



Short-sale constraints and the idiosyncratic volatility puzzle: An event study approach[☆]



Danling Jiang^{a,*}, David R. Peterson^{a,1}, James S. Doran^b

^a College of Business, Florida State University, United States

^b Implied Capital Advisors, United States

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ABSTRACT

Using three natural experiments, we test the hypothesis that investor overconfidence produces overpricing of high idiosyncratic volatility stocks in the presence of binding short-sale constraints. We study three events: IPO lockup expirations, option introductions, and the 2008 short-sale ban on financial firms. Consistent with our prediction, we show that when short-sale constraints are relaxed, event stocks with high idiosyncratic volatility tend to experience greater price reductions, as well as larger increases in trading volume and short interest, than those with low idiosyncratic volatility. These results hold when we benchmark event stocks with non-event stocks with comparable idiosyncratic volatility. Overall, our findings suggest that biased investor beliefs and binding short-sale constraints contribute to idiosyncratic volatility overpricing.

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1. Introduction

Ang et al. (2006) show that high idiosyncratic volatility stocks earn abysmal expected returns. This empirical finding has spawned a large strand of empirical work that tries to dispute (Bali and Cakici, 2008; Fu, 2009; Huang et al., 2010), explain (Jiang et al., 2009; Han and Kumar, 2013), or extend (Peterson and Smedema, 2011; Doran et al., 2012) this return phenomenon. A negative relation between idiosyncratic volatility and expected returns is difficult to reconcile within a rational framework. In the rationality-based models, idiosyncratic volatility should be either irrelevant or positively related to expected stock returns (Lehmann, 1990; Merton, 1987; Sharpe, 1964).

Overpricing of high idiosyncratic volatility, however, can arise under a setting with both overconfident trading and short-sale constraints. Consider the theoretical model of Daniel et al. (1998) and Scheinkman and Xiong (2003), in which overconfident trading generates excess volatility in stock prices. When short-sale constraints are binding, overpricing arises due to insufficient arbitrage to eliminate over-optimism (Chen et al., 2002; Miller, 1977). Consistent with this explanation, empirical

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* Corresponding author. Tel.: +1 850 645 1519.

E-mail addresses: djiang@cob.fsu.edu (D. Jiang), dpeterson@cob.fsu.edu (D.R. Peterson). URL's: <http://mailer.fsu.edu/~djiang/> (D. Jiang), <http://www.cob.fsu.edu/fin/vita/dpeterson.pdf> (D.R. Peterson).

¹ Tel.: +1 850 644 8200.

evidence shows that the time-variation in aggregate idiosyncratic volatility is related to retail investor trading in low-price stocks (Brandt et al., 2010), and the negative relation between idiosyncratic volatility and stock return relation exists primarily among firms with large proportions of retail trading (Han and Kumar, 2013). In other words, overconfident trading of retail investors is shown to be one key element to producing volatility mispricing. There is, however, little direct evidence showing that the short-sale constraint serves as the other key element.²

In this paper, we provide both theoretical motivation and empirical evidence that short-sale constraints are important for understanding the negative relation between idiosyncratic volatility and expected stock returns. The key innovation in our model and empirical design is the use of shocks that either mitigate or tighten short-sale constraints. For at least two reasons, this identification strategy is superior to an alternative approach that studies the volatility–return relation conditional on proxies for short-sale constraints. First, many existing proxies of short-sale constraints, such as short interest and loan fees, capture not only the supply-side constraints but also the shorting demand (Cohen et al., 2007), making it difficult to disentangle the pure effect of short-sale constraints from the effect of high shorting demand owing to greater initial overpricing. Second, an event-study approach allows us to measure the price reduction effect over a relatively short window caused by the new short sales under relaxed constraints, while keeping investor overconfident expectations largely fixed. Thus, the event-based identification strategy provides a cleaner test of the effect of short-sale constraints in volatility mispricing.

Our theoretical framework integrates the main features in prior models of Daniel et al. (2001) and Hong et al. (2006). In our model, risk averse overconfident investors and rational arbitrageurs trade against each other after receiving private signals about asset expected cash flows. Overpricing is generated in states when overconfident investors hold overly optimistic beliefs upon favorable signals, and rational arbitrageurs are unable to short against mispricing due to short-sale restrictions. Next, we assume that an unexpected lifting of short-sale constraints occurs to these overpriced stocks. Arbitrageurs then start to increase their short positions up to an optimal amount that is determined both by the degree of prior overpricing and the risk of arbitrage stemming from volatility in underlying cash flows. The price change from binding to lifted short-sale constraints therefore measures the price correction owing to the new short sales.

We further show that when variation in the initial overpricing is primarily driven by the variation in the degree of overconfident beliefs, there is a larger price correction, higher trading volume, and greater short sales when idiosyncratic volatility is high than when it is low. In other words, in our framework high idiosyncratic volatility represents high arbitrage profits, thus attracting more short sales to correct the overpricing. This setup contrasts with two alternatives. In one, short-sale constraints are not binding prior to the event, in which case there will be no price reaction to relaxation of the constraints. In the other, the variation in the initial overpricing is primarily driven by the variation in the risk of arbitrage caused by cash flow volatility, in which case there will be a smaller negative price reaction among high idiosyncratic volatility stocks since, now, high volatility primarily represents arbitrage costs. Thus, our test design uniquely identifies the joint role of overconfident trading and short-sale constraints in determining idiosyncratic volatility overpricing.

Our empirical tests utilize three natural experiments involving shocks to short-sale constraints: the expiration of the IPO lockup period, the introduction of tradable options, and the imposition and expiration of explicit bans on short sales of financial firms in the fall of 2008. Upon the IPO lockup expiration, insiders are allowed to sell the locked-up shares, increasing both floats and lendable shares to short sellers and effectively relaxing the (short) sale constraints (Duffie et al., 2002; Hong et al., 2006; Ofek and Richardson, 2003). Upon the introduction of tradable options, investors who before faced difficulty selling short underlying stocks can now sell short synthetically through the options market (Danielsen and Sorescu, 2001; Figlewski and Webb, 1993). This passes short sales to market makers who will hedge their positions by selling short the underlying security, usually at a lower cost (Evans et al., 2009), and hence mitigates short-sale constraints. Finally, the short-sale ban imposes direct and stringent restrictions on short sales, and the expiration of the ban removes these restrictions. Therefore, the three events represent shocks that vary short-sale constraints, but keep overconfident beliefs largely intact. This facilitates the study of price corrections of stocks with different idiosyncratic volatilities owing to changed short selling.

Our empirical evidence supports our hypothesis that overconfident trading and short-sale constraints jointly produce idiosyncratic volatility overpricing. We focus on the price, volume, and short interest changes across quintiles of event stocks sorted on idiosyncratic volatility, as compared to matching non-event stocks based on firm size, idiosyncratic volatility, and illiquidity. For price reaction, we compare the cumulative abnormal returns (CARs) of the high-minus-low (H – L) quintiles of idiosyncratic volatility of event firms with those of matching firms. Over the period 1988–2012, we show that a typical IPO experiences a significant price reduction surrounding lockup expiration and, furthermore, those in the highest idiosyncratic volatility quintile experience significant 2%–12% more negative market reactions than stocks in the lowest quintile, as compared to matching firms. This return differential is qualitatively similar and quantitatively larger among stocks with tradable options newly introduced from 1996 to 2012. We further confirm the findings using firm-level Fama and MacBeth (1973) regressions, which show that the interaction term between idiosyncratic volatility and the dummy variable for lockup expiration or option introduction is significantly negative, with controls for a host of firm characteristics and industry fixed effects. These results suggest a greater price correction among high

² Boehme et al. (2009) study the relation between idiosyncratic volatility and stock returns conditional on proxies for short-sale constraints. However, they do not find a significantly negative relation among highly shorted, low institutional ownership firms. Duan et al. (2009) study idiosyncratic volatility as a measure of limits of arbitrage and find that overpricing of stocks with high short interest occurs only when idiosyncratic volatility is high. Neither of the two provides direct evidence that short-sale constraints contribute to the phenomenon that high idiosyncratic volatility stocks earn abysmal low returns.

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