The Effect of Price Limits on Liquidity Provision

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Abstract

I examine the extent to which a recent change in the equity market structure, the introduction of price limits under the Limit Up Limit Down (LULD) Plan, affects the liquidity provision in the market. The LULD mechanism was designed to address extraordinary market volatility, and it replaced the single-stock circuit breakers (SSCB). My approach consists of comparing the effects of the LULD and SSCB mechanisms on liquidity provision using a difference-in-differences framework, which allows me to control for other confounding factors that might influence liquidity in the market. Part of the exercise focuses on studying the effects of price limits on the liquidity provision around the opening. The results of this study can help us understand the impact of the new market structure design on market quality.

Data and Methodology

The LULD Plan provides market-wide, single-stock price bands that are designed to guard against extraordinary volatility in individual NMS securities, which can undermine the integrity of the securities market. Extraordinary volatility represents episodes of significant fluctuations in individual securities' prices over short periods of time, such as those recorded during the Flash Crash of May 6, 2010. The Plan is a more finely calibrated mechanism than the single stock circuit breakers SSCB rules, and was intended as a replacement for them. The SSCB pilot program was an earlier attempt to address extraordinary volatility and was implemented through a series of rule filings by the exchanges and the Financial Industry Regulatory Authority, Inc. (FINRA).

The most recent Amendment to the LULD Plan recommends that the Securities and Exchange Commission (SEC) transitions the LULD Plan from operating as a pilot to a permanent basis. It is therefore crucial at this point in time to quantify the effect of price limits on the liquidity provision in the U.S. equity market.

For my analyses, I will use two sources of publicly available data. The primary source for intraday trading activity is the NYSE TAQ database, which is very large (approximately 50GB per day). The secondary source is CRSP, which provides daily and monthly trading volume and trading price data. I will use either R or SAS for the computing language.

My analyses will span different time periods. First, I will cover the two time periods during which the LULD was fully implemented, namely Phase I (June 3 – August 2, 2013) and Phase II (May 12 – August 29, 2014). During Phase I, LULD applied only from 9:45am to 3:30pm and only to Tier 1 securities. Phase II applied LULD to all securities (Tier 1 and Tier 2) and extended its application to the full day. For comparison purposes, I will also employ data recorded during periods that represent different rule regimes (prior to the implementation of the LULD): Pre-SSCB (January 4 – May 6, 2010) and SSCB (December 3, 2012 – April 5, 2013). For the Pre-SSCB period, I will report results both with and without the Flash Crash day of May 6, 2010, as this may be an outlier data point in some analyses.

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My approach will consist of a difference-in-differences exercise meant to capture the effect of price limits on the liquidity provision. For this exercise I will use the fact that the Plan was first implemented only in larger, more liquid securities (Tier 1), and later in all other NMS securities (Tier 2).

Related Academic Research

Academics have studied changes in market quality metrics resulting from the introduction of circuit breakers and price limits - mechanisms designed to address unwarranted large fluctuations in prices that could lead to increased uncertainty in securities valuation. Harris (1997) states that, while circuit breakers will slow price changes related to fundamentals (i.e., they will decrease fundamental volatility), their effect on transitory volatility (which is related to liquidity) is uncertain. On one hand, circuit breakers may decrease transitory volatility by restraining the trading of uninformed traders and bluffers. On the other hand, circuit breakers may increase transitory volatility by restraining the trading of informed speculators, dealers, and arbitrageurs. Ackert, Church, and Jayaraman (2001) find that a circuit breaker rule has the unintended consequence of accelerating trade, while the price discovery process is not affected. Goldstein and Kavajecz (2004) study a single instance of an activation of a circuit breaker in 1997 and find that liquidity was present in the limit order book up to the trading pause but that this liquidity was removed after the initiation of the pause. They conclude that, as the probability of a market-wide circuit breaker increased, market participants accelerated their activity, which is consistent with the "magnet effect" suggested by Subrahmanyam (1994).

As for the price limits, using data from both U.S. and international markets, the academic literature has not reached a consensus on their effectiveness. Some studies argue that price limits can moderate excessive volatility and mitigate panic behavior. Chowdhry and Nanda (1998) argue that price limits might enhance market stability by eliminating potentially destabilizing market prices. Kim and Park (2010) derive a model where price limits may deter stock market manipulators, and they present empirical evidence consistent with their model. Meanwhile, using data from the Kuala Lumpur Stock Exchange, Chan, Kim, and Rhee (2005) find that price limits on individual securities impose serious costs even when the limit band is as wide as 30%, such as a delay in the arrival of informed traders and an exacerbation in order imbalances. Draus and van Achter (2016) argue that both U.S. and China have experienced market runs due to badly calibrated circuit breakers. The authors argue that price-triggered mechanisms such as circuit breakers cannot distinguish the source of excessive selling volume, and therefore, they might in fact restrain legitimate liquidity demand in the market.

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