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Informed Trading around Stock Split Announcements: Evidence from the Option Market

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Abstract

Prior research shows that splitting firms earn positive abnormal returns and that they experience an increase in stock return volatility. By examining option-implied volatility, we assess option traders' perceptions on return and volatility changes arising from stock splits. We find that they do expect higher volatility following splits. There is only weak evidence, though, of option traders anticipating an abnormal increase in stock prices. We also show that our option measures can predict both stock volatility levels and changes after the announcement. However, there is little evidence that they can predict the returns of splitting firms.

I. Introduction

The option market is a venue for informed trading. Prior research has identified a number of reasons why informed investors may prefer to trade equity options rather than the underlying stock. Such reasons include higher leverage and ease of shorting (Black (1975)). An impressive amount of recent empirical work has demonstrated evidence of informed trading in options for both the cross section of stocks and around firm-specific events. Research that considers the cross section of stocks includes Bali and Hovakimian (2009), Cremers and Weinbaum (2010), Roll, Schwartz, and Subrahmanyam (2010), Xing, Zhang, and Zhao (2010), Johnson and So (2012), and An, Ang, Bali, and Cakici (2014). Earnings announcements are studied by Diavatopoulos, Doran, Fodor, and Peterson (2012), Jin, Livnat, and Zhang (2012), and Atilgan (2014). Last, Hayunga and

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Lung (2014), Lung and Xu (2014), and Lin and Lu (2015) consider analyst recommendations and Chan, Ge, and Lin (2015) examine mergers and acquisitions.

We contribute to this literature by investigating informed trading in options around stock split announcements. There are two key reasons why stock splits are a particularly interesting event to examine in the context of informed trading. First, unlike, for example, earnings announcements, which are scheduled events, stock split announcements are unanticipated events that the market should not be aware of in advance. This allows us to more cleanly analyze whether informed option investors are trading in anticipation of the impending event. Second, prior research shows that stocks experience changes in both the level and volatility of their returns due to splits. This provides us with a novel opportunity to examine the expectations of option traders on both return and volatility changes arising from the same event.

The specific observations of prior research on return and volatility changes due to splits that inform our analysis are as follows. There is, on average, a strong positive reaction when firms announce splits (Grinblatt, Masulis, and Titman (1984), Chern, Tandon, Yu, and Webb (2008), and Lin, Singh, and Yu (2009)). Positive return drift lasts at least 1 year after the split announcement is observed (Ikenberry, Rankine, and Stice (1996), Desai and Jain (1997), and Ikenberry and Ramnath (2002)). However, this drift is conditional on the period examined (Byun and Rozeff (2003)), and it is driven by the relatively short period between the split announcement date and the split effective date (Boehme and Danielsen (2007)). Stock volatility increases when splits are announced (Ohlson and Penman (1985)), which is a common occurrence for any unscheduled and meaningful corporate announcement. Finally, there is an increase in stock volatility after splits are effected (Ohlson and Penman (1985), Dravid (1987), and Koski (1998)).

We examine option-implied volatility around 1,780 stock split announcements for the period 1998–2012. We draw inference on option traders' perceptions on volatility changes when splits are announced and after they are effected, and on split announcement returns and longer-term return drift following announcements. We document a consistent increase in implied volatility for the most speculative short-dated options in the days preceding the split announcement. We also observe elevated levels of option trading volume prior to the announcement. These findings are indicative of informed trading in options. More pointedly, they suggest that news about impending split announcements has leaked and that option investors are trading on this information.

Throughout the analysis on option traders' volatility perceptions, we consider implied volatility changes in call and put options, separately. Prior to the announcement, we find that implied volatility increases in both short maturity calls and puts. This indicates that the trading is driven by an expected increase in stock volatility on and soon after the announcement. In contrast, if the increase in implied volatility is observed only in calls, this implies a directional bet on positive announcement returns. After a large and expected increase in implied volatility on the announcement date, call and put implied volatility both increase again the next day, but only in long maturity options that expire after the effective date. This suggests that option traders expect that stock volatility will increase after splits are effected.

To examine option traders' expectations on return changes arising from splits, we employ the option-implied volatility spread (Cremers and Weinbaum (2010)) and skew (Xing et al. (2010)). The spread and skew measure differences in implied volatility between suitably matched calls and puts. In the days preceding the announcement, there is little in our results to suggest that option investors are trading to exploit the well-documented positive returns when splits are announced. Given that our earlier analysis is strongly suggestive of volatility trading prior to the announcement, we surmise that the announcement returns are not large enough to induce traders to trade. After splits are announced, there is some evidence of option trading in anticipation of longer-term return drift, particularly in smaller stocks, but the findings are not compelling.

The analysis discussed thus far focuses on the perceptions of option investors on return and volatility changes due to splits. We also assess informed trading in options by examining whether various implied volatility measures can predict future stock returns and volatility. In cross-sectional regressions of abnormal stock volatility on daily changes in implied volatility prior to the announcement, we show that implied volatility changes significantly predict the level of stock volatility on the day after the announcement. Thus, not only do option traders seem to be trading in anticipation of volatility increases due to a split announcement; they also demonstrate an ability to predict stock volatility levels after the announcement. More broadly, in addition to displaying a capacity to acquire information, option traders also appear to be processing information skillfully.

We next show that the change in implied volatility from the announcement day to the following day significantly predicts which splitters will have the largest change in stock volatility after splits are effected, where the effective date is, on average, 40 days after the announcement date. An informed trader's private informational advantage is likely to be low directly after major news announcements. Thus, we contend that this specific instance of informed trading highlights option traders' superior ability to process public information. We then run similar regressions to Jin et al. (2012) and Chan et al. (2015), where we examine whether the implied volatility spread and skew predict short-run announcement returns and longer-term abnormal returns. We find little evidence that these option measures can predict the future returns of splitters.

Last, as a complement to our examination of the option market, we analyze institutional trading around splits. We find that proportional institutional ownership increases in the quarter around split announcements. Additionally, we observe that prior to the announcement, the information ratio is substantially higher for firms that experience an increase in institutional holdings relative to those whose holdings have decreased. These findings from institutional trades provide further confirmatory evidence of informed trading around split announcements.

Our paper makes several contributions to the literature. The prior research on informed trading in options around corporate events focuses on the predictability of option measures and, in particular, the predictability of future returns (e.g., Jin et al. (2012), Chan et al. (2015), and Hayunga and Lung (2014)). We are the first to examine the expectations of option traders on both return and volatility changes due to an unscheduled corporate event. More broadly, one could argue that this is the first paper that explicitly focuses on option traders' perceptions of a

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corporate event. Another key contribution is that we develop tests that disentangle option traders' expectations on return and volatility changes, so that we can draw inference on each. When analyzing predictability, our novel contribution is to evaluate whether option measures can predict both the level and change of future stock volatility due to the event. By investigating both the perceptions of option traders and the predictability in options trading, we assess both the acquisition and skillful processing of information. This allows us to present a more complete picture of informed trading in options.

We find that informed option traders demonstrate an ability to acquire and skillfully interpret information prior to the event. This contributes to the body of literature that documents informed trading in options prior to other corporate events (e.g., Chan et al. (2015) and Hayunga and Lung (2014)). It also complements research that shows pre-event informed trading by other market participants, such as investment banks (Bodnaruk, Massa, and Simonov (2009)), short sellers (Karpoff and Lou (2010)), hedge funds (Massoud, Nandy, Saunders, and Song (2011)), and institutional investors (Ivashina and Sun (2011)). After the announcement, we show that informed option traders possess a superior ability to process public information. This builds on similar recent evidence with options on other corporate events (Jin et al. (2012)) and with short sellers using broader news announcements (Engelberg, Reed, and Ringgenberg (2012)).

In the context of prior research on splits, rather than focusing on the return distribution of splitting stocks as the majority of past studies have done,[1] we contribute to this literature by assessing the perceptions of informed option traders. Our tests are quite simple, and given that they focus on the expectations of option investors, we believe that they are more forward-looking than conventional event study tests, which rely on stock returns.

The rest of the paper proceeds as follows: Section II outlines the research design. Section III discusses data, sample selection, and sample characteristics. Section IV presents the findings of the perceptions analysis. Section V reports on the predictability analysis. Section VI documents insights from institutional holdings. Section VII concludes.

II. Research Design

The initial analysis considers option traders' perceptions on future return and volatility changes due to splits. To investigate their perceptions on stock volatility, we examine the implied volatility of call and put options separately. With future return changes, we analyze the implied volatility of call and put options together by examining the volatility spread and skew. Our event window is the [−5, +5]-day period around the split announcement.

[1]There have been three published papers on stock splits and the option market, each of limited scale and scope. Reilly and Gustavson (1985) find that call option returns are positive prior to split announcements but negligible postannouncement. French and Dubofsky (1986) observe that the implied volatility of call options increases after the effective date but that high bid–ask spreads would render a trading strategy based on this increase unprofitable. Sheikh (1989) also finds that call option-implied volatility increases when splits are effected but that this increase is not anticipated at the time of the announcement. These studies span the period 1976–1983, and Sheikh's (1989) sample is the largest, with 83 stocks.

In these tests, we examine the daily change in implied volatility and in the volatility spread and skew. Given that volatility is persistent, implied volatility today is an appropriate proxy for expected implied volatility tomorrow. If the volatility spread and skew are indicators of future stock returns, in the absence of new information, these measures should be constant through time. Thus, we assume that the expected daily change in implied volatility and the volatility spread (skew) is 0. Our approach is consistent with Bollen and Whaley (2004) and Garleanu, Pedersen, and Poteshman (2009), who find that changes in implied volatility reflect the net buying pressure of option investors.

A. Testing Perceptions on Volatility

Ohlson and Penman (1985) document a temporary increase in stock volatility after the split announcement and a more permanent increase after splits are effected. In the days preceding the announcement, if informed option traders are speculating on a volatility spike when splits are announced, then it is likely that they will employ shorter maturity options to do so.[2] When firms announce a split, they disclose on which date the split will be effected. If option traders expect stock volatility to change after the effective date, then, postannouncement, the behavior of implied volatility should differ, depending on whether the options expire before or after the effective date. Accordingly, we compute separately the implied volatility for options that expire before and after the effective date. Furthermore, if option investors are trading in anticipation of a change in the volatility of the underlying stock, then they will likely select options that are the most sensitive to changes in stock volatility, that is, options with the highest vega. Thus, to obtain a single estimate of option-implied volatility for a given stock, we take the weighted average of all available implied volatilities where the weight is the option vega.

To examine option traders' expectations on future stock volatility, we calculate the daily change in implied volatility for call and put options as follows:

$$(1) \qquad \Delta \mathrm{IV}_{it} = \mathrm{IV}_{it} - \mathrm{IV}_{it-1}.$$

$\Delta \mathrm{IV}_{it}$ is the change in implied volatility for stock i on day t, and IV_{it} is the weighted average of all implied volatilities for stock i on day t where the weight is the option vega. It is calculated as

$$(2) \qquad \mathrm{IV}_{it} = \sum_{j=1}^{N_{i,t}} w^{i}_{j,t} \mathrm{IV}^{i}_{j,t},$$

where $N_{i,t}$ is the number of options traded for stock i on day t and $\mathrm{IV}^{i}_{j,t}$ is the implied volatility of option j for stock i on day t. Thus, we study the daily movement in the aggregate implied volatility across all options for a given stock.

[2]Short-dated options are more exposed to changes in short-term volatility, as the mean reversion in stock volatility results in the implied volatility of long-dated options being more stable. Moreover, option gamma, which reflects jump risk, is greatest for short-dated options.

B. Testing Perceptions on Returns

Although option-implied volatility reflects the demand of option investors, it may not be a reliable predictor of future stock returns. An increase in option-implied volatility may simply be the result of an expected increase in the volatility of the underlying stock. Recent literature, including Bali and Hovakimian (2009), Cremers and Weinbaum (2010), and Xing et al. (2010), suggests that the behaviors of implied volatilities of call and put options together, not in isolation, reflect informed trading and predict returns in the equity market. Specifically, Cremers and Weinbaum (2010) argue that if informed investors are optimistic about the underlying stock, then they can either buy a call option or sell a put option. This should increase (decrease) the price of call (put) options, which, in turn, induces a higher implied volatility inverted from call options relative to put options. Cremers and Weinbaum (2010) refer to this as the volatility spread. The change in the volatility spread is calculated as follows:

$$\text{(3)} \qquad \Delta \text{VS}_{it} = \text{VS}_{it} - \text{VS}_{it-1}.$$

Following Cremers and Weinbaum (2010), the volatility spread VS_{it} for firm i on day t is

$$\text{(4)} \qquad \Delta \text{VS}_{it} = \text{IV}_{i,t}^{\text{calls}} - \text{IV}_{i,t}^{\text{puts}} = \sum_{j=1}^{N_{i,t}} w_{j,t}^{i} (\text{IV}_{j,t}^{i,\text{call}} - \text{IV}_{j,t}^{i,\text{put}}),$$

where j represents each pair of call and put options matched on the same strike price and maturity date, and $N_{i,t}$ refers to the number of valid pairs of options on stock i. We eliminate option pairs when either the call or put has 0 open interest or a bid price of 0. The volatility spread for a given firm is computed by taking the weighted average of all the available option pairs, where the weight is the average open interest in the call and put options (Cremers and Weinbaum (2010)).

In addition to the volatility spread, we employ the volatility skew measure developed by Xing et al. (2010). Unlike the volatility spread, which is designed to capture information on a wide range of options across different strike prices and times to maturity, the option-implied volatility skew specifically captures information in out-of-the-money put options. The volatility skew is calculated as the difference in implied volatility between out-of-the-money put options and at-the-money call options. Doran, Peterson, and Tarrant (2007) and Xing et al. (2010) show that an increase in demand for out-of-the-money put options relative to at-the-money call options predicts negative stock returns. Jin et al. (2012) and Chan et al. (2015) find that the volatility skew forecasts positive returns as well.

If option traders believe in the existence of positive abnormal returns subsequent to the split announcement, then we should observe a reduction in the volatility skew over the event window. The volatility skew is estimated as follows:

$$\text{(5)} \qquad \text{SKEW}_{i,t} = \text{IV}_{i,t}^{\text{OTMP}} - \text{IV}_{i,t}^{\text{ATMC}},$$

where $\text{SKEW}_{i,t}$ is the option-implied volatility skew for stock i on day t, $\text{IV}_{i,t}^{\text{OTMP}}$ is the implied volatility of out-of-the-money put options for stock i on day t, and $IV_{i,t}^{ATMC}$ is the implied volatility of at-the-money call options for stock i on day t. Following Jin et al. (2012), we select out-of-the-money put options by first identifying options that have a delta within the range [−0.45, −0.15], and we choose the one that has a delta closest to −0.3. At-the-money call options are those whose deltas are closest to 0.5, given those deltas are higher than 0.4 and less than 0.7. In this case, as only one call-and-put pair is chosen per day for each splitting firm, no weighting is required. Similar to the volatility spread, we examine the change in the volatility skew. That is,

$$(6) \qquad \Delta\text{SKEW}_{it} = \text{SKEW}_{it} - \text{SKEW}_{it-1}.$$

C. Testing the Predictive Ability of Option Measures

For the predictability analysis, we run cross-sectional regressions of various option measures on future stock returns and volatility. We assess whether these option measures can predict stock volatility at the announcement and the change in volatility after the effective date. We also test whether they can predict the announcement returns and returns in the postannouncement period.

To examine whether option-implied volatility can predict stock volatility at the announcement, we run the following regression:

$$(7) \qquad \text{AB\_VOL}_i = \text{INTERCEPT} + \beta\Delta\text{IV}_i + \varepsilon_i.$$

AB_VOL_i is abnormal stock volatility and is estimated as the square of the daily returns on day 0 or day +1 minus the average squared returns over the [−60, −20] period. ΔIV_i is the daily change in implied volatility in the preannouncement period, as defined in equation (1). In the absence of new information and given the persistence in volatility, the daily change in implied volatility should have no predictive power in a cross-sectional analysis. Thus, this regression allows us to test for informed option trading on stock volatility levels after the announcement.

The regression analyzing the predictability of changes in stock volatility after the effective date is

$$(8) \qquad \sigma_{\text{posteffective},i} - \sigma_{\text{preeffective},i} = \text{INTERCEPT} + \beta\Delta\text{IV}_i + \varepsilon_i.$$

The posteffective change in volatility is measured as the difference in the annualized standard deviation of the daily returns following the effective date ($\sigma_{\text{posteffective}}$) and the annualized standard deviation of the daily returns from the announcement date to the effective date ($\sigma_{\text{preeffective}}$). The number of days for which the postsplit volatility is calculated is equivalent to the number of days from the announcement date to the effective date. Given that the date on which the split is effected is announced at the same time as the split, we consider changes in implied volatility on the announcement date and the following few days. Thus, we are examining whether option traders skillfully process the information in the announcement on postsplit changes in stock volatility.

As implied volatility is considered a forecast of stock volatility over the life of the option, it would be inappropriate to conduct the predictability analysis on stock volatility using the daily level of implied volatility. For our primary tests of the predictability of future returns, though, we use the daily level of the volatility spread and skew. This is consistent with the main analyses undertaken by Jin et al. (2012) and Chan et al. (2015).

To examine whether our option measures can predict the announcement returns, we estimate the following regressions:

$$\text{(9)}\quad \text{CAR}(0,+1)_i = \text{INTERCEPT} + \beta \text{VS}_i + \sum_{j=1}^{n} \gamma_j \text{CONTROL\_VARIABLES}_{ij} + \varepsilon_i,$$

$$\text{(10)}\quad \text{CAR}(0,+1)_i = \text{INTERCEPT} + \beta \text{SKEW}_i + \sum_{j=1}^{n} \gamma_j \text{CONTROL\_VARIABLES}_{ij} + \varepsilon_i.$$

CAR is the cumulative announcement abnormal return, VS_i and SKEW_i are as defined in equations (4) and (5), and the control variables are described in Internet Appendix A (available at www.jfqa.org). These regressions allow us to test whether the levels of the spread and skew in the days preceding the announcement explain the announcement returns.

The final regressions we run consider the predictability of returns in the postannouncement period:

$$\text{(11)}\quad \text{BHAR}(+7,+60)_i = \text{INTERCEPT} + \beta \text{VS}_i + \sum_{j=1}^{n} \gamma_j \text{CONTROL\_VARIABLES}_{ij} + \varepsilon_i,$$

$$\text{(12)}\quad \text{BHAR}(+7,+60)_i = \text{INTERCEPT} + \beta \text{SKEW}_i + \sum_{j=1}^{n} \gamma_j \text{CONTROL\_VARIABLES}_{ij} + \varepsilon_i.$$

BHAR is the buy and hold abnormal return, and the control variables are again listed in Internet Appendix A.[3] As with the regressions on the postsplit change in volatility, we analyze the spread and skew on the announcement day and the following few days. In so doing, we assess option traders' ability to interpret the information in the split announcement on future return drift.

III. Data and Sample Characteristics

From the OptionMetrics Ivy database, equity option data are collected for the period Jan. 1998–Dec. 2012. The data set covers daily closing bid and ask quotes, open interest, volume, implied volatility, and the Greeks for all exchange-listed call and put options on U.S. equities. Because options on individual stocks are American options, implied volatilities are calculated using the Cox, Ross, and Rubinstein (1979) binomial tree model, taking into account discrete dividend payments and the possibility of early exercise using historical London Interbank Offered Rate (LIBOR) as the interest rate. Specifically, different values of volatility are inserted into the model until the price of the option approximates to the midpoint of the option's best closing bid–ask prices.

The OptionMetrics data are merged with the Center for Research in Security Prices files to identify all splitting stocks with a split factor greater than or equal to 25% that have written options. In the period 1998–2012, 1,780 stock splits on

[3]The expected return used to calculate both the CAR and BHAR is the daily equal weighted return of the matching size portfolio, where four size portfolios are formed based on New York Stock Exchange (NYSE) rankings.

1,109 firms meet this requirement. With regard to the option data, each option record must have information on the strike price, best closing bid and ask prices, volume, open interest, and implied volatility during the period [−10, +10], where day 0 is the split announcement date. To address the issues related to thinly traded options, we impose the following filters: i) options with an absolute value of delta less than 0.02 and more than 0.98 are excluded, ii) options must have maturities that range between 10 and 100 days, and iii) all options with a bid–ask spread that is greater than the bid–ask midpoint are removed. There are, on average, 22 (23) call (put) options available on each splitting firm.

A. Summary Statistics on Option Liquidity and Implied Volatility

To draw an initial inference on how the option market behaves in a period outside the split announcement window, the average implied volatility, volume, and open interest of call/put options across different levels of moneyness are examined for the period [−100, −20]. Table 1 reports the results.

There is a volatility smile for both call and put options, as is typically observed. We also see that out-of-the-money and near-the-money options tend to have higher volume and open interest than in-the-money options. Because out-of-the-money and near-the-money options are relatively cheaper, they offer investors a higher degree of leverage and a better means to achieve their objectives. This, in turn, makes out-of-the-money and near-the-money options more popular among investors compared to in-the-money options. Finally, the median volume and open interest for both call and put options are much lower than their means and, in some cases, equal to 0. This indicates that trading activity in the option market is quite thin, where a large fraction of the option trading volume and open interest reside in the contracts of only a few stocks.

TABLE 1
Summary Statistics on Option Liquidity and Implied Volatility

Table 1 reports the liquidity and implied volatility for both call and put options at different levels of moneyness for the period [−100, −20], where day 0 is the split announcement date. The option's degree of moneyness is measured using the option delta, which is the risk-neutral probability of the option being in-the-money at expiration. Panel A (Panel B) reports the mean/median open interest (OI), volume, and implied volatility (IV) for call (put) options. The sample period is 1998–2012.

Moneyness Index	Option Δ	Mean OI	Median OI	Mean Volume	Median Volume	Mean IV
Panel A. Call Options						
Deep out-of-the-money	$0.02 < \Delta \leq 0.125$	1,298	279	88	2	0.554
Out-of-the-money	$0.125 < \Delta \leq 0.375$	880	149	111	4	0.530
Near-the-money	$0.375 < \Delta \leq 0.625$	797	130	120	6	0.562
In-the-money	$0.625 < \Delta \leq 0.875$	616	81	52	0	0.570
Deep in-the-money	$0.875 < \Delta \leq 0.98$	436	40	14	0	0.653
Panel B. Put Options						
Deep out-of-the-money	$-0.125 < \Delta \leq -0.02$	1,001	184	46	0	0.687
Out-of-the-money	$-0.375 < \Delta \leq -0.125$	627	75	72	0	0.594
Near-the-money	$-0.625 < \Delta \leq -0.375$	361	25	53	0	0.575
In-the-money	$-0.875 < \Delta \leq -0.625$	197	6	18	0	0.536
Deep in-the-money	$-0.98 < \Delta \leq -0.875$	126	0	6	0	0.590

B. Summary Statistics for Market Capitalization Groups

Easley, O'Hara, and Srinivas (1998) argue that informed investors' decision to trade in the option market depends on leverage and the liquidity of the option market relative to the stock market. The advantage of a liquid market is that it offers lower trading costs and allows informed investors to hide their information. Another relevant consideration for informed investors when deciding whether to trade options is the behavior of the market makers. When the market makers obtain news that they deem to have a material price impact, they will adjust the bid and ask prices in a way that inhibits other informed traders from earning abnormal returns. Informed investors faced with this situation can do one of the following: If they believe that abnormal returns cannot be earned based on the current bid and ask prices, they will not trade. If they disagree with the market makers, they may trade in the opposite direction. Finally, if they agree with the market makers and believe that abnormal returns can still be earned, their trades will drive the bid and ask prices in the same direction initiated by the market makers. In this context, a significant change in implied volatility or the volatility spread (skew) when option liquidity is low is more likely to reflect the perception of the market makers.[4] Contrastingly, when option liquidity is high, changes in these metrics are more likely to be driven by both the market makers and other informed option traders. Thus, we contend that a significant change in implied volatility or the volatility spread (skew) observed in liquid options is a stronger signal of informed investors' perceptions compared with illiquid options.

Option trading volume, open interest, and bid–ask spreads are important elements of option liquidity, but no single attribute adequately describes liquidity. Therefore, a proxy is required that represents all three elements of option liquidity, and market cap is the proxy selected. The classification scheme employed includes four size portfolios, where the first three groups comprise firms that constitute the Standard & Poor's (S&P) 500, S&P 400, and S&P 600 indices, and the last group includes firms that do not belong to these three indices. Together, the three S&P indices constitute the S&P 1500 index, accounting for approximately 85% of U.S. market capitalization. In unreported results, the average (median) market cap of stocks in the "other" portfolio is higher (lower) than for S&P 600 stocks. The reason for this is that although small firms dominate the "other" portfolio, this group also contains a number of National Association of Securities Dealers Automated Quotation System (NASDAQ) 100 stocks that are not members of the S&P 1500 index. By design, NASDAQ 100 firms have high market cap.

To evaluate whether market cap adequately captures option liquidity, an examination of option trading volume and open interest is performed using options on stocks associated with the four size portfolios, as previously identified. Internet Appendix B documents the findings. There is a monotonic decline in option volume and open interest as one moves from the large-cap S&P 500 group to the small-cap S&P 600 group. Option liquidity for stocks that belong to the "other" group is higher than in the S&P 600 index and marginally lower than in the S&P

[4]Illiquid options suggest a low level of trading activity from option investors. This does not necessarily imply a high degree of agreement between the market makers and other informed investors. The low trading activity may be due to minimal interest by investors in the stock and its options.

400 index. The "other" portfolio contains a number of higher capitalized NASDAQ 100 stocks, which exhibit high option liquidity. This explains why the average liquidity of options for the "other" portfolio is higher than the S&P 600 portfolio and only slightly lower than the S&P 400 portfolio.

Overall, the results show that option liquidity is increasing in market cap, which supports the use of market cap as a proxy for the level of option liquidity. In addition, stocks that constitute the S&P 500 index not only exhibit the highest option liquidity compared to the other three size groups; option trading volume and open interest in this group are more than triple those of the midcap S&P 400 group. This is consistent with our earlier evidence that the liquidity in the option market is concentrated in the contracts on a small proportion of stocks. Another advantage of grouping stocks by market cap is that it allows us to assess the perceptions of option traders in stocks that have varying levels of informational efficiency. As well as being the most liquid, S&P 500 stocks are also the most informationally efficient, so we are particularly interested in the findings for this group.

C. Summary Statistics on the Volatility Spread and Skew

Next, we examine the volatility spread and skew in a period preceding the split announcement window. This forms a reference point on which to base expectations on the behavior of the volatility spread and skew. Table 2 reports the output. Similar to Cremers and Weinbaum (2010) and Xing et al. (2010), the mean and median volatility spread are negative, while for the volatility skew, these values are positive. This indicates that the implied volatilities inverted from put options are relatively higher than those for call options, which reflects option investors' greater concern over downside risks. The findings for the different market cap groups in Internet Appendix C are broadly consistent with the full sample. However, it is observed that the absolute value of the volatility spread and skew increases as market capitalization decreases. This implies that put options are more expensive in small firms compared to large firms. This is expected, as smaller firms are more likely to be subject to short-sale constraints, which lead to higher demand for put options.

We also note that the absolute value of the volatility spread is lower than the volatility skew. The volatility skew is designed to extract the information in out-of-the-money put options, while the volatility spread captures the information

TABLE 2

Summary Statistics on the Volatility Spread and Skew

Table 2 reports the distribution of the volatility spread and skew for the period [−100, −20], where day 0 is the split announcement date. The volatility spread is the weighted average of the difference in implied volatility across all valid call and put option pairs matched on the same strike price and maturity date. The weight is the average open interest of the call and put options. The volatility skew is the difference in implied volatility of out-of-the-money put and at-the-money call options. Out-of-the-money put options are those with delta closest to −0.3, and at-the-money call options are those with delta closest to 0.5.

Statistic	Volatility Spread	Volatility Skew
Mean	−0.0158	0.0319
25th percentile	−0.0283	0.0019
Median	−0.0083	0.0210
75th percentile	0.0042	0.0434
Standard deviation	0.0525	0.0437

in both call and put options. If the difference in implied volatility between call and put options is mainly driven by the put options, then the magnitudes of the volatility spread and skew should be similar; they should just have the opposite sign. Thus, the lower absolute value of the volatility spread indicates that these spread differentials are a function of price pressure in both calls and puts.

Overall, the summary statistics indicate that trading activity in the option market is quite thin. Option liquidity does increase markedly, though, as one moves up through the market cap groups. Moreover, without the effect of new information, the volatility spread and skew are not centered on 0. Thus, to evaluate whether option traders expect positive abnormal returns following stock split announcements, we do not study the level of the volatility spread and skew but rather the change in these two measures.

IV. The Perceptions of Option Traders

A. Perceptions on Volatility

Table 3 reports implied volatility changes for both call and put options during the [−5, +5] event window. Short (long) maturity options are those that expire before (after) the effective date. Prior to the announcement, we observe significant increases in implied volatility in both short maturity calls and puts. Specifically, there are significant increases on days −3, −2, and −1 in calls and on days −2 and −1 in puts. There are also weakly significant increases on day −5 in calls

TABLE 3

Implied Volatility Changes around Split Announcements

Table 3 reports the change in implied volatility for call and put options around the split announcement date. The event window is [−5, +5], where day 0 is the announcement date. Short maturity options expire before the effective date, while long maturity options expire after the effective date. The sample period is 1998–2012. The *t*-statistics of the means are reported in parentheses. * and ** indicate significance at the 10% and 5% levels, respectively.

	Call Options		Put Options	
Day	Short Maturity	Long Maturity	Short Maturity	Long Maturity
−5	0.0035*	0.0014	0.0021	0.0012*
	(1.75)	(1.20)	(1.62)	(1.75)
−4	−0.0002	−0.0002	0.0023*	0.0008
	(−0.08)	(−0.17)	(1.70)	(1.03)
−3	0.0067**	−0.0012	0.0019	−0.0013**
	(3.08)	(−1.08)	(1.37)	(−2.01)
−2	0.0089**	0.0025**	0.0050**	0.0020**
	(3.57)	(2.69)	(3.52)	(3.00)
−1	0.0084**	0.0015	0.0067**	−0.0004
	(3.54)	(1.48)	(4.07)	(−0.61)
0	0.0124**	0.0117**	0.0156**	0.0118**
	(4.51)	(7.87)	(7.98)	(11.74)
1	−0.0025	0.0064**	−0.0056**	0.0026**
	(−0.94)	(4.57)	(−2.50)	(2.41)
2	0.0030	−0.0004	0.0015	−0.0003
	(1.04)	(−0.34)	(0.70)	(−0.40)
3	0.0049	0.0000	0.0023	0.0012
	(1.63)	(0.04)	(1.31)	(1.63)
4	0.0014	−0.0009	0.0026	−0.0001
	(0.56)	(−0.91)	(1.47)	(−0.14)
5	0.0010	−0.0001	0.0016	0.0007
	(0.35)	(−0.14)	(0.83)	(1.04)

and on day −4 in puts. In contrast, long maturity options only exhibit a significant increase on day −2. As these implied volatility increases are observed in both calls and puts but primarily in short maturity options, they imply that option traders expect that stock volatility will increase when splits are announced. Given that splits are unscheduled events that the market should not have foreknowledge of, these findings are strongly suggestive of information leakage prior to the announcement.

On the announcement day and as expected, there is a large increase in implied volatility across all option groups. On day +1 though, there is a significant (small) reduction in implied volatility for short maturity puts (calls). In contrast, both long maturity calls and puts exhibit another significant increase in implied volatility on day +1. As this increase is observed in both calls and puts but only in long maturity options, it suggests that option traders expect that stock volatility will increase after the effective date. Given that these are postannouncement changes, they incorporate option traders' interpretation of the information in the event.

Table 4 presents the subsample analysis for the four market capitalization groups. The daily change in implied volatility is reported over the [−2, +2] period.[5] Across the four size groups, both the short maturity calls and puts consistently show a significantly positive change in implied volatility on either day −2 or day −1, or on both days. Thus, the preannouncement increase in implied volatility documented in the full sample is also present in each of the four size groups. This is a particularly strong result, as it indicates that stock volatility is expected to increase across a broad cross section of stocks, whose options will have varying degrees of liquidity. The increase in implied volatility in S&P 500 stocks is especially telling, as it is more likely to be driven by completed trades rather than by market makers adjusting spreads to inhibit the informed from profiting.

Unsurprisingly, in all market cap and option groups, there is a large and significant increase in implied volatility on day 0. On the ensuing days, though, the behavior of implied volatility varies across the size groups. Specifically, we only observe a significant increase in implied volatility after the announcement day for long maturity options in S&P 600 and "other" stocks. This suggests that the inference reached from the full sample is that option traders expect an increase in volatility after the effective date manifests in smaller stocks. In untabulated results, the postsplit change in stock volatility, as defined in Section II.C, is 10.3% per annum for the full sample. It is 5.4%, 7.0%, 13.3%, and 14.2% for S&P 500, S&P 400, S&P 600, and "other" stocks, respectively. Thus, option traders' expectation of a postsplit increase in stock volatility, particularly in smaller stocks, is in line with the actual increases observed.

If informed investors wish to trade on information they have acquired on an impending event, when should they start trading to exploit that information? They will probably consider how much trading they think they can get away with without showing their hand. They may trade by stealth in smaller blocks (Anand

[5]Outside of the [−2,+2] window, that is, for days −5, −4, −3, +3, +4, and +5, the change in implied volatility is insignificant for all size groups.

TABLE 4
Implied Volatility Changes in Market Cap Groups

Table 4 reports the change in implied volatility for call and put options on stocks that belong to the S&P 500, S&P 400, and S&P 600 indices, and the "other" group (stocks that do not constitute any of the 3 indices). The event window is [−2, +2], where day 0 is the split announcement date. The t-statistics of the means are reported in parentheses. * and ** indicate significance at the 10% and 5% levels, respectively.

		Call Options		Put Options	
Index	Day	Short Maturity	Long Maturity	Short Maturity	Long Maturity
S&P 500	−2	0.0068* (1.91)	0.0009 (0.52)	0.0056** (2.66)	0.0029* (1.89)
	−1	0.0012 (0.37)	0.0017 (1.14)	0.0049** (2.48)	−0.0013 (−0.96)
	0	0.0084** (2.39)	0.0051** (2.18)	0.0138** (3.70)	0.0115** (6.68)
	1	−0.0058 (−1.36)	0.0031 (1.37)	−0.0113** (−3.04)	−0.0018 (−1.08)
	2	0.0016 (0.34)	−0.0005 (−0.24)	−0.0004 (−0.13)	−0.0019 (−1.12)
S&P 400	−2	0.0021 (0.50)	0.0018 (1.04)	0.0053** (2.27)	0.0011 (0.96)
	−1	0.0094** (2.07)	0.0020 (0.82)	0.0012 (0.45)	−0.0005 (−0.45)
	0	0.0108** (2.66)	0.0122** (3.75)	0.0151** (3.98)	0.0106** (6.22)
	1	−0.0006 (−0.11)	0.0028 (1.05)	−0.0011 (−0.36)	0.0022 (1.35)
	2	−0.0031 (−0.79)	−0.0014 (−0.63)	0.0019 (0.43)	0.0003 (0.24)
S&P 600	−2	0.0145** (2.80)	0.0036* (1.80)	0.0020 (0.58)	0.0010 (0.77)
	−1	0.0051 (1.00)	0.0007 (0.34)	0.0095** (2.68)	−0.0003 (−0.22)
	0	0.0142** (2.54)	0.0131** (4.60)	0.0137** (3.19)	0.0093** (4.48)
	1	0.0043 (0.76)	0.0075** (3.14)	−0.0010 (−0.20)	0.0021 (1.23)
	2	0.0014 (0.20)	0.0003 (0.13)	0.0084* (1.87)	0.0043** (3.14)
Other	−2	0.0116* (1.94)	0.0034* (1.77)	0.0066** (2.06)	0.0029** (2.10)
	−1	0.0164** (2.99)	0.0017 (0.85)	0.0102** (2.52)	0.0002 (0.15)
	0	0.0159** (2.25)	0.0151** (4.88)	0.0189** (5.00)	0.0146** (6.79)
	1	−0.0057 (−1.04)	0.0104** (3.25)	−0.0070 (−1.34)	0.0062** (2.40)
	2	0.0099 (1.58)	−0.0002 (−0.09)	−0.0024 (−0.52)	−0.0031* (−1.79)

and Chakravarty (2007)) over multiple days. Their decision is also likely to depend on the extent of information they have on the impending event. For example, they may have foreknowledge of both the split announcement and when it will be made, perhaps they do not know the exact date of the announcement, or maybe they know that some sort of meaningful corporate announcement will be made in the near future. Regardless, it is unlikely that the significant increases observed in implied volatility prior to the announcement are driven solely by those with some form of inside information, particularly given the illegality of this trading. At some point, the informed trading by those with some knowledge of the impending split will probably be detected by other informed traders. Once detected, market makers will likely adjust spreads, and other informed investors will consider jumping on the bandwagon. Our results show that the critical mass in trading seems to occur a few days prior to the announcement, as this is when implied volatility starts to significantly increase.[6]

This increase, which is detected in both short-dated calls and puts, indicates that option traders expect stock volatility to increase postannouncement. Looking more closely, though, we see that the magnitude of the increase is larger in calls than puts. Specifically, in Table 3, there is a 0.67%, 0.89%, and 0.84% increase on days −3, −2, and −1 in calls, compared with 0.19%, 0.50%, and 0.67% for the corresponding days in puts. The greater buying pressure observed in calls could imply an expectation not only of volatility increases but also of positive abnormal returns on the announcement. In a similar fashion, Table 3 shows that the implied volatility increase in long maturity calls is 0.64% on day +1 compared with 0.26% in puts. This could suggest that there is an expectation of both an increase in postsplit volatility and positive abnormal returns over the longer term. Therefore, we need to more carefully analyze whether changes in option-implied volatility reflect a change in investors' perceptions on the volatility or returns of the underlying stock. This is especially pertinent given that An et al. (2014) find that changes in implied volatility predict future returns. This leads to our next tests, which examine the volatility spread and skew.

B. Perceptions on Returns

To draw inference on option traders' perceptions on returns changes due to splits, we analyze the change in the volatility spread and skew. Prior to the announcement, we are particularly interested in these changes in short maturity options. There are two reasons for this. First, if option investors are trading in anticipation of positive returns on the announcement, they are likely to employ shorter-dated options. Second, in the preceding analysis, there are numerous instances where implied volatility significantly increases in short maturity calls prior to day 0.

Table 5 shows that there are no significant changes in the volatility spread and skew prior to the announcement in short maturity options. In fact, there is only one weakly significant change observed prior to day 0, and this is on day −5 in long maturity options for the volatility spread. The subsample analysis for the market cap groups in Table 6 broadly corroborates these findings. On days −2 and −1, the only significant change documented is on day −1 for short maturity options in S&P 400 stocks for the volatility spread.[7] Prima facie, this significantly positive change implies that option traders expect positive announcement returns in S&P 400 stocks. However, it is not supported by a concurrent reduction in the volatility skew. Although the skew does decrease on day −1, it does not do so significantly

[6]It is possible that the observed implied volatility increases are not due to information leakage but are solely due to superior processing of public information by informed traders. We think that this is unlikely, though. Further, market makers may adjust spreads as an informed reaction to suspicious trading or as part of their normal inventory management processes. Even in the latter case, though, the change in spreads will still have been initiated by informed option trading.

[7]In the broader [−5, +5] window, there are a few significant changes in spreads and skews in various market cap groups. They do not affect the inferences reached in this section, though.

TABLE 5
Volatility Spread and Skew Changes around Split Announcements

Table 5 reports the change in the option-implied volatility spread and skew in the window [−5, +5] around the split announcement date. The t-statistics of the means are reported in parentheses. * and ** indicate significance at the 10% and 5% levels, respectively.

	Volatility Spread		Volatility Skew	
Day	Short Maturity	Long Maturity	Short Maturity	Long Maturity
−5	0.0007 (0.46)	0.0023* (1.83)	−0.0003 (−0.26)	−0.0007 (−0.90)
−4	−0.0004 (−0.25)	−0.0012 (−1.22)	−0.0020 (−1.57)	−0.0005 (−0.83)
−3	0.0002 (0.14)	−0.0003 (−0.35)	0.0013 (1.18)	0.0001 (0.11)
−2	−0.0003 (−0.16)	0.0007 (0.71)	−0.0003 (−0.21)	−0.0007 (−1.04)
−1	0.0023 (1.49)	0.0003 (0.28)	−0.0016 (−1.44)	0.0007 (1.07)
0	−0.0015 (−0.78)	0.0007 (0.50)	0.0002 (0.18)	−0.0014* (−1.71)
1	0.0002 (0.11)	0.0031** (2.41)	−0.0002 (−0.13)	−0.0019** (−2.27)
2	−0.0004 (−0.19)	0.0002 (0.18)	0.0002 (0.14)	0.0003 (0.40)
3	−0.0007 (−0.40)	−0.0011 (−1.03)	0.0010 (0.86)	0.0004 (0.66)
4	0.0002 (0.11)	−0.0007 (−0.72)	−0.0011 (−0.84)	0.0004 (0.70)
5	−0.0035** (−2.05)	−0.0013 (−1.29)	−0.0012 (−1.09)	0.0009 (1.35)

(t-statistic of −1.55). Further, given that this is the only instance of a significant change prior to the announcement, we are wary of placing too much emphasis on this result. In sum, there is little evidence in the preannouncement spread and skew changes to support the contention that option investors are trading in anticipation of positive announcement returns.

Our earlier analysis of volatility perceptions is indicative of preannouncement information leakage. Given this, a possible interpretation of our return perception findings is that the announcement returns are not large enough to induce option investors to trade. In untabulated results, the mean CAR(0, +1) of our split sample is 2.01% (t-statistic of 13.68) and the median is 1.41%. Further, 68% of our sample had a positive CAR. Although the announcement return is clearly statistically significant, an average return of 2% may not be deemed large enough given the risk.

Turning our attention to the postannouncement period, Table 5 shows that in long maturity options, there is a weakly significant decrease in the volatility skew on day 0 followed by a significant decrease on day +1. This decrease in the skew on day +1 is reinforced by a significant increase in the volatility spread on the same day. These findings suggest that option traders expect positive longer-term return drift following split announcements. When we look at the market cap groups in Table 6, though, this inference becomes murky. The significant increase in the volatility spread in long maturity options on day +1 in the full sample appears to be driven by S&P 500 stocks. The spread increase on day +1 is weakly significant for this group and insignificant in the other three size groups. However,

TABLE 6
Volatility Spread and Skew Changes in Market Cap Groups

Table 6 reports the change in the option-implied volatility spread and skew on stocks that belong to the S&P 500, S&P 400, and S&P 600 indices, and the "other" group (stocks that do not constitute any of the 3 indices). The t-statistics of the means are reported in parentheses. * and ** indicate significance at the 10% and 5% levels, respectively.

		Volatility Spread		Volatility Skew	
Index	Day	Short Maturity	Long Maturity	Short Maturity	Long Maturity
S&P 500	−2	−0.0003 (−0.08)	0.0001 (0.04)	−0.0009 (−0.49)	−0.0015 (−1.43)
	−1	−0.0009 (−0.44)	−0.0005 (−0.32)	−0.0008 (−0.51)	0.0008 (0.68)
	0	−0.0021 (−0.77)	−0.0044** (−2.06)	0.0016 (0.68)	0.0019 (1.21)
	1	0.0019 (0.57)	0.0040* (1.74)	−0.0022 (−0.79)	−0.0027 (−1.56)
	2	0.0004 (0.14)	−0.0006 (−0.28)	−0.0004 (−0.22)	0.0003 (0.30)
S&P 400	−2	−0.0015 (−0.67)	0.0001 (0.10)	0.0031 (1.04)	−0.0010 (−0.87)
	−1	0.0090** (3.25)	0.0014 (0.73)	−0.0041 (−1.55)	0.0006 (0.49)
	0	−0.0025 (−0.70)	−0.0005 (−0.22)	−0.0008 (−0.36)	0.0013 (0.90)
	1	−0.0035 (−0.90)	0.0025 (1.13)	0.0023 (0.74)	−0.0019 (−1.15)
	2	−0.0005 (−0.17)	−0.0009 (−0.50)	−0.0022 (−0.73)	0.0005 (0.32)
S&P 600	−2	−0.0008 (−0.22)	0.0019 (1.02)	−0.0026 (−0.89)	0.0001 (0.09)
	−1	0.0032 (0.87)	0.0007 (0.33)	−0.0006 (−0.21)	0.0002 (0.10)
	0	−0.0020 (−0.53)	0.0018 (0.77)	−0.0045 (−1.50)	−0.0059** (−3.03)
	1	0.0024 (0.53)	0.0038 (1.44)	0.0007 (0.18)	−0.0020 (−1.03)
	2	−0.0068* (−1.78)	−0.0014 (−0.69)	0.0035 (1.07)	0.0034** (2.56)
Other	−2	0.0010 (0.25)	0.0006 (0.32)	−0.0004 (−0.16)	−0.0004 (−0.32)
	−1	−0.0001 (−0.03)	−0.0002 (−0.09)	−0.0015 (−0.67)	0.0011 (0.87)
	0	0.0001 (0.02)	0.0044 (1.39)	0.0022 (0.79)	−0.0027* (−1.91)
	1	−0.0002 (−0.04)	0.0023 (0.85)	−0.0002 (−0.07)	−0.0012 (−0.83)
	2	0.0032 (0.74)	0.0027 (1.04)	0.0006 (0.17)	−0.0019 (−1.36)

there is a significant decrease in the spread on day 0 in long maturity options for S&P 500 stocks. Given this conflict, one cannot argue that the expectation of positive return drift in the full sample is driven by S&P 500 stocks. For the volatility skew, it is insignificant on day +1 in long maturity options in all size groups, in contrast to the full sample. There is a significant decrease in the skew on day 0 in long maturity options for the S&P 600 group and "other" group, which conforms with the aggregate results. Thus, if the volatility skew findings point to an expectation of longer-term return drift, then this drift appears to be driven by smaller stocks. Overall, we find some evidence that option traders expect positive return drift over the longer term, particularly in smaller stocks, but the results are far from conclusive.

C. Sensitivity Analysis

The statistical significance of the change in implied volatility and the volatility spread (skew) is inferred based on the assumption that the expected daily change in these measures is 0. To verify this condition, we examine the distribution of these changes during the period [−100, −20]. Internet Appendix D reports that the daily change in these measures is small, particularly in comparison to the changes observed during the event window of [−5, +5]. Nevertheless, to ensure that our analysis is not influenced by cross-sectional variation in the expected change in implied volatility and the volatility spread (skew), for each firm, we select a benchmark. Specifically, the expected daily change is proxied using the average change in these measures during the period [−100, −20]. The abnormal change is then computed by subtracting the appropriate benchmark. We replicate the perceptions analysis reported in Tables 3 and 5 using these abnormal changes. In untabulated results, we find that the behavior of the abnormal change in implied volatility and the volatility spread (skew) is similar to the raw change in these metrics.

When splits are announced, it is common for firms to announce other information simultaneously. As an example, for around 30% of our sample, stock splits and cash dividends are concurrently announced. Given this, we repeat the analysis for firms that do not have a simultaneous release of other information during the period [−10, +10]. The unreported results are similar to the analogous output in Tables 3 and 5.

An option investor with an informational advantage may choose which options to trade based on moneyness when attempting to exploit their perceived advantage. It is commonly argued that informed investors prefer to trade out-of-the-money options because they are cheaper and due to the leverage available. In our context, an informed investor trading on future stock volatility may favor near-the-money options, as these options typically have the highest vegas. To assess whether our findings vary based on moneyness, we segregate options into out-of-the-money, near-the-money, and in-the-money groups and then replicate the volatility perceptions tests reported in Table 3. Internet Appendix E documents the findings. In brief, there is little variation in the results based on moneyness. Prior to the announcement, we document significant increases in implied volatility in short maturity calls and puts across all three moneyness groups. For long maturity calls and puts, there is a significant increase in implied volatility on day +1 in all moneyness groups.

D. Insights from Trading Volume

For further insight on informed option trading around split announcements, we analyze both option trading volume and the relative trading volume between options and stocks. Relative trading volume is estimated as the ratio of option trading volume to stock trading volume (O/S) following Roll et al. (2010). We consider the mean adjusted daily level of option trading volume and O/S over the [−5, +5] event window. Event period volume and O/S are adjusted for the average value of these measures during the period [−100, −20]. Figure 1 plots the findings.

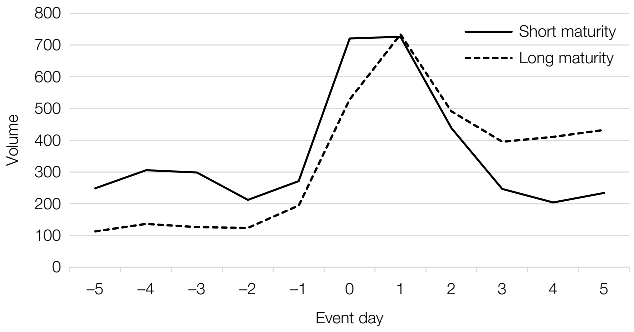
In all graphs and across the entire event window, the mean adjusted level of option volume and O/S is always positive. This implies that there is heightened trading activity in options both before and after splits are announced. Moreover, in all cases, volume and O/S increase in the preannouncement period from day −5 to day −1. These findings provide further support for our contention that there is informed trading in options prior to split announcements. As expected, trading activity spikes on the announcement day. After the announcement, though, volume and O/S quickly fall back to their preannouncement levels in short maturity options. In contrast, these measures remain at elevated levels in long maturity options. This heightened level of trading activity in both long maturity calls and puts reinforces our earlier assertion in the implied volatility analysis. It appears that option trading after the announcement is largely motivated by expectations of postsplit changes in stock volatility.

FIGURE 1

Option Trading Volume and O/S around Split Announcements

Figure 1 plots the mean adjusted daily level of option trading volume and O/S in the window [−5, +5] around the split announcement date. The average value of volume and O/S during the period [−100, −20] is subtracted from the event period value to calculate the mean adjusted values plotted. O/S is option trading volume divided by stock trading volume following Roll et al. (2010).

Graph A. Volume in Call Options



Graph B. O/S in Call Options

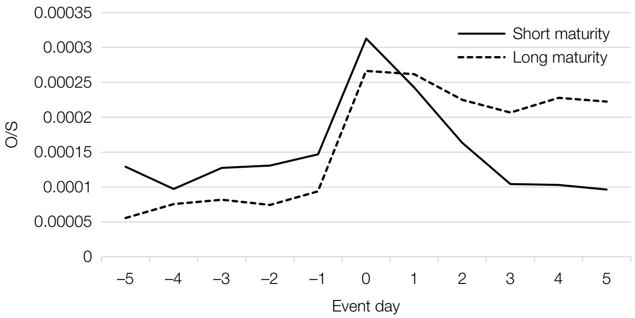


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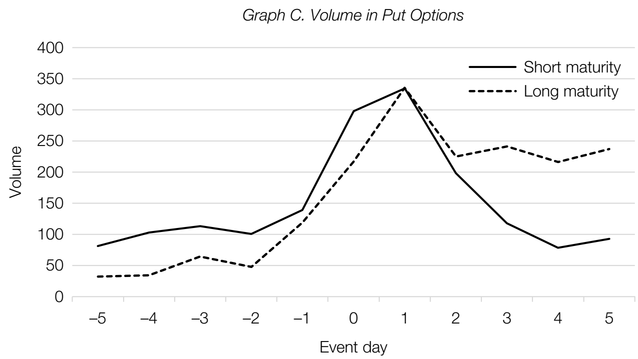
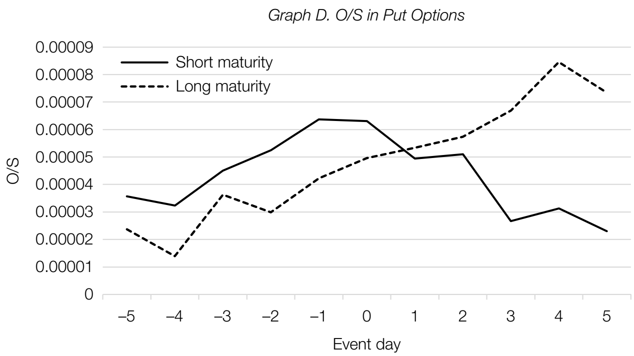
FIGURE 1 (continued)

Option Trading Volume and O/S around Split Announcements





V. The Predictive Ability of Option Measures

A. Predictability of Future Stock Volatility

In the analysis of option traders' perceptions on future stock volatility, we document numerous cases where implied volatility significantly increases in short maturity options prior to the announcement. We interpret this as evidence that option traders are acquiring and trading on private information prior to split announcements. We also conjecture that the significant increases observed are unlikely to be solely due to trading on leaked information and that they also probably entail a skillful reaction by other informed traders who are responding to the trading activity observed. However, we cannot isolate to what extent the trading is based on leaked information or skillful processing of public information. What we can say with a reasonable degree of certainty is that the implied volatility increases are strongly suggestive of trading on leaked information. To more directly address whether option traders are skillfully processing information (public or private), we analyze whether pre-event option trading predicts future changes in the return distribution of the underlying stocks.

Given that we have already documented informed trading using preannouncement changes in implied volatility, we rely on these changes again in our analysis on the predictability of volatility. Specifically, we run cross-sectional regressions of stock volatility levels at the announcement on changes in implied volatility prior to the announcement. As with all preannouncement analyses, we focus on short maturity options. Our reasons for doing so are similar to before. If option investors are trading on stock volatility levels in the near future, they are likely to employ shorter-dated options to do so. Additionally, the significant changes in preannouncement-implied volatility are observed in short maturity options.

Table 7 shows that implied volatility changes in short maturity options prior to the announcement do not predict abnormal stock volatility on day 0. However, for stock volatility on day +1, there are significantly positive coefficients in short maturity options on day −2 in calls and on days −5, −3, −2, and −1 in puts. This indicates that preannouncement-implied volatility changes predict stock volatility levels on the day after the announcement.[8] A possible reason for the lack of predictability on day 0 is noise associated with the announcement.

TABLE 7

Regressions of Announcement Volatility on Changes in Implied Volatility

Table 7 reports the output from the cross-sectional regressions of abnormal daily stock volatility (AB_VOL) on the change in option-implied volatility (ΔIV) for the sample of splitting firms. Abnormal daily stock volatility is estimated as the square of the daily returns on day 0 (day +1) minus the average squared returns over the [−60, −20] period. ΔIV is defined as in equations (1) and (2). Panel A (Panel B) reports the coefficients on ΔIV for call (put) options. The *t*-statistics of the coefficient estimates are reported in parentheses. Intercepts have been suppressed to conserve space. * and ** indicate significance at the 10% and 5% levels, respectively.

	Short Maturity		Long Maturity	
Day	Day 0 AB_VOL	Day 1 AB_VOL	Day 0 AB_VOL	Day 1 AB_VOL
Panel A. Call Options				
−5	0.0012	−0.0058	0.0237	0.0004
	(0.41)	(−0.88)	(1.38)	(0.04)
−4	0.0027	−0.0002	0.0037	−0.0067
	(1.43)	(−0.03)	(0.47)	(−0.41)
−3	0.0035	−0.0009	0.0082	0.0079
	(1.52)	(−0.17)	(0.96)	(1.12)
−2	−0.0016	0.0103**	0.0295	0.0241**
	(−0.69)	(2.44)	(1.10)	(2.51)
−1	0.0029	0.0077	0.0111	0.0053
	(1.37)	(1.24)	(0.63)	(0.82)
Panel B. Put Options				
−5	0.0171	0.0209**	0.0270*	0.0472
	(1.35)	(2.11)	(1.70)	(1.33)
−4	0.0071	−0.0136	0.0347	−0.0193
	(1.61)	(−1.04)	(1.22)	(−0.53)
−3	0.0043	0.0179**	0.0078	0.0312
	(0.97)	(2.43)	(0.43)	(1.49)
−2	0.0137	0.0223**	0.0359	0.0202
	(1.21)	(2.57)	(1.35)	(1.29)
−1	0.0520	0.0228**	0.0463	0.0204
	(1.33)	(2.11)	(0.78)	(1.07)

[8]To calculate abnormal daily stock volatility, average daily stock volatility is estimated over the period [−60, −20]. We assess robustness by extending the estimation window to [−100, −20] and [−250, −20]. The unreported results are similar.

Once this noise mitigates, the predictability appears on the following day. These predictability findings complement our earlier results quite nicely. Not only do we document significant increases in implied volatility prior to the announcement; we also show that implied volatility changes predict stock volatility levels after the announcement. More broadly, the perceptions analysis highlights option traders' capacity to acquire private information. Here, we show that they also display an ability to process information skillfully.

Given these findings that daily implied volatility changes predict stock volatility levels a few days later, a pertinent question to ask is whether this predictability exists outside the announcement window. To address this issue, we run simulations comparable to those in Chan et al. (2015) to assess the degree of predictability in a nonevent period. First, we randomly choose a pseudo-event date for each splitting firm in the period [−100, −20], where day 0 is the split announcement date. We then run a cross-sectional regression, where, for example, the abnormal level of stock volatility on day t is regressed on the change in implied volatility on day $t-1$, where day t is the pseudo-event date. We repeat this process 1,000 times. Table 8 reports the average coefficient and the coefficients at the 2.5th and 97.5th percentiles of the distribution for each simulation. For comparability, we run a simulation for each regression reported in Table 7.

In Table 8, the average coefficient is positive in almost all of the simulations. Further, the coefficient at the 97.5th percentile is larger in absolute value than the corresponding 2.5th percentile coefficient in the vast majority of cases. These findings imply that in a nonevent period, changes in implied volatility do predict stock volatility levels a few days later. However, the predictability is much weaker than during the announcement window. In most cases, the average coefficient in Table 8 is an order of magnitude smaller than the analogous coefficients reported in Table 7. We repeat the simulation analysis using the period [20, 100] after the split announcement and find similar results, which are suppressed for brevity. In sum, changes in implied volatility do predict future stock volatility levels both prior to and after split announcements, but the predictability is much weaker than during the announcement window.

The simulations in the nonevent period can be considered a baseline level of predictability with which we can compare the event period regressions. In this case, one can refer to the simulated coefficients at the 2.5th and 97.5th percentiles of the distribution as critical values. When comparing the critical values with the coefficients in the event period regressions, we see that all of the significant coefficients in Table 7 are larger than the corresponding critical values at 97.5% in Table 8. This confirms the predictability documented in these regressions in Table 7. More interestingly, though, in the regressions on stock volatility on day 0, the coefficient in Table 7 is larger than the 97.5% critical value in Table 8 in short maturity puts on days −5, −4, −2, and −1, despite the fact that these coefficients are insignificant in Table 7. Therefore, the simulations indicate that relative to the nonevent period, implied volatility changes in short maturity puts have significantly greater predictability of future stock volatility on the announcement date. Taken together, Tables 7 and 8 show that implied volatility changes in short puts have much stronger predictive ability than short calls. Informed trading in calls prior to the announcement could be motivated by both expectations of

TABLE 8
Simulation Regressions of Stock Volatility on Changes in Implied Volatility

Table 8 reports the output from pseudoevent date regressions of abnormal daily stock volatility (AB_VOL) on the change in option-implied volatility for the sample of splitting firms. Panel A (Panel B) reports the output for call (put) options. The pseudoevent date, day t, is randomly chosen for each splitting firm in each regression from the period [−100, −20], where day 0 is the split announcement date. Then, for example, abnormal daily stock volatility on day t is regressed on the change in implied volatility on day $t-1$. This simulation process is repeated 1,000 times. The first value reported is the average coefficient from these 1,000 regressions. The 2.5% critical value of the distribution is reported in parentheses below the average coefficient, and the 97.5% critical value is reported in square brackets below the 2.5% critical value. There is, on average, 40 days between the split announcement date and the split effective date. Given this, for the pseudoevent period, options that mature in fewer than 40 days are classified as short maturity, and options with 40 or more days to maturity are classified as long maturity.

	Short Maturity		Long Maturity	
Day	Day t AB_VOL	Day $t+1$ AB_VOL	Day t AB_VOL	Day $t+1$ AB_VOL
Panel A. Call Options				
$t-5$	0.0009	0.0007	0.0023	0.0033
	(−0.0029)	(−0.0031)	(−0.0086)	(−0.0043)
	[0.0072]	[0.0041]	[0.0123]	[0.0127]
$t-4$	0.0004	0.0008	0.0025	0.0028
	(−0.0063)	(−0.0027)	(−0.0081)	(−0.0052)
	[0.0043]	[0.0062]	[0.0169]	[0.0130]
$t-3$	0.0003	0.0004	0.0019	0.0024
	(−0.0037)	(−0.0053)	(−0.0118)	(−0.0082)
	[0.0050]	[0.0042]	[0.0143]	[0.0167]
$t-2$	0.0013	0.0003	0.0039	0.0014
	(−0.0023)	(−0.0031)	(−0.0071)	(−0.0129)
	[0.0076]	[0.0043]	[0.0308]	[0.0137]
$t-1$	0.0013	0.0012	0.0046	0.0039
	(−0.0044)	(−0.0025)	(−0.0162)	(−0.0068)
	[0.0065]	[0.0101]	[0.0301]	[0.0406]
Panel B. Put Options				
$t-5$	0.0019	0.0005	0.0057	0.0044
	(−0.0053)	(−0.0072)	(−0.0182)	(−0.0108)
	[0.0117]	[0.0078]	[0.0331]	[0.0268]
$t-4$	−0.0001	0.0020	0.0023	0.0062
	(−0.0101)	(−0.0040)	(−0.0274)	(−0.0151)
	[0.0068]	[0.0111]	[0.0230]	[0.0349]
$t-3$	0.0008	−0.0001	0.0031	0.0021
	(−0.0070)	(−0.0109)	(−0.0146)	(−0.0261)
	[0.0072]	[0.0079]	[0.0235]	[0.0241]
$t-2$	0.0025	0.0006	0.0094	0.0019
	(−0.0027)	(−0.0073)	(−0.0071)	(−0.0169)
	[0.0119]	[0.0076]	[0.0442]	[0.0227]
$t-1$	0.0017	0.0024	0.0046	0.0082
	(−0.0052)	(−0.0111)	(−0.0163)	(−0.0367)
	[0.0164]	[0.0111]	[0.0435]	[0.0451]

higher announcement returns and volatility. In contrast, put trading will be more focused on volatility. Thus, it is not surprising that the predictability of future stock volatility is stronger in puts.

In the volatility perceptions analysis, when we examined implied volatility changes after the announcement, we saw significant increases in both long maturity calls and puts on day +1. We interpreted this as evidence that option traders expect an increase in stock volatility after splits are effected. Now we consider whether changes in implied volatility after the announcement can predict the postsplit change in stock volatility. Here, we are interested in long maturity options, because option traders will likely employ longer-dated options that expire after the effective date if they are trading on postsplit stock volatility changes.

Table 9 shows that the coefficients on the change in implied volatility on day +1 in both long maturity calls and puts are significantly positive. There is also a weakly significant positive coefficient on day +5 in long maturity puts. These findings indicate that changes in implied volatility after the announcement predict the postsplit change in stock volatility. Again, the regression findings on the predictability of volatility complement the perceptions analysis well. Previously, we documented significant increases in implied volatility on day +1 for both long maturity calls and puts. Now we show that the change in implied volatility for these option groups on day +1 predicts the change in stock volatility after splits are effected. The private informational advantage of option traders is likely to be low directly after the announcement. As such, our interpretation of these findings is that option traders are displaying skill in processing public information.

B. Sensitivity Analysis

When we run the volatility predictability regressions reported in Tables 7 and 9 in the four market cap groups, we find that the "other" portfolio tends to drive the significant coefficients observed in the full sample regressions. The S&P 500, S&P 400, and S&P 600 groups also contribute to the significant findings, but to a lesser extent. We also find that the regression output assessing the predictability of volatility is similar when we constrain the sample to only include splitters that do not have a simultaneous release of other information. These results are suppressed for brevity.

To more directly assess the impact of option liquidity, we interact the change in implied volatility with the log of option volume. We then rerun the regressions reported in Tables 7 and 9 with this additional variable. Internet Appendices F1 and F2 document the findings. There are a couple of cases where the interaction terms are significant at the 10% level, but none are significant at the 5% level. It

TABLE 9

Regressions of the Change in Postsplit Volatility on Changes in Implied Volatility

Table 9 reports the output from the cross-sectional regressions of the change in stock volatility following the effective date on the change in option-implied volatility (ΔIV). The posteffective change in volatility is measured as the difference in the annualized standard deviation of the returns following the effective date and the annualized standard deviation of the returns from the announcement date to the effective date. The number of days for which the postsplit volatility is calculated is equivalent to the number of days from the announcement date to the effective date. Intercepts have been suppressed to conserve space. The *t*-statistics of the coefficient estimates are reported in parentheses. * and ** indicate significance at the 10% and 5% levels, respectively.

	Call Options		Put Options	
Day	Short Maturity	Long Maturity	Short Maturity	Long Maturity
0	0.0162 (0.14)	−0.2025 (−0.92)	0.1168 (0.82)	0.0784 (0.18)
1	0.1823 (1.27)	0.8710** (2.64)	0.2354 (1.26)	0.9017* (1.89)
2	0.0995 (0.65)	−0.2141 (−0.42)	0.1693 (0.90)	0.9760 (1.34)
3	−0.2080 (−1.41)	0.6059 (1.47)	−0.5247* (−1.72)	0.3033 (0.31)
4	−0.0203 (−0.17)	−0.4942 (−1.23)	0.0230 (0.08)	−0.2966 (−0.50)
5	0.0603 (0.53)	0.9762 (1.22)	−0.0629 (−0.37)	2.5907* (1.73)

seems that option volume does not affect the predictability of implied volatility on future stock volatility.

Last, we partition options into moneyness groups to examine whether the predictability of volatility varies based on option moneyness. Our reasoning for doing so is similar to before in the volatility perceptions analysis. Perhaps informed investors favor out-of-the-money options because they have higher leverage and they are cheaper. Alternatively, maybe they prefer near-the-money options when trading on volatility, as these options generally have the highest vegas. Internet Appendices G1 and G2 report the regression output.

In Internet Appendix G1, which considers the predictability of stock volatility at the announcement, the strongest predictability is observed in out-of-the-money options. Near-the-money options display good predictability here, too. There is some predictability for the in-the-money group, but it is weaker than in the other two groups. These findings are consistent with informed option traders favoring out-of-the money options because they are cheaper or near-the-money options due to their higher vegas. Additionally, the higher liquidity in both out-of-the money and near-the-money options relative to in-the-money options is likely to be another motivating factor, particularly as liquidity will help informed investors conceal their preannouncement trading. For the predictability of the post-split change in stock volatility in Internet Appendix G2, predictability is observed in all three moneyness groups, and no particular group stands out.

C. Predictability of Future Returns

We now turn our attention to the predictability of future returns. First, we consider the predictability of the announcement returns. To do so, we run regressions of the CAR(0, +1) on the preannouncement level of the volatility spread and skew. There are no significant coefficients on the spread or skew in Table 10. This implies that the preannouncement spread and skew do not predict the announcement returns. In the perceptions analysis, we find little evidence that option investors are trading to exploit the positive announcement returns. We add to this here by documenting that our option measures do not predict the announcement returns.

Chan et al. (2015) contend that even though the average announcement returns of acquirers are close to 0, there is large variation in these returns across acquirers. They find that the spread and skew do predict the announcement returns of acquiring firms. With splits, there is much less dispersion in the announcement returns. As discussed previously, the average (median) CAR is 2% (1.4%), and 68% of our sample has a positive CAR. Thus, a possible explanation of our findings is that option traders find it difficult to differentiate between the announcement returns of splitting firms.

Next, we consider whether spread and skew levels after the announcement can predict future return drift. Here we are assessing option traders' ability to interpret information in the split announcement on subsequent return drift. In Table 11, there is a significantly positive coefficient on the spread in short maturity options on day +1. There is also a weakly significant positive coefficient on the spread on day +4, again in short maturity options. These findings suggest that postannouncement option trading predicts return drift in the shorter term.

TABLE 10

Regressions of Announcement Returns on the Volatility Spread and Skew

Table 10 reports the output from the cross-sectional regressions of the cumulative announcement abnormal returns (CARs) on the preannouncement level of the option volatility spread and skew. The abnormal return is estimated as the return of the splitting firm minus the return of a size portfolio that the firm belongs to on a given day. The spread and skew are defined as in equations (4) and (5), respectively. The control variables in the regression are described in Internet Appendix A. Intercepts and coefficients on the control variables are suppressed to conserve space. The *t*-statistics of the coefficient estimates are reported in parentheses. * and ** indicate significance at the 10% and 5% levels, respectively.

	Volatility Spread		Volatility Skew	
Day	Short Maturity	Long Maturity	Short Maturity	Long Maturity
−5	−0.0626	−0.1068	0.0481	0.0251
	(−1.12)	(−0.99)	(0.52)	(0.18)
−4	0.0060	−0.1500	−0.1215	0.0814
	(0.09)	(−1.25)	(−1.05)	(0.52)
−3	−0.0406	−0.0936	−0.1267	−0.0544
	(−0.80)	(−0.86)	(−1.13)	(−0.41)
−2	0.0074	−0.0231	−0.1287	−0.0540
	(0.13)	(−0.26)	(−1.24)	(−0.46)
−1	0.0329	−0.0721	−0.0968	0.0199
	(0.59)	(−0.88)	(−0.87)	(0.17)

However, the significantly positive coefficients on the spread are not supported by significantly negative coefficients on the skew for the corresponding days. Overall, the evidence on whether postannouncement spread and skew levels predict future return drift is weak.

VI. Insights from Institutional Holdings

In the analysis of option traders' perceptions on return and volatility changes due to splits, we see that they expect stock volatility to increase postsplit. There is also some evidence that they expect longer-term return drift. These expectations are driven by smaller stocks in the S&P 600 group and the "other" group. Option traders may expect more pronounced return and volatility changes in

TABLE 11

Regressions of Postannouncement Returns on the Volatility Spread and Skew

Table 11 reports the output from the cross-sectional regressions of the buy and hold abnormal returns (BHARs) on the level of the option volatility spread and skew. The BHAR is estimated during the period [+7, +60] as the return of the splitting firm minus the return of a size portfolio that the firm belongs to on the announcement date. The control variables in the regression are described in Internet Appendix A. Intercepts and coefficients on the control variables are suppressed to conserve space. The *t*-statistics of the coefficient estimates are reported in parentheses. * and ** indicate significance at the 10% and 5% levels, respectively.

	Volatility Spread		Volatility Skew	
Day	Short Maturity	Long Maturity	Short Maturity	Long Maturity
0	0.2242	0.2996	−0.1959	0.1138
	(1.07)	(1.32)	(−0.46)	(0.23)
1	0.5218**	0.4424	−0.4219	−0.3162
	(2.05)	(1.54)	(−1.27)	(−0.74)
2	−0.0158	0.0418	−0.2536	−0.1058
	(−0.07)	(0.14)	(−0.69)	(−0.20)
3	0.1886	−0.0335	−0.0967	−0.0500
	(0.89)	(−0.10)	(−0.33)	(−0.10)
4	0.3996*	0.4536	−0.2773	−0.3166
	(1.79)	(1.43)	(−0.70)	(−0.68)
5	−0.2008	−0.0598	0.5075	−0.3286
	(−0.85)	(−0.20)	(1.24)	(−0.81)

smaller optionable stocks, because they think that these stocks are more widely held by retail investors. To examine this, we consider institutional holdings from 13F quarterly filings obtained from the Thomson Reuters database. Specifically, we look at proportional institutional ownership in the reporting quarter before and after the split announcement. Panel A of Table 12 shows that institutional ownership is lowest in the "other" group. Contrastingly, institutional ownership is highest in the S&P 600 group. There is also a decrease in proportional institutional ownership from small-cap S&P 600 stocks to midcap S&P 400 stocks and then to large-cap S&P 500 stocks. Therefore, although "other" group stocks do have the lowest institutional holdings, this is not the case in S&P 600 stocks.

In the examination of the option market, we document evidence of informed trading around split announcements. Given this and that institutional investors are typically considered more informed investors, we analyze whether institutional holdings change around split announcements. Mukherji, Kim, and Walker (1997) find that splits do not affect the proportion of equity held by institutions. Dennis and Strickland (2003) and Chen, Nguyen, and Singal (2011) report a small

TABLE 12

Institutional Holdings around Split Announcements

Table 12 reports institutional holdings from 13F quarterly filings for the full sample of optionable splitting firms and in each of the four market capitalization groups. Panel A reports statistics on proportional institutional holdings in the quarter before and the quarter after the split announcement. Panel B reports the mean excess change in proportional institutional holdings from the quarter before to the quarter after the split announcement. The excess change in holdings is calculated as the change in holdings for the splitting firm in the quarter around the announcement minus the average change in holdings for all firms in that quarter. The *t*-statistics of the means are reported in parentheses. * and ** indicate significance at the 10% and 5% levels, respectively.

Panel A. Proportional Institutional Holdings

Test Sample	Statistic	Quarter Before	Quarter After
Full sample	Mean	0.685	0.697
	Median	0.708	0.716
	Standard deviation	0.225	0.232
S&P 500	Mean	0.692	0.684
	Median	0.705	0.697
	Standard deviation	0.158	0.173
S&P 400	Mean	0.723	0.724
	Median	0.758	0.748
	Standard deviation	0.198	0.201
S&P 600	Mean	0.785	0.797
	Median	0.808	0.815
	Standard deviation	0.202	0.193
Other	Mean	0.577	0.613
	Median	0.579	0.622
	Standard deviation	0.259	0.283

Panel B. Excess Change in Holdings

Test Sample	Mean Change
Full sample	0.0081**
	(2.38)
S&P 500	−0.0116**
	(−2.17)
S&P 400	−0.0034
	(−0.55)
S&P 600	0.0071
	(1.32)
Other	0.0335**
	(4.02)

increase in percentage institutional ownership around splits. None of these studies considered the subset of optionable stocks, though.

Following Abarbanell, Bushee, and Raedy (2003), we calculate the excess change in proportional holdings as the change in holdings for the event firm in the quarter around the announcement minus the average change in holdings for all firms in that quarter. Panel B of Table 12 reports these changes. For the full sample, there is a significant increase in holdings of about 0.8%. This is consistent with informed trading by institutional investors around split announcements. In the market cap groups, though, we see that it is the "other" group, with a significant increase of 3.3%, that drives the aggregate findings. The change in holdings in the S&P 400 and S&P 600 groups is insignificant, and there is a significant decrease in proportional holdings in the S&P 500 group. Thus, it is smaller optionable stocks in the "other" group that generate the most interest from institutional investors around the split event.

To draw further insight on informed trading by institutional investors around splits, we examine the information ratio in periods before and after split announcements. The specific periods we consider are [−60, −21], [−20, −1], [0, 20], and [21, 60]. The ratio is calculated as the average daily return difference between the splitting firm and the benchmark portfolio, scaled by the standard deviation of these daily return differences.[9] It is a measure of risk-adjusted performance and stock selection ability that is regularly used by fund managers.

Table 13 shows that for the full sample, the information ratio is highest in the periods before the split announcement, where it is around 0.08. This is consistent with the large price run-ups that splitting firms experience in the months prior. The ratio falls by half to 0.04 in the [0, 20] period and is close to 0 in the [21, 60] period. Roughly half of the sample has an increase/decrease in the excess proportion of institutional holdings in the quarter around the split announcement. We examine the information ratio in each of these groups separately. In the [−60, −21] period, there is little difference between the ratios. In stark contrast, in the [−20, −1] window, the ownership increase group has a ratio that is 0.04 higher than the decrease group, and this difference is highly significant. After the announcement, the information ratio remains higher in the increase group, but not significantly.

These findings are consistent with informed trading by institutional investors around split announcements. The difference in the ratios in the [−20, −1] window is particularly striking and signifies good stock-picking ability by institutional investors. Thus, these findings are strongly suggestive of informed trading by institutional investors prior to the announcement. Given that we observe only quarterly holdings, this difference may be driven, in part, by institutional investors buying into splitting firms postannouncement that have performed particularly well just prior. However, because we do not observe significant differences in the ratios after the announcement, it is more likely due to informed institutional trading prior to the announcement.

[9]The benchmark return is the equal weighted return of the matching size portfolio, where four size portfolios are formed based on NYSE partitions. The findings are similar when the benchmark is a value-weighted market index.

TABLE 13
Information Ratio around Split Announcements

Table 13 reports the information ratio in periods around the split announcement. The information ratio is calculated as the average daily return difference between the splitting firm and the benchmark portfolio, scaled by the standard deviation of these daily return differences. Four equal weighted size portfolios based on NYSE partitions are employed as the benchmark portfolios. The mean of the information ratio is reported for the full sample and for two subsamples. The subsamples are for firms that have had an increase or decrease in the excess proportion of institutional holdings in the quarter around the split announcement. The difference in the information ratio between the institutional increase and decrease group is also reported. The t-statistics of the means are reported in parentheses. * and ** indicate significance at the 10% and 5% levels, respectively.

Period	Test Sample	Information Ratio
[−60, −21]	Full sample	0.0743
	Institutional increase	0.0734
	Institutional decrease	0.0749
	Difference	−0.0014
		(−0.19)
[−20, −1]	Full sample	0.0792
	Institutional increase	0.0986
	Institutional decrease	0.0576
	Difference	0.0410**
		(3.49)
[0, 20]	Full sample	0.0397
	Institutional increase	0.0464
	Institutional decrease	0.0386
	Difference	0.0078
		(0.68)
[21, 60]	Full sample	−0.00002
	Institutional increase	0.0073
	Institutional decrease	−0.0042
	Difference	0.0115
		(1.49)

VII. Conclusion

This study investigates informed option trading around stock split announcements. To do so, we assess the perceptions of option traders on future stock return and volatility changes due to splits. We also test whether option trading around the event predicts future changes in stock returns and volatility. By considering both perceptions and predictability, we provide a more comprehensive picture of informed trading in options.

We find that option trading activity prior to the announcement indicates that option investors anticipate an increase in stock volatility soon after the announcement. Given that splits are unscheduled events that the market should not have foreknowledge of, this is suggestive of information leakage prior to the announcement. Elevated levels of option trading volume prior to the announcement support this contention. Option trading after the announcement implies that option investors expect stock volatility to increase after splits are effected. There is little evidence, though, that option investors are trading in anticipation of positive announcement returns or return drift in the longer term. As a whole, the perceptions analysis indicates that option trading around the event is largely motivated by expected changes in future stock volatility.

Next, we show that pre-event option trading predicts the level of stock volatility soon after the announcement. This highlights option traders' capacity to skillfully process information prior to the announcement. It also complements the perceptions analysis nicely, where we show that option traders demonstrate an ability to acquire information on the impending event. We also find that option trading soon after the announcement predicts the change in stock volatility after splits are effected. Given that informed traders' private informational advantage is likely to be low soon after public announcements, we contend that this emphasizes option traders' skill in processing public information. Last, we provide some confirmatory evidence from institutional holdings of informed trading around split announcements.

In sum, we show that option traders display a capacity to both acquire and skillfully process information prior to split announcements. We also show that they are adept at analyzing public information after the announcement. Collectively, we document strong evidence of informed trading in options around split announcements.

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