheduled Economic Announcement. *Journal of Financial and Quantitative Analysis*, 48(1), 343 - 375.
- Savor, P., & Wilson, M. (2014). Asset Pricing: A tale of two days. *Journal of Financial Economics*, 113(1), 171-201.
- Tetlock, P. C. (2011). All the News That's Fit to Reprint: Do Investors React to Stale Information? *Review of Financial Studies*, 24(5), 1481-1512.
- Varian, H. R. (1985). Divergence of Opinion in Complete Markets: A note. *Journal of Finance*, 40(1), 309-317.
- Varian, H. R. (1989). Differences of Opinion in Financial Markets. In C. C. Stone, *Financial Risk: Theory, Evidence and Implications* (pp. 3-37). Springer, Dordrecht.
- Wachter, J. A., & Zhu, Y. (2018). The Macroeconomic Announcement Premium. *NBER Working Paper*, 24432, 1-50.