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Market volatility and stock returns: The role of liquidity providers ☆

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ABSTRACT

This study shows that market volatility affects stock returns both directly and indirectly through its impact on liquidity provision. The negative relation between market volatility and stock returns arises not only from greater risk premiums but also greater illiquidity premiums that are associated with higher market volatility. Consistent with our expectation, we also find that stock returns are more sensitive to volatility shocks in the high-frequency trading era, and after the regulatory changes in the U.S. markets that increased competition between public traders and market makers, reduced the tick size, and decreased the role of market makers.

1. Introduction

Market volatility, liquidity, and stock returns are all variables of significant interest to financial economists, market regulators, and investors.[1] However, why and how these variables are interrelated has not been fully understood. For example, the literature provides little guidance as to *why* the returns of certain securities are more sensitive to volatility shocks

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[1] These variables are of particular interest to market participants in times of high uncertainty; for example, during the 2007–2009 financial crisis and the 2010 Flash Crash when market volatility exploded, liquidity disappeared, and share prices plummeted. Prior research attributes disappearing liquidity during financial crises to at least two factors. Gorton and Metrick (2010) suggest that liquidity is lower during financial crises because they aggravate adverse selection problems. Nagel (2012) suggests an alternative explanation. He shows that financially-constrained liquidity providers reduce the supply of liquidity during times of market turmoil because they require higher returns during such periods.

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than the returns of other securities. In addition, no previous study explicitly considers the role of liquidity providers in the analysis of the relation between market volatility and stock returns. As a result, prior research attributes the negative relation between market volatility and market returns primarily to greater risk premiums that are associated with higher market volatility.[2]

In this study, we shed additional light on the relation between market volatility and stock returns by examining the cross-section of stock returns that result from volatility shocks using the Chicago Board Options Exchange Market Volatility Index (VIX).[3] Our study shows that the negative relation between market volatility and stock returns arises not only from greater risk premiums but also greater illiquidity premiums that are associated with higher market volatility. We also provide estimates of the direct effect of volatility shock on stock returns, which is driven by greater risk premiums, and the indirect effect of volatility shock on stock returns, which is driven by greater illiquidity premiums associated with higher market volatility.

Ang et al. (2006) analyze the pricing of aggregate volatility risk (e.g., whether stocks with high return sensitivities to changes in market volatility have higher or lower expected returns than stocks with low return sensitivities). In contrast, we examine why some stocks have higher return sensitivities to changes in market volatility than other stocks. Our study also differs from Bali et al. (2014) in that we underscore an important channel (i.e., liquidity) through which market volatility affects stock returns, while they focus primarily on the effect of liquidity shocks on stock returns without considering the role of market volatility.

We show that unexpected increases (decreases) in market volatility accompany decreases (increases) in both the liquidity and returns of individual stocks after controlling for the effect of idiosyncratic volatilities of individual securities on returns. We measure liquidity shocks by unexpected changes in the bid-ask spread and Amihud's illiquidity measure. More importantly, we also show that the decreases (increases) in individual stock returns associated with increases (decreases) in market volatility are larger for stocks with greater concurrent liquidity shocks.[4] On the whole, our results underscore the important role of liquidity providers in the analysis of the effect of market volatility on individual stock returns.

Chung and Chuwonganant (2014) show that the uncertainty elasticity of liquidity (i.e., percentage change in liquidity given a 1% change in VIX) increased significantly around regulatory changes in the U.S. markets that increased competition between public traders and market makers, reduced the tick size, and decreased or eliminated the role of NASDAQ dealers and NYSE specialists in the price discovery process. We show that the effect of market volatility on individual stock returns has increased in a similar fashion following these regulatory changes. These results support the idea that a direct reflection of expected volatility in prices and quotes, without filtering by market intermediaries, may increase the effect of market volatility on returns. In addition, we show that the sensitivity of stock returns to market volatility in the high-frequency trading era is significantly higher than that in the pre high-frequency trading period.

Our study contributes to the literature by providing an integrated analysis of market volatility, liquidity, and stock returns. Some prior studies relate market volatility to stock returns without an explicit recognition of the role of liquidity providers (e.g., French et al., 1987). Other studies relate liquidity shocks to stock returns without considering how volatility shocks could affect both liquidity and stock returns (e.g., Bali et al., 2014). Our study helps better understand the effect of market volatility on stock returns by underscoring the concurrent effect of market volatility on stock liquidity and showing how the latter effect (through illiquidity premiums) could magnify the effect of market volatility on stock returns.

Many prior studies have documented the positive ramifications of the four regulatory changes analyzed in Chung and Chuwonganant (2014) for market quality. Our study suggests another possible ramification of these rule changes that has not been addressed in the literature: the higher sensitivity of stock returns to market volatility after these rule changes may imply a market-wide increase in the equity investment risk and risk premiums. A number of recent papers show that high-frequency trading has generally improved liquidity and lowered trading costs.[5] Our finding of a greater effect of volatility shocks on stock returns in the high-frequency trading era suggests that high-frequency trading may have also increased the aggregate equity investment risk and risk premiums.

2. Data sources, variable measurement, and descriptive statistics

Our study sample consists of NYSE, AMEX, and NASDAQ stocks from January 1990 to December 2012. We obtain daily and monthly stock returns, trading volume, and the number of shares outstanding from the Center for Research in Security Prices (CRSP). We retrieve the book value of equity from the Compustat database and analyst coverage data from the

[2] French et al. (1987) first show that unexpected market returns are negatively related to unexpected increases in market volatility, and interpret the negative relation as indirect evidence of a positive relation between expected risk premiums and volatility. In a similar vein, Haugen et al. (1991) show that increases in market volatility are associated with a significant subsequent decline in stock prices and higher future returns.

[3] A number of studies have employed VIX as a measure of market volatility (e.g., Bao et al., 2008; Pan and Singleton, 2008; Graham and Harvey, 2010; Longstaff et al., 2010; Nagel, 2012).

[4] The negative relation between volatility shocks and stock returns is consistent with the positive relation between expected risk premiums and volatility (French et al., 1987). The positive relation between liquidity shocks and stock returns is consistent with the positive relation between expected returns and illiquidity (i.e., investors demand a premium for less liquid stocks) (Amihud and Mendelson, 1986).

[5] See O'Hara (2015) for an excellent review of this literature and other related issues.

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