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DISSENT IN FOMC MEETINGS AND THE ANNOUNCEMENT DRIFT*

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Abstract

We find that communication of the votes of FOMC members affects stock returns around the days of announcements. Since votes have been made public through press statements in 2002, stock markets gain value when votes are unanimous but lose value when dissent occurs. This pattern extends to US firm-size and industry portfolios and major international equity indexes. We reject differences in risk, trading volume, expectations of future monetary policy and other coincident events as the likely explanations for the phenomenon. We conclude that the cause lies in dissent votes leading to pessimistic changes in the expectations of the macroeconomic outlook.

Resumen

Este trabajo muestra que la comunicación de los votos individuales de los miembros del Comité de Política Monetaria de la Reserva Federal de Estados Unidos (FOMC) tiene impacto en los precios de acciones alrededor de los días del anuncio de la política monetaria. Desde que el FOMC ha publicado los votos de sus miembros, los mercados de acciones presentan ganancias cuando el voto es unánime y sufren pérdidas si es observado discordia en los votos. Este padrón se verifica en índices de diferentes industrias y dimensión de empresas en Estados Unidos, además de los principales índices de acciones internacionales. Nuestro estudio rechaza la posibilidad de que riesgo, volumen de transacciones, expectativas de la futura política monetaria y eventos coincidentes puedan explicar este fenómeno. Nuestra conclusión es que la explicación más plausible es que un voto con discordia lleva a cambios más pesimistas en las expectativas macroeconómicas.

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1 Introduction

Economic theory and empirical studies show that monetary policy has a strong impact on the economy, with its most immediate effects seen on financial markets (Bernanke and Blinder, 1992, Rigobon and Sack, 2004, Bernanke and Kuttner, 2005). There is therefore great interest in how monetary policy decisions are taken by central banks, particularly whether their decision committees focus on consensus or whether these reflect heterogeneous policy views (Riboni and Ruge-Murcia, 2010, 2014). The decision process of central bank committees and the communication of monetary policy to the markets are still greatly debated in policy circles and academia, with no consensus or significant evidence on what constitutes an optimal strategy or the best practice (Blinder et al., 2008, Ehrmann et al., 2012).

This paper studies how the communication of the vote of individual members of the Federal Open Market Committee (FOMC or Committee) impacts financial markets. In particular we distinguish between the impact of unanimous meetings versus those with dissent (one or more members in disagreement with the FOMC's decision). To do this we explore the fact that only from March 2002 onwards has the vote of FOMC members been disclosed through the press statement, that is, at the same time as the Committee's decision over the federal funds rate. Before this date, FOMC members's votes were only published several weeks after the decision. Although FOMC members overwhelmingly vote in favor and less than 5% of the votes cast are against the FOMC's policy, we show there is a different impact on financial markets when dissent votes are observed. In particular, we show that since FOMC members' votes have been made public in press statements, stock markets lose value around meetings with dissent votes. This difference between unanimity and dissent meetings did not exist prior to 2002, when the FOMC press release started to publish the individual votes of its members. Furthermore, we show this negative impact of dissent on stock markets is statistically significant and is not explained by differences in risk, liquidity, expectations of future monetary policy or by other coincident events. Our most plausible hypothesis is that dissent votes are interpreted by markets as a signal of a worse future economic outlook, which we test by showing the impact of dissent votes on analysts' forecasts.

Previous studies have found that FOMC announcements are associated to strong equity price appreciation movements, even if there are no unexpected components to monetary policy (Bernanke and Kuttner, 2005). Also, these large excess returns around FOMC meetings (representing about 80% of annual excess stock returns in the US since 1994) cannot be accounted for by standard explanations such as different risk, liquidity, or unexpected positive news around those days (Lucca and Moench, 2013). Savor and Wilson (2013, 2014) also find that the announcement of macroeconomic information, such as FOMC events or CPI and employment statistics, explains a significant part of equity fluctuations. Our paper shows the puzzle around FOMC announcements has another dimension, since unanimity and dissent announcements have a very different impact on stock markets.

In this paper, we calculate cumulative excess returns for a 6 day window around the FOMC meetings, and test how the stock returns differ between unanimity and dissent meetings for both the periods before and after FOMC members votes are public (i.e., before and after March of 2002). From February 1993 until January 2002 we find no difference in the pattern of stock returns between the cases of FOMC unanimity and dissent, with both events being associated to large positive excess returns around the time of FOMC meetings. This result is valid for the major American stock indexes (NASDAQ and S&P500, hence S&P) and several international stock indexes (DAX, FTSE100, CAC40, IBEX and SMI).

However, the behavior of stock markets changed when the vote of individual FOMC members became public in the press releases. After March 2002 large excess returns occur only when there was unanimity in the FOMC vote (using the S&P index, we find excess returns in the day prior to the meeting to be of on average about 37 basis points, when controlling for other explanatory variables). When a dissent vote occurs markets actually lose value. This result can be interpreted as if unanimity and dissent in the FOMC validates the optimistic or pessimistic market expectations embedded in prices. We find S&P excess returns in the day prior to a dissent meeting to be of on average about minus 18 basis points. The cumulative average loss becomes even larger on the day of the meeting (minus 67 basis points) and the day after (minus 64 basis points). Also, the FOMC announcement apprecia-

tion for unanimity votes observed for this period is of smaller magnitude than that observed before March 2002. The negative impact of dissent also appears in the NASDAQ, US firm-size and industry portfolios, plus international stocks. After March 2002 the differences in stock returns for the day after a FOMC meeting between unanimity and dissent in vote are statistically significant in 35 of the 49 industry portfolios, all of the 10 size portfolios and in all 5 of the international equity indexes.

We explore several possible explanations for the differences between unanimous and dissent votes, in particular: i) risk and liquidity, ii) expectations of future monetary policy, iii) other coincident events and iv) information about negative future economic events. For the period after March 2002 we find that unanimity episodes are associated to higher stock market risk (differences are statistically significant for the NASDAQ index but not the VIX or the S&P) and trading volume relative to dissent episodes. However, the same happens in the period before votes were published in the statement. Also, both linear and a median quantile regressions show the differences in excess returns between unanimity and dissent votes are still present even when controlling for market volatility and trading volume. Therefore, risk and liquidity are not the explanation for the phenomenon observed.

We also studied the possibility that dissent and unanimity episodes provide different signals regarding future monetary policy.[1] We find that changes in the yield curve around FOMC meetings are close to zero, statistically insignificant, and with small differences between unanimous and dissent votes. We included the federal funs rate and surprise changes to the federal funds rate (as in Kuttner, 2001) as controls in excess returns regressions and found nonetheless differences between unanimity and dissent votes. Therefore, dissent does not reveal much information about future monetary policy.

We then looked at other coincident events as a possible explanation. We found that a

[1]The New Keynesian model implies that variables such as inflation and output depend on their anticipated future values (see Galí and Gertler, 1999). This makes expectations of future monetary policy relevant for macroeconomic outcomes in the present (see Clarida, Galí and Gertler, 1999). The use of *forward guidance*, "explicit statements by a central bank about the outlook for future policy, in addition to its announcements about the immediate policy actions that it is undertaking", in monetary policy has become the focus of considerable current discussion (see Woodford, 2012).

positive impact of unanimity and a negative impact of dissent on excess returns exists for several periods of varying characteristics for which FOMC votes have been made public. The findings are present in the period from: March 2002 to January 2007 (a time of economic expansion and increasing values of the federal funds rate target), February 2007 to June 2009 (the period of the financial crisis, a time of economic recession and decreasing values of the federal funds rate) and July 2009 to January 2014 (the period of the zero-lower-bound, during which the federal funds rate target was kept constant at a value close to zero). We found therefore no support that other coincident events account for the differences in stock returns between unanimity and dissent for the period in which the vote was made public. Furthermore, we checked that the same results appear if we simply perform a sign regression with either positive or negative returns. Therefore the difference between dissent and unanimity episodes is not driven by the magnitude of a few outliers.

Finally, we looked at changes in the economic expectations of professional forecasters conditional on the frequency of dissent in the FOMC vote in the previous quarter. We find that lagged dissent is correlated with more pessimistic short and medium term forecasts: higher recession probability, higher forecasts of the interest rate spread between private and public funding, higher unemployment, lower housing starts and residential fixed investment. Dissent also increases the pessimism of long term forecasts: lower average rate of stock returns, lower annual average rate of growth in real GNP/GDP and productivity. We conclude that pessimistic changes in the economic expectations of agents are the best explanation for lower returns around FOMC meetings with a dissent vote after March 2002.

Aside from the asset pricing literature, our paper is related to recent works on the decision making process and communication policy of central banks. Policy makers and academics debate about the usefulness of individual information of Committee members (Blinder, 2007), or whether greater public disclosure is necessarily welfare increasing (Morris and Shin, 2002). Romer and Romer (2008) find that FOMC members act on their own forecasts despite these not adding forecast value relative to those of Federal Reserve staff. Ellison and Sargent (2012) rationalize this finding as a concern for decisions that are robust to worst-case scenarios.

Also, Meade and Stasavage (2008) study how transparency in the monetary decision making process can make members reluctant to dissent. Our paper shows that reluctance in FOMC members could be due to awareness of negative effects on financial markets and economic expectations of agents resulting from a vote of dissent.

Our results have important policy implications. Conventional wisdom in academia and central banking considers the essence of monetary policy is the art of managing expectations. These ideas encouraged the Federal Reserve and other central banks to be more transparent in the last decades (Blinder et al., 2008). A recent example of this is the announcement of plans to publish European Central Bank minutes (Bryant, 2014). The negative impact on stock markets around announcements with public dissent indicates that greater openness may not always be beneficial for policy (a point made in Cukierman and Meltzer, 1986).

The paper is organized as follows: section 2 describes the FOMC's announcements policy, section 3 shows the main results, section 4 studies potential explanations, section 5 concludes.

2 The communication policy of FOMC votes

The Federal Open Market Committee oversees US monetary policy and the open market operations (i.e., purchases and sales of US Treasury securities) of the Federal Reserve System. The FOMC is composed of twelve members: the seven members of the Federal Reserve Board (who are nominated by the president), the New York Federal Reserve president and four of the remaining eleven Federal Reserve bank presidents (who serve one year terms on a rotating basis). Currently, the Committee specifies policy in terms of a target level for the federal funds rate (the weighted average of interbank overnight loans).[2] Committee meetings are scheduled eight times per year at regular intervals (approximately once every six weeks).[3]

Voting composition has only been made public through the minutes or press statements. Neither minutes or statements were communicated to the public prior to 1993. Therefore,

[2]Effective federal funds rate targeting has been in place since the late 80s (Meulendyke, 1998).

[3]Unscheduled meetings are uncommon. From February of 1993 to January of 2014 there were only seven unscheduled meetings of the FOMC (two in 2008, three in 2001, one in 1998 and one in 1994).

we consider the FOMC meetings from February 1993 to January 2014 (coincidentally, the last meeting of Ben Bernanke as Chairman). The minutes record the decisions of the FOMC over policy issues, including which Committee members voted in favor and against (dissent) the decision of the federal funds rate target level. The minutes also record the reasons that justify the vote of each FOMC member that chose to dissent. The minutes of FOMC meetings are released with a lag, with their release date until December of 2004 being about six weeks after the Committee's meeting (or approximately three days after the Committee's subsequent meeting). Since 2005 minutes are released only three weeks after the meeting.

The first policy statement (announcement of a meeting's outcome) of the FOMC occurred in February 1994. Previously, the Committee did not reveal policy decisions and agents had to infer the federal funds target from the size and type of open market operations. Starting in February 1995 the FOMC has immediately communicated to the public all changes to monetary policy. From January 2000, the Committee has issued a statement following each scheduled meeting (regardless of whether a change in policy was made or not). From 1994 until January 2002 statements did not include the voting composition of the FOMC's decision. Finally, from March 2002 the press statements also disclose the vote of each individual FOMC member and the reasons justifying the vote of each member that chose to dissent.

3 Empirical results

3.1 Data

We use several data sources. From the Federal Reserve Board website we obtain data on the decisions of the federal funds rate target level (FFR_t), voting composition of FOMC members, plus data on zero-coupon yields for maturities from six months to five years (see Gurkaynak, Sack, and Wright, 2007). From Bloomberg we obtain daily frequency data on price levels, daily volatility (10 day average) and trading volume (tr_t) for several stock market indexes (S&P, NASDAQ, VIX, DAX, FTSE100, CAC40, IBEX, SMI) and 10 year Treasury bond yields. For US stock portfolios (value-weighted) sorted by ten deciles of firm size and

49 industries we use data from Kenneth French's website[4]. From Quandl we obtain federal funds future data to construct a measure of "surprise" rate changes (FFS_t) as in Kuttner (2001). Finally, we obtain predictions for a variety of economic outcomes at different horizons (each of the next 6 quarters, plus 5 and 10 years horizons) from the Survey of Professional Forecasters (SPF) of the Philadelphia Fed, which covers 30 to 55 analysts in each quarter.

To perform our analysis we consider a six day window (3 days before meeting, FOMC meeting = 0, 3 days after meeting) around FOMC meetings and then calculate stock excess returns above the risk free interest rate (r_t) given by the 10 year daily Treasury bond yield. Cumulative excess returns (CR_t) are zero on the first day of the window, $t \in \{-3, -2, -1, 0, 1, 2, 3\}$, and given on the remaining days by

$$CR_t = \ln(\frac{P_t}{P_{-3}}) - \sum_{h=-2}^{t} r_h,$$

with P_t denoting the level of the stock market index or portfolio. Then we calculate t-statistics that test: i) whether the Dissent and Unanimity events are the same ($H_{null} : \mu_D = \mu_U$, $t = \frac{\mu_D - \mu_U}{\sqrt{\sigma_D^2/T_D + \sigma_U^2/T_U}}$); ii) whether the Dissent events are statistically different from 0 ($H_{null} : \mu_D = 0$, $t = \sqrt{T_D}\frac{\mu_D - 0}{\sigma_D}$), with $\{\mu_D, \sigma_D\}$ and $\{\mu_U, \sigma_U\}$ being the mean and standard-deviation for the cumulative returns of dissent and unanimity events, respectively.[5]

We study the impact on financial markets of FOMC meetings where there was unanimity versus one or more dissent votes (39.8 % of the meetings in the 1993-2014 period) in two different periods. The first period consists of the meetings between February 1993 and January 2002, when the voting composition only became public several weeks after the FOMC decision. The second period includes the meetings between March 2002 and January 2014, when the voting composition was disclosed in the FOMC press statement and therefore was known jointly with the federal funds rate target.

[4] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[5] Note that the standard-deviation of the Cumulative Returns increases proportionally to the square-root of the number of days in the window, since asset prices tend to follow random walks. Since the impact of any event on the asset returns is finite, then events lose statistical significance over windows with too many days. For this reason we only study returns within windows with a maximum of 6 days around the event.

3.2 Voting dissent

We start with a basic overview of the patterns in voting dissent. Table 1 shows (for both the periods before and after March 2002) the total votes cast at Committee meetings and the percentage of dissent. We also show the reasons that motivated dissent, whether the FOMC member preferred more aggressive (MA AIP) or less aggressive anti-inflationary policy (LA AIP). Dissent represents a small fraction (between 3% to 5%) of votes. Most dissenting votes (over 83%) are motivated by a preference of more aggressive anti-inflationary policy (that is, dissenters tend to be "hawks"). The latter finding is in agreement with Belden (1989) who found that bank presidents dissent more frequently and "overwhelmingly for tighter policy".

We perform several logit regressions for the dissent vote decision with explanatory variables including individual characteristics of FOMC members and the macroeconomic outlook. We report three distinct variations of the empirical dissent decision model (Table 2). A standard logit, a logit with normal random effects (logit-RE) and a logit with fixed effects (logit-FE), estimated by maximum likelihood (MLE). The random and fixed effects specifications help control for a variety of unobserved factors that are correlated with the individual governors (Wooldridge, 2001), such as preferences to conform with the majority.

In the standard logit model the probability of a FOMC member dissenting decreases with his/her experience ($E_{i,t}$), but this effect disappears with the random and fixed effects models. The average experience of the Committee members ($\bar{E}_t$) and the average experience of previously dissenting members ($\bar{E}_{d,t}$) present at the meeting are not statistically significant. Dissent is less likely during periods of higher treasury bond yields (consistent with the "hawkish" tendency of dissenters), a finding which is robust across logit regressions. Market volatility (as measured by the VIX index in levels) and higher trading volumes (S&P index), however, are not a statistically significant determinant of vote decisions.

Table 3 splits Committee meetings between those in which voting was unanimous and those with one or more dissent votes. Meetings in which dissent occurs are far from rare (despite dissent votes representing less than 5% of the total votes cast by its 12 members). Between February 1993 and January 2002 dissent occurred in 33.3% of FOMC meetings.

After March 2002 dissent votes were cast in 44.9% of the meetings. In general, dissent episodes include only one dissenter, but episodes with up to three dissenters have happened (Table 4). Most episodes are motivated by preferences for more aggressive anti-inflationary policy. Table 5 shows that dissent episodes tend to be short, with 58% lasting a single meeting. The longest episodes lasted 20 (one episode) and 8 meetings (two episodes).

Voting dissent is not easily predictable (as indicated by the low Pseudo R^2 values of Table 2). There has been no Committee member that has always expressed a vote of dissent and many different FOMC members have expressed votes of dissent (about 40% of FOMC members expressed votes of dissent in both the periods before and after March 2002, as shown in Table 6). Also, dissent occurs in very different economic environments. Thornton and Wheelock (2014) find that dissent in the FOMC has happened almost every year since the 1950s and that its occurrence is not easily predictable by macro variables such as inflation and unemployment. Table 6 shows the number of dissenting members over several periods for the time in which the vote has been made public. The table shows that 11 FOMC members dissented between March 2002 and January 2007 (a period of economic expansion, as defined by the NBER, and of mostly decisions of federal funds rate increases). For the period of the financial crisis, defined as being from February 2007 (the starting date of the timeline of the financial crisis in the St. Louis FED website) until June 2009 (the date in which the recession ended as established by the NBER), 8 FOMC members expressed votes of dissent. This was a period mostly of economic contraction (as defined by the NBER) and decisions of federal funds rate reductions. Finally, 9 FOMC members expressed votes of dissent in the period from July 2009 until January 2014. This was a period for which the FOMC made no changes to the federal funds rate target.

3.3 Dissent and the announcement drift before March 2002

Now we study the period before votes of FOMC members were made available in the statement (between February 1993 and January 2002). Figure 1 shows the S&P and NASDAQ average cumulative returns around the FOMC meetings for this period. We see a strong

increase in the S&P, in particular for the day prior to the announcement of monetary policy decisions, which is in line with Lucca and Moench (2013). Quantitatively we find this pre-FOMC announcement drift to be quite large, with cumulative returns of the S&P reaching a level of about 25 basis points at the date of the meeting.[6] Figure 1 shows that the NASDAQ index has a similar pattern. Importantly, we do not see much of a difference in cumulative returns around FOMC meetings between the cases in which the vote was unanimous and the cases in which dissent occurred. Since in this period markets only learned whether dissent occurred several weeks afterwards, this result is not surprising.[7]

Figures 2 and 3 show that the FOMC announcement drift is present for several US industry and size portfolios. Figure 4 shows the strong upward drift in stock prices is present not just in US markets but also in major international equity indexes (DAX, FTSE100, CAC40, IBEX, SMI), a result also found in Lucca and Moench (2013). Just as with the S&P and NASDAQ, the pattern in cumulative returns for firm-size deciles, industries and international indexes is similar whether there was unanimity or dissent at the FOMC meeting.

3.4 Dissent and the announcement drift after March 2002

We now study the period when the votes of FOMC members were publicly disclosed. Figure 5 shows the S&P and NASDAQ mean cumulative returns around the FOMC meetings for this period. We observe large positive excess returns for both the S&P and NASDAQ indexes in the day before the announcement of a decision voted by unanimity (although the increase seems smaller than in the period before March 2002). However, when dissent occurs we observe instead a downward drift in cumulative excess returns.

[6] Lucca and Moench, 2013, report a value of about 50 basis points for the pre-FOMC announcement drift, but consider a window of only three days which is half the size of ours. This accounts for the apparent discrepancy in annualized return values.

[7] It is hard to identify the effect for this period of markets learning the voting composition of the FOMC meeting, since the minutes with the vote information were released shortly after the subsequent scheduled FOMC meeting (six weeks afterwards). Therefore it is difficult to separate the effect of the release of the voting composition of the prior decision through the minutes, from the effect of the communication of the new decision in the statement. A second reason is that FOMC members can make statements to the media, prior to the release of the minutes, which could reveal the direction of their vote to markets. This makes it harder to pinpoint the exact moment in which markets learn whether there was unanimity or dissent.

Figures 6 and 7 show the differences in cumulative excess returns of unanimity and dissent at the FOMC meeting are also present in US stock portfolios of firms from different industries and sizes.[8] Again, unanimity at FOMC meetings results in large positive excess returns in international stock markets, while dissent is associated with a downward drift (Figure 8).

We report the statistical significance of the results in these figures in Tables 7, 8, 9 and 10. Tables 7 and 8 test whether the difference in excess returns around a FOMC meeting with dissent relative to unanimity is statistically significant. Table 7 shows the p-values of the T-statistic for the difference in excess returns for the S&P, NASDAQ and the international stock indexes. The differences in the first day after the FOMC statement release are significant at the 10% level for all indexes and at the 5% level for four of the seven indexes. Table 8 shows the number of deciles and industries for which differences in dissent relative to unanimity are significant (for 1%, 5% and 10% confidence levels). Again, the differences are more significant in the first day after the FOMC vote is disclosed. In the first day after the statement release, differences for 35 (of a total of 49) industries and all 10 firm size portfolios are significant at the 10% level (of these 29 industry and 10 firm size portfolios are significant at the 5% level). For the US firm-size and industry data the differences are also significant before the FOMC decision is made. One day prior to the release of the statement differences for 19 industry and 9 firm size portfolios are significant at the 10% confidence level.

Our result that dissent has an impact on stock markets even on the day after the FOMC announcement is interesting. Therefore the price drift observed in the day after dissent meetings is not observed in unanimity meetings (Figure 5) or in the FOMC meetings before 2002 (Figure 1). Lucca and Moench (2013), furthermore, confirm that in the average FOMC meeting in the period 1993 to 2011, the price drift stops just a few hours after the announcement. Therefore that dissent events after 2002 cause a drift even one day after the meeting is a special result. One interpretation of this finding is that markets may take longer to digest the information effect of dissent meetings, since the meaning of dissent and its implications is hard to quantify. Savor (2009) finds that price events accompanied by new information

[8]Note that figures 6 and 7 include the meetings only until December 2013, since at the time we wrote this paper the data on French's website for firm portfolios ends in 31 December of 2013.

have a drift that lasts more days in relation to events with little new information. Therefore the finding that the price impact of dissent lasts more days than for unanimity meetings is consistent with dissent having new and unexpected information for market analysts.

We also test the statistical significance of the negative effect of dissent on stocks observed in figures 5 to 7. Table 9 shows the p-values of the T-statistic for the difference between mean excess returns of dissent episodes and zero returns for the S&P, NASDAQ and international indexes. The differences one day after the FOMC announcement are significant at the 10% level for five of the seven indexes. Also, one day after the announcement differences for 34 industry and all 10 firm size portfolios are significant at the 10% level (Table 10), with 26 industry and 10 size portfolios being significant at the 5% level.

In conclusion, Dissent has a significant impact on stock markets, which is statistically different from Unanimity (Tables 7 and 8) and statistically different from 0 (Tables 9 and 10). In tables A.7 to A.10 of the online appendix, we show these results are confirmed if we use bootstrap replicas of the t-statistics instead of the standard sample t-statistic.

3.5 Regression estimates

To assess more formally the connection between excess stock returns around FOMC meetings and the communication of the direction of the vote of Committee members, we did a dummy variable regression model. The regression consists of using daily S&P excess returns ($R_t = \ln(P_t/P_{t-1}) - r_t$) as dependent variable with several controls plus dummies for unanimity or dissent in the vote around a three day window of meetings (-1, 0, 1 days):

$$R_t = \beta_0 + \beta_1[\bar{U}_t, \bar{D}_t, \bar{F}_t, D_p] + \beta_x X_t + \varepsilon_t, \tag{1}$$

where $X_t = \{\Delta VIX_t, VIX_{t-1}, \Delta \ln(tr_t), \ln(tr_{t-1}), FFS_t, FFR_t\}$. $\bar{U}_t$ is a set of three dummy variables for whether it is a day ($U_t = 1$) when unanimity was communicated in the FOMC statement (period after March 2002), one day before ($U_{t+1} = 1$), or one day after such meeting ($U_{t-1} = 1$). $\bar{D}_t$ is a set of three dummy variables for whether it is a day ($D_t = 1$)

when dissent was communicated in the FOMC statement (period after March 2002), one day before ($D_{t+1} = 1$) or one day after ($D_{t-1} = 1$) such meeting. $\bar{F}_t$ is a set of three dummy variables for whether it is a day ($F_t = 1$) of a FOMC meeting with no vote information (period prior to March 2002), one day before ($F_{t+1} = 1$), or one day after ($F_{t-1} = 1$) such meeting. Finally, D_p is a dummy variable for whether it is within a day before or after a FOMC meeting for which the previous FOMC meeting's statement communicated a dissent vote. This variable measures whether a new dissent episode has a stronger effect than a recurring one. We estimate the regression with both ordinary least squares (which assumes $E[\varepsilon_t \mid X_t] = 0$), hence OLS, and a median quantile regression (which assumes $Q_{50}[\varepsilon_t \mid X_t] = 0$), hence MQ.[9] The results are displayed in Table 11. At the end of the table we include a Wald test of whether the sum of the coefficients for the impact of Dissent is significantly different from Unanimity ($H_{null} : D_{t+1} + D_t + D_{t-1} = U_{t+1} + U_t + U_{t-1}$) or from zero ($H_{null} : D_{t+1} + D_t + D_{t-1} = 0$). This Wald test has an asymptotic distribution as an $F(1, n)$, where n is the number of observations.

The OLS regression confirms that, controlling for other causes (X_t), there are positive excess returns (of around 37 basis points) in the day prior to FOMC meetings with an unanimous vote, but negative excess returns when there is dissent (of about minus 18 basis points). Curiously, the negative effect of a dissent vote on stock markets is stronger on the day of the announcement (on average about minus 67 basis points) and in the day after (on average about minus 64 basis points). This is consistent with the statistics shown in subsection 3.2 which indicate that dissent is hard to anticipate. The Wald tests reject that the Dissent event over the window of 3 days is equal to Unanimity or that it is equal to zero, with a significance level below 10% in the OLS regression and a significance level below 5% in the Median Quantile regression. Therefore the returns of Dissent events are statistically different from Unanimity or zero, even after conditioning on several observable factors.

For the dummies corresponding to the period prior to March 2002 ($\bar{F}_t$) we obtain a

[9] The reason for also considering MQ is that it is more robust to outliers than OLS. For an extended treatment of the subject see Koenker (2005). Our application of quantile regression to explain market excess returns is close to the approach suggested by Engle and Manganelli (2004).

clearly positive (and statistically significant at the 1% level) pre-FOMC announcement drift, representing about 104 basis points of excess returns in the day ahead of the meeting. This implies that the pre-FOMC announcement drift was quite high during this period. Lucca and Moench (2013) showed that excess pre-FOMC returns became statistically significant in the 1980s and increased in magnitude over time (being essentially zero from 1960 until 1979, about 20 basis points from 1980 until 1993 and about 50 basis points from 1994 until 2011). However, our regression shows that pre-FOMC returns were considerably lower after March of 2002, which suggests that communicating the votes of individual FOMC members has mitigated the magnitude of the effect of FOMC meetings on excess stock market returns.

The MQ regression estimates are similar qualitatively to the OLS results and have the same sign for all dummy coefficients (except for $F_t = 1$). Our results are therefore robust to the choice of econometric methodology.

4 Potential explanations

We now explore several possible causes for the negative impact of dissent on stock returns, in particular: (i) risk and liquidity, (ii) a signal of stricter future monetary policy, (iii) other coincident events such as the financial crisis or the zero-lower-bound period, and (iv) an indicator of a worse future economic outlook. We conclude (iv) to be the strongest explanation for our findings.

4.1 Risk and Liquidity

We start by considering whether risk and liquidity explain the differences between the cases of unanimity and dissent for the period after March 2002. The capital asset pricing model (Sharpe, 1964), and arbitrage pricing theory (Ross, 1976) predict that investors require higher returns for exposure to market risk. If higher risk is found during episodes of unanimity relative to dissent, it could explain higher stock returns during episodes of unanimity. Figures 9 and 10 show the evolution of stock volatility (measured by the VIX level, plus

S&P and NASDAQ daily volatility) around Committee meetings, for the periods prior and after March 2002 respectively. The figures show that episodes of unanimity are indeed associated with higher volatility relative to dissent episodes. However, this pattern occurs for both the periods without vote disclosure (Figure 9) and with public votes (Figure 10). It seems therefore unlikely that risk could be an explanation for the negative impact of dissent in stock markets after March 2002. Another argument supporting this conclusion is that dissent dummies for $D_t = 1$ and $D_{t-1} = 1$ in equation (1) are associated to statistically significant parameters (in both the OLS and MQ regressions), despite the fact that we control for daily volatility (Table 11 shows that excess returns are negatively related to innovations in implied volatility, as in Campbell and Hentschel, 1992, and Lucca and Moench, 2013).

Figures 11 and 12 show daily trading volume (S&P and NASDAQ) around Committee meetings for the periods prior and after March 2002 respectively. These figures show that episodes of unanimity have higher trading volumes than dissent episodes. This observation is consistent with the theoretical prediction (see, Kim and Verrecchia, 1991) that trading volumes increase more with higher precision of the public announcement. However, this pattern again occurs for both the periods without vote disclosure (Figure 11) and with public votes (Figure 12), making it doubtful that liquidity explains the negative impact of dissent in stock returns after March 2002. Also, in equation (1) the dissent dummies ($D_t = 1$ and $D_{t-1} = 1$) are significant, despite the inclusion of controls for trading volume. These facts do not support liquidity as a strong explanation for the differences in pattern of excess returns (Figures 5 to 8) between the publicly disclosed dissent and unanimity votes.

4.2 Future monetary policy

We now test whether differences between the unanimity and dissent episodes are due to informative signals on future monetary policy. The desire to achieve consensus could lead the majority to not pursue its preferred policy course in subsequent meetings.[10] Riboni and

[10]It could be the case that just a few dissenters may influence future policy. Ball (2012) states that the "leading explanation for Bernanke's caution as Fed chair is political pressure from inflation hawks", but views himself "groupthink and Bernanke's shy personality" as more important factors.

Ruge-Murcia (2010) show that a preference for consensus fits well the actual policy decisions of the US Federal Reserve, plus the Bank of Canada, the Bank of England, the European Central Bank and the Swedish Riksbank. Horváth, Šmídková and Zápal (2012) show that the voting records of central banks of several countries (the Czech Republic, Hungary, Poland, Sweden, and the United Kingdom) signal future monetary policy. Communication of the vote of FOMC members may therefore be an informative signal of future actions.

To study this hypothesis we use daily zero-coupon yields for 6 months, 1 year, 18 months, 3 and 5 year maturities (Gurkaynak, Sack, and Wright, 2007). Figure 13 shows the average change for these yields around a six day window of the FOMC vote for the period after March 2002. Yields fall in the days prior to a FOMC announcement.[11] The impact of FOMC meetings on yields, however, is quantitatively small (less than 4 basis points on average), statistically insignificant (these tests are available in a web appendix), and do not differ whether there was unanimity or dissent votes. Dissent and unanimity do not provide markets with different signals regarding future monetary policy. Also, equation (1) controls for both the federal funds rate (FFR_t) and for surprise changes to the federal funds rate (FFS_t) following the methodology in Kuttner (2001). Only surprise changes to the federal funds rate have statistically significant coefficient (indicating that markets already incorporate in prices prior to FOMC meetings anticipated changes in the federal funds rate). Nonetheless, the dissent dummies for $D_t = 1$ and $D_{t-1} = 1$ in equation (1) are associated to statistically significant parameters (in both the OLS and MQ regressions).

Therefore expectations of future monetary policy do not seem to account for the negative impact on stock returns during public dissent episodes (Figures 5 to 8).

4.3 Other coincident events

One could think that the findings may simply be the result of other coincident events such as a prolonged period of bad news (the financial crisis) or something specific to a period

[11] One reason could be that federal funds rate has a downward trend since the early 80s, leading investors to expect positive news. However, as argued by Lucca and Moench (2013) it is puzzling why such positive news would be "incorporated into prices only during the pre-FOMC window".

of low interest rates (the zero-lower-bound). In our view this is not a good explanation for the phenomenon we report, since we compare the excess returns of financial markets in a window around the FOMC meetings. Such an hypothesis does not explain why is it that markets incorporate the financial crisis or zero-lower-bound in asset prices only on the dates around FOMC meetings, since both those events already existed in the days previous to the window around the FOMC meeting. Just as a prolonged period of good news (the great moderation) is unlikely to explain the positive FOMC drift found by Bernanke and Kuttner (2005) and Lucca and Moench (2013), a prolonged period of bad news would be an unlikely explanation for ours. In order for our findings to be "spurious" it would be necessary that a series of bad news is systematically being released by chance on precisely the dates of votes with dissent, which is implausible over a period of 12 years.

To further dismiss the possibility of our findings being the result of other coincident events, we look at the effects of dissent on returns over several periods for the time in which the vote has been made public. The results are shown in Figure 14. The first period we consider is that between March 2002 and January 2007. This was a period of business cycle expansion and of rising interest rates by the FOMC (the federal funds rate target increased from 1% to 5.25% over this period). The panel at the top left of Figure 14 shows that the negative effect on stock markets of dissent is present in this period. The next period we consider is that from February 2007 until June 2009. This was mostly a period of economic recession (the financial crisis) and of interest rate reductions by the FOMC (the federal funds rate target decreased from 5.25% to an interval of 0-0.25% over this period). The panel at the bottom left of Figure 14 shows that the negative effect on stock markets of dissent is present in this period too. The third period we consider is from July 2009 until January 2014 (after the financial crisis until the end of our sample). This was the zero-lower-bound period for which the federal funds rate target remained unchanged at an interval between 0-0.25%. The results are displayed in the bottom right panel of Figure 14. Again, dissent seems to be associate with a fall in stock prices during the FOMC window. Finally, the top right panel of Figure 14 shows the period from February 2007 until January 2014 (the financial crisis

plus the zero-lower-bound period). In this case too a negative effect on the stock market seems to be present whenever dissent occurs.

We now analyze the data through an OLS regression of cumulative excess returns (CR_t) around a four day window ($t-2$ until $t+2$) of FOMC meetings:

$$CR_t = \beta_D Dissent_t + \beta_U Unanimity_t + \varepsilon_t, \tag{2}$$

where $Dissent_t$ and $Unanimity_t$ are dummy variables for whether there was a vote of dissent on the date of the FOMC meeting or a vote of unanimity respectively. The results are shown in Table 12.1. A positive impact of unanimity and negative impact of dissent on stock markets is present over all periods in which the FOMC vote was made public, whether the federal funds rate target increased, decreased or was kept at zero lower bound. The findings are robust to including a measure of surprise changes to the federal funds rate (FFS_t) in the regressors (results shown in the appendix).

As a robustness check, we repeat the same OLS regressions of equation 2) using only the sign of CR_t as a dependent variable, that is $S(CR_t) = 1$ if $CR_t > 0$, $S(CR_t) = -1$ if $CR_t < 0$, and 0 otherwise (although a 0 return is never observed). This sign regression is more robust to outliers, since it does not include whether some events have a large magnitude or not. The results in Table 12.2 confirm that there is a positive impact of unanimity and a negative impact of dissent on stock markets in all the periods with public FOMC votes, whether the federal funds rate target increased, decreased or was kept at zero lower bound.

The evidence in Figure 14 and Tables 12.1 and 12.2 does not support other coincident events as an explanation for the differences in stock returns between unanimity and dissent for the period in which the vote was made public.

4.4 Impact on expectations of future economic outcomes

Perhaps agents perceive dissent as a signal of uncertainty about the future macroeconomic outlook or an increase in the probability of negative future outcomes. Consistent with this

hypothesis is the observation of a positive effect (of about 42 basis points on average, see Table 11) of markets already knowing that there was dissent in the vote at the previous meeting. This implies that the impact of a consecutive dissent vote at FOMC meetings is less negative than a new dissent episode.

We consider that dissent in the FOMC vote has the necessary characteristics to act as a "signal" to agents. One such characteristic is that dissent is a costly action. Economists are well known for having divergent views.[12] However, as revealed by the statistics in Table 1 it is very hard for someone to disagree from the chairman (Blinder, 2007, describes several episodes in which the dominance of the chairman is clearly revealed). Meade and Stasavage (2008) argue that career concerns can make FOMC members reluctant to dissent. Another important characteristic is that dissent can reveal valuable private information. All Committee members are well experienced and respected economists. This would make their views informative to other agents. This is reinforced further by their status as policy makers, since FOMC members may have greater information than other investors. Romer and Romer (2000) show that there is asymmetric information between the Federal Reserve and investors and that monetary policy actions signal information. In summary, given that expressing a vote of dissent is demonstrably so costly, then a FOMC member would need good reasons to do so, likely motivated by concerns that extend beyond a short term horizon, and such a vote would likely be taken seriously by investors.

To study the possibility that dissent acts as an informative signal further, we look at the impact of dissent on the economic expectations of a panel of analysts from the Survey of Professional Forecasters (SPF) of the Philadelphia Fed. This data includes quarterly predictions of around 30 to 55 analysts for several outcomes in the next 6 quarters and their predictions for long term outcomes in the next 5 to 10 years. Let $Y_{i,t,t+s}$ be the prediction of analyst i at time t for the Y outcome in the future quarter $t+s$. We define lagged dissent,

[12] Anedoctal evidence of this is the statement atributed to Winston Churchill's quoting Wootton (1938): "Wherever six economists are gathered there are seven opinions". A more recent and concrete example is that two petitions with opposing views on the minimum wage were both signed by hundreds of economists (with Nobel prize winners in both petitions). See Greg Mankiw's blog post: http://gregmankiw.blogspot.ro/2014/03/economists-divided-on-minimum-wage-hike.html.

d_{t-1}, as the percentage of FOMC meetings with dissent in quarter $t-1$ (since quarters have on average two meetings, this is not a dummy variable). For each outcome Y we use SPF quarterly data from 2002Q1 until 2013Q4 to estimate

$$Y_{i,t,t+s} = \theta_{0,s} + \theta_{1,s} Y_{i,t-1,t+s} + \beta_s d_{t-1} + \varepsilon_{i,t,t+s}, \tag{3}$$

with OLS. We also performed MQ regressions of the same outcomes, but these have similar results and were left to the web appendix for conciseness.

The analysts' forecasts for each of the next 6 quarters include: the quarterly level of the GDP price index (PGDP), the quarterly unemployment rate (UNEMP), the quarterly industrial production index (INDPROD), the quarterly level of housing starts (HOUSING), the spread between Moody's AAA bonds and 10-year Treasury bonds (AAA-TBOND), the quarterly level of real residential fixed investment (RRINV), and the probability of a quarterly decline in real GDP (RECESSION).[13] Table 13 shows that lagged dissent leads to more pessimistic forecasts of the short and medium term economic outlook. A larger degree of dissent leads to: higher forecasts of the probability of the recession (a statistically significant result at the 1% level for two quarters ahead and onwards), higher forecasts of the interest rate spread between private and public funding (statistically significant at the 1% level for all the next five quarters), higher forecasts of the price level (statistically significant at the 1% level for the next four quarters), higher unemployment forecasts (statistically significant at the 10% level for the next four quarters), lower medium term forecasts of industrial output (more pessimistic forecasts from three quarters onwards, however parameter estimates are not statistically significant), lower forecasts of housing starts and real residential fixed investment (in both cases the estimates are statistically significant at the 1% level for all the next five quarters). We have tested for whether dissent had an impact on expectations if the period prior to March 2002 and found no statistically significant coefficients at the 1% level from two quarters onwards (and no significant coefficients at the 10% level from 3 quarters

[13] Note that the subjective recession probability (RECESSION) has no 6th quarter ahead forecast, therefore we regress $Y_{i,t,t+5}$ using $Y_{i,t-1,t+4}$ as covariate.

onwards). These results are shown in a web appendix. Dissent therefore is only associated with negative revision of the macroeconomic outlook since March 2002.

The analysts' long term forecasts include: the average annual CPI inflation rate over the next 5 years (CPI5YR), the average annual growth rate of real GNP/GDP over the next 10 years (RGDP10), the average annual productivity growth rate over the next 10 years (PROD10) and the average annual return to equities (S&P) over the next 10 years (STOCK10). Table 14 shows that lagged dissent also increases the pessimism of long term forecasts. A larger degree of dissent leads to: lower forecast of the annual average rate of growth in real GNP/GDP over the next 10 years (a statistically significant result at the 1% level), lower forecast of the annual average rate of growth in productivity over the next 10 years (a statistically significant result at the 5% level), lower forecast of the annual average rate of stock returns over the next 10 years (a statistically significant result at the 5% level) and lower forecasts of the annual average rate of inflation over the next 5 years (a statistically significant result at the 1% level).[14] Unfortunately we are unable verify that dissent is only associated with negative revision of the long term outlook after March 2002 because prior to 2000 most forecasters did not deliver predictions for long term horizons.

We conclude that a plausible explanation for the negative impact of dissent in stock markets is that dissent is viewed by agents as a signal of worse future economic outcomes. The web appendix shows these findings are robust to using MQ regression instead of OLS.

5 Conclusion

We find that the pattern of excess stock returns around FOMC announcements changed when the vote of individual members became publicly available at the same time as the decision over the federal funds target rate. In this period (from March 2002 onwards) stock prices on average increased only when the vote was unanimous, with markets losing value when

[14] A lower level of future inflation could be viewed as desirable but New Keynesian economics predicts that at business cycle frequencies (defined by King and Rebelo, 2000, as a period between 1.5 and 8 years) lower levels of inflation are associated with lower levels of output as well (see Galí, 2008).

dissent occurred. Differences in risk and liquidity between dissent and unanimity episodes do not account for this contrasting impact on financial markets. Also, changes to agents' expectations of future monetary policy are an unlikely explanation, since both unanimity and dissent episodes imply negligible changes in the yield curve at several maturities. We also reject other coincident events as an explanation for this result, since negative equity returns during Dissent episodes are observed for several different periods. We show that after March 2002 dissent episodes are associated with pessimistic changes in the macroeconomic and financial expectations of Professional Forecasters. We consider this to be the best explanation for the negative effect on stock markets associated with dissent votes.

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6 Tables

Table 1: Votes cast by FOMC members

	Before 03-2002	After 03-2002
Total votes	841	1053
Dissent (%)	3.69	4.93
Prefers MA AIP* (%)	3.09	4.08
Prefers LA AIP* (%)	0.59	0.85

MA/LA (More or Less Aggressive) AIP (Anti-Inflationary Policy)

Table 2: Logit model of decision $\Pr(D_{i,t} = 1)$ of FOMC member i in period t

Regressors	Logit	Logit-RE	Logit-FE
$E_{i,t}$ = number of previously	-0.021***	0.004	0.017
attended FOMC meetings	(0.007)	(0.013)	(0.017)
$\bar{E}_t = \frac{\sum_i E_{i,t}}{12}$	-0.002	-0.002	-0.001
	(0.002)	(0.002)	(0.002)
$\bar{E}_{d,t} = \frac{\sum_i E_{i,t} 1(\max_{m<t}\{D_{i,m}\} = 1)}{\sum_i 1(\max_{m<t}\{D_{i,m}\} = 1)}$	-0.001	-0.006	-0.010*
	(0.004)	(0.006)	(0.006)
US-Treasury yield$_t$	-0.336***	-0.504***	-0.460**
	(0.085)	(0.159)	(0.202)
VIX_t	0.009	0.006	0.004
	(0.012)	(0.018)	(0.018)
log(S&P Trading Vol$_t$)	-0.380	-0.480	-0.462
	(0.243)	(0.342)	(0.369)
Constant	6.992	7.834	
	(4.722)	(6.582)	
Pseudo R^2	0.062	0.041	0.064

MLE Standard-errors in (). *, **, ***, 10%, 5%, 1% significance.

1894 votes, 176 FOMC events.

Table 3: Number and % of episodes by dissent status

Type of episode	Before 03-2002	After 03-2002
Unanimity	52 (66.7%)	54 (55.1%)
Dissent	26 (33.3%)	44 (44.9%)

$D_t = 1$ (Dissent) if one or more FOMC members dissent,

$D_t = 0$ (Unanimity) all FOMC members agree with decision.

Table 4: Frequency of episodes by number of dissenting FOMC members

Number of dissenters	Dissent	MA AIP	LA AIP
1	59	51	12
2	9	6	1
3	2	2	

Table 5: Duration of consecutive dissent episodes

Consecutive meetings	Freq. (episodes)	CDF (%)
1	14	58.3
2	3	70.8
3	2	79.2
4	2	87.50
8	2	95.8
20	1	100

Table 6: Number of FOMC (and dissenting) members

Period	1993-02	2002-14	2002-07	2007-09	2009-14
Number of FOMC members	33	43	28	23	22
Number of dissenting members	13	17	11	8	9

Table 7: P-values of the T-statistic for the difference in excess returns around a FOMC meeting with dissent relative to unanimity after March 2002

Index / Day	-2	-1	0	1	2	3
S&P	0.874	0.225	0.260	0.027	0.320	0.185
NASDAQ	0.934	0.322	0.407	0.089	0.423	0.524
DAX	0.886	0.286	0.151	0.047	0.202	0.154
FTSE100	0.596	0.354	0.346	0.058	0.266	0.235
CAC40	0.782	0.285	0.144	0.045	0.151	0.080
IBEX	0.691	0.365	0.088	0.012	0.133	0.075
SMI	0.898	0.237	0.197	0.068	0.249	0.303
98 FOMC events						

Table 8: Significance by decile and industry of the T-statistic for the difference in excess returns around a FOMC meeting with dissent relative to unanimity after March 2002

Number of deciles / Day	-2	-1	0	1	2	3
Nr of deciles significant at 0.01 level	0	0	0	7	0	0
Nr of deciles significant at 0.05 level	0	3	8	10	4	3
Nr of deciles significant at 0.10 level	0	9	8	10	8	9
Number of industries / Day	-2	-1	0	1	2	3
Nr of industries significant at 0.01 level	0	4	9	16	7	0
Nr of industries significant at 0.05 level	0	14	16	29	13	0
Nr of industries significant at 0.10 level	1	19	21	35	21	0
98 FOMC events						

Table 9: P-values of the T-statistic for the difference in excess returns around a FOMC meeting with dissent relative to 0 returns after March 2002

Index / Day	-2	-1	0	1	2	3
S&P	0.429	0.115	0.680	0.032	0.098	0.078
NASDAQ	0.847	0.172	0.791	0.396	0.777	0.887
DAX	0.695	0.140	0.540	0.126	0.170	0.095
FTSE100	0.758	0.165	0.774	0.046	0.337	0.321
CAC40	0.949	0.074	0.412	0.070	0.179	0.083
IBEX	0.377	0.027	0.176	0.015	0.103	0.058
SMI	0.712	0.046	0.268	0.056	0.281	0.264
98 FOMC events						

Table 10: Significance by decile and industry of the T-statistic for the difference in excess returns around a FOMC meeting with dissent relative to 0 returns after March 2002

Number of deciles / Day	-2	-1	0	1	2	3
Nr of deciles significant at 0.01 level	0	0	0	3	0	0
Nr of deciles significant at 0.05 level	0	9	0	10	6	3
Nr of deciles significant at 0.10 level	1	10	1	10	10	5
Number of industries / Day	**-2**	**-1**	**0**	**1**	**2**	**3**
Nr of industries significant at 0.01 level	1	3	1	12	6	0
Nr of industries significant at 0.05 level	3	20	4	26	15	0
Nr of industries significant at 0.10 level	6	36	10	34	23	0
98 FOMC events						

Table 11: Parameter estimates of regressions (OLS and MQ)

of S&P excess returns with controls

Regressors	OLS	MQ	Regressors	OLS	MQ
$U_{t+1} = 1$, One day before	0.367	0.091	ΔVIX_t	-1.574***	-1.586***
the FOMC announcement	(0.252)	(0.194)		(0.015)	(0.012)
$U_t = 1$, The same day of	-0.218	-0.121	VIX_{t-1}	0.010***	-0.012***
the FOMC announcement	(0.253)	(0.194)		(0.003)	(0.002)
$U_{t-1} = 1$, One day after	-0.014	-0.147	$\ln(tr_t/tr_{t-1})$	0.150***	0.022
the FOMC announcement	(0.253)	(0.195)		(0.048)	(0.037)
$D_{t+1} = 1$, One day before	-0.182	-0.250	$\ln(tr_{t-1})$	-0.024	-0.019
the FOMC announcement	(0.361)	(0.278)		(0.026)	(0.020)
$D_t = 1$, The same day of	-0.667*	-0.875***	FFS_t	-0.012***	-0.010***
the FOMC announcement	(0.362)	(0.278)		(0.003)	(0.003)
$D_{t-1} = 1$, One day after	-0.637*	-0.687**	FFR_t	-0.008	-0.003
the FOMC announcement	(0.361)	(0.278)		(0.011)	(0.009)
$F_{t+1} = 1$, One day before	1.043***	0.997***	Constant	0.325	0.574
the FOMC announcement	(0.208)	(0.160)		(0.505)	(0.388)
$F_t = 1$, The same day of	0.111	-0.217	Observations	6266	6266
the FOMC announcement	(0.208)	(0.160)	R^2	0.630	0.367 (Pseudo R^2)
$F_{t-1} = 1$, One day after	-0.116	-0.060			
the FOMC announcement	(0.208)	(0.160)			
D_p	0.423	0.536**			
	(0.287)	(0.220)			
P-value Wald Test ($D \neq U$)	0.059*	0.013**			
P-value Wald Test ($D \neq 0$)	0.081*	0.006***			

Standard-errors in (). *, **, ***, 10%, 5%, 1% significance.

Table 12.1: OLS regression of S&P CR around FOMC windows for several periods after March 2002

Regressors	2002-14	2002-07	2007-09	2009-14
$Dissent_t$	-0.450*	-0.549*	-0.922	-0.706***
	(0.247)	(0.290)	(0.846)	(0.255)
$Unanimity_t$	0.460**	0.654***	1.406*	0.253
	(0.223)	(0.133)	(0.733)	(0.450)
Observations	98	40	21	37
R^2	0.073	0.421	0.204	0.186

Table 12.2: OLS regression for the Sign (1,0,-1) of the S&P CR around FOMC windows for several periods after March 2002

Regressors	2002-14	2002-07	2007-09	2009-14
$Dissent_t$	-0.455***	-0.714**	-0.556*	-0.357*
	(0.131)	(0.294)	(0.275)	(0.184)
$Unanimity_t$	0.556***	0.636***	0.667**	0.111
	(0.118)	(0.136)	(0.238)	(0.325)
Observations	98	40	21	37
R^2	0.263	0.423	0.386	0.100

Standard-errors in (). *, **, ***, 10%, 5%, 1% significance.

2002-14 indicates that data from March 2002 until January 2014 was used, 2002-07 indicates that data from March 2002 until January 2007 was used, 2007-09 indicates that data from February 2007 until June 2009 was used, 2009-14 indicates that data from July 2009 until January 2014 was used.

Table 13: OLS regressions of short and medium term forecasts on lagged dissent

	Dissent coef. (β)				
Predictions	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 5
RECESSION	1.282	3.327***	4.375***	3.087***	1.607**
	(1.249)	(1.188)	(0.913)	(0.726)	(0.706)
AAA-TBOND	0.069***	0.081***	0.126***	0.141***	0.164***
	(0.0216)	(0.029)	(0.032)	(0.032)	(0.032)
100 ln(PGDP)	0.054***	0.075***	0.110***	0.133***	0.144**
	(0.0168)	(0.028)	(0.038)	(0.049)	(0.061)
UNEMP	0.121***	0.044**	0.044*	0.049*	0.0511
	(0.018)	(0.019)	(0.023)	(0.028)	(0.034)
100 ln(INDPROD)	0.108	0.001	-0.034	-0.138	-0.188
	(0.072)	(0.090)	(0.120)	(0.149)	(0.179)
100 ln(HOUSING)	-1.502***	-1.962**	-2.671***	-3.464***	-4.935***
	(0.567)	(0.761)	(0.946)	(1.099)	(1.216)
100 ln(RRINV)	-0.631***	-1.447***	-1.858***	-2.056***	-2.289***
	(0.215)	(0.273)	(0.359)	(0.447)	(0.542)

Standard-errors in (). *, **, ***, 10%, 5%, 1% significance.

RECESSION gives the probability of a quarterly decline in real GDP. AAA-TBOND is the forecast for the spread between Moody's AAA bonds and 10-year Treasury bonds. PGDP is forecast for the quarterly level of the GDP price index. UNEMP is the forecast for the quarterly unemployment rate. INDPROD is the forecast for the quarterly industrial production index. HOUSING is the forecast for the quarterly level of housing starts. RRINV is the forecast for the quarterly level of real residential fixed investment.

Table 14: OLS regressions of long term forecasts on lagged dissent

Predictions	Dissent coef. (β)
RGDP10	-0.219***
	(0.054)
PROD10	-0.146*
	(0.076)
STOCK10	-0.729**
	(0.311)
CPI10	-0.134***
	(0.031)
CPI5YR	-0.139***
	(0.048)

Standard-errors in (). *, **, ***, 10%, 5%, 1% significance.

RGDP10 is the forecast for the annual average rate of growth in real GNP/GDP over the next 10 years. PROD10 is the forecast for the annual average rate of growth in productivity over the next 10 years. STOCK10 is the forecast for the annual average rate of return to equities (S&P) over the next 10 years. CPI10 is the forecast for the annual average rate of CPI inflation over the next 10 years. CPI5YR is the forecast for the annual average rate of CPI inflation over the next 5 years.

7 Figures

Figure 1: S&P and NASDAQ average cumulative returns around the FOMC vote in the period before votes were made available in the statement (February 1993-January 2002)

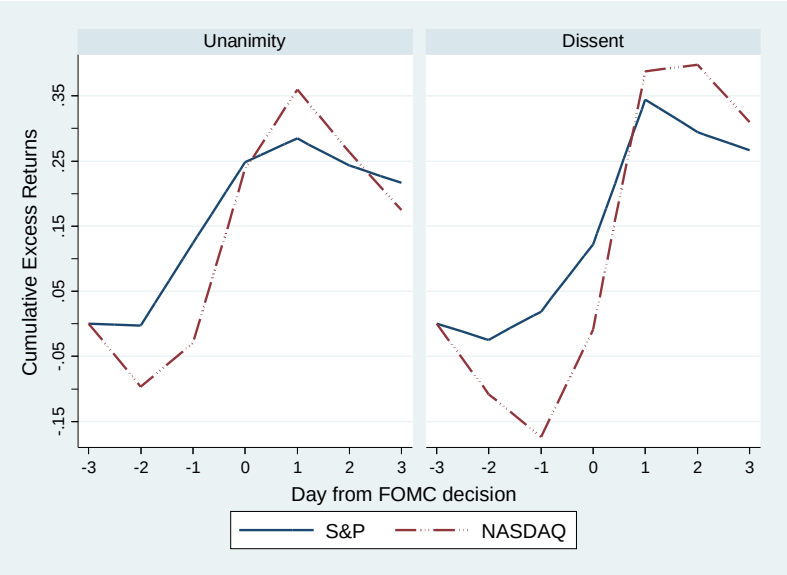


Figure 2: French industry portfolios average cumulative returns around the FOMC vote in the period before votes were made available in the statement (February 1993-January 2002)

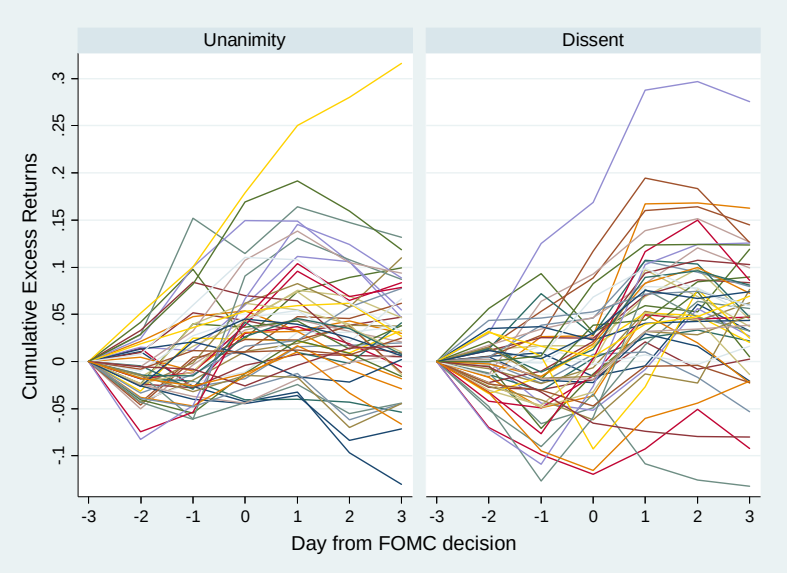


Figure 3: French size portfolios cumulative returns around the FOMC vote in the period before votes were made available in the statement (February 1993-January 2002)

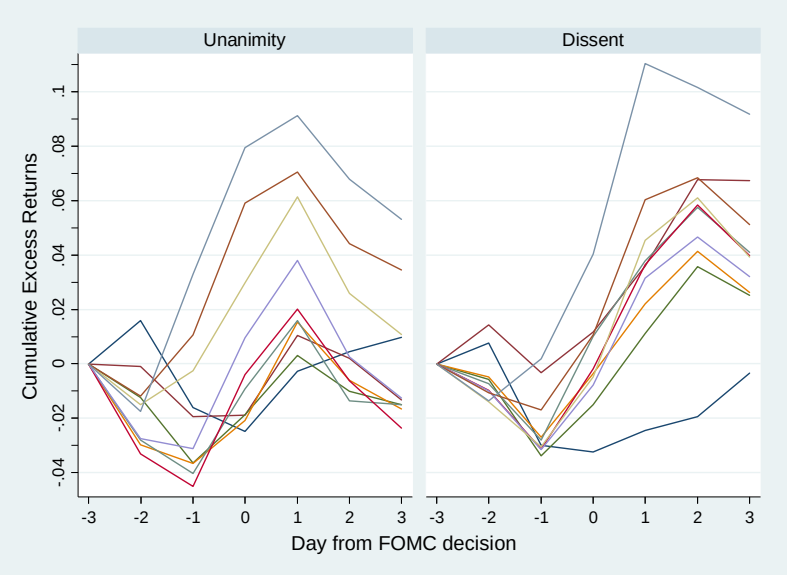


Figure 4: Foreign stock indexes average cumulative returns around the FOMC vote in the period before votes were made available in the statement (February 1993-January 2002)

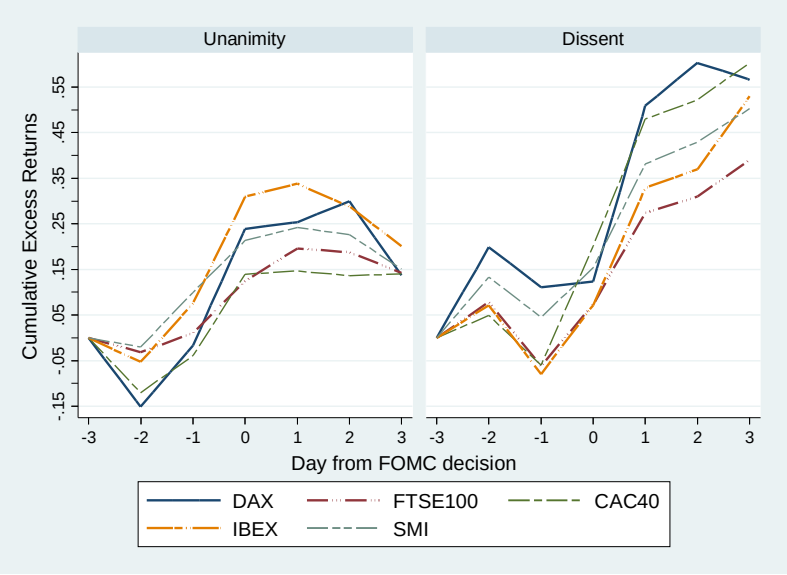


Figure 5: S&P and NASDAQ average cumulative returns around the FOMC vote in the period with votes available in the statement (March 2002-January 2014)

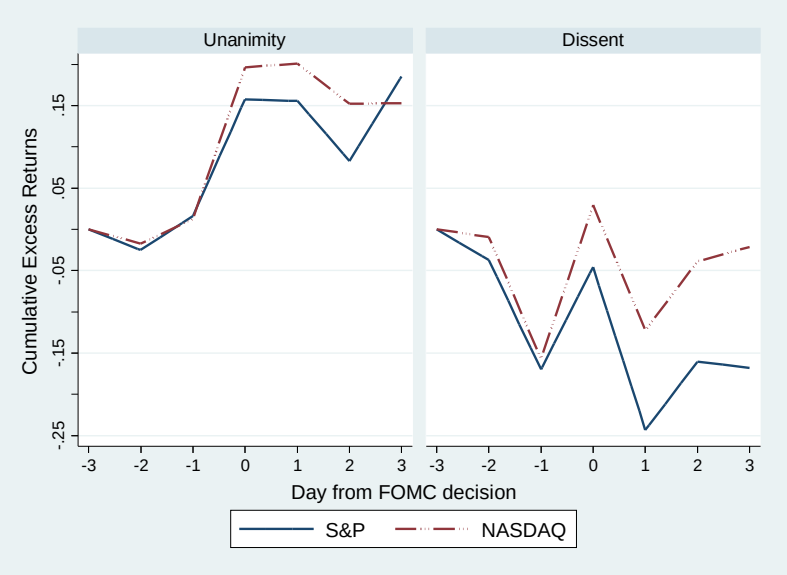


Figure 6: French industry portfolios average cumulative returns around the FOMC vote in the period with votes available in the statement (March 2002-December 2013)

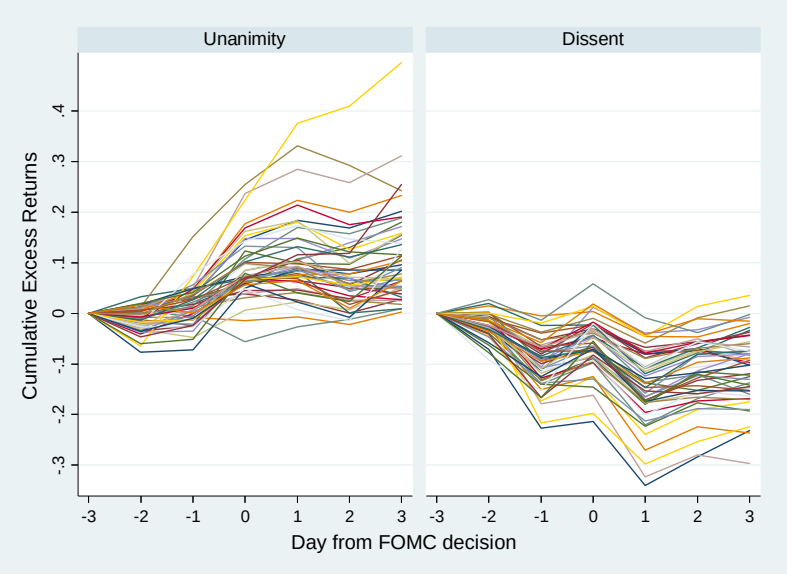


Figure 7: French size portfolios average cumulative returns around the FOMC vote in the period with votes available in the statement (March 2002-December 2013)

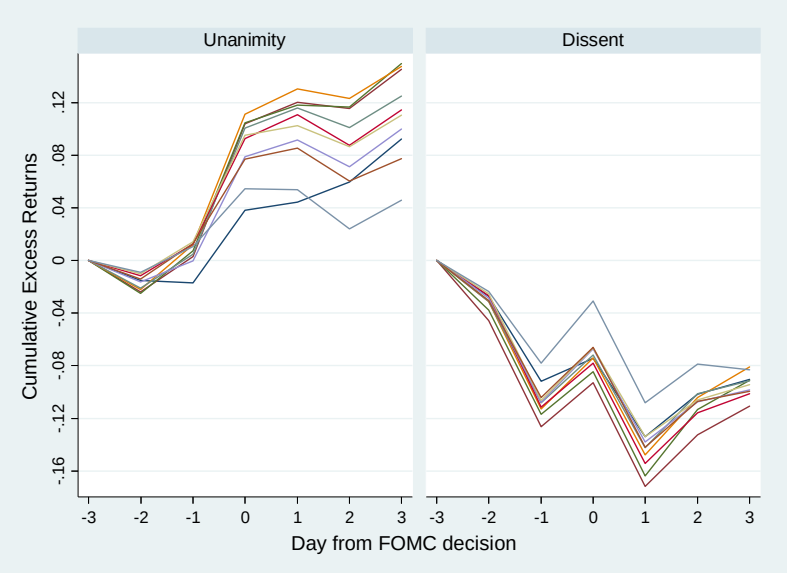


Figure 8: Foreign stock indexes average cumulative returns around the FOMC vote in the period with votes available in the statement (March 2002-January 2014)

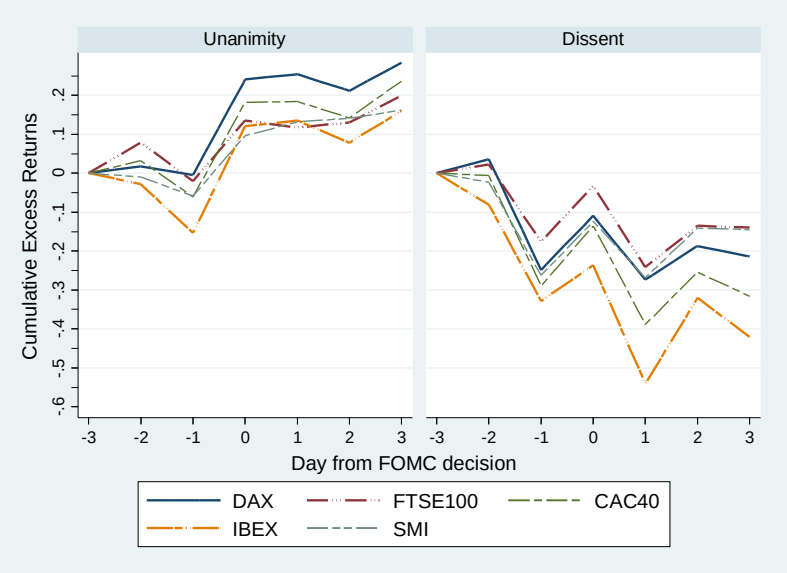


Figure 9: Average Daily stock volatility around the FOMC vote in the period before votes in the statement (February 1993-January 2002)

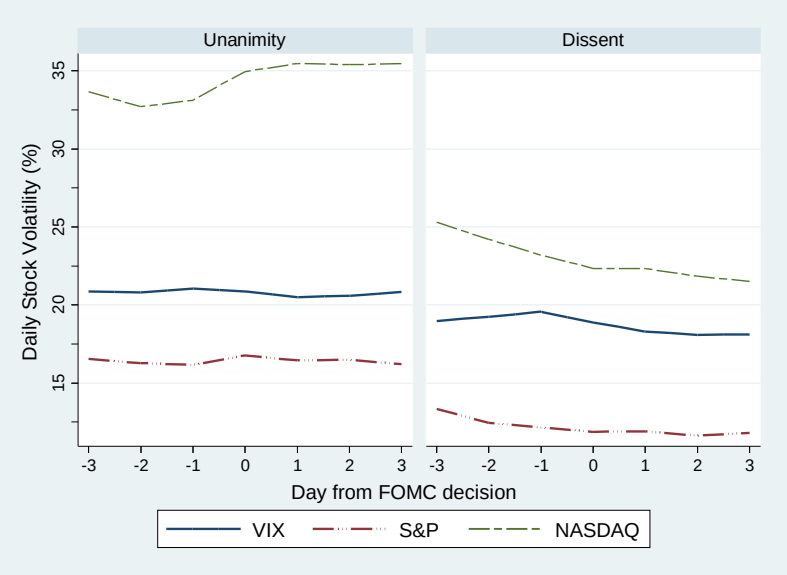


Figure 10: Average Daily stock volatility around the FOMC vote in the period with votes in the statement (March 2002-January 2014)

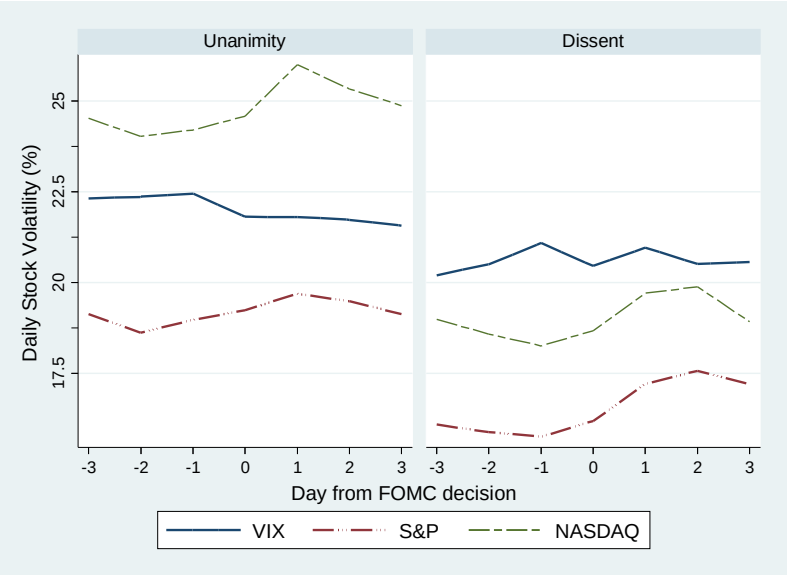


Figure 11: Average S&P and NASDAQ daily trading volume around the FOMC vote in the period before votes in the statement (February 1993-January 2002)

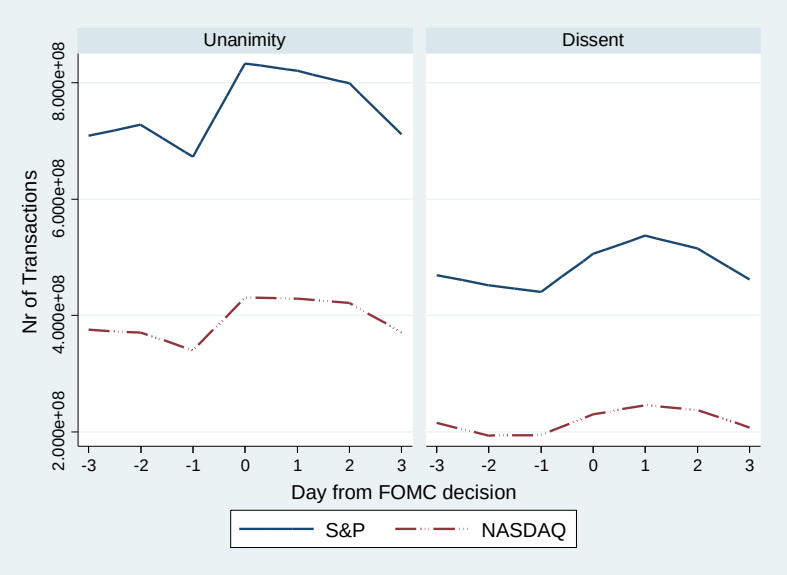


Figure 12: Average S&P and NASDAQ daily trading volume around the FOMC vote in the period with votes in the statement (March 2002-January 2014)

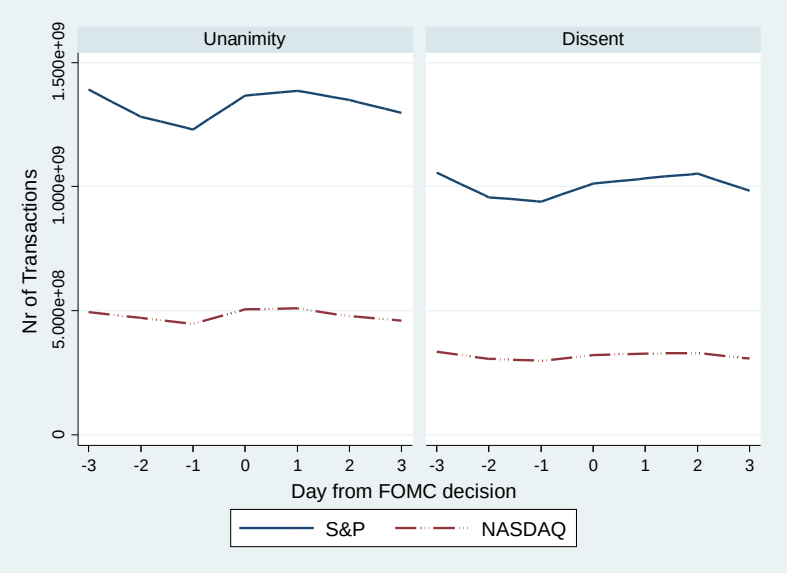


Figure 13: Average Change in yields around the FOMC vote in the period with votes in the statement (March 2002-January 2014)

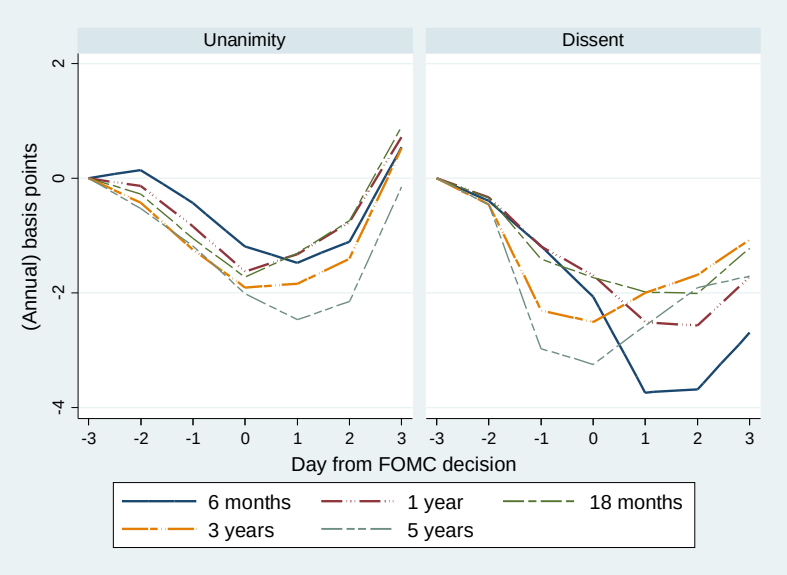
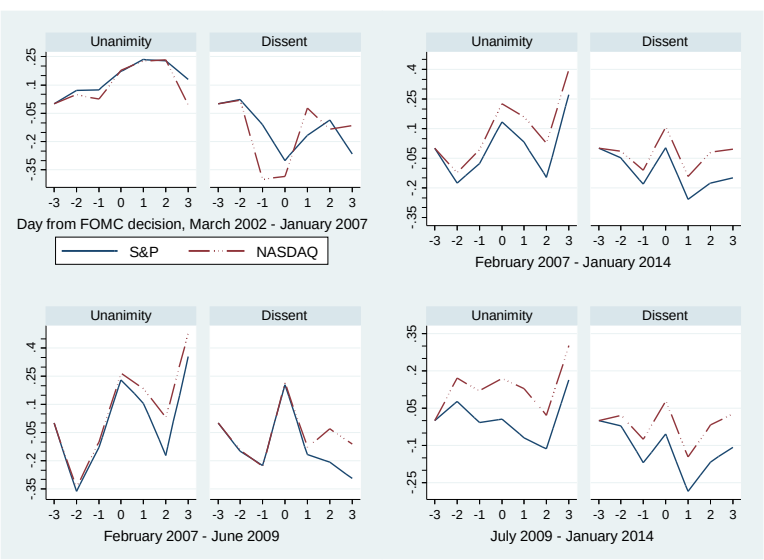


Figure 14: S&P and NASDAQ average cumulative returns around the FOMC vote for several periods with votes available in the statement (March 2002-January 2014)



8 Appendix

This appendix reports the p-values of the T-statistic for the difference in change in yields around a FOMC meeting with dissent relative to unanimity (Table A1) or dissent versus 0 impact (Table A2). We also show OLS regressions for cumulative returns around FOMC windows for several periods after March 2002 (Table A3). Finally, we show the results of MQ regressions using the SPF forecasts and the average FOMC dissent in the previous quarter for short/medium term (Tables A4, A6) and long term (Table A5) horizons.

JEL Classification: E52, G10, G12, G15.

Keywords: Dissent; FOMC; excess stock returns; monetary policy committees; transparency; central bank communication.

8.1 Appendix Tables

Table A1: P-values of the T-statistic for the difference in change in yields around a FOMC meeting with dissent relative to unanimity after March 2002

Index / Day	-2	-1	0	1	2	3
6 months	0.502	0.567	0.637	0.338	0.211	0.111
1 year	0.826	0.796	0.969	0.563	0.331	0.198
18 months	0.949	0.804	0.998	0.737	0.510	0.301
3 years	0.977	0.512	0.758	0.945	0.904	0.528
5 years	0.959	0.287	0.577	0.969	0.931	0.599
98 FOMC events						

Table A2: P-values of the T-statistic for the difference in change in yields around a FOMC meeting with dissent relative to 0 returns after March 2002

Index / Day	-2	-1	0	1	2	3
6 months	0.545	0.162	0.181	0.049	0.021	0.096
1 year	0.611	0.176	0.214	0.105	0.053	0.218
18 months	0.621	0.138	0.194	0.177	0.134	0.405
3 years	0.568	0.039	0.086	0.234	0.313	0.553
5 years	0.613	0.016	0.055	0.216	0.356	0.432
98 FOMC events						

Table A3: OLS regression of S&P CR around FOMC windows for several periods after March 2002

Regressors	2002-14	2002-07	2007-09	2009-14
$Dissent_t$	-0.422*	-0.535*	-0.811	-0.707**
	(0.254)	(0.294)	(1.072)	(0.269)
$Unanimity_t$	0.457**	0.671***	1.419*	0.255
	(0.224)	(0.139)	(0.756)	(0.479)
FFS_t	0.030	-0.036	0.021	0.007
	(0.057)	(0.070)	(0.12)	(0.659)
Observations	98	40	21	37
R^2	0.076	0.425	0.205	0.186

Standard-errors in (). *, **, ***, 10%, 5%, 1% significance.

2002-14 indicates that data from March 2002 until January 2014 was used, 2002-07 indicates that data from March 2002 until January 2007 was used, 2007-09 indicates that data from February 2007 until June 2009 was used, 2009-14 indicates that data from July 2009 until January 2014 was used.

Table A4: MQ regressions of short and medium term forecasts on lagged dissent after March 2002

	Dissent coef. (β)				
Predictions	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 5
RECESSION	1.667	2.500**	4.386***	5***	5***
	(1.508)	(1.042)	(0.887)	(1.034)	(0.886)
AAA-TBOND	0.014	0.057**	0.083**	0.104**	0.190***
	(0.014)	(0.026)	(0.036)	(0.042)	(0.041)
100 ln(PGDP)	0.067***	0.057**	0.025	0.081*	0.010
	(0.016)	(0.026)	(0.036)	(0.043)	(0.059)
UNEMP	3.81e-07	2.17e-07	0.019	0.086***	0.078***
	(0.019)	(0.019)	(0.026)	(0.028)	(0.030)
100 ln(INDPROD)	0.373***	0.107	0.041	-0.064	-0.113
	(0.046)	(0.072)	(0.095)	(0.120)	(0.162)
100 ln(HOUSING)	-0.560	-1.907***	-2.588***	-4.764***	-6.465***
	(0.520)	(0.705)	(0.964)	(1.187)	(1.402)
100 ln(RRINV)	-0.549**	-0.926***	-1.675***	-2.128***	-2.480***
	(0.267)	(0.271)	(0.328)	(0.448)	(0.591)

Standard-errors in (). *, **, ***, 10%, 5%, 1% significance.

RECESSION gives the probability of a quarterly decline in real GDP. AAA-TBOND is the forecast for the spread between Moody's AAA bonds and 10-year Treasury bonds. PGDP is forecast for the quarterly level of the GDP price index. UNEMP is the forecast for the quarterly unemployment rate. INDPROD is the forecast for the quarterly industrial production index. HOUSING is the forecast for the quarterly level of housing starts. RRINV is the forecast for the quarterly level of real residential fixed investment.

Table A5: MQ regressions of long term forecasts

on lagged dissent after March 2002

Predictions	Dissent coef. (β)
RGDP10	-0.140**
	(0.065)
PROD10	-0.173*
	(0.098)
STOCK10	-0.640**
	(0.269)
CPI10	-0.190***
	(0.029)
CPI5YR	-0.158***
	(0.041)

Standard-errors in (). *, **, ***, 10%, 5%, 1% significance.

RGDP10 is the forecast for the annual average rate of growth in real GNP/GDP over the next 10 years. PROD10 is the forecast for the annual average rate of growth in productivity over the next 10 years. STOCK10 is the forecast for the annual average rate of return to equities (S&P) over the next 10 years. CPI10 is the forecast for the annual average rate of CPI inflation over the next 10 years. CPI5YR is the forecast for the annual average rate of CPI inflation over the next 5 years.

Table A6: MQ regressions of short and medium term forecasts on lagged dissent before March 2002

	Dissent coef. (β)				
Predictions	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 5
RECESSION	0	-2.400	0	0	-5***
	(1.491)	(1.481)	(1.272)	(2.549)	(1.804)
AAA-TBOND	-0.025	-0.009	0.006	0.003	-0.064
	(0.022)	(0.036)	(0.044)	(0.047)	(0.049)
100 ln(PGDP)	0.048**	-0.036	-0.027	-0.086	-0.054
	(0.024)	(0.039)	(0.057)	(0.089)	(0.103)
UNEMP	3.18e-07	-2.05e-07	0	-6.99e-08	0.019
	(0.025)	(0.037)	(0.050)	(0.050)	(0.062)
100 ln(INDPROD)	0.134	-0.030	0.086	0.057	-0.242
	(0.086)	(0.129)	(0.179)	(0.200)	(0.236)
100 ln(HOUSING)	-0.699	0	0.580	0.817	0.825
	(0.691)	(0.829)	(0.885)	(0.902)	(1.026)
100 ln(RRINV)	-1.019***	-0.567	-0.241	-0.059	-0.234
	(0.231)	(0.381)	(0.511)	(0.648)	(0.814)

Standard-errors in (). *, **, ***, 10%, 5%, 1% significance.

RECESSION gives the probability of a quarterly decline in real GDP. AAA-TBOND is the forecast for the spread between Moody's AAA bonds and 10-year Treasury bonds. PGDP is forecast for the quarterly level of the GDP price index. UNEMP is the forecast for the quarterly unemployment rate. INDPROD is the forecast for the quarterly industrial production index. HOUSING is the forecast for the quarterly level of housing starts. RRINV is the forecast for the quarterly level of real residential fixed investment.

8.2 Bootstrap P-values for the differences between Dissent versus Unanimity and Dissent versus 0

Table A.7: P-values of the T-statistic for the difference in excess returns around a FOMC meeting with dissent relative to unanimity after March 2002

Index / Day	-2	-1	0	1	2	3
S&P	0.884	0.239	0.246	0.031	0.313	0.181
NASDAQ	0.916	0.340	0.399	0.099	0.414	0.510
DAX	0.884	0.293	0.148	0.095	0.200	0.157
FTSE100	0.597	0.362	0.351	0.068	0.270	0.248
CAC40	0.780	0.283	0.140	0.045	0.085	0.085
IBEX	0.677	0.359	0.084	0.011	0.056	0.075
SMI	0.888	0.245	0.206	0.072	0.252	0.312
98 FOMC events, 1000 bootstrap replicas						

Table A.8: Significance by decile and industry of the T-statistic for the difference in excess returns around a FOMC meeting with dissent relative to unanimity after March 2002

Number of deciles / Day	-2	-1	0	1	2	3
Nr of deciles significant at 0.01 level	0	0	0	8	0	0
Nr of deciles significant at 0.05 level	0	0	6	9	1	0
Nr of deciles significant at 0.10 level	0	6	8	10	8	7
Number of industries / Day	-2	-1	0	1	2	3
Nr of industries significant at 0.01 level	0	3	6	19	5	4
Nr of industries significant at 0.05 level	0	12	14	30	12	13
Nr of industries significant at 0.10 level	0	17	20	36	18	20
98 FOMC events, 1000 bootstrap replicas						

Table A.9: P-values of the T-statistic for the difference in excess returns around a FOMC meeting with dissent relative to 0 returns after March 2002

Index / Day	-2	-1	0	1	2	3
S&P	0.437	0.125	0.661	0.037	0.109	0.074
NASDAQ	0.849	0.189	0.789	0.399	0.772	0.880
DAX	0.720	0.139	0.518	0.252	0.367	0.277
FTSE100	0.788	0.162	0.765	0.051	0.349	0.353
CAC40	0.913	0.068	0.385	0.029	0.077	0.026
IBEX	0.371	0.023	0.165	0.015	0.028	0.059
SMI	0.697	0.048	0.270	0.032	0.303	0.303
98 FOMC events, 1000 bootstrap replicas						

Table A.10: Significance by decile and industry of the T-statistic for the difference in excess returns around a FOMC meeting with dissent relative to 0 returns after March 2002

Number of deciles / Day	-2	-1	0	1	2	3
Nr of deciles significant at 0.01 level	0	0	0	1	0	0
Nr of deciles significant at 0.05 level	0	6	0	10	1	1
Nr of deciles significant at 0.10 level	0	10	0	10	7	3
Number of industries / Day	**-2**	**-1**	**0**	**1**	**2**	**3**
Nr of industries significant at 0.01 level	0	2	1	6	1	0
Nr of industries significant at 0.05 level	2	14	3	25	11	11
Nr of industries significant at 0.10 level	5	32	4	32	16	12
98 FOMC events, 1000 bootstrap replicas						

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