



Retail clientele and option returns



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ABSTRACT

Does the retail clientele matter for option returns? By delta-hedging options and trading straddles, thus allowing a focus on volatility, this paper empirically shows that a higher retail trading proportion (RTP) is related to lower option returns. Long-short portfolios involving options on low and high RTP stocks generate significantly positive abnormal returns. The results suggest that retail investors speculate and pay a lottery premium on the expected future volatility, resulting in more expensive options with higher implied volatilities.

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1. Introduction

One salient feature of retail investors is their tendency to speculate and gamble by overpaying stocks with lottery features such as low prices, high idiosyncratic volatility, and high idiosyncratic skewness.¹ Moreover, the correlated trading decisions of retail investors are found to move stock prices unrelated to fundamentals.² Given that equity options are derivatives of the underlying stocks, whether option prices are also subject to the impact of retail investors' activities is an unaddressed issue in the literature. Very little research exists that examines how retail investors affect option prices via speculation on both price level and volatility, and in a broader sense, how behavioral factors play a role in option pricing.

This paper fills the gap by examining option expensiveness and the associated retail trading activities. It is motivated by the evidence in behavioral economics that risk-taking behaviors of individuals in different settings are linked together.³ In particular,

Kumar (2009) finds that state lotteries and lottery-type stocks attract clientele with similar socioeconomic characteristics. If retail traders are attracted to the stock market to satisfy their speculative appetite, it is likely that they also exhibit a similar behavior in the options market and participate in speculative option trading. Under the assumption that volatility is time-varying and stochastic, retail investors, when trading options for speculation purposes, may be betting on the stock price, the expected future volatility, or both. While it is possible that they use the leverage feature of options to bet on the stock price, the speculation on expected future volatility can only be done using options. Based on this conjecture, the current paper proposes that retail investors may be overpaying the volatility component of options, leading to overpricing of options with high retail trading activities.⁴

To separate the impacts of speculations on the stock price and volatility, besides trading straddles, this paper studies option returns and remove the stock price effect by delta-hedging, allowing a focus on the volatility effect. The presence of a lottery premium on volatility will result in lower delta-hedged and straddle returns among options with more retail trading activities.

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¹ Bauer et al. (2009), Kumar (2009), Green and Hwang (2012) and Han and Kumar (2013).

² For example, Hvidkjaer (2008), Barber et al. (2009), Taylor (2009), Kaniel et al. (2012), Han and Kumar (2013), Kumar et al. (2013).

³ For example, Barsky et al. (1997) show that the behavior of smoking, heavy drinking, not buying health insurance, and holding stocks can be predicted by constructing a risk-tolerance measure. Other papers include Horvath and Zuckerman (1993), Nicholson et al. (2005) and Grinblatt and Keloharju (2009).

⁴ While retail investors can also place a downward bet of volatility by writing options, they are likely limited by capital constraints due to margin requirements. In the U.S., according to the Chicago Board Options Exchange, for naked written call or put positions, initial margin includes all of the option proceeds and 20% of the value for the underlying securities, whereas for covered option positions, it includes 50% of the value for the underlying securities, and option proceeds in the case of puts.

To this end, this paper uses retail trading proportion (*RTP*) of stocks, defined as the proportion of trades with dollar volume less than \$5,000, to proxy retail trading activities in the options market, and verifies its accuracy with a dataset from the Chicago Board of Option Exchange (CBOE) that contains trader-type classifications. Option data spanning from January 1, 1996 to December 31, 2012 are retrieved from OptionMetrics.

Empirical analysis shows that a higher *RTP* is found to be related to lower future delta-hedged and straddle returns in the following month, and the phenomenon is more pronounced before earnings announcements. The results are consistent with the hypothesis that retail investors speculate and overpay the volatility components of options and the behavior is more pronounced before scheduled information events. In particular, one standard deviation increase of *RTP* results in approximately 17.8% lower annualized delta-hedged call returns. The delta-hedged call returns of a stock with average *RTP* are 24% lower when an earnings announcement is to occur in one week. This paper also finds lower delta-hedged returns and straddle returns for stocks with more time-varying and positively skewed volatility, providing further evidence of speculative behavior of retail investors and their paying a lottery premium on the volatility. Moreover, the negative *RTP* – option return relationship is robust to different holding periods of the option portfolios, sub-period analysis, alternative delta estimation procedures, and alternative definitions of retail trading activities. Some researchers suggest that volatility risk premium⁵ and jump risks can explain the significant non-zero delta-hedged returns. I show that the significant negative relation between delta-hedged returns and *RTP* remains even after controlling for volatility risk premium and jump risks. In addition, by forming a portfolio with long-short positions in options on low and high *RTP* stocks, I find significantly positive abnormal portfolio returns after controlling for standard asset pricing factors and the market volatility.

This paper contributes to the literature in several aspects. This is the first study to show that investor clientele does have an effect on option returns, and, in particular, retail investors exhibit behavioral bias in the options market by speculating on volatility. The study also sheds light on the broader issue of the speculative behavior of retail investors and motivates further research on the relationship between retail investors and higher moments of returns: some options are more expensive because the option price embeds a lottery premium on expected future volatility.

My paper is related to the literature on whether investors treat options as speculation tools. Hodges et al. (2008) find that returns on index options exhibit a similar pattern to the favorite/long-shot bias in the horse racing market: overpaying of bets on horses that have a low probability to win. This kind of return pattern may attract investors to use options for gambling. However, the empirical evidence on whether investors overpay options for speculative purposes is still mixed. For example, Bauer et al. (2009) document that individual investors in the Netherlands suffer substantial losses in option trading. While Ni (2009) finds that out-of-the-money calls have negative average returns, which may be the result of investors' skewness-seeking behavior, Chaudhuri and Schroder (2013) do not find such results under a different sorting methodology.

This study also contributes to the growing literature on the anomalies in the options market. For example, Stein (1989) and Poteshman (2001) find that there are misreactions of investors to changes in volatility in index options although Cao et al. (2005)

find that such misreactions are economically insignificant in the presence of transaction costs. Several recent papers document anomalies in equity options along the following dimensions: options being more expensive on small and value stocks versus large and growth stocks (Pietro and Vainberg, 2006), lower delta-hedged returns when the implied volatility is higher than the historical realized volatility (Goyal and Saretto, 2009), out-of-the-money call option returns too low (Ni, 2009), lower delta-hedged returns over the weekend (Jones and Shemesh, 2010), and slopes of implied volatility smiles varying with speculative demands and investor sentiments (Lemmon and Ni, 2014). Garleanu et al. (2009) show that end-user demands can affect option prices and explain options' expensiveness. However, the above papers on options do not look into the retail clientele, and in particular very little research examines whether retail investors exhibit speculative behavior in the options market and, if they do speculate, how they affect option returns.

The paper is organized as follows. Hypotheses are developed in Section 2. Section 3 is devoted to data description, variable definitions, and summary statistics. Section 4 presents empirical results regarding option returns and retail trading. Section 5 conducts a number of robustness checks. Section 6 concludes.

2. Hypothesis development

Kumar (2009) provides evidence that individual investors prefer stocks with lottery features, such as low price, high idiosyncratic volatility, and high idiosyncratic skewness. Moreover, Bauer et al. (2009) show that individual option traders in the Netherlands incur substantial losses. However, it is not clear whether the loss is due to incorrect inference on the price of the underlying stocks or overpaying for the volatility.

If retail investors speculate in the options market, they may bet on the price of the underlying stock, the expected future volatility, or both. While the leverage feature of options may facilitate their bet on the stock price, speculation on the volatility can only be done using options. Since speculative activities are shown to be associated with a premium in the case of stocks, I conjecture that such premium also exists in the options market and it arises from volatility speculation. I therefore hypothesize that options with higher retail trading activities are overpriced as retail investors pay a premium on the volatility component of options.

To separate the effect of retail clientele speculations on the stock price versus expected future volatility, I focus on delta-hedged and straddle returns. Delta-hedging the option position removes the component of option returns that is directly from stock price movement and allows me to isolate the portion of option returns related to volatility. Therefore, even if retail investors are paying a lottery premium on the underlying stock, it will be removed through delta-hedging and the presence of a lottery premium on volatility will still result in lower delta-hedged returns. For straddles, it is intuitive that they are overpriced if retail investors pay more on the volatility components of options. The above discussion leads to the following hypothesis:

(H1) A higher retail trading proportion is related to lower delta-hedged returns and straddle returns.

During an earnings announcement, the release of earnings figures and other firm information will induce increased stock price fluctuations which in turn attract retail investors. Mahani and Poteshman (2008) show that retail investors load up option positions on growth stocks relative to value stocks before earnings announcements. Choy and Wei (2012) also show heightened option trading activities before earnings announcements, and the increase in trading

⁵ The term "volatility risk premium" has been used in the literature in two related contexts. In the first instance, it refers to the market price of risk for volatility which is shown to be negative, at least for indices; in the second, it refers to the difference between the realized and risk-neutral volatilities, which is a reflection of the risk premium in the stochastic volatility. In this paper, the term is used in both senses.

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