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Abstract

This paper takes the effect of FOMC cycles as found by Cieslak et al. (2016) as a basis to find a similar effect of the ECB with respect to European markets. By examining several US equity indices, it can be confirmed that weeks in which FOMC meetings happen and even weeks thereafter are characterized by higher return than uneven cycle-weeks. Positive returns on FOMC meeting days are confirmed for several European indices, however, FOMC cycles are not found in the underlying sample. US returns are found to be higher five days before and eight days after ECB meetings for unknown reasons. The precise effect on the European equity market varies across nations and subperiods. Nevertheless, in contrast to the meeting days as such the 6th and 5th day before each meeting are characterized by mainly positive returns for all indices. Returns are moreover positive for the whole week preceding each meeting, which nevertheless seems to be mainly driven by the two aforementioned individual days. A simple pattern like the FOMC cycles with positive even week and negative uneven week return, however, could not be statistically confirmed for the European equity indices.

Zusammenfassung

Diese Arbeit nimmt das Phänomen der FOMC-Zyklen von Cieslak et al. (2016) zum Ausgangspunkt, um ähnliche Effekte der EZB auf europäische Märkte zu finden. Bei der Untersuchung mehrerer US Indizes kann bestätigt werden, dass in Wochen, in denen FOMC-meetings stattfinden und in jeder zweitfolgende Woche danach die Indexwertsteigerungen höher sind als in den restlichen Wochen des Zyklus. Auch für europäische Indizes ist ein positiver Effekt auf die Kursentwicklung an FOMC-meeting Tagen erkennbar, allerdings finden sich keine längerfristigen Auswirkungen. Die US Indizes wachsen fünf Tage vor und acht Tage nach EZB-Meetings aus unbekannter Ursache. Die Auswirkungen auf die europäischen Aktienmärkte schwanken je nach Land und Beobachtungszeitraum. Für alle Indizes sind Gewinne sechs beziehungsweise fünf Tage vor den Meetings zu verzeichnen. Eine Kurssteigerung findet für die ganze Woche vor dem jeweiligen Treffen nachweisbar statt, wobei die beiden eben erwähnten Tage eine entscheidende Rolle zu spielen scheinen. Dahingegen konnte kein einfaches Muster von wöchentlichen Schwankungen von Kursgewinnen und -verlusten, wie es die FOMC-Zyklen sind, für die EZB oder europäische Aktienmärkte nachgewiesen werden.

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Abbreviations

AMEX	American Stock Exchange
ATX	Austrian Traded Index (AUT)
CAC	Cotation Assistée en Continu (FRA)
DAX	Deutscher Aktienindex (DEU)
DJ	Dow Jones (USA)
ECB	European Central Bank
FDL	French Data Library (only in this paper)
Fed	Federal Reserve
FOMC	Federal Open Market Committee
FTSE	Financial Times Stock Exchange Index (GBR)
GDP	Gross Domestic Product
IBEX	Iberia Index (ESP)
MSCI	Morgan Stanley Capital International
NASDAQ	National Association of Securities Dealers Automated Quotations (USA)
NYSE	New York Stock Exchange (USA)
S&P	Standard & Poor's 500 (USA)
*/**/***	Throughout this paper */**/*** means significance at the 0.1/0.05/0.01 level

Introduction

Finance literature has discovered several phenomena over the past decades that challenge our concept of an efficient market. Various calendar effects like Monday-, January- or other effects contradict the well-known efficient market hypothesis by allowing us to make profits by trading simply based on publicly available information. The first papers that examine those effects in more detail were published in the 80ies of the last century. The following decades have produced an abundance of effects and literature, but the interest in the topic seems to have diminished over the years to such an extent that recent literature on those calendar effects can be called more than scarce. This goes hand in hand with the fact that some of these effects seem to have vanished after becoming known and well-defined, although contradicting views are also still present. Others seem to be very short-lived effects, that can only be exploited by high frequency traders specializing on arbitrage opportunities. Altogether, those calendar effects do not proof to be too interesting for the casual trader and for the average researcher anymore, since they are one the one hand too hard to exploit and on the other hand already too well-defined and analyzed by an abundance of better-known scholars. The initial idea behind this thesis was to test several of those phenomena on the Austrian equity market hoping that the rare species of market anomalies would have survived in a comparably small national market. Already the initial literature research revealed that this topic was not in the least interesting anymore for the present academic research literature. It became clear that a more recent topic had to be found. Fortunately, literature research also showed that old-fashioned calendar effects had already been replaced by a new class of effects.

In the early 2000s, a new category of research had begun to challenge the efficient market hypothesis. Researchers started to find out, that equity premia in the US market are mostly earned on days of various macroeconomic announcements like unemployment reports or the announcement of the GDP. One of the most prominent, which is also quite influential on the stock market, is the announcement that follows the scheduled meetings by a special body of the Federal Reserve, the FOMC (Federal Open Market Committee). (Ai & Bansal, 2016) Significantly positive returns on meeting days of this FOMC, which take place eight times per year and are well known to the public quite some time in advance, are confirmed by several authors even for the most recent years. Literature furthermore discovered an influence of those FOMC announcements on non-US markets including most national European and Asian equity markets. (e.g. Brusa et al., 2015 & Kroencke et al., 2017)

The simple increase in excess return on FOMC announcement days, or according to Lucca & Moench (2015) the 24h before the time of the announcement, is not the only thing that makes this new sort of calendar effect interesting for casual traders, beginning academic researchers and thus also this here thesis. Cieslak et al. (2016) go one step further and find an ongoing effect of weekly highs and lows in US stock returns following each FOMC meeting. The period that starts one week before each meeting, which is the first week of high return, usually lasts for six to seven weeks and is hereafter called FOMC-cycle. Those FOMC-cycles are neither limited to high frequency data, nor do we have an abundance of researchers examining it to every detail yet. This means that they represent a relatively "new" phenomenon that is quite a simple pattern and not yet researched in depth. Thus, it offers some freedom of investigative research, choice of methodology and a lot of unexamined markets. FOMC-cycles seem to be still present in the current stock market unlike most of the aforementioned elder market anomalies, that could almost be called historic effects already. Furthermore, they may be of relevance not only for financially strong, well-organized trading institutions but also for casual equity traders. Taken together, these facts seem to make the FOMC-cycles a perfect topic for a finance master thesis.

To define the exact aim of this paper, the initial idea of testing various calendar effects on the Austrian market should be recalled once more. Since the US background of this effect and thus the approach of most academic papers dealing with FOMC meetings too is rather distant to our European setting, the main idea of this thesis is to test the concept of the FOMC-cycles against the European peculiarities. For the announcement day as such, Brusa et al. (2015) have already done research and found significantly positive returns on those FOMC-meeting days in several European markets. Furthermore, they find that ECB (European Central Bank) announcement days are not characterized by such sharp return spikes. FOMC-cycles on the other hand have not been researched in European markets yet it seems. The first aim of this paper will therefore be to test this effect of FOMC-cycles for Europe as such and then on selected national European equity markets. But this will only constitute the first of several steps to shift the geographical focus from the US closer to Austria.

With the creation of the Eurozone, the already mentioned ECB has been established as an institution very similar to the US-Fed. As will be shown, it also holds regular meetings and issues policy decisions that may have a considerable impact on national stock markets. Its aim for stability of prices and sustainable growth are comparable to the dual mandate of the Federal Reserve, it also manages interest rates and is composed of members in similar positions – presidents of decentralized/national reserve banks. (Brusa et al., 2015) It will therefore be

treated as the FOMC's European counterpart in this thesis. Also, the thought may be raised that the stock market itself, its organization and institutions can play an important role for creating those cycles. Especially the degree to which national enterprises are internationally engaged including their dependencies on interest and exchange rates will probably affect their response to European or US central bank announcements. Since there is not one huge common European equity market yet but rather several national markets that operate independently from each other it would make sense to also use national indices for research.

To sum up the aim and structure of this thesis; This paper will first present the underlying concept of FOMC-cycles on which the whole research section of this work is based. For the purpose of conducting a comprehensible shift of geographical focus, both vital actors, the FOMC and the ECB will be analyzed and compared with explicit attention to their meeting regime. In the empirical part of this paper, the results of Cieslak et al. (2016) shall be replicated to test whether the methodology applied here leads to similar results. This means the influence of the FOMC meeting calendar on the US equity market shall be tested first. In the following step, the ECB's influence on the US market represented by the same dataset as used by the underlying paper shall be tested. The same thing will be done for one composite European series of returns. The main part then consists in finding out whether FOMC and/or ECB cycles can be found in national equity markets, represented by their respective stock indices. In the end, some adjustments of the model as well as some alternatives will be tested.

Background - *What are FOMC-cycles?*

The methodology applied in this work is more or less purely based on the research done by Cieslak et al. (2016)[1] in their paper "Stock Returns over the FOMC-Cycle". These FOMC-Cycles are a phenomenon the authors discovered by analyzing the mean return of the US stock market in the weeks after the regularly scheduled FOMC-meetings. The FOMC has been holding and still holds eight meetings each year followed by an announcement of their decision usually on the second day of the meeting. Time between those meetings and the exact date as discussed below are more or less random, which is a strong argument against a movement inherent to the stock market but for the existence of an independent anomaly. Furthermore, the findings can be replicated quite easily, since data is publicly available, the dataset is not too large for regular computers to handle and the model is easy enough to understand.

[1] The basis for this thesis is the June 12, 2016 draft of their paper, the most current one is from February 12, 2018. There are some minor differences like the omission of Figure 1 Panel B - which is given below - and the inclusion of recent literature and data. Nevertheless, the changes do not have any significant impact on the phenomenon as such or the main research question of this work.

While other researchers already found strong movements of prices on the days before the announcement (Lucca & Moench, 2015), Cieslak et al. (2016) consider a much longer impact on the stock market. They consider daily excessive log return over 30-day T-bill return for a sample of 5736 trading days from 1994 until 2015. At the beginning of their research, they calculate the cumulative 5-day return for every day before and after the meetings and interpret the plot of this calculation (given below in Figures 1 and 2) with return on the vertical and the cycle days on the horizontal axis. This will therefore also be the first step in this paper for every equity index later on. Each of these FOMC-cycles starts on Day -6 before the respective meeting and ends on Day -7 before the next meeting. Since this is on average Day 25, the last peak on the figures below will not be part of every cycle. For this paper's sample, there is one single cycle that lasts until a theoretical Day 35 and there are twelve observations for Day 33, which was chosen as the last cycle-day in the underlying paper.

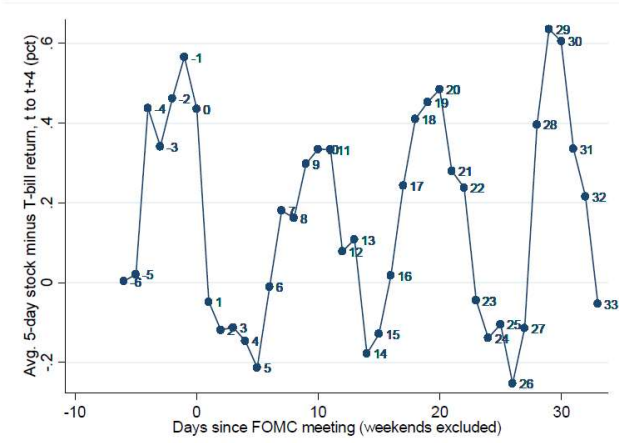


Figure 2: Figure 1 Panel A Average 5-day stock return minus bill return over the FOMC cycle, 1994-2015, percent Cieslak et al. (2016) p. 39

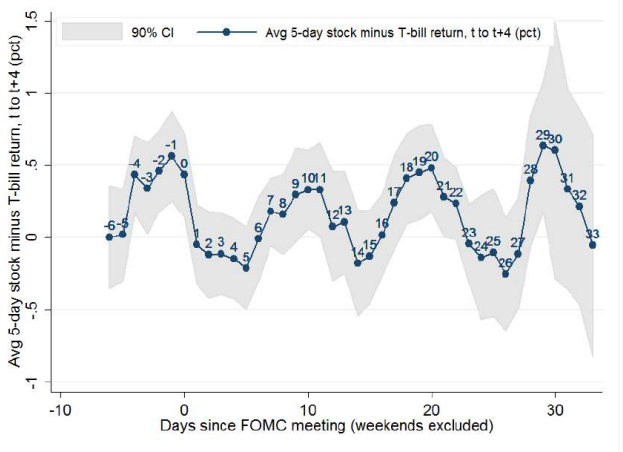


Figure 1: Figure 1 Panel B Average 5-day stock return minus bill return over the FOMC cycle, with 90 percent bootstrapped confidence band, 1994-2015, percent Cieslak et al. (2016) p. 39

After this visual introduction, Cieslak et al. (2016) start to group those returns by weeks. Those weeks, however, are not calendar weeks but rather describe groups of five trading days resetting at each announcement day. Thus, Week 0, which includes the announcement day, starts one day before, on Day -1, and ends three days after each announcement, on Day 3. Interpreting the figures above correctly, one can conclude that the weeks having the highest returns start at Day 29 and Day -1, which is probably – taken together with the findings of Lucca & Moench (2015) – the reason for this specific setting of the weeks with Week 0 starting on Day -1. Between meeting days, there are usually seven to eight of those cycle weeks. As mentioned above, there would have been two days in the sample theoretically belonging to the ninth week - i.e. Week 7 - which have been dropped in this work and in the underlying paper.

This second step of grouping the return by weeks – which basically means looking at the 5-Day return of the first day of each cycle-week – now finally reveals the main finding of the paper. While the return for even weeks of the FOMC-cycle (i.e. Week 0, 2, 4 & 6), is on average positive, return in uneven weeks, e.g. the weeks before and after the week including the FOMC meeting, is on average negative.

To support the thusly formed hypothesis of positive even-week and negative uneven-week-return, Cieslak et al. (2016) perform several regressions of daily return on week dummies. The results given in the table below show that return in even weeks is positive and significantly higher compared to return in uneven weeks. For this here thesis the same step is also vital and will be used as the main methodology to derive conclusions for the European markets. In the further course of the underlying paper, Cieslak et al. (2016) also show that this finding holds for several subperiods although statistical significance may decrease for some of the even cycle-weeks at the end of the observed period. The same hypothesis is then confirmed for several composite MSCI indices like the emerging markets index, which are also available on the French Data Library. However, results for Europe or Japan are not calculated or at least not shown although data would have been available for those on the same homepage too. One simple explanation could be that neither Europe nor Japan show any signs of FOMC cycles in their daily return patterns, which will be proven for Europe in the course of this work.

Panel A. Main sample: 1994-2015

	Dependent variable: Excess return on stocks over T-bills	
	(1)	(2)
Dummy=1 in Week 0	0.138***	0.138***
	(3.00)	(3.00)
Dummy=1 in Week 2, 4, 6	0.106***	
	(3.03)	
Dummy=1 in Week 2		0.083*
		(1.88)
Dummy=1 in Week 4		0.117**
		(2.37)
Dummy=1 in Week 6		0.201**
		(2.21)
Constant	-0.024	-0.024
	(-1.17)	(-1.17)
N (days)	5736	5736

Table 1: Table 1 Panel A Regressions of daily excess US stock returns on FOMC cycle dummies as given in the underlying paper

"The definition of weeks in FOMC cycle time are: Week -1: Days -6 to -2. Week 0: Days -1 to 3. Week 1: Days 4 to 8. Week 2: Days 9 to 13. Week 3: Days 14 to 18. Week 4: Days 19 to 23. Week 5: Days 24-28. Week 6: Days 29-33. t-statistics robust to heteroscedasticity are in parentheses. The left-hand side variable is in percent, so (for example) 0.1 means 10 basis points per day. Holidays and these day are included with returns set to zero, but regression results are almost identical if holidays are instead dropped. (…) ***/**/* indicates significance at the 1/5/10 percent level." Cieslak et al. (2016) p. 46

The last and largest part of the underlying paper by Cieslak et al. (2016) tries to identify the reasons behind this phenomenon and raises some hypothesis. The first of those hypothesis is the so-called "Fed-Put", which is also the main topic of another recent paper by two of the three authors (Cieslak & Vissing-Jorgensen, 2017). This "Fed-Put" describes a mean reversion of returns in even weeks, or in other words, whenever there has been a period of low returns, the Federal Reserve seems to react with an accommodating policy resulting in a period of positive stock returns. This phenomenon is found to be responsible for the majority of realized stock returns over their sample period. They furthermore rule out that the FOMC calendar just lines up with reserve maintenance periods, earnings announcements or other important macroeconomic news calendars. Also, they find that meetings of the Board of Governors of the Federal Reserve positively influence return if they take place in even weeks. Finally, it is found that none of the public release instruments of the Fed seems to be responsible for abnormally high even week return, although some of them do have an impact on return as such. However, there is evidence in favor of informal communication channels. Therefore, it is concluded that the even week pattern is mainly driven by information leakages about board meetings to the media and private investment enterprises.

Replicating this final but crucial part of the underlying paper for the European setting, however, would by far exceed the means and scope of this master thesis. Not only do we have several national markets characterized by individual reactions to central bank actions, but also seemingly unsurmountable language barriers. There could also be systematic effects inherent to each national stock market playing a role for the return calendar. This means one would also have to find a macroeconomic release calendar for every single European country and to identify communication channels of ECB board members to their respective home-country. Altogether, this limits the scope of this here work to the possible verification of weekly patterns of European and US equity returns following a central bank calendar scheme. Proving the linkage between the institution and the stock market as well as identifying possible information channels on the other hand will have to remain an open task for future research. What can be done on the other hand is describing the two central institutions of this paper as precise as possible and necessary which will be the topic of the next section.

FOMC meetings

"*The Federal Reserve, the central bank of the United States, provides the nation with a safe, flexible, and stable monetary and financial system.*"[2] To this end, the Federal Reserve controls besides the national discount rate and reserve requirements also open market operations. These open market operations basically mean the buying and selling of publicly available securities by the Federal Reserve. As those operations can have a considerable impact on the economy as such, changes in the Fed's open market policy and funds target rate are observed closely by market participants. Effects on the stock market actually represent only a part of the possible consequences of Federal Reserve decisions. Other possible economic changes would be those in foreign exchange rates, long-term interest rates and also employment rates.[3] This may explain why Fed meetings are quite a popular topic for academic literature, although the exact approach tends to vary a lot form paper to paper. In this here work, the main focus will simply be on the date of those meetings, completely disregarding the actual content, outcome, wording of the announcement or anything else about the meetings themselves. Other literature for example tries to identify the role of central bank communication tone on asset prices (Schmeling & Wagner, 2015), or tries to infer stock market reactions from qualified communication about the latest FOMC measures (Azar & Lo, 2016).

The Fed's decision-making body with regard to those open market operations is the Federal Open Market Committee (FOMC) that has already been mentioned several times so far. For the discount rate and reserve requirements on the other hand, the board of governors is in charge. Research usually concentrates on the scheduled meetings of the FOMC, disregarding other communication channels or other board meetings. The FOMC as such is composed of twelve members. Seven of those are the board of governors of the federal reserve system, the others are presidents of regional reserve banks on a rotating basis. The currently nonvoting regional reserve presidents also participate in meetings and discussions.[4] Altogether there are 12 regional reserve bank presidents. Disagreement, dissenting opinions and voting behavior of the FOMC members have already been studied for example by Lähner (2015). However, this research as well as the ones mentioned before about the tone of announcements and social media communication only care about immediate effects on the stock market. Mostly, only the effect on the announcement day itself it observed (e.g. Lucca & Moench, 2015 or Bernile et al., 2016) in contrast to the underlying research that examines the whole period between meetings.

[2] Homepage of the Federal Reserve, *https://www.federalreserve.gov/* , 22/01/2018
[3] Homepage of the Federal Reserve, *https://www.federalreserve.gov/monetarypolicy/fomc.htm* , 22/01/2018
[4] ibidem

For several decades already, the FOMC has been holding 8 scheduled meetings per year, where it determines the Feds monetary policy for the next few weeks. Those meetings are closely observed by market participants and various effects on the stock market in terms of price, return, volatility and others seem to be closely related to the meetings in terms of timing. (Azar & Lo, 2016 or Kurov & Gu, 2016) Bollerslev et al. (2017) for example discover jumping volume and volatility at the exact time of FOMC announcements. Lucca & Moench (2015) on the other hand find that the whole profit of the FOMC cycle Week 0 is earned prior to the FOMC statement which follows each meeting usually around 2.15 pm. Bernile et al. (2016) also find a positive FOMC pre-announcement return growth. Ai & Bansal (2016) state that excessive returns on FOMC and other macroeconomic announcement days taken together have been as high as the whole respective annual return for the latest two decades. The exact reasons and ways of interdependency between the meetings and corresponding announcements on the one and the reaction of the stock market on the other hand still remain unknown though, which applies even more to the FOMC cycles.

Cieslak et al. (2016), therefore, look at the different channels of information releases that are used by the FOMC and conclude that neither the announcement as such nor the minutes released a few weeks after each meeting can be considered responsible for FOMC cycle returns. Rather than that, they argue that informal communication with media and private financial institutions leads to this biweekly movement. As mentioned before, this part constitutes a large portion of their paper, however, the purpose of this work is rather to find out whether this effect also exists in Europe and not why it may be there. Another problem may be that in Europe we do not have one common language of communication and also many more possible individual national interests represented by the members of the ECB's decision-making body. Therefore, it makes sense to look at different national stock markets since informal communication and thus also the reaction to ECB decisions may vary across countries.

The FOMC calendar as such. Usually the FOMC meetings are 2-day meetings nowadays taking place from Tuesday to Wednesday with the announcement of results on the second day of the meeting. At the beginning of our sample, however, meetings used to be for one day only, just Tuesday. Until 2005 only the January and June meetings were 2-day meetings, then October was added as another one. In 2009 all meetings lasted for two days, which has been the standard from 2013 until today. The meetings are scheduled well in advance, meaning that meeting dates of the upcoming year are already known to the public. Although it is often true that the meeting dates just shift by one number each year (e.g. 2009 to 2011), frequent jumps in date make it unlikely for FOMC cycles to be a plain-vanilla-calendar phenomenon.

The time between following meeting days varies quite a lot. There is a minimum of 24 and a maximum of 42 trading days between announcements. On average, there are about 33 trading days between two announcement days with a standard deviation of 3.8 days. In terms of the underlying paper, this would translate into an average of 6,6 FOMC cycle weeks. Since the count in all the models starts before the actual meeting day, it means an average FOMC cycle goes from Day -6 until Day 25. Always starting in Week -1 the cycle will usually end in Week 5. There are eleven cases where we have a full eighth week which would translate into Week 6 lasting until Day 33. The one and only case where we have a theoretical Week 7 including Days 34 and 35 is treated as an outlier by Cieslak et al. (2016) for good reasons. The exact meeting dates for this paper's sample period can be found in the Appendix.

ECB meetings

Trying to apply the methodology of Cieslak et al. (2016) to the European stock market means at first identifying an institution that plays a comparable role to the FOMC in the USA. This means it would have to affect all or at least several national equity markets by making monetary policy decisions including for example open market operations or interest rate setting. At least for the 19 European countries that are part of the eurozone this institution should be the European Central Bank (ECB). Its primary goals are similarly to the Federal Reserve price stability and if possible sustainable economic growth for the eurozone. For that purpose, it regularly decides on one common monetary policy strategy for all of the 19 eurozone members. (Ulrich et al., 2017) But not only the main purposes of the two institutions are very similar. Also in terms of academic research there are quite similar approaches for both FOMC and ECB meetings to be found. Pre-Announcement return, post-announcement volatility and tone of communication have been examined for both institutions. (e.g. Sager & Taylor, 2004 , De Haan, 2008 or Brand et al., 2010) From the academic point of view and the main goal of price stability, the two institutions can therefore be considered their US/European counterpart.

The decision-making body of the ECB is called Governing Council and is composed similarly to the FOMC. It consists of the six ECB Executive Board members as well as the governors of the national central banks of the 19 eurozone member states. The national central bank governors share voting rights depending on the size of their economies and respective financial sectors and take turns using their rights on a monthly basis, which can be seen as another similarity to the FOMC voting structure.[5]

[5] Homepage of the ECB: *https://www.ecb.europa.eu/ecb/orga/decisions/govc/html/index.en.html* & *https://www.ecb.europa.eu/explainers/tell-me-more/html/voting-rotation.en.html* , 23/01/2018

Compared to the Federal Reserve, the ECB is quite a new institution. It has been created in 1998 and is operating since 1999, a time at which the FOMC had already been holding its eight annual meetings for decades. From the very beginning the ECB used to hold – at least many sources say so – biweekly meetings, although it may be easier to say two meetings per month. This results in 24 monetary policy decisions for the years 2000 and 2001 and 23 for 1999, its first year of operation.[6] This three-year-period is therefore very problematic for the research topic of this thesis, since we only have ten trading days between meetings, which would only be enough for two possible ECB-cycle-weeks (-1 and 0) according to the underlying model. For the next period from 2002 onwards until the end of 2014, the policy was adopted to announce decisions only at the end of the first out of the two monthly meetings – with one exception in 2008. Therefore, we get twelve monetary policy decisions per year from 2002 until 2014, notwithstanding the fact that the ECB was still holding 24 biweekly meetings per year. (compare: Sager & Taylor, 2004) For the last three years of the period of observation, the ECB has switched to holding two non-monetary policy meetings followed by one monetary policy meeting, which results in eight decisions and corresponding announcements per year, which is now equal to the number of FOMC meetings. All of the meetings since 1999 have taken place on Thursdays with only a few exceptions that took place on a Wednesday. They are always followed by a public announcement of the decision at 13:45 CET. Then at 14:30 CET the president of the executive board reads a public statement explaining the reasons for the specific decision, which is closely observed by the public. (Ulrich et al., 2017)

After the theoretical part about the ECB meeting calendar a few facts shall be presented to facilitate comparison to the FOMC calendar. After reconstructing the ECB meeting schedule from monetary policy decision releases found on the official homepage of the ECB some minor inconsistencies of the meeting schedule appeared. Because one year has 52 weeks, it is not possible to adhere to a strict pattern of biweekly meetings. Neither is it completely correct to speak of two meetings per month, since there have been for example three meetings in March and September 2001, but only one meeting in November and December. For the second part of the calendar we have two inconsistencies in the years 2003 and 2006, but from 2009 onward there is precisely one meeting per month. As already mentioned above, several meetings did not take place on a Thursday. However, the ECB's meeting calendar is way more consistent compared to the FOMC calendar, which is characterized by quite a variation in announcement-weekdays also due to the switching between one- and two-day meetings.

[6] The released monetary policy decisions and corresponding dates were obtained from the ECB's webpage: *https://www.ecb.europa.eu/press/pr/date/2017/html/index.en.html* , 23/01/2018

The numerical facts presented now should further show how the FOMC and ECB meeting calendar still tend to differ although both hold eight meetings per year now. For the first part of the meetings calendar from 1999-2001 a mode of 14 calendar days between meetings is not very surprising due to the biweekly meeting pattern. Since there are a few weeks without a meeting, the mean is a bit higher being 15,2 and we have a standard deviation of 4,1 days. The shortest period between meetings has been four days, from Thursday to Monday, which equals a difference of just two trading days in September 2001. In those very rare cases where one meeting date would already belong to the next ECB-cycle it was just assumed that the effect of the upcoming meeting would overrule the last meeting. Thus, we have some meeting days that are already part of the next cycle and thus not Day 0. From 2002 until 2014 we have four weeks in between meetings in about two thirds of the cases and five weeks in about another third. The minimum of three and the maximum of six weeks can be found six times each. Translated into the basic model it means that for the largest part of the observation period the ECB cycles end around Day 13 in cycle-time. This further translates into a full Week 2 in most of the cases and quite a few observations of Week 3 too. In this second part of the sample there are still some meetings that took place on Wednesday and not on Thursday.

For the last three years of the sample with eight scheduled meetings per year - like for the FOMC - the time between the meeting dates is not very surprisingly quite similar for both calendars. Since we have a bit more variation due to changing weekdays for the FOMC, the standard deviation is lower for the ECB. Another fact lowering the standard deviation is that we have either 30 or 35 trading days between meetings, while FOMC-cycles could be shorter or longer too. This also means that there has never been a Week 6 in any ECB cycle. On the other hand, all of the cycles include Week 5, which is missing in some of the FOMC-cycles. Furthermore, it seems worth to mention that ECB and FOMC meetings have never taken place on the same day from the establishment of the ECB until today. There have been usually four or nine trading days between ECB and FOMC meetings for the last three years. This also means that ECB meetings will take place both in even and uneven weeks of the FOMC cycle and vice versa. Any discovered ECB effects are therefore most likely genuine effects and not FOMC relics. The ECB meeting dates for this paper's sample period can also be found in the Appendix.

Data

The initial idea has been to follow the approach of Cieslak et al. (2016) as closely as possible. However, with regard to the dataset we already have to accept some deviation. The underlying paper uses publicly available daily log returns taken from the French Data Library[7]. Those returns are the value weighted returns of US firms listed on NYSE, AMEX or NASDAQ minus the one-month treasury bill rate obtained from a private source. The same website also provides daily stock return for Europe minus – for whatever reason – the US T-bill return. Interestingly the risk-free rate is given with three digits after the comma for the US and rounded to two for Europe, which makes it 0 in Europe from October 2008 onwards. Since the risk-free rate does not change too much over long periods of time, the serious question may be raised whether it really plays a role for weekly return patterns.

To come closer to the initial idea behind this paper, which has been to discover effects on national stock markets, we have to find an alternative for the French Data Library. Therefore, daily index prices are obtained from Thomson Reuters Datastream for several countries. Dow Jones, NYSE, NASDAQ and S&P have been chosen as proxies for the US stock market and ideally the general outcome for those indices should be similar to the results for the FDL sample. The European indices chosen for this paper are the DAX, CAC, FTSE and IBEX as well as the ATX for minimalistic academic patriotism. The FTSE has been included although the UK are not a member of the eurozone since they are nevertheless one of the most important economies in Europe. One could therefore raise the hypothesis that ECB monetary policy decisions should have an impact on eurozone member indices but they should have a weaker effect on the FTSE since the UK are a European country but use the Pound and not the Euro.

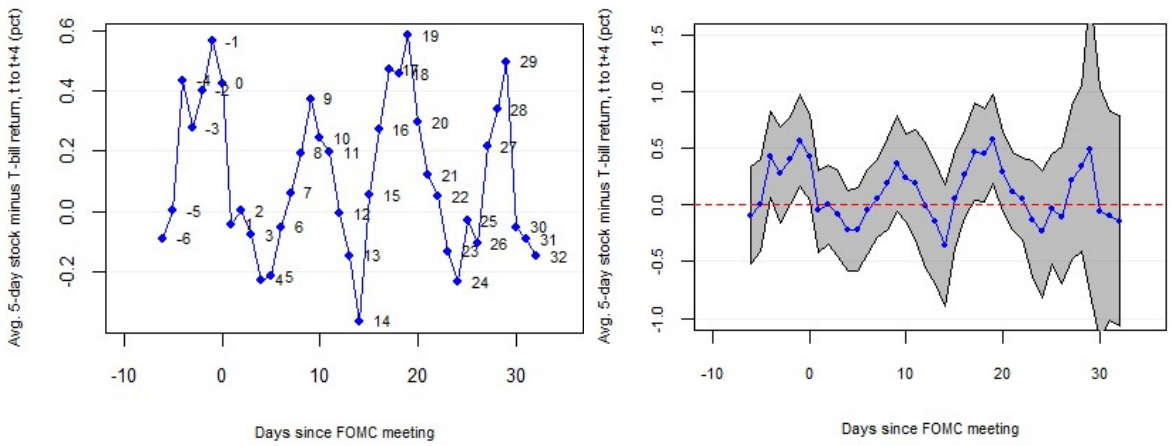
The period of observation for this thesis starts on the 1st of January 1999 and ends on the 31st of December 2017 due to the relatively late establishment of the ECB compared to the FOMC. Thus, we get a number of 4957 observations or trading days per index which means we have a rather mediocre sample size. The number is a bit smaller for the French Data Library samples since at the point of creation of this thesis the up-to-date European samples ended in May, those for the US ended with the last day of October. The returns which are calculated in this paper using index prices are log returns. Data on 30-day T-bills is not available over the whole period of observation and for some countries there is no such individual bond available at all. Thus, this work does not use excessive but only simple equity return.

[7] French Data Library (FDL): *http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html* 24/01/2018

Replicating US results

The following section deals with replicating the findings of Cieslak et al. (2016) for the deviating sample-period of this paper. This first empirical step is conducted to make sure that the functions and formulas applied create results that are comparable to the underlying paper. This means it should be made sure that the calculations of this thesis do not suffer from any systematic errors leading to wrong conclusions about the European market later on. Since Cieslak et al. (2016) did start with a plot of 5-day return over the FOMC-cycle, went on to calculating weekly returns and then regressed daily returns on week dummies, this approach will also be followed in this here section and after that in the later course of this work. For confirming the original results for this paper's sample period as well as the tests on the European market, data from the French Data Library is used in this section. The original sample period has been 22 years long from 1994 to 2015. In this here thesis, the period of observation is 19 years long, starting 5 years later but including 2 more recent years.

Figure 3: Average 5-day US log return over the FOMC-cycle. Starting on Day -6 going until Day 33, 4724 observations from 1999-2017, percent, FDL sample, with 90% bootstrapped confidence band in the right panel



Plotting the average 5-day log excessive stock over T-bill return for the FOMC-cycle is the first step. This is done for the alternative sample period from 1999-2017 and reveals patterns very similar to those found in the underlying paper given in Figures 1 and 2 on page 5 of this work. The average return is given in (log) percent on the vertical, the days since the last FOMC meeting are given on the horizontal axis. One can identify four pronounced return spikes, meaning that the high even-week return is also present for the alternative period of observation and the timing seems to be the same. For the simple plot of returns the overall picture speaks in favor of the comparability of approaches. For the confidence interval we see that our alternative results lack significance for the second and the last returns spike, but this could be due to slight differences in methodology that cannot be completely inferred from the underlying paper.

Therefore, weekly return should be calculated as the next step. The weekly average 5-day returns for the underlying paper and this thesis are given in the table below and confirm the conclusions drawn from comparing the plots. Although the exact numbers are again a bit different – especially for the last weeks with lower numbers of observations per week – the pattern of even highs and uneven lows stays the same for both samples. Thus, it seems safe to assume that these two steps can be applied to the European samples hereafter as well and will lead to meaningful results.

	Cieslak et al. (2016) (1)	**Replication (2):**
Main sample:	**1994-2015**	**1999-2017**
Return per week:		
	(1)	**(2)**
Week -1	0	-0.09
Week 0	0.57	0.56
Week 1	-0.15	-0.22
Week 2	0.30	0.37
Week 3	-0.18	-0.36
Week 4	0.45	0.58
Week 5	-0.14	-0.23
Week 6	0.64	0.50

Table 2: Average 5-day log return for FOMC-cycle weeks. Day 0 marks FOMC announcement days. Week -1 starts 6 days before each meeting and ends on Day -1. Thus, average Week 0 5-day return means average return from Day -1 to Day 3. Values from the underlying paper in the first column, those from this paper in the second column. Both papers use excessive log returns obtained from the French Data Library.

Regression on week dummies:		
	(1) 1994-2015	**(2) 1999-2017**
Dummy=1 in Week 0	0.138***	0.150***
	(3.00)	(2.94)
Dummy=1 in Week 2	0.083*	0.111**
	(1.88)	(2.19)
Dummy=1 in Week 4	0.117**	0.148***
	(2.37)	(2.73)
Dummy=1 in Week 6	0.201**	0.113
	(2.21)	(0.72)
Constant	-0.024	-0.037
	(-1.17)	(-1.52)
N (days)	5736	4739

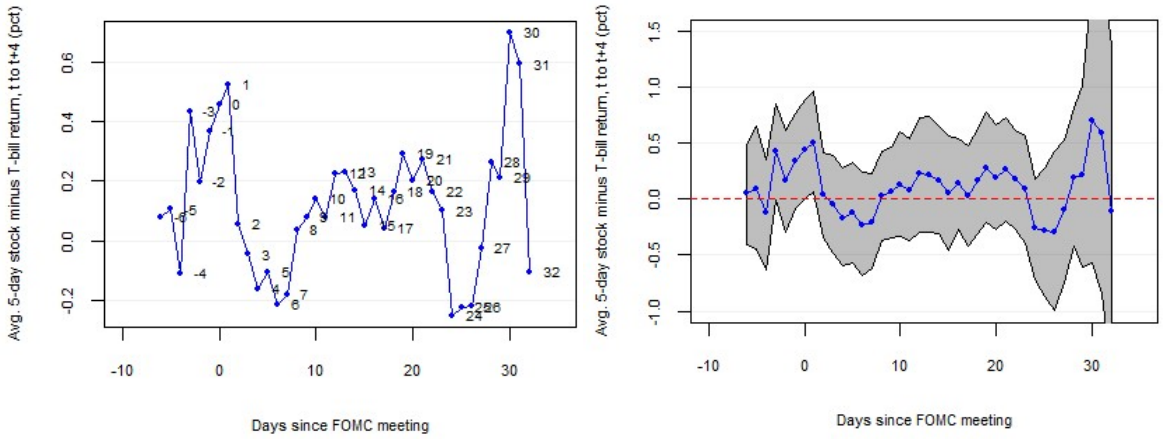
*Table 3: Regression of daily log return on even Week dummies. Daily excessive log return from the FDL is used in both models. (1) means Cieslak et al. (2016), (2) are this paper's results. */**/*** indicates significance at the 0.1/0.05/0.01 level. Week 0 starts 1 day before each FOMC announcement and ends on Day 3 of the FOMC-cycle. Weeks last for 5 trading days.*

To statistically verify those results derived from interpreting the plot and average weekly returns, a regression of daily return on dummies representing FOMC-cycle weeks is conducted in a way similar to Cieslak et al. (2016). They apply two models, one of them includes two dummies, one for Week 0 and one for the other even weeks (2,4 and 6), the other one has one individual dummy for each of those even weeks. The results of the regressions are almost the same for this thesis and for the underlying paper with the exception of Week 6, which has a positive yet not significant effect on returns. Since there are only 62 observations for Week 6 and the sample period changed quite a bit, this aberration is most likely due to the dataset and not due to the methodology. To sum it up, returns in even weeks are found to be significantly higher and positive compared to uneven weeks. This also holds for the individual week dummies except for Week 6. The replication of the underlying results can therefore be called successful and thus the methodology that has been applied in this section will also be used for the rest of the thesis.

European equity returns

As a second step, the methodology that has been tested by replicating the underlying paper's results will now be applied to the second dataset that was taken from the French Data Library, daily excessive European stock market returns. As already mentioned in the section about the Data itself, returns for Europe are only available up to May 2017 and the risk-free rate is the same as for the US. The main conclusions of this thesis will therefore be drawn using the results for national index data. This chapter is intended to help identifying effects common to all national stock markets, meaning whether European equity markets as such move in accordance to the FOMC-cycle or not. However, already at the initial step, the plotting of 5-day returns, interpretation speaks against such an effect. Although some even FOMC-cycle weeks are characterized by high returns quite similar to the US market, the other weeks' returns spikes are not very pronounced in Europe. On the other hand, there might be a significant effect around the announcement day. At this point it is of course too early to jump to any final conclusions, but the righthand panel on the following page speaks against a FOMC-cycle effect on the European stock market. In other words, apart from the days before each announcement, the confidence band does not really move out of the middle, rendering most aberrations in returns insignificant. Calculating average weekly return thereafter gives ambiguous results. Although there are positive average returns to be found in all even weeks of the FOMC-cycle with a maximum of 0,54 in Week 6 and 0,46 in Week 0, slightly positive returns can also be found in weeks -1 and 3. Only week 1 and 5 are characterized by negative average returns.

Figure 4: Average 5-day excessive log return for the European FDL sample. 1999-2017. Day 0 marks FOMC announcement days. The vertical axis shows log return in percent. The right panel includes a 90% bootstrapped confidence band



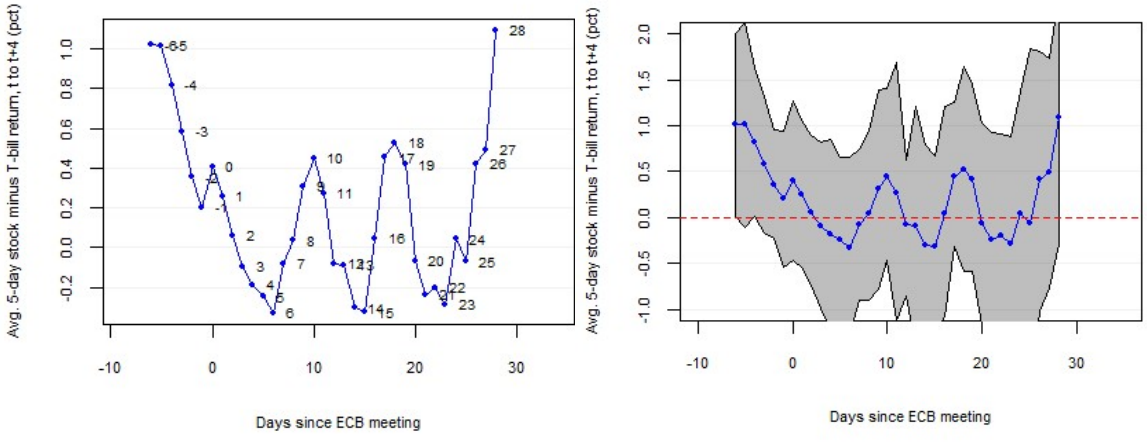
To statistically answer the question whether returns in even weeks of the FOMC-cycle are significantly higher than those in uneven weeks on the European equity market too, the same regressions as have been performed for the US sample are repeated. This means again two models with first two dummies for Week 0 and the other even weeks and another model with four dummies for each even cycle-week. Additionally, there are two regressions with one dummy each, one for Week 0 and one for Day 0. Those regressions reveal that while returns in Week 0 are indeed significantly positive and higher than in the other weeks of the cycle, none of the remaining even weeks was found to have any significant impact on European stock returns. On the other hand, FOMC announcement days as such have a significantly positive impact on European stock returns. Day 0 is characterized by higher and significantly positive returns compared to all other trading days of the cycle. The coefficient is even larger than for the US market. This finding is also in line with the research done by Brusa et al. (2015). This said paper also provides a table that takes differences in local time into consideration to find out on which actual day or trading day relative to the meeting day any possible FOMC effect would have to take place. They argue that FOMC meetings will affect the European market on the same day. Therefore, the methodology used for the US market was applied to the European market without any changes. This timing is now also supported by this paper's genuine findings. Given that average even week return was nevertheless positive and Week 0 return even significantly positive, it can be argued that one could have made a profit on European markets using the same trading strategy as for the US equity market. However, since a weekly pattern of high and low returns was not supported by any analysis, the conclusion must be drawn that although there is some relationship between FOMC meeting dates and European returns, the European market does at least not move in the same FOMC-cycles as the US market.

Testing ECB meeting influence on US and European equity return

After showing that the US equity market moves in accordance to the US central bank calendar and the European market does not, it should be tested whether the European market moves according to the European central bank calendar. For this task, there is some preliminary differentiation that should be made before going on to hypothesis testing. As explained before, the FOMC has been holding eight meetings per year for several decades already. The ECB on the other hand has been established just 18 years ago and modified its rate of monetary policy meetings twice. Therefore, what we get is quite a segregated calendar for ECB meetings. This may affect a possible cyclic movement, since as shown in the section about the ECB calendar, the time between meetings is quite short for the majority of the sample period and of more constant length compared to the FOMC meeting schedule. Testing will therefore be done for the main sample from 1999-2017 as well as subsamples representing different meeting regimes.

Loosely following Cieslak's et al. (2016) approach the first step consists in trying to derive some general idea from a graphic illustration of returns over the possible ECB cycle. Like it has already been done for the FOMC-cycle, average return from Day-t until Day-(t+4) is calculated for every day of the ECB cycle starting on Day -6 with Day 0 marking ECB announcement days. This is done for both the US as well as the European return series. Since the frequency of meetings is not the same over the whole sample period, the average length of the ECB cycles changes over time. Overall, one has to admit that for the main sample as well as the earlier two subsamples there is no cyclic movement to be derived from the graphs. At least none that would be as obvious as the FOMC cycles. There are highs and lows for the European as well as for the US stock market but it is not possible to derive any regularity or significance from the plots. The plot with the most visible pattern in return for the European equity market is given in the figure below.

Figure 5: Average 5-day European stock minus T-bill return obtained from the FDL over the ECB cycle in log percent 2015-2017, right panel with 90% bootstrapped confidence band



For the last part of the sample, when the ECB meets eight times per year to discuss its monetary policy, the graph starts to show a cyclic pattern, which is more or less similar to the one of the FOMC cycles. Nevertheless, none of the returns spikes seem to be significant, however, judging from the confidence band, one could argue in favor of positive returns for the first days of the ECB-cycle. The methodology applied in the replication section is therefore continued to detect a possibly significant influence of the ECB. This means calculating average weekly return for each of the possible ECB cycle weeks. One problem with this step may probably be to use the same timing as for FOMC- cycles weeks. Problems like this one, however, will be addressed in the section about possible alternative models. The aim of this chapter is simply transferring the concept of FOMC-cycles to the European settings. This is done step by step and the current step consists in changing FOMC to ECB meetings. Average weekly returns do reveal any pronounced characteristics like positive even and negative uneven week return either. Over the full sample period it just seems that profits were made in the weeks before the announcement days and from Week 0 onward we mainly have negative average returns. Calculating average weekly return for sub-periods with respect to the various meeting frequencies just further indicates that there are no cyclic movements caused by the ECB. Thus, the underlying model may be a good fit for the combination of FOMC meetings and the US market, however, it fails to describe the influence of the ECB on the equity market, if there is any. For the last subperiod characterized by eight annual monetary policy meetings the situation is again a bit different. During the last three years, returns have in general been high for even and negative for uneven weeks on the European equity market. Nevertheless, the highest average weekly return can be found in Week -1. This phenomenon of high pre-announcement-week returns can also be found on the US equity market and thus it still remains unclear whether there is really any ECB announcement effect or just numerical coincidence.

Table 4 Average 5-day European stock return in log percent, 2015-2017, Week -1 starts on Day -6, Day 0 marks ECB announcement days, each week lasts for five trading days

2015-2017	**Average European weekly return**
Week	Avg. Return
-1	1.0173684
0	0.2031579
1	-0.1868421
2	0.3073684
3	-0.3031579
4	0.3011111
5	-0.3260000

Like it was done in the replication section all those assumptions will therefore be backed up by regressing daily excessive log returns on various week and cycle-day dummies. This is again done for the full sample as such as well as for the three subsamples with respect to ECB meeting frequency. As plots and calculation of average weekly returns already indicated, those regressions further confirm that there are no statistically significant ECB weeks to be found for the US stock market. It can thus be safely concluded that the US equity market moves in a cyclic weekly pattern depending on the FOMC calendar but independent from the ECB meeting schedule. Using dummies for each cycle day on the other hand indicates that there is a significantly positive effect on US-return on days -5 and 8 as shown in Appendix 7. Thus, one should not conclude that the timing of ECB meetings has no whatsoever effect on US stock returns. Maybe those two days line up with some other influential US macroeconomic release schedule, nevertheless, it may be worth to mention that they coincide with FOMC announcements as such only 13 out of more than 400 times and have equally likely been part of even as well as uneven weeks of the FOMC cycle. This effect however seems to change in magnitude depending on the subperiod and will therefore be examined in more detail when looking at individual index returns in the following part of this paper.

For Europe, the situation is a bit more complicated. There is not a single week for any of the three subsamples that shows an effect which would be significant on a 5% level. However, Week -1 is significantly positive at the 10% level from 2002 onwards. Furthermore, Week 3 has significant positive returns for the middle sample period from 2002 until 2014. In the end one has to nevertheless admit that ECB cycle weeks are not significantly different from each other when it comes to daily return. Even for the latest subsample, that has shown something like a cyclic pattern in the plot and average weekly returns, none of the other coefficients is very large or significantly different from zero. The conclusion that has to be drawn from this part, therefore, is that the common European equity market return neither moves in weekly ups and downs dependent on the FOMC meeting schedule, nor does it move in accordance to the ECB meeting schedule. One possible hypothesis, that national European markets do react to the ECB but each in an individual fashion, will be the topic of the next section. The argument that the sample – especially with respect to the latest change in the meeting regime of the ECB – is not large enough for any effect to show is not flawless. Even for the short period of the last three years one can find a significantly positive effect of even FOMC-cycle weeks on the US stock market.[8]

[8] Cieslak et al. (2018) use a subsample from 2014-2016 in their current draft. Here, index return from 2015-2017 was used. It has to be mentioned at this point that although even week returns are still positive across all indices, the announcement day effect as such has disappeared, probably because it is already too well known not to be exploited.

*Table 5: Regression of daily excessive European log return on ECB-cycle-week dummies in two different models. The first one has two dummies, one for Week 0 and one for the other even weeks (2 and 4) the second model has one dummy for Week -1, for the sample period form 2002-2014 a separate Week 3 dummy was added. Coefficients are given in the first lines, t-values in parenthesis in the second line. */**/*** indicates significance at the 0.1/0.05/0.01 level. Week -1 starts on Day -6 before each ECB announcement, Week 0 starts one day before on Day -1 and ends on Day 3. Each week lasts for five trading days.*

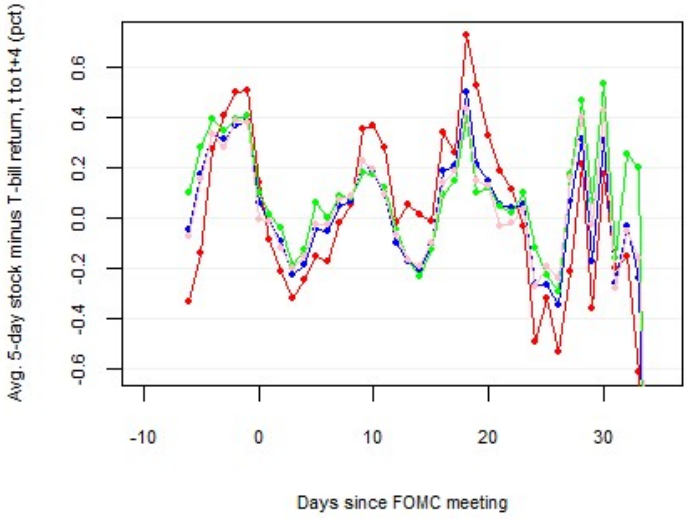
	Main sample	**1999-2001**	**2002-2014**	**2015-2017**
Constant	0.03758	-0.03401	0.05821*	0.01540
	(1.522)	(-0.602)	(1.886)	(0.272)
Week 0	-0.02537	0.01590	-0.03233	0.02523
	(-0.581)	(0.191)	(-0.572)	(0.209)
Even Weeks	-0.04651	-0.12039	-0.07556	0.05471
	(-0.995)	(-0.517)	(-1.334)	(0.578)
F-statistic	(0.5394)	(0.173)	(0.9072)	(0.1683)
Constant	0.01159	-0.008309	0.004171	0.005646
	(0.552)	(-0.150)	(0.152)	(0.125)
Week -1	0.03855	-0.049370	0.075395	0.197827*
	(0.929)	(-0.602)	(1.384)	(1.709)
Week 3			0.148282*	
			(1.746)	

To sum it up, one can only conclude that the US model does not explain the relationship between ECB meetings and the movement of European stock markets to a satisfactory extent. The table given above shows, that ECB announcement days do not procure the same pattern of high even week returns as FOMC meetings do. A more elaborated table for regressions on ECB-cycle-weeks can be found in Appendix 6. The plots and also the average returns by week, however, suggest that there might be at least some sort of connection although interpretation remains vague and risky. As mentioned above, before starting to search for a better model, the old one will be used for hypothesis testing once again. Since the concept of one single European market does not really fit the segregation by nationality which characterizes the European financial system, the alternative dataset composed of national index prices obtained from Thomson Reuters Datastream will be used for further testing. Neither influences of the FOMC on the European, nor the ECB's influence on the US market have been ruled out completely so far, thus both will be tested again.

National Indices

The following part of this paper deals with the examination of more specific samples. First with testing whether similar results as those that have been found by Cieslak et al. (2016) and in the previous sections of this work for the French Data Library sample can be generated for S&P 500, NYSE, NASDAQ and DOWJONES Data from Thomson Reuters Datastream too. Or in other words, whether FOMC cycles are also present in individual index returns compared to some value weighted composite return. Subsequent, this section shall deal with testing the models of FOMC and ECB cycles for several selected national European indices, namely the ATX, DAX, CAC, FTSE and IBEX. The general approach still stays the same, starting with a plot of average 5-day returns for the individual cycle days followed by calculating average weekly returns and concluding with a set of various regressions.

Figure 6: Average 5-day (from t until t+4 with t on the x-axis) log return over the FOMC cycle for S&P (blue), DJ (green), NYSE (pink) and NASDAQ (red) indices. Returns are given in log percent. 1999-2017. Day 0 marks FOMC announcement days



Finding FOMC-Cycles in the alternative sample was probably the easiest task of this whole paper. Although the specific figures for the daily return obtained from the Datastream sample deviate quite a bit form the French Data Library sample, the basic movement remains the same. When plotting the 5-Day return over the FOMC-cycle one can see that all of the four US indices move in a quite similar fashion too. Furthermore, a clear weekly pattern of high and low return is recognizable for each of the four individual indices. However, the pattern is not as distinct as for the FDL sample when it comes to pronounced peaks, especially with respect to the last cycle. For the NASDAQ index for example the local minimum between Weeks 2 and 4 is not as low or even below zero as for the other indices, which can be seen in the graph above for Days 12 and 13. Nevertheless, graphical evidence speaks in favor of FOMC-cycles in the alternative dataset for all US indices.

The average weekly return is positive in even and negative in uneven FOMC-cycle-weeks for all four US indices, with the sole exception of Week -1 for the DowJones, which is uneven yet has a positive average return. With respect to the specific numbers, the NASDAQ weekly returns are both the highest and closest to the French Data Library Sample. The regressions of daily log return on cycle-week dummies reveal that daily log returns in Week 0 are significantly higher than return in uneven weeks for all of the indices. The same holds for even week return in general, which can be seen in the table below. The regression on individual cycle-week dummies can be found in the Appendix. Individual FOMC-cycle-week dummies do not have consistently significant effects on daily returns. Week 4 is characterized by significantly positive returns for all indices except for the DowJones. For the NYSE Weeks 2 and 6 are also significantly different from zero, but the coefficient for Week 4 is not as large as for Nasdaq or S&P 500. All in all, the conclusion that FOMC cycles are present in all chosen indices can nevertheless be safely drawn.

*Table 6: Regression of daily log return on one dummy for FOMC-cycle Week 0 and one composite dummy for the following even weeks (2,4 and 6). Week 0 includes the days -1 to 3 of the FOMC-cycle. Day 0 stands for FOMC announcement days. */**/*** means significance at the 0.1/0.05/0.01 level. Coefficients can be found in the first line, t-values in parenthesis in the second line. The sample contains 4957 observations from 1999-2017.*

Dataset:	**FDL**	**DJ**	**S&P**	**NASDAQ**	**NYSE**
Constant	-0.03697	-0.02311	-0.03773	-0.04684	-0.03624
	(-1.519)	(-1.070)	(-1.630)	(-1.525)	(-1.575)
Week 0	0.14962***	0.12664***	0.13824***	0.16842***	0.13401***
	(-2.942)	(-2.778)	(-2.828)	(-2.596)	(-2.758)
Even Weeks	0.12758***	0.08027**	0.10227***	0.13559***	0.09658***
	(-3.165)	(-2.265)	(-2.691)	(-2.689)	(-2.557)
F-Statistic	(-7,25)	(-5.027)	(-5.917)	(-5.423)	(-5.495)

When using the same approach again but for European indices, starting with plots, then calculating average 5-Day return per cycle-week and then regressing on week dummies, one thing becomes quite clear: European national markets behave differently. This does not only mean different from the US indices, but they also differ considerably from each other. While the CAC shows signs of FOMC cycles in the plot as well as in average weekly returns, all the other indices clearly move independently from the US meeting calendar. Neither of the other plots has an identifiable week-pattern. When looking at the average weekly return one can see that both even and uneven weeks can have either high or low average returns, but there are no consistent aberrations across indices. Apart from some individual exceptions, furthermore, none of the FOMC-cycle-week dummies has any significant impact on daily returns.

To confirm Brusa's et al. (2015) findings of high FOMC-announcement-day return for the majority of European markets, one regression of daily European index return on a single dummy for meeting days is conducted. Like it has already been found for the French Data Library sample, European equity returns are significantly higher on FOMC meeting days across all of the national indices examined in this thesis. However, the magnitude of the effect varies across nations. This means that the effect is strongest for the DAX and the CAC, with a coefficient that is about twice as large as for the ATX, for which the effect is only significant at the 10% level compared to all other indices with significance at least at the 5% level. Consequently, daily European index returns are further regressed on one dummy for Week 0 of the FOMC-cycle, which lasts from Day -1 until Day 3. For all indices except the IBEX the coefficient for Week 0 is significantly positive at least at the 10% level meaning that European returns in Week 0 of the FOMC-cycle are by and large higher than during the rest of the time. For all the other cycle-week-dummies the effect on daily returns is not significantly different from zero. Neither for individual even weeks nor for the composite even week dummy. The hypothesis that FOMC cycles are present in the form of high even week return in the European markets too has to be clearly rejected therefore.

*Table 7: FOMC-announcement-day effect on European Indices. Coefficients and t-values for the regression of daily log return for several European indices on one dummy for FOMC-announcement days from 1999 to 2017. */**/*** indicates significance at the 0.1/0.05/0.01 level.*

	ATX	**DAX**	**CAC**	**IBEX**	**FTSE100**	**FTSE250**
Constant	0.01862	0.007378	-0.006534	-0.01007	-0.003471	0.02192
	(0.938)	(0.347)	(-0.317)	(-0.480)	(-0.206)	(1.492)
Meeting Day	0.19518*	0.386962***	0.390751***	0.35245***	0.289073***	0.24513***
	(1.725)	(3.195)	(3.325)	(2.946)	(3.006)	(2.926)
F-statistic	(2.975)	(10,21)	(11,06)	(8.679)	(9.038)	(8.561)

Results for the French Data Library sample had shown no significant cycle-week effects in the US for the ECB calendar. Neither did the meeting day itself exert any noticeable influence on daily returns. Nevertheless, there have been significant and positive coefficients for Day -5 and Day 8 dummies. All of those findings could be replicated with the Datastream sample. There were no weekly effects of the ECB meeting calendar for any of the four US indices and also no impact on the meeting day itself. Thus, Europe has to admit that the ECB meetings are not nearly as influential on the US or even European stock markets as the FOMC meetings are for both of the two continents. Further, the effect of days -5 and 8 is depending on the subsample. For the period from 2002 to 2014, Day 8 has a positive effect on return and Day -5 does not.

From 2015 onward, the opposite is true. One possible explanation could be that another announcement schedule independent form the FOMC but nevertheless influential in the US would line up with the ECB meeting schedule and only shifted its relative position when the ECB's meeting regime changed. Also, from 2015 onward, weeks -1, 0 and 4 of the ECB cycle show higher returns than the rest of the weeks. Since only around 50% of those days took place in even FOMC-cycle weeks it could be a genuine effect of ECB meetings on the US stock market. One argument in favor of that hypothesis would be that, as shown later, Week -1 shows higher returns for European indices too. Sadly, there is no extensive comparative literature when it comes to overlapping financial calendars, thus, it remains unclear whether this paper found genuine effects one week before ECB meetings or the relatively regular ECB calendar just lines up with some other US macroeconomic schedule.

*Table 8: Three separate regressions of daily US index log return on one specific ECB-cycle dummy each. */**/*** indicates significance at the 0.1/0.05/0.01 level. The specific sample period is given in the first line. The second line indicates the dummy. Day 0 stands for ECB announcement dates, Week -1 starts on Day -6, each week lasts for five trading days.*

	2015-2017 **Day -5**	2002-2014 **Day 8**	2015-2017 **W -1, 0&4**
NASDAQ	0.324* (1.74)	0.272** (2.35)	0.181*** (2.84)
NYSE	0.341** (2.11)	0.292** (1.98)	0.095* (1.72)
S&P	0.297* (1.87)	0.208** (2.03)	0.107* (1.96)
DowJones	0.328** (2.14)	0.187* (1.92)	0.072 (1.36)

ECB and European Indices

Like all the plots that depict 5-day return over the possible ECB cycle, the graphs showing the returns of the European indices are hard to interpret. The most obvious finding would be that none of the plots, neither for subsamples nor the main sample, shows any cyclic pattern as clear as the US one. For the later subsamples, the plots suggest a low around Day 5 and a high in the week before the announcement for most of the indices. This may help constructing an alternative model, but for ECB cycles this is quite another counterargument. The pattern with one large peak before the announcement and two smaller ones thereafter, which was found in the dataset obtained from the French Data Library was not supported by the movements of the individual national indices. The usual calculation of average 5-day return by cycle-week does

not really tell us more about the ECB's impact on the European market as such. While it confirms high average return in Week -1 for all indices and negative return in Week 1, which includes Day 5, deriving a general pattern or even one pattern for each national index remains unfeasible. One interesting detail may be that the FTSE is the only index of the whole sample which has negative average returns in Week 0. The average return for the other cycle weeks pretty much varies across indices. It once again completely depends on the regressions to identify possible long-term effects of ECB meetings on returns.[9]

Although there were not too many significant results to expect judging from the plots and average returns, ECB meetings nevertheless seem to have at least some effect on returns. There are three week-dummies for the ATX and the FTSE250 that have at least some effect on returns over the whole sample period. The effect as such is mainly a positive one for Week -1 although it is not too strong. Week -1 returns become significantly positive for the other European indices too during the last three years of the sample but the remaining effects on the FTSE vanish. Although preliminary results for the French Data Library sample suggested that the model would fit better for the last three years, meaning that there could be a cyclic effect, there is none. Although there are still effects of Week -1 and 1 on the ATX analysis suggests that we are still far away from pronounced ECB-cycles that would be comparable to the underlying FOMC-cycles. High returns in Week -1 may be driven by the return on Day -6, which is significantly positive for the 2002-2014 period. For the last three years the same applies for Day -5. The meeting days as such are of quite an ambiguous nature. For the period from 2002 to 2014 the return on meeting days is negative for most and even significantly negative for some indices. During the last three years regressions of daily return on a meeting day dummy on the other hand reveal positive effects. The overall conclusion is risky to draw but probably has to be that none of our chosen national equity markets moves in cycles that depend on ECB meetings. Rather than that we have to abandon the idea of even and uneven weeks in favor of something different that explains the anomalies in daily returns that have been discovered. While positive returns have been found for Week -1, other days like the meeting day itself have been found to influence returns in a way dependent on the subperiod. Since this paper has just used an US model without any adaptions so far, the next section is intended to try out different patterns in order to find a model with more explanatory power with respect to the interrelation between ECB meetings and national equity indices.

[9] The regressions and respective results mentioned in the following paragraphs are too numerous to include them in the text, thus, all of them can be found in the Appendix.

Towards an alternative model

It was shown before that although returns do not move in a weekly – positive in even, negative in uneven weeks – pattern, week dummies seem to be at least some way to describe the dependency of returns on ECB meetings. In this section, several alternative models will be described and compared to the initial findings to approximate a possible underlying mechanism behind ECB meetings and the stock markets. This is done for the two later parts of the sample only, from 2002-2017, since the ECB's meeting regime before 2002 leaves too little time between meetings for some of the model alternatives to by applied. Furthermore, all of the scarce impacts that have been found for the ECB calendar did only appear in one of those two later subsamples.

The first idea has been to change the day on which the ECB cycle period would start. While FOMC-cycles clearly start on Day -6 this may not be the same for the European stocks. The hypothesis behind it was that days before Day -6 may already be affected by the upcoming ECB meeting, however, in the initial model, their number would be something around 22-26 and thus not consistent, which would make it impossible to see any effect in the actual model. Going back until day -12 revealed that sticking to the initial model would not be too far off, Starting the whole cycle one day earlier, thus, regressing returns on alternative week dummies that are shifted by one – i.e. Week -1 (from Day -7 until Day -3) Week 0 (-2 until 2) and so on – did not lead to any overall improvements. For some indices this was the model with more explanatory power, however, for those that react noticeably to ECB meetings like the ATX this alternative was even worse. It needs to be mentioned that Week -1 still has a significantly positive coefficient for all indices. Changing Week -1 to include Day -7 and not Day -2 leads to higher coefficients, however, prior calculation showed that both of the two days actually have average negative returns. The coefficient for Week 1 is negative and Week 3 positive for all, however, significantly and large only for some indices. Starting the ECB-cycles even earlier or shifting them into the other direction was tested too, but was overall worse than just leaving the whole thing as it had been from the start.

The next idea was to change the length of cycle weeks additionally to the first step. This idea came up since pre-announcement returns seems to be high from Day -6 until Day -3 for all indices. Average returns on later or earlier cycle-days were either slightly positive or negative depending on the index in question. Of course, the 5-Day FOMC cycles are closely tied to the usual trading week being five days long. Nevertheless, the European market behaves differently. Thus, effects that are independent from regular calendar weeks may be present. A shorter cycle

period of only 4-days per week was chosen and tested as well as longer ones. The regressions revealed that the high positive return of the first period was still the only constant in all models, however the 4-day model was as bad or good as shifting the 5-day model by one day. Starting the 4-day weeks on Day -7 or Day -6 did not make any significant difference probably because the positive effect of Week -1 seems to be mainly driven by Day -6 and Day -5 returns. Therefore, it does not make too much of a difference, whether Days -7, -4, -3 and -2 are included in Week -1 or not. Since there have been other weeks with coefficients significantly different from zero for the original setting, but not for any of the alternative models, the idea of shorter cycle "weeks" can also be rejected.

The last alternative tested was a longer cycle period. An increase from 5 to 8-day cycles leads to one week that starts before and includes the meeting, two full weeks after the meeting for the whole sample and another full week for the last few years. At the end of the cycle there are usually some few days remaining which are not treated as an own week. This last model is overall one of the worst when it comes to explaining the movement of return for most European indices. However, it is a very good fit for the ATX from 2002 to 2014. It means ATX return is significantly positive from day -7 until the meeting day, significantly negative from day 1 until day 8, around zero until day 16, significantly positive thereafter and again not significantly different from zero but probably negative during the days until the next cycle starts. As for most of the alternative models, European index return excluding the FTSE is significantly higher in the first cycle period. This means the dummy including eight days from Day -7 until the ECB announcement day has a significantly positive coefficient for all of the eurozone equity markets.

In the end, none of the alternatives really lead to noteworthy improvements of explanatory power with respect to long term ECB announcement effects. Nevertheless, the numerous alternatives of composing Week -1 suggest that something has to happen on Days -5 and -6 of the ECB-cycle, but the precise effect is an individual one for each country. ECB meetings, thus, do indeed have an impact on stock returns, however, this impact is not as long-lived and pronounced as the effects of the FOMC in the US. Some national indices may be influenced by the meeting calendar in the long run too, but the overall impact is probably not too strong since it did not appear in any of this paper's calculations so far.

Conclusion

Starting with the idea to test old-fashioned calendar effects on the Austrian stock market, literature research revealed that central bank meeting days are the new driver behind modern calendar effects. Cieslak et al. (2016) found that US stock return moves in weekly ups and downs resetting the week before each FOMC announcement and thus the idea was born to look for similar cycles on the European equity markets and in conjunction with ECB meetings. The first step has been a successful replication of the underlying research findings for the US as such and later for all individual US indices chosen. Furthermore, the positive influence on return on FOMC meeting days has been confirmed for all national European indices that have been tested in this thesis. The spillovers of the ECB calendar on the US market are limited to higher returns on Day 8 for 2002-2014 and on Day -5 for 2015-2017. Genuine transatlantic effects are only one possibility, other macroeconomic announcements would be another explanation. One argument in favor of a genuine effect would be that Day -5 returns are also higher for European indices. Investigating further into the causal relationship can, however, not be expected from this thesis due to its limits of scope and resources and should therefore be left to more experienced scholars.

The ECB's influence in Europe on the other hand is more pronounced in the meaning that its pre-announcement effect extends over the whole week before each meeting. The precise extent of this Week -1 depends on the national market and seems to be mainly driven by only two ECB-cycle days, Days -6 and -5. Whether this phenomenon is caused by early, pre-release implementation of monetary policies or something completely independent from the ECB as such can of course not be inferred from simple regressions. Thus, it was shown that although FOMC and ECB meetings share their aim, the underlying institution and organization of the meeting board and finally nowadays even their yearly frequency, their importance and impact is quite different. While FOMC-meetings affect their national stock market for the whole period until the next meeting and even influence foreign markets, the ECB-meetings only have a very limited pre-announcement effect even on European equity markets. Possible explanations could be the later or shorter history of the ECB, the different organization and importance of equity markets in Europe and political context. Future research would be well advised to focus on integration of different meeting calendars and release schedules. A composite model of FOMC, ECB and national announcement calendars may lead to better understanding of this new category of calendar effects. However, the scope of this task surpasses this here thesis and will therefore remain open for future academic research.

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Appendix

Appendix 1 – FOMC meeting calendar

2017	2016	2015	2014	2013
31.01.2017-01.02.2017	26.01.2016-27.01.2016	27.01.2015-28.01.2015	28.01.2014-29.01.2014	29.01.2013-30.01.2013
14.03.2017-15.03.2017	15.03.2016-16.03.2016	17.03.2015-18.03.2015	18.03.2014-19.03.2014	19.03.2013-20.03.2013
02.05.2017-03.05.2017	26.04.2016-27.04.2016	28.04.2015-29.04.2015	29.04.2014-30.04.2014	30.04.2013-01.05.2013
13.06.2017-14.06.2017	14.06.2016-15.06.2016	16.06.2015-17.06.2015	17.06.2014-18.06.2014	18.06.2013-19.06.2013
25.07.2017-26.07.2017	26.07.2016-27.07.2016	28.07.2015-29.07.2015	29.07.2014-30.06.2014	30.07.2013-31.07.2013
19.09.2017-20.09.2017	20.09.2016-21.09.2016	16.09.2015-17.09.2015	16.09.2014-17.09.2014	17.09.2013-18.09.2013
31.10.2017-01.11.2017	01.11.2016-02.11.2016	27.10.2015-28.10.2015	28.10.2014-29.10.2014	29.10.2013-30.10.2013
12.12.2017-13.12.2017	13.12.2016-14.12.2016	15.12.2015-16.12.2015	16.12.2014-17.12.2014	17.12.2013-18.12.2013

2012	2011	2010	2009	2008
24.01.2012-25.01.2012	25.01.2011-26.01.2011	26.01.2010-27.01.2010	27.01.2009-28.01.2009	29.01.2008-30.01.2008
13.03.2012	15.03.2011	16.03.2010	17.03.2009-18.03.2009	18.03.2008
24.04.2012-25.04.2012	26.04.2011-27.04.2011	27.04.2010-28.04.2010	28.04.2009-29.04.2009	29.04.2008-30.04.2008
19.06.2012-20.06.2012	21.06.2011-22.06.2011	22.06.2010-23.06.2010	23.06.2009-24.06.2009	24.06.2008-25.06.2008
31.07.2012-01.08.2012	09.08.2011	10.08.2010	11.08.2009-12.08.2009	05.08.2008
12.09.2012-13.09.2012	20.09.2011-21.09.2011	21.09.2010	22.09.2009-23.09.2009	16.09.2008
23.10.2012-24.10.2012	01.11.2011-02.11.2011	02.11.2010-03.11.2010	03.11.2009-04.11.2009	28.10.2008-29.10.2008
11.12.2012-12.12.2012	13.12.2011	14.12.2010	15.12.2009-16.12.2009	15.12.2008-16.12.2008

2007	2006	2005	2004	2003
30.01.2007-31.01.2007	31.01.2006	01.02.2005-02.02.2005	27.01.2004-28.01.2004	28.01.2003-29.01.2003
20.03.2007-21.03.2007	27.03.2006-28.03.2006	22.03.2005	16.03.2004	18.03.2003
09.05.2007	10.05.2006	03.05.2005	04.05.2004	06.05.2003
27.06.2007-28.06.2007	28.06.2006-29.06.2006	29.06.2005-30.06.2005	29.06.2004-30.06.2004	24.06.2003-25.06.2003
07.08.2007	08.08.2006	09.08.2005	10.08.2004	12.08.2003
18.09.2007	20.09.2006	20.09.2005	21.09.2004	15.09.2003
30.10.2007-31.10.2007	24.10.2006-25.10.2006	01.11.2005	10.11.2004	28.10.2003
11.12.2007	12.12.2006	13.12.2005	14.12.2004	09.12.2003

2002	2001	2000	1999
29.01.2002-30.01.2002	30.01.2001-31.01.2001	01.02.2000-02.02.2000	02.02.1999-03.02.1999
19.03.2002	20.03.2001	21.03.2000	30.03.1999
07.05.2002	15.05.2001	16.05.2000	18.05.1999
25.06.2002-26.06.2002	26.06.2001-27.06.2001	27.06.2000-28.06.2000	29.06.1999-30.06.1999
13.08.2002	21.08.2001	22.08.2000	24.08.1999
24.09.2002	02.10.2001	03.10.2000	05.10.1999
06.11.2002	06.11.2001	15.11.2000	16.11.1999
10.12.2002	11.12.2001	19.12.2000	21.12.1999

Appendix 2 – ECB meeting calendar

2015-2017

2017	2016	2015
14.12.2017	08.12.2016	03.12.2015
26.10.2017	20.10.2016	22.10.2015
07.09.2017	08.09.2016	03.09.2015
20.07.2017	21.07.2016	16.07.2015
08.06.2017	02.06.2016	03.06.2015
27.04.2017	21.04.2016	15.04.2015
09.03.2017	10.03.2016	05.03.2015
19.01.2017	21.01.2016	22.01.2015

2002-2014

2014	2013	2012	2011	2010	2009
04.12.2014	05.12.2013	06.12.2012	08.12.2011	02.12.2010	03.12.2009
06.11.2014	07.11.2013	08.11.2012	03.11.2011	04.11.2010	05.11.2009
02.10.2014	02.10.2013	04.10.2012	06.10.2011	07.10.2010	08.10.2009
04.09.2014	05.09.2013	06.09.2012	08.09.2011	02.09.2010	03.09.2009
07.08.2014	01.08.2013	02.08.2012	04.08.2011	05.08.2010	06.08.2009
03.07.2014	04.07.2013	05.07.2012	07.07.2011	08.07.2010	02.07.2009
05.06.2014	06.06.2013	06.06.2012	09.06.2011	10.06.2010	04.06.2009
08.05.2014	02.05.2013	03.05.2012	05.05.2011	06.05.2010	07.05.2009
03.04.2014	04.04.2013	04.04.2012	07.04.2011	08.04.2010	02.04.2009
06.03.2014	07.03.2013	08.03.2012	03.03.2011	04.03.2010	05.03.2009
06.02.2014	07.02.2013	09.02.2012	03.02.2011	04.02.2010	05.02.2009
09.01.2014	10.01.2013	12.01.2012	13.01.2011	14.01.2010	15.01.2009

2008	2007	2006	2005	2004	2003	2002
04.12.2008	06.12.2007	07.12.2006	01.12.2005	02.12.2004	04.12.2003	05.12.2002
06.11.2008	08.11.2007	02.11.2006	03.11.2005	04.11.2004	06.11.2003	07.11.2002
08.10.2008	04.10.2007	05.10.2006	06.10.2005	07.10.2004	02.10.2003	10.10.2002
02.10.2008	06.09.2007	31.08.2006	01.09.2005	02.09.2004	04.09.2003	12.09.2002
04.09.2008	02.08.2007	03.08.2006	04.08.2005	05.08.2004	31.07.2003	01.08.2002
07.08.2008	05.07.2007	06.07.2006	07.07.2005	01.07.2004	10.07.2003	04.07.2002
03.07.2008	06.06.2007	08.06.2006	02.06.2005	03.06.2004	05.06.2003	06.06.2002
05.06.2008	10.05.2007	04.05.2006	04.05.2005	06.05.2004	08.05.2003	02.05.2002
08.05.2008	12.04.2007	06.04.2006	07.04.2005	01.04.2004	03.04.2003	04.04.2002
10.04.2008	08.03.2007	02.03.2006	03.03.2005	04.03.2004	06.03.2003	07.03.2002
06.03.2008	08.02.2007	02.02.2006	03.02.2005	05.02.2004	06.02.2003	07.02.2002
07.02.2008	11.01.2007	12.01.2006	13.01.2005	08.01.2004	09.01.2003	03.01.2002
10.01.2008						

1999-2001

2001		2000		1999	
07.06.2001	06.12.2001	08.06.2000	14.12.2000	17.06.1999	15.12.1999
23.05.2001	08.11.2001	25.05.2000	30.11.2000	02.06.1999	02.12.1999
10.05.2001	25.10.2001	11.05.2000	16.11.2000	20.05.1999	18.11.1999
26.04.2001	11.10.2001	27.04.2000	02.11.2000	06.05.1999	04.11.1999
11.04.2001	27.09.2001	13.04.2000	19.10.2000	22.04.1999	21.10.1999
29.03.2001	17.09.2001	30.03.2000	05.10.2000	08.04.1999	07.10.1999
15.03.2001	13.09.2001	16.03.2000	14.09.2000	18.03.1999	23.09.1999
01.03.2001	30.08.2001	02.03.2000	31.08.2000	04.03.1999	09.09.1999
15.02.2001	02.08.2001	17.02.2000	03.08.2000	18.02.1999	26.08.1999
01.02.2001	19.07.2001	03.02.2000	20.07.2000	21.01.1999	29.07.1999
18.01.2001	05.07.2001	20.01.2000	06.07.2000	07.01.1999	15.07.1999
04.01.2001	21.06.2001	05.01.2000	21.06.2000		01.07.1999

Appendix 3 – Regressions of Daily US Return for the French Data Library Sample

Daily excessive log returns for the US obtained from the French Data Library are regressed on several FOMC cycle week dummies. Announcement days of FOMC meetings are defined as Day 0. Week -1 starts on Day -6 and ends on Day -2, Week 0: Days -1 to 3, Week 1: Days 4 to 9 and so on, Week 6: Days 19 to 33. Even Weeks are Weeks 0, 2, 4, and 6. All regressions are done for the whole sample period from January 1999 to October 2017. T-values can be found in parenthesis. */**/*** indicates significance at the 0.1/0.05/0.01 level.

Panel A. Individual dummies for each cycle week.

	Coefficient	**t-value**	**F-statistic**
Week -1	-0.01776	(-0.397)	
Week 0	0.11265**	(2.521)	
Week 1	-0.04497	(-1.006)	(2.023)
Week 2	0.07445*	(1.666)	
Week 3	-0.06882	(-1.530)	**p-value**
Week 4	0.11104**	(2.290)	0.03311**
Week 5	0.01694	(0.233)	
Week 6	0.07613	(0.490)	**N**
Week 7	-0.18000	(-0.147)	4724

Panel B. One dummy for meeting-weeks and one for the other even weeks.

	Coefficient	**t-value**	**F-statistic**
Constant	-0.03697	(-1.519)	(7,25)
Week 0	0.14962***	(2.942)	0.0007184***
Week 2,4,6	0.12758***	(3.165)	**N** 4724

Panel C. Regression of daily US log returns on individual dummies for each even week

	Coefficient	t-value	F-statistic
Constant	-0.03697	(-1.519)	(3.703)
Week 0	0.14962***	(2.941)	
Week 2	0.11142**	(2.190)	0.005155***
Week 4	0.14801***	(2.729)	
Week 6	0.11310	(0.719)	**N** 4724

Panel D. Regression of daily US log returns on one FOMC announcement day dummy

	Coefficient	t-value	F-statistic
Constant	0.01613	(0.891)	(9.221)
			0.002405***
Day 0	0.30834***	(3.037)	**N** 4724

Appendix 4 – European FDL sample returns over the FOMC cycle

The following numbers are average log returns from Day x to Day x+4, with Day x being the first day of each week. Week -1 starts on Day -6, Week 0 on Day -1 and so on. Day 0 stands for FOMC announcement days.

Week -1	0.1048299
Week 0	0.4588435
Week 1	-0.1051701
Week 2	0.1406803
Week 3	0.0511564
Week 4	0.2034058
Week 5	-0.2910989
Week 6	0.5382353

Daily excessive log returns for Europe obtained from the French Data Library are regressed on several FOMC cycle week dummies. The setting is the same as for the US; Announcement days of FOMC meetings are defined as Day 0. Week -1 starts on Day -6 and ends on Day -2, Week 0: Days -1 to 3, Week 1: Days 4 to 9 and so on, Week 6: Days 19 to 33. Even Weeks are Weeks 0, 2, 4, and 6. All regressions are done for the whole sample period from January 1999 to May 2017. T-values can be found in parenthesis. */**/*** indicates significance at the 0.1/0.05/0.01 level.

Panel A. Individual dummies for each FOMC cycle week

	Coefficient	t-value	F-statistic
Week -1	0.020966	(0.453)	
Week 0	0.091769**	(1.984)	
Week 1	-0.021034	(-0.455)	(0.7312)
Week 2	0.028136	(0.608)	
Week 3	0.008837	(0.190)	**p-value**
Week 4	0.035464	(0.737)	0.6807
Week 5	-0.059829	(-0.894)	
Week 6	0.080238	(0.586)	**N**
Week 7	-0.335000	(-0.378)	4787

Panel B. Regression on two dummies for Week 0 and the rest of the even weeks (2,4 & 6).

	Coefficient	t-value	F-statistic
Constant	-0.005975	(-0.241)	(1.847)
Week 0	0.097744*	(1.863)	0.1579
Even Weeks	0.040354	(0.989)	**N** 4787

Panel C. Regression on dummies for even weeks (0,2,4,6) of the FOMC cycle

	Coefficient	t-value	F-statistic
Constant	-0.005975	(-0.241)	(0.9558)
Week 0	0.097744*	(1.862)	
Week 2	0.034111	(0.650)	0.4306
Week 4	0.041439	(0.765)	
Week 6	0.086213	(0.620)	**N** 4787

Panel D. Regression of daily European returns on one dummy for FOMC announcement days

	Coefficient	t-value	F-statistic
Constant	0.00881	(0.479)	(15.92)
			0.00006711***
Day 0	0.41847***	(3.990)	**N** 4787

Appendix 5 – Comparison

The following table contains a comparison of three regressions for the US and European Dataset. Announcement days of FOMC meetings are defined as Day 0. Week -1 starts on Day -6 and ends on Day -2, Week 0: Days -1 to 3, Week 1: Days 4 to 9 and so on, Week 6: Days 19 to 33. Even Weeks are Weeks 0, 2, 4, and 6. All regressions are done for the whole sample period from January 1999 to May 2017. T-values can be found in parenthesis. */**/*** indicates significance at the 0.1/0.05/0.01 level. The first part of the table contains one regression on a single announcement day dummy. The second part consists in two regressions with a dummy for Week 0 each, which is of course the same for both regressions and furthermore one dummy for the rest of the even cycle-weeks in the first and with an individual dummy for each remaining even week in the second model.

		Europe	USA
Meeting Day	**Constant**	0.00881 (0.479)	0.01613 (0.891)
	Day 0	0.41847*** (3.990)	0.30834*** (3.037)
	F-statistic	(15.92)***	(9.221)***
Weekly Effects			
	Constant	-0.005975 (-0.241)	-0.03697 (-1.519)
	Week 0	0.097744* (1.862)	0.14962*** (2.941)
	Even Weeks	0.040354 (0.989)	0.12758*** (3.165)
	Week 2	0.034111 (0.650)	0.11142** (2.190)
	Week 4	0.041439 (0.765)	0.14801*** (2.729)
	Week 6	0.086213 (0.620)	0.11310 (0.719)
	F-Statistics	(1.847) (0.956)	(7.250)*** (3.703)***

Appendix 6 – Regressions of FDL Returns on ECB Weeks

Regressions of daily log returns on ECB cycle week dummies for the US and European sample obtained from the French Data Library. The first lines are coefficients, the second lines in parenthesis are t-values. ECB weeks are defined in analogy to FOMC cycle weeks. ECB announcement days are defined as Day 0. Week -1 starts on Day -6 and ends on Day -2, Week 0 starts on Day -1 and ends on Day 3, all the other weeks are construed in the same way. Due to the changes in meeting regimes across the subperiods weeks with very low numbers of observations are excluded from the table from each subsample. */**/*** indicates significance at the 0.1/0.05/0.01 level.

	Week -1	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5
1999-2017							
Full sample							
US	0.04535	0.01148	0.05005	-1.617	0.09324	0.06265	-0,14683
	(1.303)	(0.327)	(1.242)	(-0.380)	(1.405)	(0.597)	(-0,929)
EU	0.050147	0.012209	0.003753	-0,014466	0.093279	0.028154	-0,04193
	(1.400)	(0.339)	(0.091)	(-0,34)	(1.427)	(0.256)	(-0,252)
1999-2002							
US	-0,01395	-0,01455	-0,01024	0.10652			
	(-0,188)	(-0,19)	(-0,048)	(0.370)			
EU	-0,05768	-0,01811	0.13120	-0,1544			
	(-0,955)	(-0.296)	(0.822)	(-0.684)			
2002-2014							
US	0.05891	0.02005	0.06354	-0.03570	0.13213	-0.04938	
	(1.297)	(0.439)	(1.386)	(-0.739)	(1.568)	(-0,221)	
EU	0.079566*	0.025876	0.003884	-0.019271	0.152454*	0.028387	
	(1.689)	(0.546)	(0.082)	(-0.398)	(1.895)	(0.120)	
2015-2017							
US	0.13296*	0.05600	0.01655	0.02764	0.02536	0.10192	-0.15833
	(1.767)	(0.728)	(0.215)	(0.359)	(0.330)	(1.256)	(-1.359)
EU	0.20347*	0.04063	-0.03737	0.06147	-0,06063	0.07883	-0.09288
	(1.906)	(0.381)	(-0,35)	(0.576)	(-0,568)	(0.734)	(-0.644)

Appendix 7 - Daily US-Return on Cycle-Day dummies

Panel A. Regression of the full sample of daily US log returns obtained from the French Data Library on individual dummies for each day of the ECB cycle. Day 0 stands for ECB announcement days. */**/*** indicates significance at the 0.1/0.05/0.01 level.

	Coefficient		**Coefficient**
Day -6	0.021619	Day 13	-0.096829
Day -5	0.169433**	Day 14	0.077722
Day -4	0.023968	Day 15	0.058974
Day -3	-0.043508	Day 16	0.041169
Day -2	0.055587	Day 17	0.246812*
Day -1	0.086194	Day 18	0.020541
Day 0	0.011619	Day 19	0.067187
Day 1	-0.019431	Day 20	0.226452
Day 2	-0.041516	Day 21	0.221333
Day 3	0.020439	Day 22	-0.261154
Day 4	-0.124171	Day 23	-0.029412
Day 5	0.110860	Day 24	-0.015333
Day 6	0.033280	Day 25	-0.150000
Day 7	-0.005405	Day 26	-0.203077
Day 8	0.244719***	Day 27	-0.266154
Day 9	-0.036193	Day 28	-0.057500
Day 10	-0.072841		
Day 11	0.020682	**N**	4734
Day 12	0.081149	**F-statistic**	1,012

Panel B. Regression of daily US log return on two dummies over the full sample period. One dummy for Day -5 of the ECB cycle, one for Day 8 of the ECB cycle.

	Coefficient	**t-value**	**F-Statistic**
Constant	0.008658	(0.465)	(4.973)
Day -5	0.160775**	(2.008)	0.00696***
Day 8	0.236061**	(2.522)	**N** 4736

Appendix 8 – FOMC cycles for US indices

Panel A. Daily log return for the four US equity indices regressed on one meeting day dummy. First line are coefficients, second line in parenthesis are t-values. All meeting-day coefficients are significant at the 1% level, NYSE has a p-value of 0,0005537. */**/*** indicates significance at the 0.1/0.05/0.01 level.

	DJ	SP	NAS	NYSE
Constant	0.01355	0.006696	0.01097	0.004365
	(0.847)	(0.390)	(0.482)	(0.256)
Meeting Day	0.26093***	0.291044***	0.34696***	0.335824***
	(2.861)	(2.976)	(2.673)	(3.456)
F-Statistic	(8.185)	(8.855)	(7.145)	(11,9400)

Panel B. Daily US index return on FOMC cycle week dummies.

This table contains two Regressions of daily returns on several week dummies. F-statistics are given for the first model which has just two dummies – one for Week 0 and one composite for the three even weeks 2,4,6 – and the second model which has individual even week dummies. */**/*** indicates significance at the 0.1/0.05/0.01 level. The Constant and Coefficient for Week 0 are the same for both models.

		DJ	SP	NAS	NYSE
Constant		-0.02311	-0.03773	-0.04684	-0.03624
		(-1.070)	(-1.630)	(-1.525)	(-1.575)
Week	**0**	0.12664***	0.13824***	0.16842***	0.13401***
		(2.778)	(2.828)	(2.596)	(2.758)
Weeks	**2,4,6**	0.08027**	0.10227***	0.13559***	0.09658***
		(2.265)	(2.691)	(2.689)	(2.557)
Week	**2**	0.06992	0.07976	0.08949	0.08300*
		(1.534)	(1.632)	(1.379)	(1.708)
Week	**4**	0.07660	0.11627**	0.17848***	0.09690*
		(1.629)	(2.306)	(2.667)	(1.933)
Week	**6**	0.19758	0.18401	0.19100	0.21000*
		(1.656)	(1.438)	(1.125)	(1.651)
F-statistic		(5.027)	(5.917)	(5.423)	(5.495)
		(2.781)	(3.156)	(3.031)	(2.978)

Appendix 9 – FOMC cycles for EU indices

Panel A. Coefficients and t-values for the regression of Daily European Index Returns on one Week 0 dummy. Week 0 consists of Days -1 to Day 3 of the FOMC-cycle with Day 0 being the announcement day. */**/*** indicates significance at the 0.1/0.05/0.01 level.

	ATX	DAX	CAC	IBEX	FTSE100	FTSE250
Constant	0.004451	0.002919	-0.008944	-0.00612	-0.006579	-0.01080
	(0.210)	(0.128)	(-0.405)	(-0.272)	(-0.385)	(-0.598)
Week 0	0.127252**	0.106268*	0.093139*	0.04586	0.102718**	0.10532**
	(2.351)	(1.831)	(1.654)	(0.800)	(2.357)	(2.287)
F-statistic	(5.527)**	(3.354)*	(2.737)*	(0.6403)	(5.554)**	(5.232)**

Panel B. Daily European index return on FOMC cycle week dummies.

This table contains two Regressions of daily returns on several week dummies. F-statistics are given for the first model which has just two dummies – one for Week 0 and one composite for the three even weeks 2,4,6 – and the second model which has individual even week dummies. */**/*** indicates significance at the 0.1/0.05/0.01 level. This table is built in the same manner as Appendix 8 Panel B but for European instead of US indices.

	ATX	DAX	CAC	IBEX	FTSE100	FTSE250
Constant	0.013036	-0.01290	-0.01940	-0.02184	-0.01930	0.01403
	(0.487)	(-0.450)	(-0.697)	(-0.771)	(-0.847)	(0.707)
Week 0	0.063624	0.11651*	0.09239	0.05627	0.08843*	0.05876
	(1.125)	(1.923)	(1.571)	(0.940)	(1.839)	(1.402)
Even	0.005727	0.04542	0.03399	0.04448	0.03542	0.02038
	(0.130)	(0.964)	(0.744)	(0.956)	(0.947)	(0.625)
Week 2	0.04167	0.02917	0.003085	0.001909	0.0448647	0.043636
	(0.737)	(0.481)	(0.052)	(0.032)	(0.933)	(1.041)
Week 4	-0.05287	0.05292	0.061914	0.077850	0.0297293	-0.008225
	(-0.906)	(0.847)	(1.021)	(1.261)	(0.599)	(-0.190)
Week 6	0.16103	0.12491	0.077693	0.144767	-0.0002851	0.047380
	(1.088)	(0.788)	(0.505)	(0.924)	(-0.002)	(0.432)
F-statistic	(0.653)	(1.940)	(1.281)	(0.6976)	(1.785)	(1.009)
	(1.060)	(1.062)	(0.817)	(0.7102)	(0.929)	(0.758)

Panel C. Daily European index log returns are regressed on individual FOMC cycle week dummies. */**/*** indicates significance at the 0.1/0.05/0.01 level.

	Week -1	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	F-statistic
ATX	0.006552	0.076660	0.022037	0.054705	0.012287	-0.039838	0.008457	0.174062	0.6554
	(0.131)	(1.538)	(0.442)	(1.097)	(0.245)	(-0.768)	(0.116)	(1.195)	
DAX	-0.01964	0.10361*	0.01163	0.01627	0.00585	0.04003	-0.09070	0.11201	0.7156
	(-0.368)	(1.941)	(0.218)	(0.305)	(0.109)	(0.720)	(-1.163)	(0.718)	
CAC	0.02516	0.07299	-0.01741	-0.01631	-0.01685	0.04252	-0.12433	0.05829	0.6675
	(0.486)	(1.409)	(-0.336)	(-0.315)	(-0.323)	(0.789)	(-1.643)	(0.385)	
IBEX	-0.005433	0.034428	0.011368	-0.019936	-0.020753	0.056005	-0.131087*	0.122922	0.5973
	(-0.103)	(0.653)	(0.216)	(-0.378)	(-0.391)	(1.021)	(-1.702)	(0.798)	
FTSE100	-0.004452	0.069127	0.016273	0.025562	-0.020253	0.010426	-0.125309**	-0.019588	0.8434
	(-0.105)	(1.631)	(0.384)	(0.603)	(-0.475)	(0.236)	(-2.024)	(-0.158)	
FTSE250	-0.01569	0.07279**	0.03235	0.05766	0.02331	0.00580	0.02080	0.06141	0.9331
	(-0.425)	(1.971)	(0.876)	(1.561)	(0.628)	(0.151)	(0.386)	(0.569)	

Appendix 10 – ECB cycles on US indices

Regression of daily US index returns on dummies for each cycle-day revealed that there are several significant daily effects over the full sample period. Those are: Day -5, 4 and 8 for NYSE, -5 and 4 for NASDAQ and S&P, Days 4 and 8 for DowJones. Therefore, the following panel regresses daily US index log returns on two dummies for Days -5 and 8 for two subperiods. */**/*** indicates significance at the 0.1/0.05/0.01 level. The first line contains coefficients, the second line contains t-values in parenthesis.

2002-2014	**Day -5**	**Day 8**	**Model**
DJ	0.106176	0.187250*	(2.353)
	(1.097)	(1.923)	
SP	0.103420	0.207842**	(2.473)
	(1.014)	(2.026)	
NAS	0.136241	0.272766**	(3.34)
	(1.182)	(2.353)	
NYSE	0.1387	0.2092**	(2.717)
	(1.322)	(1.981)	

2015-2017	**Day -5**	**Day 8**	**Model**
DJ	0.32769**	-0.17759	(3.067)
	(2.138)	(-1.182)	
SP	0.29709*	-0.13542	(2.17)
	(1.866)	(-0.867)	
NAS	0.32385*	-0.22896	(2.37)
	(1.739)	(-1.254)	
NYSE	0.34072**	-0.11440	(2.537)
	(2.110)	(-0.722)	

Appendix 11 – ECB Cycle on EU Indices

The following table shows coefficients and t-values for the regression of daily European index log return on ECB cycle week dummies for each individual week. This table shows values for the whole sample period from 1999-2017 which entails 4957 observations. */**/*** indicates significance at the 0.1/0.05/0.01 level. The cycle weeks are defined as for the FOMC calendar, Day 0 stands for ECB announcement days, Week -1 starts on Day -6, Week 0 starts on Day -1. Each week lasts for five trading days.

1999-2017	**ATX**	**DAX**	**CAC**	**IBEX**	**FTSE100**	**FTSE250**
Week -1	0.08403**	0.05635	0.073926*	0.0665855	0.05079	0.0757035***
	(2.166)	(1.351)	(1.829)	(1.613)	(1.536)	(2.636)
Week 0	-0.00173	0.04344	0.015226	0.0417140	0.01105	0.0360891
	(-0.044)	(1.038)	(0.375)	(1.007)	(0.333)	(1.252)
Week 1	-0,0781*	-0.02136	-0.067780	-0.074900	-0.06399	-0.0533360
	(-1.760)	(-0.448)	(-1.466)	(-1.586)	(-1.692)	(-1.624)
Week 2	0.01873	-0.04855	-0.050904	-0.066462	-0.03105	0.0006484
	(0.408)	(-0.984)	(-1.065)	(-1.361)	(-0.794)	(0.019)
Week 3	0.13885**	0.11130	0.088228	-0.000131	0.08885	0.0866098*
	(1.995)	(1.488)	(1.216)	(-0.002)	(1.498)	(1.681)
Week 4	0.12977	-0.04936	-0.009473	0.017428	0.09473	0.1602388*
	(1.158)	(-0.410)	(-0.081)	(0.146)	(0.992)	(1.931)
Week 5	-0.09833	-0.02352	-0.058233	-0.063804	-0.14500	-0.0247741
	(-0.603)	(-0.134)	(-0.343)	(-0.368)	(-1.044)	(-0.205)
F-statistic	(1.948*)	(0.9245)	(1.196)	(1.163)	(1.469)	(2.536**)

Appendix 12 – ECB on EU subperiods

The following tables show coefficients and t-values for daily European index log returns regressed on ECB cycle week dummies. There are separate dummies for each cycle week. The sample is split up into three subsamples in accordance to changes in the ECB meeting regime. The first subperiod from 1999 to 2001 is left out since the cycles are too short for any reasonable estimation. */**/*** indicates significance at the 0.1/0.05/0.01 level. The cycle weeks are defined as for the FOMC calendar, Day 0 marks ECB announcement days, Week -1 starts on Day -6, Week 0 starts on Day -1. Each week lasts for five trading days.

2002-2014	**ATX**	**DAX**	**CAC**	**IBEX**	**FTSE100**	**FTSE250**
Week -1	0.108042**	0.068578	0.060762	0.092420*	0.06705	0.108709***
	2.019	1.269	1.147	1.740	1.551	2.776
Week 0	-0.026775	0.015644	-0.004312	0.025796	0.02423	0.043364
	-0.499	0.289	-0.081	0.485	0.559	1.105
Week 1	-0.075754	-0.002105	-0.054657	-0.051084	-0.05674	-0.071962*
	-1.410	-0.039	-1.027	-0.958	-1.307	-1.831
Week 2	0.005535	-0.046687	-0.058490	-0.066888	-0.04806	-0.007397
	0.101	-0.840	-1.074	-1.225	-1.081	-0.184
Week 3	0.173783*	0.164144*	0.143271	0.072609	0.11174	0.114662*
	1.904	1.780	1.585	0.801	1.515	1.716
Week 4	0.370962	-0.202312	-0.105667	0.009061	0.01318	0.327466*
	1.380	-0.745	-0.397	0.034	0.061	1.664
F-statistic	1.976*	1,02	1.033	1.053	1.316	3.005***

2015-2017	**ATX**	**DAX**	**CAC**	**IBEX**	**FTSE100**	**FTSE250**
Week -1	0.27573***	0.239650**	0.28057***	0.25868**	0.12998	0.097403
	2.628	2.196	2.614	2.178	1.544	1.257
Week 0	0.13857	0.133862	0.07674	0.08861	-0.03425	-0.002616
	1.321	1.227	0.715	0.746	-0.407	-0.034
Week 1	-0.18504*	-0.100418	-0.13923	-0.18465	-0.09074	-0.036377
	-1.793	-0.935	-1.319	-1.580	-1.096	-0.477
Week 2	0.06085	-0.008737	0.03002	-0.00365	0.06885	0.045961
	0.590	-0.081	0.284	-0.031	0.831	0.603
Week 3	0.06055	-0.007166	-0.03516	-0.16319	0.03752	0.023726
	0.577	-0.066	-0.328	-1.374	0.446	0.306
Week 4	0.06694	-0.009514	0.01559	0.01961	0.11598	0.116676
	0.635	-0.087	0.145	0.164	1.372	1.499
Week 5	-0.09833	-0.023525	-0.05823	-0,06381	-0.14500	-0.024774
	-0.721	-0.166	-0.417	-0.413	-1.325	-0.246
F-Statistic	1.925**	1.036	1.352	1.412	1.183	0.6533

Appendix 13 – ECB meeting days

The following table shows results for the regression of daily European index log returns on one dummy for ECB announcement days. This is done for two subsamples, 2002-2014 and 2015-2017. */**/*** indicates significance at the 0.1/0.05/0.01 level. Coefficients can be found in the first line, the second one has t-values in parenthesis.

	ATX	**DAX**	**CAC**	**IBEX**	**FTSE100**	**FTSE250**
2002-2014						
Constant	0.02296	0.03119	0.007442	0.01629	0.01261	0.03107
	(0.870)	(1.172)	(0.285)	(0.622)	(0.592)	(1.608)
Meeting Day	-0.06688	-0.24307**	-0.201889*	-0.20528*	-0.13129	-0.04180
	(-0.544)	(-1.961)	(-1.661)	(-1.684)	(-1.323)	(-0.465)
2015-2017						
Constant	0.03933	0.02370	0.02029	-0.02339	0.01939	0.03075
	(0.950)	(0.552)	(0.479)	(-0.500)	(0.584)	(1.009)
Meeting Day	0.46584*	0.36288	0.27680	0.63364**	0.05443	0.12494
	(1.952)	(1.465)	(1.134)	(2.351)	(0.284)	(0.711)

Appendix 14 – Days -6 and -5 and Week -1

The following table contains three regressions of daily European index log returns for different subperiods on one dummy each. The first model regresses daily returns from 2002 to 2014 on one dummy for Day -6 of the ECB cycle, the second and third take returns from 2015-2017. The second model has one dummy for Day -5, the third one for Week -1. Day 0 marks ECB announcement days, Week -1 starts on Day -6, Week 0 on Day -1, each week has five trading days. */**/*** indicates significance at the 0.1/0.05/0.01 level. The first lines are coefficients, the second line shows t-values in parenthesis.

	ATX	**DAX**	**CAC**	**IBEX**	**FTSE100**	**FTSE250**
2002-2014: **Day-6**						
Coefficient	0.306705**	0.286232**	0.35460***	0.296079**	0.212073**	0.16401*
	(-2.499)	(-2.310)	(-2.920)	(-2.431)	(-2.139)	(-1.824)
Constant	0.005724	0.006773	-0.01823	-0.006846	-0.003231	0.02158
	(0.217)	(0.254)	(-0.699)	(-0.262)	(-0.152)	(1.117)
2015-2017: **Day -5**						
Coefficients	0.60111**	0.39436	0.58503**	0.44697*	0.29764	0.15348
	(-2.523)	(-1.593)	(-2.403)	(-1.655)	(-1.557)	(0.874)
Constant	0.03526	0.02276	0.01102	-0.01777	0.01208	0.02989
	(0.853)	(0.530)	(0.261)	(-0.380)	(0.364)	(0.981)
2015-2017: **Week -1**						
Coefficients	0.26175**	0.241323**	0.29655**	0.30955**	0.128235	0.07403
	(-2.298)	(-2.042)	(-2.550)	(-2.404)	(-1.403)	(0.882)
Constant	0.01398	-0.001673	-0.01598	-0.05088	0.001747	0.02337
	(0.316)	(-0.036)	(-0.354)	(-1.019)	(0.049)	(0.718)

Appendix 15 – Alternative Models

Panel X. The following table regresses daily European log return on two different sets of dummies. For both models (1) and (2), Day 0 marks ECB announcement days. In model (1), Week -1 starts on Day -6 and ends on Day -2, in model (2), Week -1 starts on Day -7 and ends on Day -3. All the weeks have a duration of five trading days. Thus model (2) is the same as model (1) but all the week dummies are shifted by one day to the past. */**/*** indicates significance at the 0.1/0.05/0.01 level. The sample period is 2002-2017.

		Week -1	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5	F-statistic
ATX									
	(1)	0.130326**	-0.004729	*-0.089585*	0.013464	*0.138851*	0.129768	-0.098329	2.313**
	(2)	0.12134**	0.01638	*-0.08434*	0.01101	0.10679	0.16893	-0.19715	2.181**
DAX									
	(1)	0.09131*	0.03141	-0.01636	-0.04125	0.11130	-0.04936	-0.02352	1.032
	(2)	0.13152***	-0.02130	-0.01502	-0.03361	0.13211*	-0.03353	-0.12563	1.704
CAC									
	(1)	0.089973*	0.006496	-0.066316	-0.045803	0.088228	-0.009473	-0.02352	1.146
	(2)	0.11609**	-0.04224	-0.06805	-0.02316	0.09582	0.02976	-0.15233	1.664
IBEX									
	(1)	0.1145142**	0.0341717	-0.0699155	-0.0578230	-0.000131	0.0174285	-0.0638048	1.388
	(2)	0.101954**	0.007833	-0.063610	-0.019890	0.003343	0.044700	-0.190060	1.103
FTSE100									
	(1)	0.07541*	0.01643	-0.06083	-0.03130	0.08885	0.09473	-0.14500	1.641
	(2)	0.073381*	-0.003991	-0.058050	-0.012002	0.086044	0.091585	-0.109612	1.383
FTSE 250									
	(1)	0.1072064***	0.0372334	*-0.0666155*	0.0002516	0.0866098	0.1602388*	-0.0247741	2.891***
	(2)	0.09193***	0.05999*	*-0.06843*	-0.00410	0.08183	0.17776**	-0.05510	2.923***

Appendix 16 – Week -1 in alternative models

Panel A. Regression of daily log return of several European indices on various ECB-cycle-week dummies. (1) is the basic model starting the cycle on Day -6, i.e. six days before each announcement. Each week in (1) lasts for five trading days. Thus, the dummy for this model includes Days -6 to -2. In model (2) the ECB-cycle starts one day earlier. This means Week -1 goes from Day -7 to Day -3. Model (3) has shorter Cycle-weeks of only four days. Therefore, Week -1 includes Days -6 to -3. The last model (4) has cycle-weeks that last for eight days, so Week -1 starts on Day -7 and ends on the announcement day. */**/*** stands for significance at the 0.1/0.05/0.01 level. Coefficients mean difference in log percent and are given in the first line each. T-values can be found in parenthesis below. The sample period starts in 2002 and ends at the end of 2017.

	ATX	**DAX**	**CAC**	**IBEX**	**FTSE**
Basic (1)					
Constant	-0.002057	0.003688	-0.01975	-0.02569	-0.005879
	(-0.082)	(0.145)	(-0.791)	(-1.012)	(-0.303)
Week -1	0.132239**	0.087523	0.10962**	0.14008**	0.085052**
	(2.448)	(1.599)	(2.042)	(2.567)	(2.040)
Model (2)					
Constant	0.0003826	-0.007434	-0.02698	-0.02226	-0.00467
	(0.015)	(-0.292)	(-1.081)	(-0.877)	(-0.241)
Week -1	0.1209586**	0.138951**	0.14307***	0.12421**	0.07946*
	(2.239)	(2.540)	(2.666)	(2.276)	(1.905)
Model (3)					
Constant	0.0009461	-0.004616	-0.02774	-0.02604	-0.006003
	(0.039)	(-0.186)	(-1.142)	(-1.054)	(-0.318)
Week -1	0.1477774**	0.157223***	0.18302***	0.17693***	0.106914**
	(2.515)	(2.642)	(3.135)	(2.981)	(2.357)
Model (4)					
Constant	-0.01027	0.001164	-0.02030	-0.02669	-0.002535
	(-0.374)	(0.042)	(-0.743)	(-0.961)	(-0.119)
Week -1	0.10657**	0.062100	0.07022	0.09059*	0.043564
	(2.278)	(1.310)	(1.510)	(1.917)	(1.206)

Panel B. Basically the same as Panel A but for the three-year subperiod of 2015-2017 and Model (3) starts one day earlier and thus goes from Day -7 to Day -4.

	ATX	DAX	CAC	IBEX	FTSE
Basic (1)					
Constant	0.01398	-0.001673	-0.01598	-0.05088	0.006223
	(0.316)	(-0.036)	(-0.354)	(-1.019)	(0.186)
Week -1	0.26175**	0.241323**	0.29655**	0.30955**	0.117011
	(2.298)	(2.042)	(2.550)	(2.404)	(1.357)
Model (2)					
Constant	0.01609	-0.01931	-0.02586	-0.06287	0.000926
	(0.364)	(-0.423)	(-0.575)	(-1.262)	(0.028)
Week -1	0.24770**	0.35859***	0.36226***	0.38931***	0.152236*
	(2.174)	(3.044)	(3.122)	(3.030)	(1.767)
Model (3)					
Constant	0.02218	-0.01133	-0.02306	-0.05774	0.003726
	(0.511)	(-0.252)	(-0.522)	(-1.180)	(0.114)
Week -1	0.25900**	0.38189***	0.42954***	0.44402***	0.167016*
	(2.068)	(2.949)	(3.372)	(3.146)	(1.765)
Model (4)					
Constant	-0.00630	-0.03715	-0.04289	-0.09554*	0.0006873
	(-0.135)	(-0.769)	(-0.901)	(-1.816)	(0.019)
Week -1	0.24788***	0.29828***	0.29720***	0.37909***	0.0961393
	(2.605)	(3.027)	(3.062)	(3.535)	(1.334)

Appendix 17 – Days -5 and -6

Regression of daily European index log return on a single dummy for Days -5 and -6 of the ECB cycle. */**/*** stands for significance at the 0.1/0.05/0.01 level. Coefficients mean difference in log percent and are given in the first line each. T-values can be found in parenthesis below. When read together with the previous Appendix, one can see how much of Week -1 return actually stems from just those two days.

	ATX	DAX	CAC	IBEX	FTSE
2002-2017					
Constant	0.007055	0.00351	-0.02262	-0.02033	-0.001223
	(0.303)	(0.149)	(-0.979)	(-0.865)	(-0.068)
Days -5&-6	0.225016***	0.22062***	0.30686***	0.28793***	0.158630***
	(2.847)	(2.755)	(3.910)	(3.607)	(2.600)
2015-2017					
Constant	0.02996	0.01451	-0,00006	-0.03135	0.01326
	(0.713)	(0.333)	(-0.002)	(-0.66)	(0.417)
Days -5&-6	0.38872**	0.33429*	0.4769***	0.44930**	0.17555
	(2.270)	(1.881)	(2.730)	(2.320)	(1.355)