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THE IPO QUIET PERIOD ANOMALY

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ABSTRACT

This paper examines whether abnormal returns surrounding the end of the IPO Quiet Period still occur in U.S. markets, and if so, whether these excess returns vary with market conditions. In addition, the period of time after the Jumpstart Our Business Startups (JOBS) Act was signed into law (April 5, 2012) is examined. Last, there is a cross-sectional analysis on industry differences. First, this research finds that significant abnormal returns did not occur during the examined bear market (9 October 2007 through 9 March 2009), whereas significant abnormal returns did occur during the examined bull market (10 March 2009 through 30 September 2011). As a result, this paper concludes that abnormal returns surrounding the Quiet Period expiration vary with market conditions, although this is inconsistent with market efficiency. Second, there are ambiguous results with respect to the presence of abnormal returns during the post-JOBS Act period (2 July 2012 through 30 June 2015), making any inference inconclusive. Third, the results from the cross-sectional analysis on industry differences show that there are no significant differences in abnormal returns surrounding the end of the Quiet Period between relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry) and relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry). However, a caveat is that the sample size for relatively certain industries is small in this analysis, leading to problematic statistical inference.

Keywords: Initial public offerings; Quiet Period; Analyst recommendations; Analyst initiations; Market efficiency.

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I. Introduction

Analysts of affiliated underwriters (lead and co-lead underwriters) are restricted from issuing opinions concerning valuation, forward-looking statements regarding sales and earnings forecasts, and research reports regarding the firm during a specified period of time following an initial public offering (IPO). This period of prohibited forward-looking statements relating a newly public company is regulated by the U.S. Securities and Exchange Commission (SEC) and is known as the 'Quiet Period'. The focus of this paper is specifically on the period of time where the Quiet Period lasted until 40 calendar days after the IPO. Hence, affiliated underwriters are prohibited to issue research reports and recommendations for a total of 40 calendar days after completion of an IPO. After the Quiet Period expiration, analysts of affiliated underwriters are permitted to initiate analyst coverage, and publish earnings forecasts and research reports regarding the newly public company. Ritter and Welch (2002) state that, typically, the managing underwriters (lead and co-lead) initiate analyst coverage usually with a 'strong buy' or 'buy' recommendation at the Quiet Period expiration. The conflict of interest hypothesis, attributed to Michaely and Womack (1999), suggests that "underwriter analysts have a strong incentive to recommend IPOs that their firms have recently taken public, regardless of the IPO's quality" (Michaely and Womack, 1999: 683). After completion of an IPO, affiliated underwriters have built a strong relationship with the newly public company, and may have an incentive to issue favorable recommendations to secure future investment banking business. Moreover, the curry favor hypothesis of Bradley *et al.* (2007) state that analysts of non-affiliated underwriters are, like analysts of affiliated underwriters, biased because they want to build a positive relationship with a newly public company in order to assure investment banking business in the future. Several studies (Bradley *et al.* (2003); Bradley *et al.* (2004); Highfield *et al.* (2008)) confirm that analysts, whether affiliated to the managing underwriters or not, mainly issue favorable recommendations on newly public companies. As shown by anecdotal and empirical evidence, as a result, stock prices typically rise surrounding the end of the Quiet Period. Correspondingly, prior Quiet Period research (Bradley *et al.* (2003); Highfield *et al.* (2008)) found that, typically, significant abnormal returns occur surrounding the end of the Quiet Period. Since the Quiet Period expiration dates are known ahead of time with complete certainty, significant abnormal returns surrounding the end of the Quiet Period are inconsistent with market efficiency. As stated by Bradley *et al.* (2003), "if analysts systematically issue favorable recommendations at the time the Quiet Period expires, market participants should anticipate these announcements, and, on average, we should not observe a significant abnormal return at the end of the Quiet Period" (Bradley *et al.*, 2003: 7). On average, abnormal returns at the Quiet Period expiration should be zero in an efficient market. Therefore, this paper refers to the 'Quiet Period Anomaly' when discussing excess returns surrounding the Quiet Period expiration as, on average, abnormal returns should not exist around such an event. Bradley *et al.* (2003) found positive and significant abnormal returns during a bull market (1996-2000), while Bradley *et al.* (2004) found insignificant abnormal returns during a bear market (January 2001-July 2002). Furthermore, Highfield *et al.* (2008) found positive and significant returns during the bull market of July 2002-December 2005. Highfield *et al.* (2008) argue that, "given that returns surrounding the Quiet

Period expiration are only positive and statistically significant during bull markets, it appears that analyst activity and Quiet Period returns for IPOs vary with market conditions" (Highfield *et al.*, 2008: 1365).

This paper examines whether the Quiet Period Anomaly still exists, and if so, whether the Anomaly varies with market conditions. In other words: are abnormal returns surrounding the end of the Quiet Period still possible and do these excess returns occur during bear markets as well as bull markets? Additionally, the period of time after the Jumpstart Our Business Startups (JOBS) Act was signed into law (April 5, 2012) is examined. This paper appears to be the first to specifically examine the effect of the JOBS Act on events surrounding the end of the Quiet Period. Besides examining whether the Quiet Period Anomaly still exists and varies with market conditions, there is a cross-sectional analysis on industry differences. This paper appears to be the first to specifically examine differences between particular industries regarding excess returns surrounding the Quiet Period expiration.

Specific periods of time are classified as either a bear or bull market. A period of four years is examined, October 2007 through September 2011, in order to examine the first two market conditions. This period of time experienced a bear market as well as a bull market. From 9 October 2007 through 9 March 2009 a bear market occurred, while from 10 March 2009 through 30 September 2011 a bull market occurred. A period of three years is examined, 2 July 2012 through 30 June 2015, in order to examine the post-JOBS Act period. To test whether, on average, U.S. firms experience abnormal returns surrounding the IPO Quiet Period expiration, there is relied on standard event study methods. Day 0 indicates the expiration of the Quiet Period, which is the 41st calendar day (i.e., event date) following the IPO (or the first trading day thereafter). Consistent with prior Quiet Period research, market-adjusted returns (MARs) are used as a measure of abnormal returns. The five-day (-2, +2) event window shows whether there is a clear clustering of significant abnormal returns in the days surrounding the expiration of the Quiet Period. The final samples for the initial event study consist of 125, 263, and 538 unique IPO observations for the examined bear market, bull market, and post-JOBS Act period, respectively. A multivariate regression analysis is conducted to cross-check the outcomes of the initial event study. In addition, the multivariate regression model is used as a cross-sectional analysis to examine if there are any differences between specific industries. As a result of doing so, the precise effect of a particular market condition and cluster of specific industries on the cumulative market-adjusted returns (CMARs) can be examined. The first cluster of industries concerns relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry), whereas the second cluster concerns relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry). This research classified IPO firms as operating in a relatively uncertain or certain industry based on differences in industry average volatility (market and firm-specific uncertainty, estimated as the variance in monthly returns). The multivariate regression analysis on varying market conditions covers 603 unique IPO observations and the cross-sectional multivariate regression analysis on industry differences covers 672 unique IPO observations. The regression method of ordinary least squares (OLS) is used to examine the determinants of the CMARs.

For the examined bear market, the unconditional CMAR over the five-day (-2, +2) window is 62 basis points, which is not statistically different from zero at conventional levels. This finding is consistent with

Bradley *et al.* (2004), who found a statistically insignificant abnormal return of 1.4 percent around the Quiet Period expiration date for a sample of IPOs issued during a bear market. For the examined bull market, the unconditional CMAR over the five-day (-2, +2) window is 1.17 percent, which is statistically significant at the five percent level. Nevertheless, this is much smaller than the statistically and economically significant 3.12 percent and 1.89 percent for a sample of IPOs issued during a bull market documented by Bradley *et al.* (2003) and Highfield *et al.* (2008), respectively. In contrast to the examined bear and bull market, the initial event study for the examined post-JOBS Act period shows that there is a negative CMAR over the five-day (-2, +2) window of minus 12 basis points, which is statistically significant at the one percent level.

The multivariate regression analysis on varying market conditions confirms that the Quiet Period Anomaly did not occur during the examined bear market by showing a consistently insignificant effect of this specific market condition on the cumulative abnormal returns at the Quiet Period expiration. With regard to the examined bull market, for the five-day (-2, +2) window, the multivariate regression analysis confirms that this specific market condition has a significantly positive effect on abnormal returns at the Quiet Period expiration. With regard to the examined post-JOBS Act period, the multivariate regression analysis did not find a significantly negative effect on abnormal returns at the Quiet Period expiration for the five-day (-2, +2) window as indicated by the initial event study. Hence, the significant effect of IPOs issued after the JOBS Act was signed into law on the CMARs disappeared in the multivariate regression analysis. Concluding, the multivariate regression analysis thus shows that a bear market has a persistent insignificant effect on the cumulative abnormal returns at the Quiet Period expiration, whereas a bull market has a significant effect on the CMARs. Correspondingly, the Quiet Period Anomaly did not occur during the examined bear market, whereas the Anomaly did occur during the examined bull market. As a consequence, this paper concludes that the Quiet Period Anomaly varies with market conditions. In other words: excess returns surrounding the end of the Quiet Period can only be earned during bull markets, although this is inconsistent with market efficiency. On the contrary, the multivariate regression analysis shows that there is no consistent effect of the post-JOBS Act period on abnormal returns at the Quiet Period expiration, making any inference on this specific period of time inconclusive.

The cross-sectional multivariate regression analysis on industry differences indicates that relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry) and relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry) do not significantly affect the size of abnormal returns at the Quiet Period expiration for the five-day (-2, +2) window. Concluding, there are no significant differences in abnormal returns surrounding the end of the Quiet Period among specific industries. Notably, the cross-sectional multivariate regression analysis on industry differences thus shows that both clusters of specific industries (relatively uncertain and certain industries) do not consistently affect the size of the CMARs. However, a caveat is that the sample size for relatively certain industries is small in this analysis, leading to problematic statistical inference. As a result, the effect of relatively certain industries on the CMARs (and its effect relative to relatively uncertain industries, and vice versa) is not perfectly clear.

The remainder of the paper is organized as follows. In Section II, there is a review of prior research relating the IPO Quiet Period. In Section III, the testable predictions are determined. Section IV describes the data and explains the methodology. Section V presents and discusses the results, and Section VI concludes the paper.

II. Institutional and literature background

In this section, basic institutional background concerning the IPO Quiet Period is provided. Furthermore, there is a review of prior research on initiated analyst coverage after the Quiet Period expiration, market reactions to analyst recommendations, and possible conflicts with market efficiency.

A. IPO Quiet Period

When a company takes part in an initial public offering (IPO) it faces many regulatory requirements and restrictions concerning the public distribution of valuation and forward-looking statements. During this period of time, the company is 'in registration' and a firm is regarded to be in registration for an additional period after completion of an IPO. During this specified period of time following the IPO, analysts of affiliated underwriters (lead and co-lead underwriters) are restricted from issuing opinions concerning valuation, forward-looking statements regarding sales and earnings forecasts, and research reports regarding the firm. This period of prohibited forward-looking statements relating a newly public company is regulated by the U.S. Securities and Exchange Commission (SEC) and is known as the 'Quiet Period'. Eckbo (2007) defines the Quiet Period as:

> "U.S. regulation which prohibits firms going public and their underwriters from disclosing sales and earnings forecasts not in the prospectus starting before the firm announces its IPO and ending 40 calendar days after the offer. This also precludes stock analysts affiliated with an underwriter from covering the stock of an IPO for the same period" (Eckbo, 2007: 246).

Prior to July 2002, the post-IPO Quiet Period consisted of 25 calendar days. NYSE Rule 472 and NASD Rule 2711, implemented by the SEC on 9 July 2002, extended the post-IPO Quiet Period from 25 to 40 calendar days[1]. In December 2015, NYSE Rule 472 and NASD Rule 2711 has been superseded by Rule 2241 of the Financial Industry Regulatory Authority (FINRA). For any member that participated as an underwriter or dealer, FINRA Rule 2241 reduced the 40-day Quiet Period to a minimum of 10 days after the date of the offering[2]. SEC Release #5180, *Guidelines for the Release of Information by Issuers whose Securities Are in*

[1]The focus of this paper is specifically on the period of time where the Quiet Period lasted until 40 calendar days after the IPO. Therefore, when speaking of the Quiet Period, there is referred to the 40-day period after the IPO, unless otherwise stated.

[2]Bradley *et al.* (2004) examined analyst behavior following the regulatory changes instituted in July 2002 that changed the length of the Quiet Period. The authors found that affiliated analysts continue to issue mostly favorable recommendations as soon as the Quiet Period expires. Thus, the only practical implication of FINRA Rule 2241 is a reduction of a certain number of days in IPO firms receiving analyst coverage. Therefore, the general premise of this paper remains the same, regardless of the post-2015 change in the Quiet Period duration.

Registration (SEC, 1971), outlines what a firm can and cannot do during the Quiet Period, which can be found in Appendix A.

One of the major implications of the regulatory restrictions regarding the Quiet Period concerns financial analysts of affiliated underwriters (lead and co-lead underwriters). The SEC prohibits analysts that are affiliated with firms completing their IPOs to issue opinions concerning valuation, forward-looking statements about sales and earnings forecasts, and research reports concerning the firm. Hence, affiliated underwriters are prohibited to issue research reports and recommendations for a total of 40 calendar days after completion of an IPO. After the Quiet Period expiration, analysts of affiliated underwriters are permitted to initiate analyst coverage, and publish earnings forecasts and research reports regarding the newly public company.

The general idea behind the SEC's implementation of a post-IPO Quiet Period is that all relevant information should be included in the prospectus. The Quiet Period enables investors to have enough time in which to carry out research, thereby allowing market forces to establish a fair value of the newly public company. In addition, this fair value can be derived because the firm's management and affiliated underwriters are not allowed to influence asset prices by trying to promote the stock during the first few weeks of a new IPO. For example, analysts of affiliated underwriters could do so by issuing positively biased research reports and recommendations after completion of an IPO.

As stated by Bradley *et al.* (2003), "because the end of the Quiet Period marks the first opportunity for firms and their underwriters to make forward-looking statements and give valuation opinions, it makes an excellent laboratory for the study of market reactions to information release" (Bradley *et al.*, 2003: 5). After completion of an IPO, affiliated underwriters have built a strong relationship with the newly public company, and may have an incentive to issue favorable recommendations to secure future investment banking business. On the other hand, the affiliated underwriters have gained valuable information during the due diligence and selling process, creating a significant informational advantage. Moreover, due to limited public information, there is high uncertainty with regard to the value of newly public companies. The post-IPO Quiet Period maintains this uncertainty as it restricts the public distribution of valuation and forward-looking statements. Bradley *et al.* (2003) conclude that significant share price revisions are possible once the Quiet Period ends because investors receive new information from then on. As Cedergren (2014) summarizes, the Quiet Period expiration is the commencement of a potentially considerable shift in the information environment of newly public companies. Cedergren (2014) adds that the Quiet Period creates a (relative) degree of calm before firms and analysts start talking freely, and is therefore regarded to be effective.

B. Initiation of analyst coverage

As mentioned earlier, affiliated lead and co-lead underwriters are permitted to initiate analyst coverage, and publish earnings forecasts and research reports regarding the newly public company after the IPO Quiet Period expiration. Highfield *et al.* (2008) found that, although NYSE Rule 472 and NASD Rule 2711 only require affiliated analysts to wait for 40 days before initiating coverage, almost all analysts wait until the end

of the 40-day Quiet Period to initiate coverage. This finding suggests that analysts of non-affiliated underwriters may wait on analysts of affiliated underwriters to determine if coverage is initiated and what the recommendation of the lead underwriter will be. This result supports the findings of Welch, who concludes that "analysts herd based on little or no information" (Welch, 2000: 371).

There are two primary competing hypotheses concerning analyst recommendations of underwriters (lead and co-lead underwriters) that are affiliated with firms completing their IPOs. Specifically, the superior information hypothesis and the conflict of interest hypothesis, which will be discussed next. Thereafter, empirical evidence regarding analyst recommendations surrounding the end of the Quiet Period is provided.

Superior information hypothesis

The superior information hypothesis, attributed to Allen and Faulhaber (1989), suggests that through the process of taking a firm public, analysts of lead underwriters gain superior information compared to analysts of non-lead underwriters. By being highly involved in the due diligence and selling process, the affiliated underwriters have gained valuable information, thereby creating a significant informational advantage. As stated by Highfield *et al.* (2008), the market reaction to the announcement of a buy recommendation by analysts of lead underwriters should therefore be more favorably relative to the market reaction to a buy recommendation by analysts of non-lead underwriters because analysts of lead underwriters have superior information for making such recommendation.

Conflict of interest hypothesis

The conflict of interest hypothesis by Michaely and Womack (1999) is competing the superior information hypothesis. This hypothesis suggests that "underwriter analysts have a strong incentive to recommend IPOs that their firms have recently taken public, regardless of the IPO's quality. That is, there may be a conflict of interest between analysts' fiduciary responsibility to investing client (to make accurate recommendations) and their incentive to market stocks underwritten by their firms" (Michaely and Womack, 1999: 683). As Highfield *et al.* (2008) conclude, analysts may be under pressure to issue positively biased recommendations because of the aspiration of the affiliated underwriter to maintain a positive relationship with a newly public company in order to secure investment banking business in the future (e.g., secondary equity offerings). Using a sample of IPOs from 1990 and 1991, Michaely and Womack (1999) found three pieces of evidence supporting the conflict of interest hypothesis: (i) recommendations of lead underwriters are more optimistic than recommendations of non-lead underwriters; (ii) market reactions to the announcement of buy recommendations are smaller for lead underwriters, indicating that the market discounts them; and (iii) firms that are recommended by their lead underwriters perform worse in the long-run than firms recommended by non-lead underwriters.

Nevertheless, analysts of affiliated underwriters may not be alone in issuing favorable recommendations. Rajan and Servaes (1997) found that analysts of underwriters are not unique in being optimistic: analysts of non-affiliated underwriters are, on average, excessively optimistic. Moreover, the curry

favor hypothesis of Bradley *et al.* (2007) state that analysts of non-affiliated underwriters are, like analysts of affiliated underwriters, biased because they want to build a positive relationship with a newly public company in order to assure investment banking business in the future.

Ritter and Welch (2002) state that, typically, the managing underwriters (lead and co-lead) initiate analyst coverage usually with a 'strong buy' or 'buy' recommendation at the Quiet Period expiration. Several studies confirm that analysts issue favorable recommendations on newly public companies. Using a sample of IPOs from 1996 to 2000, Bradley *et al.* (2003) found that 96 percent of all recommendations are either 'strong buy' or 'buy' (i.e., favorable), and that there was an average of 1.71 ratings issued per firm. In a follow-up study of the January 2001-July 2002 time period, Bradley *et al.* (2004) found that 95 percent of all recommendations are favorable, and analysts issued 2.72 ratings per firm. Both studies found that recommendations of lead underwriters are neither statistically nor economically different from recommendations of non-lead underwriters. Furthermore, during the July 2002-December 2005 time period, Highfield *et al.* (2008) found that 71 percent of all recommendations are favorable, and that there was an average of 1.73 ratings per firm.

Different market conditions could be a reason for varying average issued analyst ratings. There was a relatively high average rating per firm of 2.72 during the relatively weak January 2001-July 2002 market, while analysts only issued 1.71 and 1.73 ratings on average during the strong markets of 1996-2000 and July 2002-December 2005, respectively. Highfield *et al.* (2008) suggest that, by increasing the frequency of coverage, analysts may try to promote a firm which goes public during a weak IPO market. This result is consistent with James and Karceski (2006), who found that firms with negative initial returns are more likely to receive favorable recommendations, particularly by analysts affiliated with the lead underwriter. At last, Highfield *et al.* (2008) also found "little difference between the mean ratings for firms where the lead underwriter initiates coverage vs. firms where the lead underwriter does not initiate coverage" (Highfield *et al.*, 2008: 1367), supporting the curry favor hypothesis of Bradley *et al.* (2007). Concluding, when the IPO Quiet Period expires, financial analysts, whether affiliated to the managing underwriters or not, typically issue favorable recommendations on newly public companies.

C. Market reactions to analyst recommendations

During the IPO Quiet Period there is high uncertainty regarding the value of newly public companies. When the Quiet Period expires, and analysts publish research reports and recommendations, investors receive new information and may revise share prices. Since investors have limited information on newly public companies, they can rely on research reports and recommendations from affiliated analysts when making decisions, in line with Firth (1998). The financial press (Scott, 1999) provides anecdotal evidence which indicates that the Quiet Period expiration can have considerable consequences for shareholders, with companies experiencing surging share prices after receiving favorable recommendations. Hereafter, three leading papers concerning the end of the Quiet Period are discussed. The paper of Bradley *et al.* (2003) appears to be the first which specifically examined the stock market reaction to analyst initiations at the end of the Quiet Period. Subsequently, Bradley

et al. (2004) and Highfield *et al.* (2008) carried out additional research on these events, examining different periods of time.

Bradley *et al.* (2003) found that over the January 1996 through December 2000 period, there is an evident clustering of significant abnormal returns in the days surrounding the expiration of the Quiet Period[3]. In their sample, the average cumulative market-adjusted return (CMAR) for the five-day (-2, +2) window is 3.12 percent, which is highly significant. Out of a total five-day CMAR of 3.12 percent, 2.32 percent occurs in the two-day (-2, -1) pre-event period. Hence, significant abnormal returns begin to occur several days before the end of the Quiet Period. This outcome applies to all IPOs, irrespective of whether coverage is initiated or not.

In a follow-up study, however, Bradley *et al.* (2004) found that for IPOs issued between January 2001 and July 2002, the unconditional CMAR over the five-day window is 1.4 percent, which is not statistically significant. Besides, Bradley *et al.* (2004) examined firms that went public between July and December 2002[4]. They found the same pattern of CMARs as in the 2001-2002 period[5], but with problematic statistical inference due to the limited sample. In addition, Bradley *et al.* (2008) found that the market reaction is basically the same for initiations of affiliated underwriters as for initiations of non-affiliated underwriters.

Last, Highfield *et al.* (2008) examined the Quiet Period from July 2002 to December 2005 to determine if the positive significant market-adjusted returns found by Bradley *et al.* (2003) have disappeared as suggested by Bradley *et al.* (2004). For the overall sample period, they found a significant CMAR of 1.89 percent for the five-day window surrounding the Quiet Period expiration. Additionally, for the two-day (-1, 0) window consisting of the day before and the day of the Quiet Period expiration, there is a significant positive CMAR of 99 basis points for a randomly selected IPO. Furthermore, the authors found that there is no significant difference in returns for firms with coverage compared to firms without coverage initiated. In Appendix B, an overview of the main findings of studies concerning excess returns surrounding the Quiet Period expiration can be found.

Concluding, Bradley *et al.* (2003) found positive and significant returns during a bull market, while Bradley *et al.* (2004) found insignificant returns during a bear market. Moreover, Highfield *et al.* (2008) found positive and significant returns during the bull market of 2002-2005. Loughran and Ritter (2004) found that IPO underpricing differs with different market conditions, and Highfield *et al.* (2008) argue that the same may hold for Quiet Period returns. The authors conclude that, "given that returns surrounding the Quiet Period expiration are only positive and statistically significant during bull markets, it appears that analyst activity and Quiet Period returns for IPOs vary with market conditions" (Highfield *et al.*, 2008: 1365).

[3]Prior to July 2002, the post-IPO Quiet Period consisted of 25 calendar days.

[4]To examine the impact of NYSE Rule 472 and NASD Rule 2711, implemented by the SEC on 9 July 2002, which extended the post-IPO Quiet Period from 25 to 40 calendar days.

[5]Thus, the only practical implication of the new regulation is a 15-day delay in IPO firms receiving analyst coverage.

D. Possible conflicts with market efficiency

Barberis and Thaler (2003) state that in the traditional framework, where there are no market frictions and agents are rational, asset prices are equal to their 'fundamental value'. This value is the discounted sum of expected future cash flows, where investors correctly process all available information when forming expectations. The hypothesis that actual prices reflect fundamental values is the Efficient Market Hypothesis (EMH) by Fama (1970). In an efficient market, investors are rational and prices should correctly incorporate all available information. As illustrated by Barberis and Thaler (2003), as soon as there is a mispricing (i.e., a deviation from fundamental value), a lucrative investment opportunity appears where rational traders will instantly seize the opportunity, thereby correcting the mispricing.

As mentioned before, anecdotal and empirical evidence shows that stock prices typically rise surrounding the expiration of the Quiet Period, predominantly because of favorable analyst recommendations. Nonetheless, as argued by Bradley *et al.* (2003), "what is puzzling about this finding is that the expiration date of the Quiet Period is known in advance. For any given firm, positive or negative abnormal returns may occur if market participants infer unexpectedly good or bad news from perceived insider selling, but, on average, the abnormal returns should be zero in an efficient market" (Bradley *et al.*, 2003: 6). Since the relevant dates are known ahead of time with complete certainty, significant abnormal returns surrounding the expiration of the Quiet Period are inconsistent with market efficiency. Following the EMH, on average, abnormal returns should not exist around such an event.

Apparently, in the context of the IPO Quiet Period, markets fail to incorporate favorable recommendations even though this information is predictable. A possible explanation is that investors underreact to the absence of news, as suggested by Giglio and Shue (2014). The authors argue that boundedly rational agents tend to underreact to less vivid and salient sources of information, not fully updating on the passage of time. Two behavioral models, proposed by Barberis, Shleifer, and Vishny (BSV, 1998) and Daniel, Hirshleifer, and Subrahmanyam (DHS, 1997) possibly explain how the judgement biases of investors can cause overreaction to some events and underreaction to others. The BSV model (1998) is based on evidence from cognitive psychology of two judgement biases. Specifically, (i) the representativeness bias, attributed to Kahneman and Tversky (1982): people give recent patterns in the data too much weight and give the properties of the population that generates the data too little weight. (ii) The conservatism bias of Edwards (1968): people have the tendency to revise their beliefs insufficiently in the face of new evidence, resulting in the slow updating of models. The DHS model (1997), on the other hand, has different behavioral foundations than the BSV model (1998). In the DHS model (1997) there are informed and uninformed investors, where the uninformed investors are not prone to judgment biases. However, informed investors determine stock prices, and this kind of investors are subject to two biases, overconfidence and the self-attribution bias. (i) Overconfidence causes informed investors to overstate the precision of their private signals about the value of a stock. (ii) The self-attribution bias leads informed investors to downweigh public signals about a stock's value, especially when the public signals are in contradiction with their private signals. Correspondingly,

Fama (1998) concludes that overreaction occurs to private information and underreaction occurs to public information.

Nevertheless, significantly positive returns surrounding the Quiet Period expiration should be arbitraged away. Limits to arbitrage could be a reason why rational investors are not willing or able to arbitraging away mispricing in newly public companies. Barberis and Thaler (2003) state that, even when an asset is substantially mispriced, trading strategies designed to correct the mispricing can be risky as well as costly, therefore being unattractive. As a result, the deviation of the actual asset price from its fundamental value can remain unchallenged. Bradley *et al.* (2003) confirm that trading strategies where traders buy stock just before the end of the Quiet Period are commonly known, but compelling evidence on the returns from such strategies is lacking. Field and Hanka (2001) conducted an event study on the expiration of IPO share lockups, in which they found statistically significant abnormal returns (negative abnormal return of minus 1.5 percent around the lockup expiration). As with the Quiet Period, the lockup period ends on a specific calendar date that is known well in advance. The authors state that "the predictable, permanent share price drop at the unlock date violates semi-strong form market efficiency, but does not represent an obvious short-term profit opportunity. Bid and ask prices do not fall far enough to reward the strategy of selling short at the bid price before the unlock day and then covering at the ask price after the unlock day" (Field and Hanka, 2001: 487-488). Field and Hanka (2001) add that, "although the abnormal return does not represent a short-term profit opportunity for traders who must transact at the bid and ask, nonetheless it challenges the more extreme versions of the EMH, as it is difficult to understand how the events of the unlock day could be consistently worse than expected, or why a rational trader would buy at the ask price in the week before the unlock day" (Field and Hanka, 2001: 495).

Concluding, as the end of the Quiet Period is known in advance, observed significant abnormal returns surrounding the Quiet Period expiration are inconsistent with market efficiency. This implies that the market consistently fails to anticipate the predictable events at the end of the Quiet Period, not correctly incorporating all available information. Nevertheless, compelling evidence on the returns from related trading strategies is lacking, probably due to limits to arbitrage.

III. Hypothesis development

As mentioned before, when the IPO Quiet Period expires, financial analysts, whether affiliated to the managing underwriters or not, mainly issue favorable recommendations on newly public companies. Prior research shows that, typically, significant abnormal returns occur surrounding the end of the Quiet Period. Since the Quiet Period expiration dates are known ahead of time with complete certainty, significant abnormal returns surrounding the end of the Quiet Period are inconsistent with market efficiency. We speak of an anomaly when describing the incidence if the actual result under a given set of assumptions is different from the expected result. Therefore, this paper refers to the 'Quiet Period Anomaly' when discussing excess returns surrounding the Quiet Period expiration as, on average, abnormal returns should not exist around such an event.

A. The Quiet Period Anomaly and varying market conditions

Anecdotal and empirical evidence shows that stock prices typically rise surrounding the end of the Quiet Period after receiving favorable recommendations from positively biased analysts. However, abnormal returns surrounding the Quiet Period expiration seem to vary with market conditions. Bradley *et al.* (2003) found positive and significant abnormal returns during a bull market (1996-2000), while Bradley *et al.* (2004) found insignificant abnormal returns during a bear market (January 2001-July 2002). Furthermore, Highfield *et al.* (2008) found positive and significant returns during the bull market of July 2002-December 2005. Highfield *et al.* (2008) argue that, "given that returns surrounding the Quiet Period expiration are only positive and statistically significant during bull markets, it appears that analyst activity and Quiet Period returns for IPOs vary with market conditions" (Highfield *et al.*, 2008: 1365). This paper examines whether the Quiet Period Anomaly still exists, and if so, whether the Anomaly varies with market conditions. In other words: are abnormal returns surrounding the end of the Quiet Period still possible and do these excess returns occur during bear markets as well as bull markets?

Two testable hypotheses are derived to test whether the Quiet Period Anomaly still exists and varies with market conditions. The first hypothesis examines a period of time containing a bear market, whereas the second hypothesis examines a period of time containing a bull market. As stated by Bradley *et al.* (2003), "if analysts systematically issue favorable recommendations at the time the Quiet Period expires, market participants should anticipate these announcements, and, on average, we should not observe a significant abnormal return at the end of the Quiet Period" (Bradley *et al.*, 2003: 7). On average, abnormal returns at the Quiet Period expiration should be zero in an efficient market. Therefore, the null hypothesis is that, on average, firms do not experience significant abnormal returns surrounding the Quiet Period expiration. As argued by Bradley *et al.* (2003), "some firms will naturally experience a positive surprise if the information released is better than expected, and vice versa. Nonetheless, if expectations are unbiased, the average should be insignificantly different from zero" (Bradley *et al.*, 2003: 7). The alternative hypothesis is that, on average, firms do experience significant abnormal returns surrounding the end of the Quiet Period.

Hypothesis I

H_0: *On average, firms do not experience significant abnormal returns at the Quiet Period expiration during a bear market*

H_1: *On average, firms do experience significant abnormal returns at the Quiet Period expiration during a bear market*

Hypothesis II

H_0: *On average, firms do not experience significant abnormal returns at the Quiet Period expiration during a bull market*

H_1: *On average, firms do experience significant abnormal returns at the Quiet Period expiration during a bull market*

Following the results of prior Quiet Period research (Bradley *et al.* (2003); Bradley *et al.* (2004); Highfield *et al.* (2008)), the expectation is that, on average, there can be significant abnormal returns surrounding the Quiet Period expiration in the examined bull market. On the contrary, for the examined bear market, the expectation is that there are no significant abnormal returns surrounding the end of the Quiet Period. Thus, overall the expectation is that the Quiet Period Anomaly (partially) exists in the examined period of time, although this is inconsistent with market efficiency. Naturally, the outcomes of the testable hypotheses are explained with economic theory and relating literature. Furthermore, there is a cross-sectional analysis to examine what drives the CMARs, what are possible explanations, and if there are any differences between specific industries.

In addition, this paper examines the period of time after the Jumpstart Our Business Startups (JOBS) Act was signed into law on April 5, 2012. The JOBS Act intends to encourage funding of small businesses in the U.S. by easing many of the country's asset regulations. The JOBS Act made the process of raising capital for companies easier, encouraging more companies to go public. The JOBS Act left in place most of the regulatory requirements and restrictions concerning the public distribution of valuation and forward-looking statements, as well as the post-IPO 40-day Quiet Period. Nonetheless, as stated by Cedergren (2014), the JOBS Act "allows so-called emerging growth companies[6] to engage in private oral or written communications, while the company is in registration, to certain accredited institutional investors in order to gauge investment interest[7]" (Cedergren, 2014: 35). As Cedergren (2014) suggests, future studies can assess whether the JOBS Act has an effect on IPO outcomes such as proceeds (e.g., abnormal returns surrounding the Quiet Period expiration). This paper appears to be the first to specifically examine the effect of the JOBS Act on events surrounding the end of the Quiet Period. Like the previous testable hypotheses, the null hypothesis is that, on average, firms do not experience significant abnormal returns surrounding the Quiet Period expiration. The alternative hypothesis is that, on average, firms do experience significant abnormal returns surrounding the end of the Quiet Period.

Hypothesis III

H_0: *On average, firms do not experience significant abnormal returns at the Quiet Period expiration after the JOBS Act was signed into law*

H_1: *On average, firms do experience significant abnormal returns at the Quiet Period expiration after the JOBS Act was signed into law*

As the JOBS Act was signed into law during a bull market, the expectation of this hypothesis could be similar to the second hypothesis. That is, on average, there can be significant abnormal returns surrounding the Quiet Period expiration during this period of time. On the other hand, the introduction of 'testing the waters'

[6]The JOBS Act defines emerging growth companies as firms with less than $1 billion in revenues in the most recent fiscal year, a definition which would encompass the majority of IPO firms.

[7]This practice is referred to as 'testing the waters' communications.

communications can lead to the absence of abnormal returns. These pre-IPO communications with important investors (i.e., institutional investors) possibly reduce the uncertainty with regard to the value of newly public companies. As a consequence, share price revisions after positively biased analyst recommendations at the end of the Quiet Period could be less severe as investors receive relatively known information, leading to absent abnormal returns. Thus, the effect of the JOBS Act on events surrounding the end of the Quiet Period is ambiguous. In line with the previous testable hypotheses, the outcome of this hypothesis is explained with economic theory and relating literature. Furthermore, there is a cross-sectional analysis to examine what drives the CMARs, what are possible explanations, and if there are any differences between specific industries.

B. The Quiet Period Anomaly and industry differences

In order to conduct a cross-sectional analysis regarding excess returns surrounding the Quiet Period expiration, a couple of industries are closely investigated. As stated by Smit and Trigeorgis (2004), some industries face more uncertainty (i.e., market and firm-specific uncertainty, estimated as the variance in monthly returns) than others. For example, the Information Technology and Pharmaceutical Products industry are significantly more uncertain than the Chemicals, Food Products, and Transportation industry. Where the Information Technology and Pharmaceutical Products industry have an uncertainty-factor of 23 and 14 percent, respectively, the Chemicals, Food Products, and Transportation industry have an uncertainty-factor of 6, 6, and 9 percent, respectively. In Appendix C, an overview of the industry (average) volatility (market and firm-specific uncertainty) for a number of representative industries can be found. Differences in industry average volatility are predominantly due to differences in growth opportunities. According to Smit and Trigeorgis (2004), "growth firms (e.g., leading firms in Information Technology and Pharmaceuticals) tend to have a higher option value component than income stocks (e.g., firms in Chemicals, Food Products, and Transportation), for two reasons. First, they tend to operate in more volatile industries (characterized by more frequent technological innovations and a more intensely competitive environment), with the higher underlying volatility being translated into higher (simple) option value. Second, they tend to have a greater proportion of compound (multistage or growth) options as opposed to simple (cash-generating) options, which amplifies their option value (being options on options)" (Smit and Trigeorgis, 2004: 6-7). Correspondingly, Tong and Reuer (2006) confirm that the value of growth options has an industry component, and industry effects are likely to play a significant role. The authors state that "shared options are likely to come into existence, and industry effects are likely to be important, for several reasons. First, shared options can arise from similarities between competitors' option portfolios based on the investment opportunities they have. Second, not only might firms within an industry have option portfolios sharing a common component, but industry conditions can also have a direct effect on the value of firms' growth options because of differences in demand uncertainty across product markets. Third, it is plausible that industry competitors can also shape the terms at which real options are purchased or exercised" (Tong and Reuer, 2006: 75-76). Additionally, Tong and Reuer

(2006) confirm that the specific industries mentioned earlier indeed differ with respect to their value of growth options.

As the value of growth opportunities is uncertain, future cash flows are subsequently difficult to estimate, leading to higher share price volatility (as a firm's equity value consists of the present value of its assets in place and growth opportunities). Differences in industry average volatility possibly have significant implications for the market reaction to analyst initiations at the end of the Quiet Period. During the Quiet Period there is high uncertainty regarding the value of newly public companies, and this uncertainty is even higher when such company operates in a relatively uncertain industry. When the Quiet Period expires, and analysts publish research reports and recommendations, investors receive new information and may revise share prices. Since investors have little information on newly public companies, they can rely on analyst recommendations when making decisions. Investors possibly do this more strongly in case a firm that went public is operating in a relatively uncertain industry. As a result, there can be significant differences in abnormal returns surrounding the end of the Quiet Period among specific industries.

This paper appears to be the first to specifically examine differences between particular industries regarding excess returns surrounding the Quiet Period expiration. Two testable hypotheses are derived. The first hypothesis examines relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry). Both industries are one of the most uncertain ones, thereby being a good proxy for the effect of relatively uncertain industries on abnormal returns surrounding the end of the Quiet Period. The second hypothesis examines relatively certain industries, namely the Chemicals, Food Products, and Transportation industry. Moreover, Smit and Trigeorgis (2004) report that the Banking and Electric Power industry also are relatively certain, with an uncertainty-factor of 6 and 4 percent, respectively. However, consistent with prior IPO research, Financial Services and Utilities are not taken into account, restricting the cross-sectional analysis to unregulated industries. Thus, this variable proxies for the effect of relatively certain, unregulated industries on abnormal returns surrounding the end of the Quiet Period. Unfortunately, the number of IPOs belonging to these relatively certain industries in the examined period of time is limited. Therefore, a caveat of this 'certainty variable' is that the sample size is possibly small in this analysis, making inferences difficult. Nonetheless, this is a given fact, not due to wrongly pulling and/or adjusting data, as the majority of IPOs during this period of time consists of Nasdaq-listed stocks (i.e., Information Technology and Pharmaceutical Products stocks). As a consequence, when making inferences in the results section, this caveat is taken into account. The null hypothesis is that, on average, IPO firms belonging to a particular industry do not significantly affect abnormal returns at the Quiet Period expiration. The alternative hypothesis is that, on average, IPO firms belonging to a particular industry do significantly affect abnormal returns at the Quiet Period expiration.

Hypothesis IV

H_0: *On average, IPO firms belonging to relatively uncertain industries do not significantly affect abnormal returns at the Quiet Period expiration*

H_1: *On average, IPO firms belonging to relatively uncertain industries do significantly affect abnormal returns at the Quiet Period expiration*

Hypothesis V

H_0: *On average, IPO firms belonging to relatively certain industries do not significantly affect abnormal returns at the Quiet Period expiration*

H_1: *On average, IPO firms belonging to relatively certain industries do significantly affect abnormal returns at the Quiet Period expiration*

The expectation is that relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry) are more likely to have a significant effect on abnormal returns at the Quiet Period expiration than relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry). When the Quiet Period expires, investors possibly rely more strongly on analyst recommendations for uncertain industries than for certain industries. Since investors have little information on uncertain IPO firms, leading to difficulties in their valuations due to uncertain future cash flows, investors may assume that affiliated analysts know more about the fundamental business value, and therefore rely more strongly on their recommendations. As a result, positively biased analyst recommendations at the end of the Quiet Period possibly lead to significant abnormal returns as investors are more likely to be positively surprised if the information released is better than expected, and vice versa. Since future cash flows are more easily to estimate for relatively certain industries, investors possibly rely more on their own valuations, and therefore rely less strongly on analyst recommendations at the end of the Quiet Period. Consequently, as investors are more likely to correctly incorporate all available information, positively biased analyst recommendations at the end of the Quiet Period possibly lead to absent abnormal returns.

IV. Data and methodology

This section describes the data and explains the methodology. The data and methodology section is divided into the following four parts: (a) the description of the data; (b) the methodology of the initial event study; (c) the methodology of the multivariate regression analysis; and (d) preliminary multivariate regression analysis.

A. Data

Consistent with prior Quiet Period research, the focus of this paper is on U.S. IPO firms. Following a stock market report by Yardeni Research, Inc. (2018), specific periods of time are classified as either a bear or bull market. A period of four years is examined, October 2007 through September 2011, in order to test the first two hypotheses. This period of time experienced a bear market as well as a bull market. From 9 October 2007

through 9 March 2009 a bear market occurred, while from 10 March 2009 through 30 September 2011 a bull market occurred. A period of three years is examined, 2 July 2012 through 30 June 2015, in order to test the third hypothesis. This paper does not examine the post-June 2015 time period due to the fact that, in December 2015, FINRA Rule 2241 reduced the 40-day IPO Quiet Period to a minimum of 10 days after the date of the offering for affiliated underwriters (lead and co-lead underwriters). Future studies can assess the effect of this new regulatory requirement on returns surrounding the end of the Quiet Period.

Prior Quiet Period research (Bradley *et al.* (2003); Bradley *et al.* (2004); Highfield *et al.* (2008)) found that recommendations of lead underwriters are neither statistically nor economically different from recommendations of non-lead underwriters. Additionally, Bradley *et al.* (2008) found that the market reaction is basically the same for initiations of affiliated underwriters as for initiations of non-affiliated underwriters. Last, prior Quiet Period research (Bradley *et al.* (2003); Bradley *et al.* (2004); Highfield *et al.* (2008)) found that firms with coverage do not have significantly different returns from firms without coverage initiated. In other words: observed significant abnormal returns applies to all IPOs, irrespective of whether coverage is initiated or not. Therefore, the focus of this paper is on all firms that went public between October 2007-September 2011 and July 2012-June 2015, making no distinction between IPO firms with respect to initiated analyst coverage (whether coverage is initiated or not, and the origin and number of analyst recommendations).

U.S. IPO data is obtained from Wharton Research Data Service (WRDS) Compustat North America, covering a period of seven years, October 2007 through September 2011 and July 2012 through June 2015. Consistent with prior IPO research, closed-end funds, depositary shares, real estate investment trusts (REITs), spinoffs, unit issues, reverse leveraged buyouts, banks, and savings and loans are eliminated[8]. Moreover, firms with missing stock return data in the Center for Research in Securities Prices (CRSP) database are eliminated. These adjustments leave a final sample of 125, 263, and 538 unique IPO observations for the examined bear market, bull market, and post-JOBS Act period, respectively. Table I displays an overview of the three final samples for the initial event study. In Section B, the methodology of the initial event study is explained.

Table I – Initial Event Study: Final Samples

Market condition	Period of time	Post-IPO Quiet Period duration	U.S. IPO data	*N*
Bear market	9 October 2007 - 9 March 2009	40 calendar days	WRDS Compustat North America	125
Bull market	10 March 2009 - 30 September 2011	40 calendar days	WRDS Compustat North America	263
Post-JOBS Act	2 July 2012 - 30 June 2015	40 calendar days	WRDS Compustat North America	538

[8]Specifically, in line with prior IPO research, the following SIC codes (SEC, 2018) are excluded: National commercial banks (6021), state commercial banks (6022), other commercial banks (6029), savings institutions, federal (6035), savings institutions, non-federal (6036), non-deposit trusts (6091), business credit institutions (6159), pension, health, and welfare funds (6371), investment offices (6722), unit investment trusts (6726), religious, and educational trusts (6732), other trusts (6733), REITs (6798), and investors (6799).

A multivariate regression analysis is conducted to cross-check the outcomes of the initial event study. Furthermore, the multivariate regression model is used as a cross-sectional analysis to examine what drives the CMARs, what are possible explanations, and if there are any differences between specific industries. The data collection methods and adjustments described earlier also apply to the multivariate regression analysis on varying market conditions. However, for the cross-sectional analysis on industry differences, not only IPOs that took place in the examined periods of time (October 2007 through March 2009, March 2009 through September 2011, and July 2012 through June 2015) are included, but, also all IPOs in between (i.e., firms that went public from 1 October 2011 through 1 July 2012). Subsequently, the cross-sectional multivariate regression analysis on industry differences covers a total period of October 2007 through June 2015. By including IPOs that are not of primary interest, an extensive regression analysis can be conducted with a proper estimation of the relevant coefficients. In addition, the data of two control variables is obtained from Thomson Reuters Securities Data Company (SDC) Platinum. The control variables are explained in Section C. Hereafter, the dataset from WRDS Compustat North America is merged with the dataset from Thomson Reuters SDC Platinum, unfortunately leading to a drop in the number of IPO observations. Nevertheless, it seems that the number of observations for most independent variables is sufficient enough to make statistical inferences. The sample size is relatively small for relatively certain industries, possibly making inferences difficult. Therefore, when making inferences in the results section, this caveat is taken into account. As a result, the multivariate regression analysis on varying market conditions covers 603 unique IPO observations and the cross-sectional multivariate regression analysis on industry differences covers 672 unique IPO observations. Table II displays an overview of the final samples for the multivariate regression analysis. In Section C, the methodology of the multivariate regression analysis is explained.

Table II – Multivariate Regression Analysis: Final Samples

Panel A: Varying Market Conditions

Market condition	Period of time	*N*
All	9 October 2007 - 30 September 2011, 2 July 2012 - 30 June 2015	603
Bear market	9 October 2007 - 9 March 2009	60
Bull market	10 March 2009 - 30 September 2011	146
Post-JOBS Act	2 July 2012 - 30 June 2015	397

Panel B: Industry Differences

Industry (un)certainty	Period of time and underlying industries	*N*
All	9 October 2007 - 30 June 2015	672
Uncertain industries	Information Technology, Pharmaceutical Products	235
Certain industries	Chemicals, Food Products, Transportation	27
Other	All except above industries	410

B. Initial event study

To test whether, on average, U.S. firms experience abnormal returns surrounding the IPO Quiet Period expiration, there is relied on standard event study methods. In an event study, the goal is to see whether a particular event influences some outcome (Wooldridge, 2013). Highfield *et al.* (2008) found that, although NYSE Rule 472 and NASD Rule 2711 only require affiliated analysts to wait for 40 days before initiating coverage, almost all analysts wait until the end of the 40-day Quiet Period to initiate coverage. Correspondingly, day 0 indicates the expiration of the Quiet Period, which is the 41st calendar day (i.e., event date) following the IPO (or the first trading day thereafter).

Consistent with prior Quiet Period research, market-adjusted returns (MARs) are used as a measure of abnormal returns. The CRSP Value Weighted is used as the market index. As stated by Fama (1998), "one can argue that value-weight returns give the right perspective on an anomaly because they more accurately capture the total wealth effects experienced by investors. Since equal-weight portfolio returns give more weight to small stocks, bad-model problems are more severe in inferences from equal-weight returns" (Fama, 1998: 296). All returns are measured inclusive of dividends. Excluding dividends yields precisely the same observed (abnormal) returns because newly public companies do not pay out dividends during the first weeks after their IPO. Formula (i) denotes the calculation method for the market-adjusted returns, where *MAR* stands for market-adjusted return for firm *j* on day *t*, and *R* for the rate of return of firm *j* and market index *m* on day *t*.

$$\text{(i)} \quad MAR_{jt} = R_{jt} - R_{mt}.$$

To examine the possibility of significant abnormal returns surrounding the end of the Quiet Period, various event windows are constructed in which the cumulative market-adjusted return (CMAR) is calculated. Formula (ii) denotes the calculation method for the cumulative market-adjusted returns, where *CMAR* stands for the cumulative abnormal return for firm *j* over an event window, days D_1 through D_d.

$$\text{(ii)} \quad CMAR_{j,(D_1,D_d)} = \sum_{t=D_1}^{D_d} MAR_{jt}.$$

In order to test the hypotheses, the cross-sectional average of cumulative market-adjusted returns (CMAARs) in specific event windows are calculated. Formula (iii) denotes the calculation method for the cumulative average market-adjusted returns, where *CMAAR* stands for cumulative average abnormal return for a sample of *n* stocks over a particular event window.

$$\text{(iii)} \quad CMAAR_{D_1,D_d} = \frac{1}{n}\sum_{j=1}^{n} CMAR_{j,(D_1,D_d)}.$$

Fama (1998) emphasizes that "the bad-model problem is less serious in event studies that focus on short return windows (a few days) since daily expected returns are close to zero and so have little effect on estimates of unexpected (abnormal) returns" (Fama, 1998: 291). Therefore, consistent with prior Quiet Period research, this paper constructs several short return windows. The five-day (-2, +2) window shows whether there is a clear clustering of significant abnormal returns in the days surrounding the expiration of the Quiet Period. Subsequently, the five-day (-2, +2) window is decomposed into a two-day (-2, -1) pre-event window and a three-day (0, +2) post-event window. As a result of doing so, there can be assessed whether significant abnormal returns begin to occur several days before and/or after the end of the Quiet Period. Following the results and explanations of prior Quiet Period research (Bradley *et al.* (2003); Bradley *et al.* (2004)), the specific event windows possibly show interesting investor behavior surrounding the end of the Quiet Period. Observed positive abnormal returns in the pre-event (-2, -1) window would indicate that knowledgeable market participants begin to accumulate shares in anticipation of positively biased analyst recommendations. Thereafter, observed negative abnormal returns in the post-event (0, +2) window would indicate that, once the recommendations are released, these same market participants postpone their selling of IPO stock until after the Quiet Period expiration to benefit from the run-up in price. In other words: these findings would suggest that market participants seem to anticipate favorable recommendations on newly public companies, and pursue a strategy of liquidating their positions once the recommendations are made. When positive abnormal returns are observed in the post-event (0, +2) window instead of negative abnormal returns, this would indicate that the buying pressure from less knowledgeable market participants bids up the prices and then absorbs the selling when recommendations are released. Another reason for this could be that the market did not fully anticipated what the actual recommendations will be, leading to a further post-event positively adjustment. In both cases the effect of knowledgeable market participants' selling pressure is dominated, so that overall the observed abnormal returns are positive.

In order to test for the significance of the abnormal returns surrounding the Quiet Period expiration, there are two statistical tests conducted. Specifically, the parametric Cross-Sectional t-Test and the nonparametric Generalized Sign Test. The Cross-Sectional t-Test is the 'baseline' test statistic for testing the null hypothesis that the cross-sectional average of cumulative market-adjusted return is equal to zero. Formula (iv) denotes the test statistic of the Cross-Sectional t-Test.

$$\text{(iv)} \quad t_{CMAAR} = \sqrt{n}\,\frac{CMAAR}{S_{CMAAR}},$$

Where S_{CMAAR} is the standard deviation of the cumulative abnormal returns across the sample.

$$S^2_{CMAAR} = \frac{1}{n-1}\sum_{j=1}^{n}(CMAR_j - CMAAR)^2.$$

But, as stated by Dutta (2014), "one disadvantage of using parametric test statistics is that they do require essential assumptions about the probability distribution of returns" (Dutta, 2014: 137). Brown and Warner (1985) report that stock prices are not normally distributed. Correspondingly, when this assumption of normality is violated, parametric tests yield mis-specified test statistics. Specifically, Brown and Warner (1985) showed that the Cross-Sectional t-Test is prone to event-induced volatility, thus having low power. On the other hand, as argued by Dutta (2014), "nonparametric tests are well-specified and more powerful at detecting a false null hypothesis of no abnormal returns" (Dutta, 2014: 137). Consequently, this paper relies on the Generalized Sign Test proposed by Cowan (1992). As Dutta (2014) summarizes, the advantage of the Cowan's Generalized Sign Test is that the evidence of skewness in asset returns is taken into account. As explained by Cowan (1992), "the Generalized Sign Test examines whether the number of stocks with positive cumulative abnormal returns in the event window exceeds the number expected in the absence of abnormal performance. The number expected is based on the fraction of positive abnormal returns in a particular estimation period" (Cowan, 1992: 5). Normal returns are the expected returns in the absence of the event. Accordingly, overlapping the event window with the estimation window can lead to confounded results, as normal return model parameters are estimated from returns affected by the event. Therefore, in line with prior Quiet Period research, this paper restricts the estimation window to the time period prior to the event window, using the time-series portfolio approach with a (-13, -3)-day pre-event window. As stated by Bradley *et al.* (2003), "with this approach, a single variance is estimated for the entire portfolio rather than combining individual variances" (Bradley *et al.*, 2003: 8). The null hypothesis states that the cross-sectional average of cumulative market-adjusted return is not statistically different from zero. In other words: the percentage of positive returns is the same as in the estimation period assuming independence. Formula (v) denotes the Generalized Sign Test.

$$\text{(v)} \quad \hat{p} = \frac{1}{n}\sum_{j=1}^{n}\frac{1}{11}\sum_{t=E_1}^{E_{11}} S_{jt,}$$

Where

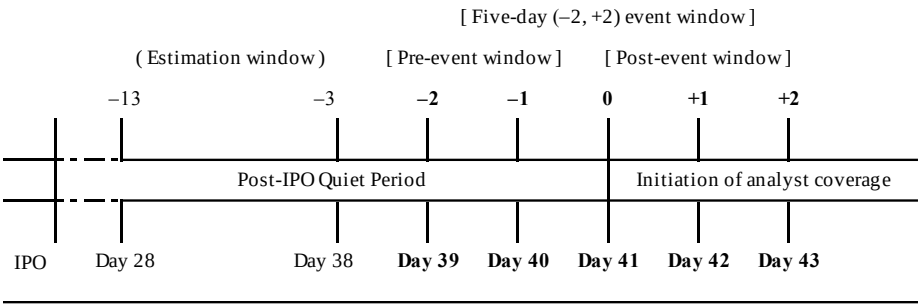
$$S_{jt} = \begin{cases} 1 \; if \; AR_{jt} > 0 \\ 0 \; otherwise \end{cases}$$

The test statistic uses the normal approximation to the binomial distribution with parameter $\hat{p}$. Define *w* as the number of stocks in the event window for which the cumulative abnormal return $CMAR_{j,(D_1,D_2)}$ is positive. The Generalized Sign Test statistic is:

$$Z_G = \frac{w - n\hat{p}}{\sqrt{[n\hat{p}(1-\hat{p})]}}.$$

Ultimately, the three hypotheses can be tested by examining the abnormal returns surrounding the Quiet Period expiration during three periods of time (bear market of October 2007 through March 2009, bull market of March 2009 through September 2011, and the post-JOBS Act period of July 2012 through June 2015). The initial event study on excess returns surrounding the Quiet Period expiration is summarized in Figure I.

Figure I – Initial Event Study



Notes: Day 0 marks the end of the Quiet Period, which is the 41st calendar day (i.e., event date) following the IPO (or the first trading day thereafter). The five-day (-2, +2) window shows whether there is a clear clustering of significant abnormal returns in the days surrounding the end of the Quiet Period. Subsequently, the five-day (-2, +2) window is decomposed into a two-day (-2, -1) pre-event window and a three-day (0, +2) post-event window. The expected CMARs in the absence of abnormal performance are based on the fraction of positive abnormal returns in the (-13, -3)-day pre-event window.

C. Multivariate regression model

A multivariate regression analysis is conducted to cross-check the outcomes of the initial event study. Furthermore, the multivariate regression model is used as a cross-sectional analysis to examine what drives the CMARs, what are possible explanations, and if there are any differences between specific industries. Where the focus of the multivariate regression analysis on varying market conditions is on the specific periods of time discussed in Section A, the cross-sectional multivariate regression analysis on industry differences covers the total period of October 2007 through June 2015. Firms that went public from 1 October 2011 through 1 July 2012 are included in order to extend the regression model, thereby preventing problematic statistical inference. Subsequently, relevant regression coefficients can be estimated properly, and their significance can be determined accordingly. As a result, the multivariate regression analysis on varying market conditions covers 603 unique IPO observations and the cross-sectional multivariate regression analysis on industry differences covers 672 unique IPO observations. The regression method of ordinary least squares (OLS) is used to examine the determinants of the CMARs. The following regression model is employed:

(vi) $$CMAR(t_1, t_2)_i = \alpha_0 + \beta_1 \cdot BEAR_i + \beta_2 \cdot BULL_i + \beta_3 \cdot JOBS_i + \beta_4 \cdot UNCERTAIN_i + \beta_5 \cdot OTHER_i + \beta_6 \cdot CERTAIN_i + \beta_7 \cdot LNSIZE_i + \beta_8 \cdot LNPROC_i + \varepsilon_i,$$

Where

$CMAR(t_1, t_2)_i$	= CMAR for firm i over the (t_1, t_2) window, calculated by summing each market-adjusted return over the (-2, +2), (-2, -1), and (0, +2) event windows;
$BEAR_i$	= binary variable equal to one if firm i went public in a bear market, and zero otherwise;
$BULL_i$	= binary variable equal to one if firm i went public in a bull market, and zero otherwise;
$JOBS_i$	= binary variable equal to one if firm i went public during the post-JOBS Act period, and zero otherwise;
$UNCERTAIN_i$	= binary variable equal to one if firm i belongs to the Information Technology or Pharmaceutical Products industry, and zero otherwise;
$OTHER_i$	= binary variable equal to one if firm i belongs to an industry other than the Information Technology, Pharmaceutical Products, Chemicals, Food Products, and Transportation industry, and zero otherwise;
$CERTAIN_i$	= binary variable equal to one if firm i belongs to the Chemicals, Food Products, or Transportation industry, and zero otherwise;
$LNSIZE_i$	= natural logarithm of the IPO offer size;
$LNPROC_i$	= natural logarithm of the proceeds from the IPO;
ε_i	= OLS residuals.

The CMARs for the five-day (-2, +2), pre-event (-2, -1), and post-event (0, +2) window are pulled from the initial event study, thus using data from WRDS Compustat North America. The 9 October 2007 through 9 March 2009 time period is classified as a bear market, while the 10 March 2009 through 30 September 2011 time period is classified as a bull market. The 2 July 2012 through 30 June 2015 time period is classified as the post-JOBS Act period. The outcome and significance of these 'market dummy' coefficients show whether a particular market condition significantly affects cumulative abnormal returns surrounding the Quiet Period expiration. In line with the determined testable predictions in section III, the expectation is that *BULL* has a significantly positive effect on cumulative abnormal returns at the Quiet Period expiration, whereas the expectation is that *BEAR* has an insignificant effect. Moreover, due to the fact that a bull market occurred during the post-JOBS Act period, the expectation of *JOBS* could be similar to that of *BULL*. On the other hand, the introduction of 'testing the waters' communications can lead to the absence of abnormal returns, which results in an insignificant effect of *JOBS*. Thus, the effect of *JOBS* on events surrounding the end of the Quiet Period is ambiguous, and therefore is undetermined.

In addition, several 'industry dummies' are included in the regression model in order to examine cross-sectional differences between specific industries regarding excess returns surrounding the Quiet Period

expiration. Loughran and Ritter (2004) is followed regarding their classification of Information Technology[9] stocks. The authors identified internet IPOs and classify IPOs as a technology firm or not. Besides, the Fama-French 49 industry classification is used to identify which IPOs belong to the Pharmaceutical Products[10], Chemicals[11], Food Products[12], and Transportation[13] industry, respectively. As discussed in section III, the expectation is that relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry) are more likely to have a significant effect on abnormal returns at the Quiet Period expiration than relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry). Correspondingly, the expectation is that *UNCERTAIN* has a significantly positive effect on cumulative abnormal returns at the Quiet Period expiration. The expectation is that *CERTAIN* has a significantly negative effect on cumulative abnormal returns at the Quiet Period expiration because this effect is measured relative to IPO firms belonging to neither *UNCERTAIN* nor *CERTAIN*. As mentioned in the hypothesis development section, since future cash flows are more easily to estimate for relatively certain industries, investors possibly rely less strongly on analyst recommendations at the end of the Quiet Period. Consequently, positively biased analyst recommendations at the end of the Quiet Period possibly lead to absent abnormal returns, resulting in a negative coefficient with respect to the cumulative abnormal returns at the Quiet Period expiration. The expectation per independent variable of primary interest is summarized in Table III.

Last, consistent with Bradley *et al.* (2003) and Bradley *et al.* (2004), conditioning variable *SIZE* is included to control for the IPO offer size. Additionally, conditioning variable *PROC* is included to control for the proceeds from the IPO, consistent with Highfield *et al.* (2008). Both variables are obtained from Thomson Reuters SDC Platinum. For each control variable there is examined whether the variable is normally distributed by checking the skewness and kurtosis using histograms. Skewness and kurtosis close to zero indicate that the variable is normally distributed. The outcome is that *SIZE* and *PROC* are positively skewed. As a consequence, the natural logarithm of both conditioning variables is calculated, in line with prior Quiet Period research (Bradley *et al.* (2003); Bradley *et al.* (2004); Highfield *et al.* (2008)). The expectation is that both control variables are highly correlated with each other, due to the fact that they both proxy for some form of IPO size. Nevertheless, as both variables are included in the regression model as control variables, thereby not being of primary interest, this has not to be problematic.

[9]Specifically, Information Technology stocks are defined as: computer hardware (3571, 3572, 3575, 3577, 3578), communication equipment (3661, 3663, 3669), electronics (3671, 3672, 3674, 3675, 3677-3679), navigation equipment (3812), measuring and controlling devices (3823, 3825-3827, 3829), medical instruments (3841, 3845), telephone equipment (4812, 4813), communications services (4899), and software (7371-7375, 7378, 7379).

[10]Specifically, Industry 13, Pharmaceutical Products, includes SIC codes 2830, 2831, and 2833-2836.

[11]Specifically, Industry 14, Chemicals, includes SIC codes 2800-2829, 2850-2879, and 2890-2899.

[12]Specifically, Industry 2, Food Products, includes SIC codes 2000-2046, 2050-2063, 2070-2079, 2090-2092, 2095, 2098, and 2099.

[13]Specifically, Industry 41, Transportation, includes SIC codes 4000-4013, 4040-4049, 4100, 4110-4121, 4130, 4131, 4140-4142, 4150, 4151, 4170-4173, 4190-4200, 4210-4219, 4230, 4231, 4240-4249, 4400-4700, 4710-4712, 4720-4749, 4780, 4782-4785, and 4789.

Table III – Multivariate Regression Analysis: Regressions

Independent variable	Dependent variable				
	CMAR	*CMAR*	*CMAR*	*CMAR*	*CMAR*
	Reg. I, VI, and XI	Reg. II, VII, and XII	Reg. III, VIII, and XIII	Reg. IV, IX, and XIV	Reg. V, X, and XV
BEAR	x				x
Expectation	(No relation)				(No relation)
BULL	x				x
Expectation	(Sign. positive)				(Sign. positive)
JOBS		x			
Expectation		(Amb. relation)			
UNCERTAIN			x	x	x
Expectation			(Sign. positive)	(Sign. positive)	(Sign. positive)
OTHER				x	
Expectation				(No relation)	
CERTAIN			x		x
Expectation			(Sign. negative)		(Sign. negative)
Control variables	x	x	x	x	x

Notes: The regressions are conducted for every event window, namely for the five-day (-2, +2), pre-event (-2, -1), and post-event (0, +2) window, respectively. The five-day (-2, +2) window shows whether there is a clear clustering of significant abnormal returns in the days surrounding the end of the Quiet Period. Subsequently, the five-day (-2, +2) window is decomposed into a two-day (-2, -1) pre-event window and a three-day (0, +2) post-event window.

Table III shows which multivariate regressions are conducted in order to examine the precise effect of a particular market condition and cluster of specific industries on the cumulative abnormal returns at the Quiet Period expiration. The first two regressions specifically relate to Hypotheses I-III. That is, whether a particular market condition significantly affects cumulative abnormal returns surrounding the Quiet Period expiration, and are conducted in order to cross-check the outcomes of the initial event study. The first regression captures the effect of a bear market as well as a bull market on the CMARs relative to all IPOs not belonging to these two market dummies (i.e., all firms that went public after the JOBS Act was signed into law). The second regression captures the effect of the post-JOBS Act period relative to all IPOs before the JOBS Act was signed into law.

The third and fourth regression specifically relate to Hypothesis IV and V. That is, whether there are cross-sectional differences between specific industries regarding excess returns surrounding the Quiet Period expiration. Where the third regression isolates the effect of relatively (un)certain industries relative to IPO firms not belonging to either (*OTHER*), the fourth regression specifically examines the difference in effect of both types of industries.

At last, the fifth regression includes all independent variables of primary interest. This regression shows whether the coefficients of the market and industry dummies remain robust after combining both in the regression model. *JOBS* and *OTHER* are excluded from the regression. The reason for this is that in case all

binary market and industry dummies in the regression are used along with a constant, there will be perfect multicollinearity. As stated by Stock and Watson (2012), "if there are *G* binary variables, if each observation falls into one and only one category, if there is an intercept in the regression, and if all *G* binary variables are included as regressors, then the regression will fail because of perfect multicollinearity. This situation is called the dummy variable trap. The usual way to avoid the dummy variable trap is to exclude one of the binary variables from the multivariate regression, so only $G - 1$ of the *G* binary variables are included as regressors. In this case, the coefficients on the included binary variables represent the incremental effect of being in that category, relative to the base case of the omitted category, holding constant the other regressors" (Stock and Watson, 2012: 243). By excluding *JOBS* and *OTHER* the dummy variable trap is avoided.

D. Preliminary multivariate regression analysis

Before conducting specific statistical tests, particular characteristics of the multivariate regression variables are examined. First, there is examined whether to winsorize the CMARs for the five-day (-2, +2), pre-event (-2, -1), and post-event (0, +2) window. No large outliers are one of the key assumptions for the regression method of OLS. As stated by Stock and Watson (2012), large outliers can make OLS regression misleading. Through winsorizing these outliers can be dropped from the dataset, preventing confounded results. However, one should be reducing the influence of large outliers, not the original values. If a variable is winsorized that is destined to be the response in a regression, one probably would be altering the wrong observations. For some IPO firms, relatively large abnormal returns did occur, which are possible if the market receives much better-than-expected news from analyst initiations at the end of the Quiet Period. As these data points are no entry errors, and the histograms of the abnormal returns for the three event windows show acceptable normal distributions, winsorizing the CMARs would not be optimal. As a robustness check, winsorized CMARs for the three event windows are used in the corresponding regressions. Using winsorized CMARs does not alter the outcome and significance of the coefficients of primary interest, justifying the use of non-winsorized CMARs.

Second, the average and median of the CMARs for the three event windows are examined. For the first two event windows, the median of the abnormal returns is much smaller than the average of the abnormal returns, reflecting positive skewness in the distribution of the abnormal returns. Notably, the pre-event (-2, -1) window is approximately three times more positively skewed than the five-day (-2, +2) window. In other words: it may be that the CMARs are driven by a subset of firms in the sample. This is why this paper conducts a cross-sectional analysis regarding excess returns surrounding the Quiet Period expiration, as some firms (i.e., industries) possibly determine the CMARs in the sample. For the post-event (0, +2) window, the median of the abnormal returns is also smaller than the average of the abnormal returns, but the skewness is less severe, being close to zero.

Third, correlations across the dependent and independent variables are examined. Particularly, the Pearson correlation matrix is inspected to identify contingent multicollinearity. An overview of the Pearson correlation matrix including all dependent and independent variables can be found in Appendix D. The control

variables, *LNSIZE* and *LNPROC*, are highly correlated with each other, as anticipated. Additionally, there is a highly negative relationship between *UNCERTAIN* and *OTHER*, which could be problematic. Since a high correlation between two independent variables does not necessarily implies that there is a collinearity problem, hereafter there is tested for the severity of multicollinearity between *UNCERTAIN* and *OTHER*. The strong correlations across the dependent variables are not troublesome, due to the fact that these variables are naturally not included in the regressions simultaneously. Furthermore, there is a moderately negative relationship between *BULL* and *JOBS*. Nevertheless, again this is not problematic, as these independent variables are not simultaneously included in the regression. Finally, the correlation matrix indicates that there are no odd or unexpected relationships between the dependent and control variables. Concluding, inspection of the correlations among independent variables indicates that there probably is no troublesome multicollinearity. However, this needs to be further examined, especially for *UNCERTAIN* and *OTHER*, which highly correlate with each other.

In order to cross-check the outcome of the Pearson correlation matrix analysis, the Variance Inflation Factor (VIF) test for every regression is conducted. The VIF test quantifies the severity of multicollinearity in an OLS regression analysis, and is the ratio of variance in a model with multiple terms, divided by the variance of a model with one term alone. According to Hair Jr *et al.* (2010), a rule of thumb is that if the VIF factor is higher than 10, then multicollinearity is marked as high. An overview of the conducted VIF tests can be found in Appendix E. The VIF test confirms that there is no perfect multicollinearity among the independent variables, as none of the independent variables have a VIF factor that exceeds 10. Specifically, for *UNCERTAIN* and *OTHER*, the corresponding VIF factor indicates that there is no troublesome collinearity. Concluding, the VIF test confirms that there is no contingent perfect multicollinearity identified in the conducted regressions.

Last, the Breusch-Pagan/Cook-Weisberg test is conducted to test whether the variance of the errors from a regression is dependent on the values of the independent variables. In that case, heteroscedasticity is present. The null hypothesis is that the error variances are all equal versus the alternative hypothesis that the error variances are a multiplicative function of one or more variables. Thus, under the null hypothesis there is homoscedasticity (constant variances), whereas under the alternative hypothesis there is heteroscedasticity. A large *chi*-square, and conversely a low *p*-value, would indicate that heteroscedasticity is present. If the *chi*-squared outcome of the Breusch-Pagan/Cook-Weisberg test shows that there is heteroscedasticity present, robust standard errors are used in the regression. For the regressions corresponding to the five-day (-2, +2) and post-event (0, +2) window, the null hypothesis can be rejected at a significance level of five percent. Therefore, as heteroscedasticity is present, robust standard errors are used in these regressions. On the contrary, for the regressions corresponding to the pre-event (-2, -1) window, the null hypothesis cannot be rejected at a similar significance level. Consequently, the standard errors are homoscedastic, and thus there is no need for robust standard errors in the regressions. Summarizing, robust standard errors are used in the five-day (-2, +2) and post-event (0, +2) window, corresponding to regressions I-V and XI-XV, where robust standard errors are not used in the pre-event (-2, -1) window, corresponding to regressions VI-X.

V. Results

This section presents and discusses the results of this paper. The results section is divided into the following three parts: (a) the initial event study results; (b) the multivariate regression results; and (c) possible explanations for both results.

A. Initial event study results

Table IV displays the cross-sectional average of (cumulative) market-adjusted returns for the examined bear market from 9 October 2007 through 9 March 2009. These results correspond to Hypothesis I, whether, on average, U.S. firms experience significant abnormal returns at the IPO Quiet Period expiration during a bear market. As mentioned in the data and methodology section, when assessing the significance of observed (cumulative) market-adjusted returns, this paper relies on the nonparametric Generalized Sign Test proposed by Cowan (1992). Panel B shows that the unconditional cumulative average market-adjusted return (CMAR) over the five-day (-2, +2) window is 62 basis points, which is not statistically different from zero at conventional levels. This finding is consistent with Bradley *et al.* (2004), who found a statistically insignificant abnormal return of 1.4 percent around the Quiet Period expiration date for a sample of IPOs issued during a bear market. While these results suggest that the Anomaly may have largely disappeared, this paper does find a pre-event run-up in advance of the Quiet Period expiration. The second and third lines of Panel B decompose the five-day (-2, +2) window into a pre-event (-2, -1) window and a post-event (0, +2) window. Interestingly, most of the abnormal returns occur before the actual analyst recommendations are issued. As shown, the (-2, -1)-day CMAR is 62 basis points, which is significant at the one percent level. The single largest daily statistically significant abnormal return, 27 basis points, occurs on day -2. Hence, for this period of time, there is a run-up in the last several days of the Quiet Period, and the largest average abnormal return is observed on the second-last day of the Quiet Period. Nevertheless, although the CMARs observed in the days before the Quiet Period expiration are statistically significant, one could argue that these abnormal returns are economically insignificant. Additionally, as mentioned earlier, the market-adjusted returns *surrounding* the end of the Quiet Period are insignificant. As this five-day (-2, +2) window is the event window of primary interest, it appears that the Quiet Period Anomaly does not exist (i.e., no significant abnormal returns) during the examined bear market. This finding is consistent with the findings of Bradley *et al.* (2004).

Table IV – Initial Event Study Results: Bear Market

Panel A: Market-adjusted Returns (*MARs*)

Day	Average *MAR* (%)	*t*-statistic	*N*	Positive/ negative	Generalized sign *z*
–2	0.27%	0.696	125	1.273***	1.881*
–1	0.36%	1.034	125	1.119	1.164
0	–0.15%	–0.418	125	1.155**	1.343^
+1	0.25%	0.784	125	1.119	1.164
+2	–0.14%	–0.339	125	0.838	–0.448

Panel B: Cumulative Market-adjusted Returns (*CMARs*)

Window	Average *CMAR* (%)	*t*-statistic	*N*	Positive/ negative	Generalized sign *z*
(–2, +2)	0.62%	0.772	125	0.953	0.269
(–2, –1)	0.62%	1.281	125	1.551***	2.955**
(0, +2)	–0.08%	–0.139	125	0.923	0.090

^,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively

Table V displays the cross-sectional average of (cumulative) market-adjusted returns for the examined bull market from 10 March 2009 through 30 September 2011. These results correspond to Hypothesis II, whether, on average, U.S. firms experience significant abnormal returns at the IPO Quiet Period expiration during a bull market. Panel B shows that the unconditional cumulative average market-adjusted return (CMAR) over the five-day (-2, +2) window is 1.17 percent, which is statistically significant at the five percent level. Nevertheless, this is much smaller than the statistically and economically significant 3.12 percent and 1.89 percent for a sample of IPOs issued during a bull market documented by Bradley *et al.* (2003) and Highfield *et al.* (2008), respectively. Furthermore, out of the total five-day CMAR, 1.13 percent occurs in the two-day (-2, -1) pre-event window. The single largest daily statistically significant abnormal return, 68 basis points, occurs on day -2. Hence, similar to the examined bear market, there is a run-up in the last several days of the Quiet Period, and the largest average abnormal return is observed on the second-last day of the Quiet Period. In contrast, the statistically significant abnormal return for the three-day (0, +2) post-event window is zero percent, which is clearly economically insignificant. Thus, while there is a clustering of significant abnormal returns in the days *surrounding* the expiration of the Quiet Period, the abnormal returns are concentrated in the days *before* the Quiet Period expires. Concluding, for the examined bull market, it appears that the Quiet Period Anomaly still exists, consistent with Bradley *et al.* (2003) and Highfield *et al.* (2008). However, it seems that the Anomaly has become less pronounced, corresponding to a much smaller abnormal return of only 1.17 percent.

Table V – Initial Event Study Results: Bull Market

Panel A: Market-adjusted Returns (*MARs*)

Day	Average *MAR* (%)	*t*-statistic	*N*	Positive/ negative	Generalized sign *z*
–2	0.68%	2.848**	263	1.327***	2.603**
–1	0.47%	1.578^	262	1.113	1.186
0	–0.13%	–0.510	262	1.015	0.444
+1	0.10%	0.449	263	1.039	0.630
+2	0.01%	0.032	263	0.992	0.260

Panel B: Cumulative Market-adjusted Returns (*CMARs*)

Window	Average *CMAR* (%)	*t*-statistic	*N*	Positive/ negative	Generalized sign *z*
(–2, +2)	1.17%	2.012*	263	1.248***	2.110*
(–2, –1)	1.13%	3.139***	263	1.369***	2.850**
(0, +2)	0.00%	–0.009	263	0.801^	–1.467^

^,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively

Table VI displays the cross-sectional average of (cumulative) market-adjusted returns for the examined post-JOBS Act period from 2 July 2012 through 30 June 2015. These results correspond to Hypothesis III, whether, on average, U.S. firms experience significant abnormal returns at the IPO Quiet Period expiration after the JOBS Act was signed into law. In contrast to the examined bear and bull market, Panel B shows that there is a negative cumulative average market-adjusted return (CMAR) over the five-day (-2, +2) window of minus 12 basis points, which is statistically significant at the one percent level. Moreover, instead of finding that the abnormal returns are concentrated in the days *before* the Quiet Period expires, there is an evident clustering of significantly negative abnormal returns in the three-day (0, +2) post-event window. In other words: market participants experienced a negative cumulative average market-adjusted return of minus 27 basis points during the day of the Quiet Period expiration and two days hereafter for a randomly selected IPO between 2 July 2012 and 30 June 2015. The single largest daily statistically significant abnormal return, minus 36 basis points, occurs on day +1. Hence, for this period of time, the largest negative average abnormal return is observed on the day after the Quiet Period expiration. In contrast, the abnormal return for the two-day (-2, -1) pre-event window is positive, although statistically and economically insignificant. Thus, while there is a clustering of significantly negative abnormal returns in the days *surrounding* the end of the Quiet Period, the abnormal returns are driven by negative abnormal returns on the day of the Quiet Period expiration and the couple of days hereafter. Nevertheless, one could argue that these abnormal returns are economically insignificant. Concluding, for the examined post-JOBS Act period, it appears that the Quiet Period Anomaly to some extent exists with negative abnormal returns for the five-day (-2, +2) window surrounding the Quiet Period expiration. Nonetheless, as the observed abnormal returns are not economically significant, it seems

that the Anomaly has become less pronounced. Due to the fact that a bull market occurred during the post-JOBS Act period, one could argue that this finding is inconsistent with Bradley *et al.* (2003) and Highfield *et al.* (2008). Both studies reported statistically and economically significant positive abnormal returns for a sample of IPOs issued during a similar period of time (i.e., bull market). On the other hand, one could argue that the introduction of 'testing the waters' communications resulted in the absence of positive abnormal returns. Despite the ambiguously expectation for this period of time, the results suggest that the post-JOBS Act period does not completely features similar characteristics as a 'regular' bull market with respect to abnormal returns at the Quiet Period expiration. Specifically, it seems that the introduction of 'testing the waters' communications dominates the effect of a bull market, thereby leading to absent positive abnormal returns.

Table VI – Initial Event Study Results: Post-JOBS Act

Panel A: Market-adjusted Returns (*MARs*)

Day	Average *MAR* (%)	*t*-statistic	*N*	Positive/ negative	Generalized sign *z*
–2	0.25%	1.353^	538	1.015	0.600
–1	–0.09%	–0.488	538	0.971	0.082
0	–0.13%	–0.880	538	0.849^	–1.470^
+1	–0.36%	–2.408**	538	0.799*	–2.160*
+2	0.20%	0.493	538	0.811*	–1.988*

Panel B: Cumulative Market-adjusted Returns (*CMARs*)

Window	Average *CMAR* (%)	*t*-statistic	*N*	Positive/ negative	Generalized sign *z*
(–2, +2)	–0.12%	–0.216	538	0.747***	–2.936**
(–2, –1)	0.15%	0.618	538	0.949	–0.177
(0, +2)	–0.27%	–0.578	538	0.758***	–2.764**

^,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively

B. Multivariate regression results

Table VII displays the outcome of the five multivariate regressions that are conducted in order to examine the precise effect of a particular market condition and cluster of specific industries on the cumulative market-adjusted returns (CMARs) over the five-day (-2, +2) window. The first two regressions specifically relate to Hypotheses I-III. That is, whether a particular market condition significantly affects cumulative abnormal returns surrounding the IPO Quiet Period expiration, and are conducted in order to cross-check the outcomes of the initial event study. The third and fourth regression specifically relate to Hypothesis IV and V. That is, whether there are cross-sectional differences between specific industries regarding excess returns surrounding the Quiet Period expiration. Last, the fifth regression includes all independent variables of primary interest.

This regression shows whether the coefficients of the market and industry dummies remain robust after combining both in the regression model. *JOBS* and *OTHER* are excluded from the fifth regression, thereby preventing the dummy variable trap.

With regard to the Quiet Period Anomaly and varying market conditions, the first two regressions of Table VII show that only *BULL* significantly affects the size of the five-day (-2, +2) CMARs. On the other hand, *BEAR* as well as *JOBS* do not significantly affect the CMARs over this event window. With regard to the Quiet Period Anomaly and industry differences, regression III and IV show that neither *UNCERTAIN* nor *CERTAIN* significantly affect the CMARs over the five-day (-2, +2) window. A caveat is that the sample size for *CERTAIN* is relatively small in this analysis, leading to problematic statistical inference. As a consequence, the effect of *CERTAIN* on the CMARs (and its effect relative to *UNCERTAIN*, and vice versa) over the different event windows is not perfectly clear. The fifth regression shows that the effect of *BULL* is robust to the inclusion of other independent variables of primary interest, and that the other independent variables remain insignificant. For *BEAR* as well as *BULL* the outcome is consistent with the initial event study results, and more specifically, consistent with prior Quiet Period research (Bradley *et al.* (2003); Bradley *et al.* (2004); Highfield *et al.* (2008)). On the contrary, the outcome of *JOBS* is not completely consistent with the initial event study results. Where the initial event study suggests that there were significantly negative abnormal returns for the five-day (-2, +2) window surrounding the Quiet Period expiration, the multivariate regression indicates that there is no significant effect of IPOs issued after the JOBS Act was signed into law on the CMARs over the same event window. Furthermore, with regard to the Quiet Period Anomaly and industry differences, the outcome of *CERTAIN* as well as *UNCERTAIN* is inconsistent with the determined predictions discussed in Section III. The expectation was that relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry) have a significantly positive effect on the size of abnormal returns at the Quiet Period expiration, whereas relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry) have a significantly negative effect. It seems that both types of industries do not significantly affect the size of the five-day (-2, +2) CMARs, and that there are no significant differences between them[14]. Concluding, for the five-day (-2, +2) window, it appears that only a bullish market condition significantly affects abnormal returns at the Quiet Period expiration. All other market conditions (bear market and post-JOBS Act period) and clusters of specific industries (relatively uncertain and certain industries) do not significantly affect the size of the five-day (-2, +2) CMARs.

[14]Although the sample size for *CERTAIN* is relatively small in this analysis, leading to problematic statistical inference.

Table VII – Multivariate Regression Results: Five-day (–2, +2) window

Independent variable	Dependent variable				
	CMAR (–2, +2)	*CMAR* (–2, +2)	*CMAR* (–2, +2)	*CMAR* (–2, +2)	*CMAR* (–2, +2)
	Reg. I	Reg. II	Reg. III	Reg. IV	Reg. V
Intercept	–0.168	–0.156	–0.215*	–0.217*	–0.173
BEAR	0.005				0.005
BULL	0.014*				0.014*
JOBS		–0.012			
UNCERTAIN			–0.006	–0.004	–0.004
OTHER				0.003	
CERTAIN			–0.003		–0.005
LNSIZE	0.010	0.010	0.016	0.016	0.011
LNPROC	0.001	0.001	–0.006	–0.006	–0.000
Observations	603	603	672	672	603
R-squared	0.018	0.017	0.010	0.010	0.019
Robust std. errors	YES	YES	YES	YES	YES
Regression type	OLS	OLS	OLS	OLS	OLS

*,**, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels, respectively

Notes: The first regression captures the effect of a bear market as well as a bull market on the CMARs relative to all IPOs not belonging to these two market dummies (i.e., all firms that went public after the JOBS Act was signed into law). The second regression captures the effect of the post-JOBS Act period relative to all IPOs before the JOBS Act was signed into law. Where the third regression isolates the effect of relatively (un)certain industries relative to IPO firms not belonging to either (*OTHER*), the fourth regression specifically examines the difference in effect of both types of industries. At last, the fifth regression includes all independent variables of primary interest. This regression shows whether the coefficients of the market and industry dummies remain robust after combining both in the regression model. *JOBS* and *OTHER* are excluded from the fifth regression, thereby preventing the dummy variable trap.

Table VIII displays the outcome of the five multivariate regressions that are conducted in order to examine the precise effect of a particular market condition and cluster of specific industries on the CMARs over the two-day (-2, -1) pre-event window. With regard to the Quiet Period Anomaly and varying market conditions, the first two regressions of Table VIII show that *BULL* as well as *JOBS* significantly affect the size of the two-day (-2, -1) CMARs. On the other hand, *BEAR* does not significantly affect the CMARs over this event window. With regard to the Quiet Period Anomaly and industry differences, regression VIII and IX show that neither *UNCERTAIN* nor *CERTAIN* significantly affect the CMARs over the two-day (-2, -1) window. The fifth regression shows that the effect of *BULL* is robust to the inclusion of other independent variables of primary interest, and that the other independent variables remain insignificant. For *BULL* the outcome is consistent with the initial event study results, and more specifically, consistent with prior Quiet Period research (Bradley *et al.* (2003); Bradley *et al.* (2004); Highfield *et al.* (2008)). On the contrary, the outcome of *BEAR* and *JOBS* is not completely consistent with the initial event study results. Where the initial event study suggests that there were significantly moderate abnormal returns for the two-day (-2, -1) window at the Quiet Period expiration during a bear market, the multivariate regression indicates that there is no significant effect of IPOs issued during a bear market on the CMARs over the same event window. Besides, where the initial

event study suggests that there were insignificant abnormal returns for the two-day (-2, -1) window for the examined post-JOBS Act period, the multivariate regression indicates that there is a significantly negative effect of IPOs issued after the JOBS Act was signed into law on the CMARs over the same event window. Furthermore, with regard to the Quiet Period Anomaly and industry differences, the outcome of *CERTAIN* as well as *UNCERTAIN* is inconsistent with the determined predictions discussed in Section III. The expectation was that relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry) have a significantly positive effect on the size of abnormal returns at the Quiet Period expiration, whereas relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry) have a significantly negative effect. It seems that both types of industries do not significantly affect the size of the two-day (-2, -1) CMARs, and that there are no significant differences between them. Concluding, for the two-day (-2, -1) window, it appears that only a bullish market condition and IPOs issued after the JOBS Act was signed into law significantly affect abnormal returns at the Quiet Period expiration. A bearish market condition and clusters of specific industries (relatively uncertain and certain industries) do not significantly affect the size of the two-day (-2, -1) CMARs.

Table VIII – Multivariate Regression Results: Pre-event (–2, –1) window

Independent variable	Dependent variable				
	CMAR (–2, –1)	*CMAR* (–2, –1)	*CMAR* (–2, –1)	*CMAR* (–2, –1)	*CMAR* (–2, –1)
	Reg. VI	Reg. VII	Reg. VIII	Reg. IX	Reg. X
Intercept	–0.013	–0.002	–0.051	–0.050	–0.008
BEAR	0.007				0.008
BULL	0.013**				0.013**
JOBS		–0.011**			
UNCERTAIN			0.004	0.004	0.006
OTHER				–0.000	
CERTAIN			0.000		0.000
LNSIZE	–0.000	–0.000	0.003	0.003	–0.001
LNPROC	0.003	0.003	0.001	0.001	0.004
Observations	603	603	672	672	603
R-squared	0.014	0.013	0.004	0.004	0.016
Robust std. errors	NO	NO	NO	NO	NO
Regression type	OLS	OLS	OLS	OLS	OLS

*,**, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels, respectively

Notes: The first regression captures the effect of a bear market as well as a bull market on the CMARs relative to all IPOs not belonging to these two market dummies (i.e., all firms that went public after the JOBS Act was signed into law). The second regression captures the effect of the post-JOBS Act period relative to all IPOs before the JOBS Act was signed into law. Where the third regression isolates the effect of relatively (un)certain industries relative to IPO firms not belonging to either (*OTHER*), the fourth regression specifically examines the difference in effect of both types of industries. At last, the fifth regression includes all independent variables of primary interest. This regression shows whether the coefficients of the market and industry dummies remain robust after combining both in the regression model. *JOBS* and *OTHER* are excluded from the fifth regression, thereby preventing the dummy variable trap.

Table IX displays the outcome of the five multivariate regressions that are conducted in order to examine the precise effect of a particular market condition and cluster of specific industries on the CMARs over the three-day (0, +2) post-event window. With regard to the Quiet Period Anomaly and varying market conditions, the first two regressions of Table IX show that none of the three specific market conditions significantly affect the size of the three-day (0, +2) CMARs. With regard to the Quiet Period Anomaly and industry differences, regression XIII and XIV show that *UNCERTAIN* has a significantly negative effect on the CMARs over the three-day (0, +2) window, whereas *CERTAIN* has an insignificant effect. The fifth regression shows that the effect of *UNCERTAIN* is robust to the inclusion of other independent variables of primary interest, and that the other independent variables remain insignificant. For *BEAR* the outcome is consistent with the initial event study results, and more specifically, consistent with prior Quiet Period research (Bradley *et al.* (2003); Bradley *et al.* (2004); Highfield *et al.* (2008)). On the contrary, the outcome of *BULL* and *JOBS* is not completely consistent with the initial event study results. Where the initial event study suggests that there were significantly moderate abnormal returns for the three-day (0, +2) window at the Quiet Period expiration during a bull market, the multivariate regression indicates that there is no significant effect of IPOs issued during a bull market on the CMARs over the same event window. Besides, where the initial event study suggests that there were significantly negative abnormal returns for the three-day (0, +2) window for the examined post-JOBS Act period, the multivariate regression indicates that there is no significant effect of IPOs issued after the JOBS Act was signed into law on the CMARs over the same event window. Furthermore, with regard to the Quiet Period Anomaly and industry differences, the outcome of *CERTAIN* as well as *UNCERTAIN* is inconsistent with the determined predictions discussed in Section III. The expectation was that relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry) have a significantly positive effect on the size of abnormal returns at the Quiet Period expiration, whereas relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry) have a significantly negative effect. Over this event window, a significantly effect of relatively uncertain industries is found, but instead of a positive effect, a negative effect on abnormal returns at the Quiet Period expiration is observed. Concluding, for the three-day (0, +2) window, it appears that only relatively uncertain industries significantly affect abnormal returns at the Quiet Period expiration. Nonetheless, the observed negative effect of relatively uncertain industries on abnormal returns at the Quiet Period expiration is opposite to the determined expectation. All three specific market conditions (bull market, bear market, and post-JOBS Act period) and relatively certain industries do not significantly affect the size of the three-day (0, +2) CMARs.

Table IX – Multivariate Regression Results: Post-event (0, +2) window

Independent variable	Dependent variable				
	CMAR (0, +2)	*CMAR* (0, +2)	*CMAR* (0, +2)	*CMAR* (0, +2)	*CMAR* (0, +2)
	Reg. XI	Reg. XII	Reg. XIII	Reg. XIV	Reg. XV
Intercept	–0.154*	–0.154*	–0.164**	–0.167**	–0.165**
BEAR	–0.002				–0.003
BULL	0.002				0.001
JOBS		–0.001			
UNCERTAIN			–0.010*	–0.008	–0.010*
OTHER				0.003	
CERTAIN			–0.003		–0.005
LNSIZE	0.010	0.010	0.012*	0.012*	0.012*
LNPROC	–0.002	–0.002	–0.007	–0.007	–0.005
Observations	603	603	672	672	603
R-squared	0.011	0.011	0.013	0.013	0.017
Robust std. errors	YES	YES	YES	YES	YES
Regression type	OLS	OLS	OLS	OLS	OLS

*,**, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels, respectively

Notes: The first regression captures the effect of a bear market as well as a bull market on the CMARs relative to all IPOs not belonging to these two market dummies (i.e., all firms that went public after the JOBS Act was signed into law). The second regression captures the effect of the post-JOBS Act period relative to all IPOs before the JOBS Act was signed into law. Where the third regression isolates the effect of relatively (un)certain industries relative to IPO firms not belonging to either (*OTHER*), the fourth regression specifically examines the difference in effect of both types of industries. At last, the fifth regression includes all independent variables of primary interest. This regression shows whether the coefficients of the market and industry dummies remain robust after combining both in the regression model. *JOBS* and *OTHER* are excluded from the fifth regression, thereby preventing the dummy variable trap.

C. Possible explanations for the results

In this section, possible explanations for the results from the initial event study and multivariate regression analysis are provided. First, explanations for the initial event study results are discussed, followed by explanations for the multivariate regression results.

Initial event study results

For the examined bull market[15], it appears that the Quiet Period Anomaly still exists, consistent with Bradley *et al.* (2003) and Highfield *et al.* (2008). However, it seems that the Anomaly has become less pronounced, corresponding to a much smaller significantly abnormal return of only 1.17 percent for the five-day (-2, +2) window surrounding the Quiet Period expiration. Nevertheless, still the conventional Wall Street wisdom of 'buy on the rumor, sell on the news' is observed. That is, observed significantly positive abnormal returns in

[15]For the examined bear market, the market-adjusted returns *surrounding* the end of the Quiet Period are insignificant. As this five-day (-2, +2) window is the event window of primary interest, it appears that the Quiet Period Anomaly does not exist during the examined bear market. Therefore, as the Quiet Period Anomaly did not occur during the examined bear market, there is no further discussion in this section on this specific market condition.

the pre-event (-2, -1) window show that knowledgeable market participants begin to accumulate shares in anticipation of positively biased analyst recommendations. Thereafter, observed significantly abnormal returns of zero percent in the post-event (0, +2) window show that, once the recommendations are released, these same market participants postpone their selling of IPO stock until after the Quiet Period expiration to benefit from the run-up in price. In other words: these findings suggest that market participants seem to anticipate favorable recommendations on newly public companies, and pursue a strategy of liquidating their positions once the recommendations are made. At the same time, the buying pressure from less knowledgeable market participants bids up the prices and then absorbs the selling when recommendations are released. This is probably one of the reasons why the observed significantly abnormal returns in the post-event (0, +2) window are not negative. Another reason for this could be that the market did not fully anticipated what the actual recommendations will be, leading to a further post-event positively adjustment. In both cases the effect of knowledgeable market participants' selling pressure is cancelled out, so that overall the observed abnormal returns are zero for this examined period of time.

For the examined post-JOBS Act period, it appears that the Quiet Period Anomaly to some extent exists with significantly negative abnormal returns for the five-day (-2, +2) window surrounding the Quiet Period expiration. Nonetheless, as the observed abnormal returns are not economically significant, it seems that the Anomaly has become less pronounced. While there is a clustering of significantly negative abnormal returns in the days *surrounding* the end of the Quiet Period, the abnormal returns are driven by negative abnormal returns on the day of the Quiet Period expiration and the couple of days hereafter. There are probably three explanations for the observed post-event, negative abnormal returns. One explanation could be that the events of the Quiet Period expiration are consistently worse than expected. The introduction of 'testing the waters' possibly resulted in inflated asset prices during the first few weeks of a new IPO because the firm's management and affiliated underwriters were now allowed to influence the stock. As a result, even positively biased analyst recommendations could be worse than expected for over-optimistic institutional investors. Another explanation could be that the pursued strategy of postponed selling, liquidating positions once the recommendations are made, was more present during this period of time than in the examined bull market. However, in contrast to the examined bull market, there is no pronounced run-up in the last several days of the Quiet Period. This indicates that market participants did not accumulate shares in anticipation of positively biased analyst recommendations, and therefore the observed post-event, negative abnormal returns are not related to a particular pre-event run-up. Consistent with Bradley *et al.* (2003), a more likely scenario is that the selling of allotted shares in the IPO by institutional investors is postponed until after coverage is initiated. For example, a number of hedge fund managers have told Bradley *et al.* (2003) "that this is exactly the strategy that they pursue, having noticed the pre-expiration run-up" (Bradley *et al.*, 2003: 17). This strategy probably accounts for the pattern of negative abnormal returns observed post-event, which this time dominates the effect of less knowledgeable market participants' buying pressure and/or any further post-event positively adjustment from the market. Concluding, the results suggest that the post-JOBS Act period does not completely features similar characteristics as a 'regular' bull market with respect to abnormal returns at the

Quiet Period expiration. Specifically, it seems that the introduction of 'testing the waters' communications is one of the reasons for the observed post-event, negative abnormal returns.

Multivariate regression results

A multivariate regression analysis is conducted to cross-check the outcomes of the initial event study. The multivariate regression analysis on varying market conditions confirms that the Quiet Period Anomaly did not occur during the examined bear market by showing a consistently insignificant effect of this specific market condition on the cumulative abnormal returns at the Quiet Period expiration. With regard to the examined bull market, for the five-day (-2, +2) and pre-event (-2, -1) window, the multivariate regression analysis confirms that this specific market condition has a significantly positive effect on abnormal returns at the Quiet Period expiration. However, for the post-event (0, +2) window, the multivariate regression analysis did not find a significantly effect on abnormal returns at the Quiet Period expiration Thus, the moderately significant effect of IPOs issued during a bull market on the post-event CMARs disappeared in the multivariate regression analysis. As a consequence, one could argue that either the effect of knowledgeable market participants' selling pressure, the effect of less knowledgeable market participants' buying pressure, or a further post-event positively adjustment from the market is not present as mentioned earlier. So, overall, any post-event adjustments are questionable for this specific market condition.

With regard to the examined post-JOBS Act period, the multivariate regression analysis did not find a significantly negative effect on abnormal returns at the Quiet Period expiration for the five-day (-2, +2) and post-event (0, +2) window as indicated by the initial event study. Hence, the significant effect of IPOs issued after the JOBS Act was signed into law on the CMARs disappeared in the multivariate regression analysis. This would indicate that the introduction of 'testing the waters' communications resulted in the absence of positive abnormal returns. These pre-IPO communications with important investors (i.e., institutional investors) reduced the uncertainty with regard to the value of newly public companies. As a consequence, share price revisions after positively biased analyst recommendations at the end of the Quiet Period were less severe as investors receive relatively known information, leading to absent abnormal returns. On the other hand, the multivariate regression analysis did find a significantly negative effect on abnormal returns for the pre-event (-2, -1) window, but for this event window the initial event study indicated an insignificant effect. As a result, the initial event study and multivariate regression analysis show ambiguous results with respect to the effect of the post-JOBS Act period on abnormal returns at the Quiet Period expiration. In general, the multivariate regression analysis thus shows that a bear market has a persistent insignificant effect on the cumulative abnormal returns at the Quiet Period expiration, whereas a bull market has a significant effect on the CMARs. Correspondingly, the Quiet Period Anomaly did not occur during the examined bear market, whereas the Anomaly did occur during the examined bull market. On the contrary, the multivariate regression analysis shows that there is no consistent effect of the post-JOBS Act period on abnormal returns at the Quiet Period expiration, making any inference on this specific period of time inconclusive.

In addition, the multivariate regression model is used as a cross-sectional analysis to examine if there are any differences between specific industries[16]. The cross-sectional multivariate regression analysis on industry differences indicates that relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry) and relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry) do not significantly affect the size of abnormal returns at the Quiet Period expiration for the five-day (-2, +2) and pre-event (-2, -1) window. For the post-event (0, +2) window, it appears that only relatively uncertain industries significantly affect abnormal returns at the Quiet Period expiration (i.e., an observed negative effect). The expectation was that relatively uncertain industries have a significantly positive effect on the size of abnormal returns at the Quiet Period expiration, whereas relatively certain industries have a significantly negative effect. Thus, the multivariate regression analysis contradicts the claim that differences in industry average volatility (market and firm-specific uncertainty) have significant implications for the market reaction to analyst initiations at the end of the Quiet Period. Consequently, there are no significant differences in abnormal returns surrounding the end of the Quiet Period among specific industries. In other words: when the Quiet Period expires, investors do not rely more strongly on analyst recommendations for uncertain industries than for certain industries. An explanation for this could be that investors do not identify that a particular IPO firm operates in a relatively uncertain or certain industry. As a result, positively biased analyst recommendations at the end of the Quiet Period can positively surprise investors if the information released is better than expected, and vice versa (leading to significant abnormal returns), but with no significant differences *between* specific industries. A more likely explanation for the absence of significant differences in abnormal returns at the Quiet Period expiration among specific industries could be that investors have more information on uncertain IPO firms than previously thought. As investors become increasingly more sophisticated, perhaps they are more able to properly understand the fundamental business value of firms that operate in relatively uncertain industries, thereby correctly estimating future cash flows. Since investors do not assume that affiliated analysts know more about the fundamental business value, they therefore do not rely more strongly on their recommendations. As a consequence, positively biased analyst recommendations at the end of the Quiet Period lead to absent abnormal returns as investors are not likely to be positively surprised if the information released is better than expected, and vice versa. In general, the cross-sectional multivariate regression analysis on industry differences thus shows that there are no significant differences in abnormal returns surrounding the end of the Quiet Period.

[16]A caveat is that the sample size for relatively certain industries is small in this analysis, leading to problematic statistical inference. As a consequence, the effect of relatively certain industries on the CMARs (and its effect relative to relatively uncertain industries, and vice versa) over the different event windows is not perfectly clear. Nevertheless, this section provides explanations for the results from the cross-sectional multivariate regression analysis on industry differences.

VI. Concluding remarks

This section provides the concluding remarks of this paper. The concluding remarks section is divided into the following two parts: (a) the conclusion of the paper; and (b) limitations, shortcomings, and directions for future research.

A. Conclusion

The results from the initial event study and multivariate regression analysis show that the Quiet Period Anomaly did not occur during the examined bear market (9 October 2007 through 9 March 2009), whereas the Anomaly did occur during the examined bull market (10 March 2009 through 30 September 2011). For the examined bull market, it appears that the Quiet Period Anomaly still exists, consistent with Bradley *et al.* (2003) and Highfield *et al.* (2008). However, it seems that the Anomaly has become less pronounced, corresponding to a much smaller significantly abnormal return of only 1.17 percent for the five-day (-2, +2) window surrounding the Quiet Period expiration. As a consequence, this paper concludes that the Quiet Period Anomaly varies with market conditions. In other words: excess returns surrounding the end of the Quiet Period can only be earned during bull markets, although this is inconsistent with market efficiency. On the contrary, the initial event study and multivariate regression analysis show ambiguous results with respect to the presence of the Anomaly during the post-JOBS Act period (2 July 2012 through 30 June 2015), making any inference on this specific period of time inconclusive. Nevertheless, the results suggest that the post-JOBS Act period does not completely features similar characteristics as a 'regular' bull market with respect to abnormal returns at the Quiet Period expiration. Specifically, it seems that the introduction of 'testing the waters' communications is one of the reasons for the observed post-event, negative abnormal returns in the initial event study. In addition, the results from the cross-sectional analysis on industry differences show that there are no significant differences in abnormal returns surrounding the end of the Quiet Period between relatively uncertain industries (i.e., Information Technology and Pharmaceutical Products industry) and relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry). Notably, both clusters of specific industries (relatively uncertain and certain industries) do not consistently affect the size of the CMARs. However, a caveat is that the sample size for relatively certain industries is small in this analysis, leading to problematic statistical inference. As a result, the effect of relatively certain industries on the CMARs (and its effect relative to relatively uncertain industries, and vice versa) is not perfectly clear.

B. Limitations, shortcomings, and directions for future research

As mentioned, the most notable shortcoming of this research concerns the precise effect of a cluster of industries on the cumulative abnormal returns at the Quiet Period expiration. Specifically, the number of IPOs belonging to relatively certain industries (i.e., Chemicals, Food Products, and Transportation industry) in the examined period of time is limited. Therefore, the sample size is relatively small for relatively certain industries, making inferences difficult. Nonetheless, this is a given fact, not due to wrongly pulling and/or adjusting data, as the majority of IPOs during this period of time consists of Nasdaq-listed stocks (i.e.,

Information Technology and Pharmaceutical Products stocks). As a consequence, it is difficult to correctly derive the effect of relatively certain industries on the abnormal returns (and its effect relative to relatively uncertain industries, and vice versa). Moreover, this research classified IPO firms as operating in a relatively uncertain or certain industry based on differences in industry average volatility (market and firm-specific uncertainty, estimated as the variance in monthly returns). However, there are more precise methods to classify industry average uncertainty. For example, one can use the 10-K based product market fluidity data from Hoberg *et al.* (2014) to examine cross-sectional differences between specific industries regarding excess returns surrounding the Quiet Period expiration. This method is probably more accurate than the used industry dummies in the multivariate regression model.

The results of this paper suggest some avenues for future research. This paper does not examine the post-June 2015 time period due to the fact that, in December 2015, FINRA Rule 2241 reduced the 40-day IPO Quiet Period to a minimum of 10 days after the date of the offering for affiliated underwriters (lead and co-lead underwriters). Future studies can assess the effect of this new regulatory requirement on returns surrounding the end of the Quiet Period. Furthermore, as the initial event study and multivariate regression analysis show ambiguous results with respect to the presence of the Quiet Period Anomaly during the post-JOBS Act period, further research on this specific period of time is needed. Additionally, as mentioned earlier, more research is necessary on the Quiet Period Anomaly and industry differences. This paper suggests using the 10-K based product market fluidity data from Hoberg *et al.* (2014), thereby preventing problematic statistical inference. As a result of doing so, there can be more precisely assessed whether there are cross-sectional differences between specific industries regarding excess returns surrounding the Quiet Period expiration. Last, it would be interesting to specifically examine the behavior of knowledgeable and less knowledgeable market participants surrounding the end of the Quiet Period. Many possible explanations for the results from the initial event study and multivariate regression analysis with regard to investor behavior remain speculatory, and thus further examination is needed. Besides, trading strategies where traders buy stock just before the end of the Quiet Period are commonly known, but compelling evidence on the returns from such strategies is lacking. Future studies can assess if the Quiet Period Anomaly represents an obvious short-term profit opportunity for traders.

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Appendices

Appendix A – SEC Release #5180, *Guidelines for the Release of Information by Issuers whose Securities Are in Registration* (SEC, 1971)

"It has been suggested that the Commission promulgate an all-inclusive list of permissible and prohibited activities in this area. This is not feasible for the reason that determinations are based upon the particular facts of each case. However, the Commission as a matter of policy encourages the flow of factual information to shareholders and the investing public. Issuers in this regard should:

(1) Continue to advertise products and services.
(2) Continue to send out customary quarterly, annual and other periodic reports to stockholders.
(3) Continue to publish proxy statements and send out dividend notices.
(4) Continue to make announcements to the press with respect to factual business and financial developments; i.e., receipt of a contract, the settlement of a strike, the opening of a plant, or similar events of interest to the community in which the business operates.
(5) Answer unsolicited telephone inquiries from stockholders, financial analysts, the press and others concerning factual information.
(6) Observe an "open door" policy in responding to unsolicited inquiries concerning factual matters from securities analysts, financial analysts, security holders and participants in the communications field who have a legitimate interest in the corporation's affairs.
(7) Continue to hold stockholder meetings as scheduled and to answer shareholders' inquiries at stockholder meetings relating to factual matters.

In order to curtail problems in this area, issuers in this regard should avoid:

(1) Issuance of forecasts, projections, or predictions relating but not limited to revenues, income, or earnings per share.
(2) Publishing opinions concerning values" (SEC, 1971).

Appendix B – Overview of the main findings of studies concerning excess returns surrounding the Quiet Period expiration

Appendix – Table I

Study	Period of time	Market condition	*CMAR* five-day (–2, +2) window	*CMAR* two-day (–2, –1) window	*CMAR* two-day (–1, 0) window
Bradley *et al.* (2003)	January 1996 - December 2000	Bull market	3.12%*	2.32%*	2.12%*
Bradley *et al.* (2004)	January 2001 - July 2002	Bear market	1.4%	N.A.	N.A.
	July - December 2002	Bear market	Problematic statistical inference	N.A.	N.A.
Highfield *et al.* (2008)	July 2002 - December 2005	Bull market	1.89%*	N.A.	0.99%*

*Statistically significant different from zero at conventional levels

Appendix C – Industry (average) Volatility (Market and Firm-Specific Uncertainty) for a Number of Representative Industries

Appendix – Table II

Industry	*Uncertainty*		
	Total =	Firm +	Market
Pharmaceuticals	14	12	2
Information technology	23	20	3
Consumer electronics	26	21	5
Food	6	5	1
Banking	6	4	2
Transportation	9	7	2
Electric power	4	3	1
Chemicals	6	4	2

Notes: Industry (average) volatility, as of June 30, 1998. Numbers are percentages. Averages per industry are equally weighted (to avoid excessive influence of large firms), based on monthly returns over the period 1988–98. Total risk (volatility) is estimated as the variance of monthly returns; market (or systematic) risk is estimated from the volatility of the S&P 500 market index at time *t*, and the beta or sensitivity of monthly returns of firm *i* to monthly market returns of the S&P 500 index estimated over a period of 10 years.

Source: Smit, H.T.J., and Trigeorgis, L. (2004). *Strategic Investment: Real Options and Games*, first edition. Princeton (NJ), United States: Princeton University Press.

Appendix D – Pearson Correlation Matrix

Appendix – Table III

	CMAR (–2, +2)	*CMAR* (–2, –1)	*CMAR* (0, +2)	*BEAR*	*BULL*	*JOBS*	*UNCERTAIN*	*OTHER*	*CERTAIN*	*LNSIZE*	*LNPROC*
CMAR (–2, +2)	1.00										
CMAR (–2, –1)	0.72	1.00									
CMAR (0, +2)	0.75	0.07	1.00								
BEAR	0.00	0.02	–0.01	1.00							
BULL	0.07	0.09	0.02	–0.16	1.00						
JOBS	–0.08	–0.09	–0.02	–0.38	–0.63	1.00					
UNCERTAIN	–0.05	0.02	–0.09	–0.03	–0.05	0.06	1.00				
OTHER	0.04	–0.02	0.08	0.01	0.04	–0.05	–0.92	1.00			
CERTAIN	0.00	–0.00	0.01	0.04	0.02	–0.01	–0.15	–0.26	1.00		
LNSIZE	0.09	0.05	0.08	0.01	0.08	–0.09	–0.23	0.20	0.07	1.00	
LNPROC	0.07	0.05	0.05	–0.02	0.04	–0.03	–0.31	0.27	0.07	0.91	1.00

Appendix E – Variance Inflation Factor (VIF) test for multicollinearity

Appendix – Table IV

Regression	*BEAR*	*BULL*	*JOBS*	*UNCERTAIN*	*OTHER*	*CERTAIN*	*LNSIZE*	*LNPROC*
I, VI, and XI	1.05	1.05					5.92	5.88
II, VII, and XII			1.02				5.92	5.88
III, VIII, and XIII				1.14		1.02	5.97	6.23
IV, IX, and XIV				6.46	6.32		5.97	6.23
V, X, and XV	1.05	1.06		1.15		1.03	6.01	6.23

Appendix F – Breusch-Pagan/Cook-Weisberg test for heteroscedasticity

Appendix – Table V		
Panel A: Five-day (–2, +2) window		
Regression	*Chi*-squared	*p*-value
I	7.21	0.0073
II	6.45	0.0111
III	9.53	0.0020
IV	9.53	0.0020
V	10.17	0.0014
Panel B: Pre-event (–2, –1) window		
Regression	*Chi*-squared	*p*-value
VI	1.26	0.2621
VII	2.68	0.1018
VIII	0.77	0.3808
IX	0.77	0.3808
X	0.18	0.6747
Panel C: Post-event (0, +2) window		
Regression	*Chi*-squared	*p*-value
XI	17.36	0.0000
XII	15.03	0.0001
XIII	14.66	0.0001
XIV	14.66	0.0001
XV	20.13	0.0000