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Volatility spreads and earnings announcement returns

Yigit Atilgan *

Finance at the School of Management, Sabanci University, Orhanli, Tuzla, 34956 İstanbul, Turkey

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ABSTRACT

Prior research documents that volatility spreads predict stock returns. If the trading activity of informed investors is an important driver of volatility spreads, then the predictability of stock returns should be more pronounced during major information events. This paper investigates whether the predictability of equity returns by volatility spreads is stronger during earnings announcements. Volatility spreads are measured by the implied volatility differences between pairs of strike price and expiration date matched put and call options and capture price pressures in the option market. During a two-day earnings announcement window, the abnormal returns to the quintile that includes stocks with relatively expensive call options is more than 1.5% greater than the abnormal returns to the quintile that includes stocks with relatively expensive put options. This result is robust after measuring volatility spreads in alternative ways and controlling for firm characteristics and lagged equity returns. The degree of announcement return predictability is stronger when volatility spreads are measured using more liquid options, the information environment is more asymmetric, and stock liquidity is low.

1. Introduction

Under standard option pricing models, an equity option's price is dictated by the price of the underlying stock. However, in incomplete markets, option prices may convey information about future stock returns if informed traders have a preference for the option market as a trading venue. Black (1975) suggests that the option market provides higher leverage for traders to exploit their private information. Option markets enhance the opportunities for taking short positions in response to bad news by limiting potential losses and investors who have private information about the volatility of the underlying equity prices can only use this information by trading options. Although there are conflicting findings in the early literature,[1] recent research presents empirical evidence that supports the conjecture that information is reflected in the option market before it is reflected in the stock market.[2]

This paper builds on prior research which finds that implied volatility spreads predict equity returns. The purpose of this study is focusing on an informationally intensive event such as the announcement of corporate earnings and investigating whether the predictability documented in the prior literature is due to informed trading. The main result is that stocks with higher (lower) put minus call implied volatility spreads before earnings announcements earn significantly negative (positive) abnormal returns during a two-day announcement window. This result cannot be solely explained by short sales restrictions. The degree of predictability is stronger under conditions when informed investors are more likely to trade in the option market.

The volatility spread between strike price and expiration date matched put and call options has been used to measure deviations from put-call parity by several studies.[3] Put-call parity is a simple no arbitrage relationship which hinges on the idea that the payoff of a stock can be synthetically replicated using call options, put options and bonds. Deviations from put-call parity do not always represent arbitrage opportunities since factors such as dividend payments, transaction costs and the early exercise premium for American options can cause call and put option prices to deviate from parity. A potential reason for these deviations is the trading activity of informed investors. Bollen and Whaley (2004) and

* Tel.: +90 (216) 483 9663.
E-mail address: yatilgan@sabanciuniv.edu

[1] Manaster and Rendleman (1982), Bhattacharya (1987), Anthony (1988) and Sheikh and Ronn (1994) provide evidence that option prices and trading volume contain information not reflected in contemporaneous stock prices. However, Vijh (1988), Stephan and Whaley (1990) and Finucane (1999) challenge these findings. Chan et al. (1993) and Diltz and Kim (1996) are studies that attempt to reconcile these conflicts.

[2] See Chan et al. (2002), Chakravarty et al. (2004), Chen et al. (2005), Cao et al. (2005), Pan and Poteshman (2006), Bali and Hovakimian (2009), Chang et al. (2009), Cremers and Weinbaum (2010), An et al. (2013) and Bali and Murray (2013).

[3] See Figlewski and Webb (1993), Amin et al. (2004), Ofek et al. (2004), Broadie et al. (2007) and Cremers and Weinbaum (2010).

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Garlenau et al. (2009) introduce demand-based option pricing models where the demand for an option affects its price. When the demand for a particular option contract is strong, competitive risk-averse option market makers cannot hedge their positions perfectly and they require a premium for taking this risk. In this type of equilibrium, one would expect a positive relationship between end-user demand and option expensiveness, which can be measured by implied volatility. If some investors have private information about future price increases (decreases), then they would demand more call (put) options which will increase the implied volatilities of call (put) options with respect to put (call) options. Therefore, the difference between put and call implied volatilities would increase (decrease) before stock price decreases (increases). Options on individual stocks are American and strict put-call parity relationships take the form of an inequality due to early exercise premia. Thus, in the spirit of demand-based option pricing models, volatility spreads are just a means of capturing relative price pressures in the option market.

If the trading activity of informed traders is an important driver of option market price pressures as measured by volatility spreads, then the predictability of stock returns by these spreads should be strongly pronounced during major information events such as earnings announcements.[4] When stocks are sorted based on their volatility spreads one trading day before earnings announcements, on average, the quintile that includes stocks with the smallest put minus call volatility spreads (relatively more expensive call options) earns a five-factor adjusted abnormal return of 44 basis points whereas the quintile that includes stocks with the largest volatility spreads (relatively more expensive put options) earns a five-factor adjusted abnormal return of −38 basis points during a two-day earnings announcement window. The abnormal return difference between these two extreme quintiles is 82 basis points and highly significant. When compared to the one-week hedge portfolio return of 20 basis points that Cremers and Weinbaum (2010) uncover using the same methodology, this finding is consistent with the idea that the predictability of stock returns by volatility spreads should be stronger during periods that are informationally intensive. This result cannot be solely explained by short sales restrictions since it is a symmetric result and the quintile that holds stocks with relatively high call implied volatilites earns a significantly positive abnormal return. If the volatility spreads could solely be explained by short sales restrictions,[5] one would expect the predictability to be concentrated on stocks with relatively high put implied volatilities.

The changes in the volatility spreads in the period preceeding the earnings announcements are also investigated because the volatility spreads could change as the option market participants anticipate the magnitude and direction of the announcement returns. When stocks are double-sorted with respect to their volatility spread levels one day before the earnings announcements and the changes in their volatility spreads during the pre-announcement week, the diagonal group of equities that holds stocks with relatively expensive calls (puts) earns an abnormal return of 78 (−89) basis points. The abnormal return difference between these two extreme equity groups is 166 basis points and highly significant. The results are qualitatively similar during both halves of the sample period which indicates that the degree of announcement return predictability has stayed strong over time.

Three sets of results are presented to argue that the return predictability during the earnings announcement period reflects informed trading. Easley et al. (1998) find equilibrium conditions under which informed traders will be pooled with liquidity traders in the option market. Their model implies that when the option market is more liquid, the stock market is less liquid and the information environment is more asymmetric, informed traders will be more inclined to exploit their private information in the option market. First, when implied volatility spreads are measured using only the most liquid option pairs, the degree of announcement return predictability is higher. Second, the announcement return predictability is stronger for stocks with higher PIN values, which is a proxy for the existence of asymmetric information for a particular stock. Third, stocks with higher illiquidity ratios exhibit stronger announcement return predictability.

Panel regressions reiterate the results from the quintile analysis. After controlling for lagged stock returns and various contemporaneous and lagged firm characteristics such as market beta, firm size, book-to-market ratio and skewness, there is a significantly negative relationship between the levels of and the changes in the volatility spreads before earnings announcements and the announcement returns. Regression analysis also confirm the finding that the significantly negative relationship between volatility spreads and earnings announcement returns is stronger for stocks whose liquidity is low and probability of informed trading is high.

The paper is organized as follows. Section 2 describes the empirical methodology and data. Section 3 presents the results for the quintile analysis. Section 4 presents panel regression results for robustness check. Section 5 concludes.

2. Methodology and data

2.1. Measuring volatility spreads

The Black and Scholes (1973) implied volatilities of put and call options with the same strike prices and expiration dates should be equal for European options. This study focuses on options written on individual stocks, which are American. These options can be exercised before their expiration dates, thus their prices should reflect an early exercise premium. However, the Black–Scholes implied volatility difference between matched pairs of put and call options, adjusted for early exercise premia and dividends, can still be used to proxy for price pressures in the option market. On a particular day, there may be multiple pairs of strike price and expiration date matched put and call options written on a given stock. To construct a single volatility spread measure for each stock in each trading day, the implied volatility differences between matched put and call options are weighted by the average open interest of the call and put options in each pair.[6] Options for which open interest is non-positive and trading volume is missing are eliminated.[7] One can formulate the weighted average volatility spread for stock i on day t as follows:

$$VS_{it} = \sum_{j=1}^{N_{it}} w_{jt}(IVput_{jt} - IVcall_{jt}) \quad (1)$$

where j refers to pairs of put and call options with the same strike price and expiration date written on stock i, N_{it} refers to the number

[4] See Patell and Wolfson (1979), Donders and Vorst (1996), Amin and Lee (1997), Xing et al. (2008), Isakov and Perignon (2001) and Diavatopoulos et al. (2012) for studies that investigate other aspects of option markets such as volatility smirks, trading volumes and implied higher order moments around earnings announcements.

[5] Ofek and Richardson (2003) and Ofek et al. (2004) find that deviations from put-call parity may occur when there are limits on arbitrage such as short sales restrictions.

[6] The results are robust to using the average volume of the call and put options in each pair is as the weighting variable.

[7] Adding additional screens to the option data does not alter the results. Results are qualitatively the same after eliminating stocks whose price is less than $5, keeping only the options whose implied volatility is between 3% and 200% and whose time to expiration is within 10–60 days and deleting options whose price (average of best bid and best ask) is less than $0.125.