Regulatory Risk Containment Measures on Single Stock Derivatives

An Impact Assessment

LATHA CHARI, PRADIPTARATHI PANDA, C K G NAIR

Significant additional risk containment measures such as the revision of market-wide position limits, increasing the margin requirements for both equity cash and derivatives, and flexing of price bands were imposed by the Securities and Exchange Board of India in the Indian securities markets in March 2020. The objective was to curtail volatility, ensure orderly trading, improve risk management and price discovery, and help maintain market integrity. This study concentrates on assessing the ban on trading in single stock derivatives arising from the downward revision of MWPLs on liquidity and volatility. Liquidity measures used for the study are the Amihud illiquidity ratio and turnover ratio, and volatility is measured using the Yang–Zhang and Rogers, Satchell, and Yoon models. The result of the study shows that the imposition of the ban results in the reduction of volatility and liquidity during the ban period across the sample set of stocks.

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Latha Chari (*latha.chari@nism.ac.in*) is a professor, Pradiptarathi Panda (*pradiptarathi.panda@nism.ac.in*) is an assistant professor and C K G Nair (*director@nism.ac.in*) is a director at the National Institute of Securities Markets, Maharashtra.

Financial instruments serve the twin purpose of investment and hedging to maximise wealth and manage risks, respectively. Instruments like equity, bonds, and mutual fund units are designed to serve the purpose of wealth creation. Derivatives are primarily for managing risks. Based on the general structure and covenant, equities are riskier as compared to bonds. Similarly, a derivative instrument can be used for hedging or speculation (profit motive) based on user preferences. Thus, all financial instruments not only provide returns but also carry significant risks. Financial consumers seek ways to minimise the risks associated with the financial instruments and maximise the return through portfolio diversification (Markowitz 1952) and by using derivatives.

Derivatives are financial instruments that derive their value based on the value of underlying assets. Derivative instruments primarily serve the purpose of cost-effective hedging. Producers and consumers of different commodities transfer price risk associated with the underlying commodity or stock to a large group of speculators who are willing to shoulder such risks. Thus, derivatives serve a very important purpose in the economy. Derivatives can be over-the-counter (OTC) or exchange-traded contracts. Forwards and swaps are OTC products, while futures and options are exchange-traded products. The first futures contracts were traded in Japan around 1650, and the first derivative on financial assets was traded in currencies at the Chicago Mercantile Exchange in 1972. The first options contracts started trading at the Chicago Board Options Exchange (CBOE) in 1973, after the introduction of option pricing model by Black and Scholes (1973).

India was a pioneer in the field as the first futures contract in cotton was introduced for trading by the Bombay Cotton Trade Association in 1875. Over a period, this market flourished and futures contracts were established in other commodities like oilseeds, jute, jute goods, bullion, and a host of other food commodities like pulses, etc, which were actively traded as OTC contracts. In 1953, the Forward Markets Commission was established under the Forward Contracts (Regulation) Act, 1952 to supervise and regulate the forward market in commodities. However, in the 1950s, India was facing food shortage. This combined with the absence of proper regulation and settlement system in these markets, led the government to believe that excessive speculation in derivatives was causing spiralling food prices. Hence, trading in futures and options in most of the commodities was banned. However, on account of the increased use of such products globally, driven by the need for hedging against the growing price risk in a liberalised domestic economic environment, commodity futures contracts were reintroduced in select commodities since the early 1990s.

In parallel, the L C Gupta Committee appointed by the SEBI in 1997 recommended a regulatory framework for exchange-traded derivatives, although focusing mainly on equity derivatives. J R Varma Committee (1998) fine-tuned the risk containment measures for the derivatives markets providing the operational details of the system, margining methodology, net worth requirement for brokers, requirement of deposit and monitoring of the market on a real-time basis, etc. In 1999, the Securities Contracts (Regulation) Act (SCRA), 1956, was amended to include derivatives under the definition of "securities." Exchange-traded derivatives contracts, which incorporated the stated risk containment measures, were introduced for trading in India with Index Futures in June 2000, followed by index options in June 2001, stock options in July 2001, and stock futures in November 2001. Trading in currency derivatives commenced in 2008. Panda and Thiripalraju (2015) chart the rise and fall of interest rate derivatives as the product failed in three launches in 2003, 2009, and 2012. Its reintroduction, the fourth time in 2014 turned out to be a bit lucky, though it could not yet muster liquidity as expected.

Currently, the Indian stock exchanges are among the top exchanges in the world measured in terms of volume and the number of securities traded in both equity cash and derivative segments. The National Stock Exchange of India (NSE) is the largest derivatives exchange in terms of the number of contracts traded with 8,850 million contracts traded in 2020. It ranks fourth in stock futures (256 million contracts traded), seventh in single stock options (272 million contracts traded), eighth in stock index futures (131 million contracts traded), and first in stock index options (6,668 million contracts traded) as per the NSE (2021).

Despite the substantial growth in derivatives market and the stringent regulatory and disclosures requirement laid out for the segment, it is perceived that financial derivatives continue to pose significant risks to both users and institutions facilitating their trades and clearing. Factors like adverse correlated movements in underlying assets, combined with transaction size that are disproportionately large, high concentration of financial obligations among a few players have the potential to trigger multiple obligations at the same time. Such triggers can result in systemic default and failures that can destabilise large institutions in very short periods (Brunnermeier et al 2009). Regulatory risk containment measures are therefore important to ensure the smooth functioning of these markets. Risk containment measures like position limits, price limits, market-wide circuit breakers, margins, etc, are, however, often opposed by some economists who argue that these measures restrict liquidity, price discovery, and adversely affect market efficiency. Several studies have looked at the impact of some of these measures on trading activity. Chari et al (2017) examined the impact of market-wide circuit breakers on liquidity and volatility and find that the restrictive measures by the securities market regulator help to curb volatility and increase liquidity. Nair (2012) dwells on the need for financial sector reforms with the advent of growth in financial instruments and markets. The study elaborated on the current status of the financial regulatory environment in India and the need to minimise the pains and maximise the opportunities through an effective and responsive regulatory–institutional architecture.

Market-wide Position Limits: Rationale and Regulation

Market-wide position limit (MWPL) is defined as the maximum number of open positions allowed to be held in the derivative segment (that is, the futures and options contracts) of stock across all exchanges on any trading day. It is a popular restrictive trading mechanism aimed at preventing excessive speculation in the derivatives market. The SEBI has been using MWPL as a regulatory tool since 2004, a few years after the introduction of futures and options (F&O) contracts in the Indian securities markets.

The MWPL for single stock derivatives is calculated as lower of the following measures:

(i) Thirty times the average number of shares traded daily, during the previous calendar month, in the relevant underlying security in the underlying segment, or

(ii) Twenty percent of the number of free-float holding, that is, the number of shares held by non-promoters in the relevant underlying security.

When the combined open interest in derivatives position breaches the above-prescribed limits, the stock is included in the F&O ban list by the stock exchange. This implies that the clients and the trading members are not allowed to take any fresh positions in the derivatives segment in that stock. They can only close out the existing position by taking reverse or offsetting positions. The regulation also provides for penal and disciplinary action from the stock exchange/clearing corporation, if anyone takes fresh position of a security that is under such a ban. A stock will be allowed to exit the F&O ban when the combined open interest in it falls to 80% of the MWPL.

The rationale for the introduction of MWPL and futures and options and ban based on the ensuing triggers is based on what is popularly known as "Masters Hypothesis" (Irwin 2013). The Masters Hypothesis argues that excessive speculation causes undesirable gyrations in prices and price bubbles in the futures market. These, in turn, get transmitted to the spot market prices through arbitrage linkages between spot and future market prices, thereby effectively distorting spot market prices (Master and White 2008). Additionally, proponents in favour of position limits argue that excessive speculation and large size of clients or member holdings have the potential to distort prices when such positions are created. Further, closer to the expiry date, large positions can impact settlement prices and accentuate settlement risks for both cash-settled and physically settled contracts. Other implications are in terms of increased capital costs, high volatility, the creation of artificial prices, and loss of confidence in the markets. The MWPL regulation attempts to control "excessive speculation" by limiting the size of holdings, which by itself limits the potential for excess profits and may act as a disincentive to resort to market abuse. The regulation intends to curtail volatility, ensure orderly trading, improve risk management, and maintain market integrity by limiting such excessive speculation.

In March 2020, the outbreak of the COVID-19 pandemic created unprecedented risks to financial markets across the globe, with increased volatility across all markets. The volatility measure, India volatility index (VIX), rose to a high of about 86, with a monthly average of 64 in March 2020. The comparable previous average levels were around 23. Various countries responded to the challenge with different risk containment measures to protect the market from systemic risks as well as to maintain investor confidence in the market. The SEBI also initiated significant risk containment measures that included revision of MWPLs, increasing the margin requirement for both equity cash segment and derivatives, and flexing of price bands after a cooling period of 15 minutes through a circular/press release issued on 20 March 2020, which came into effect from 23 March 2020.

As per the above circular, the MWPL was reduced to 50% of the existing levels. The conditions of this circular were applied on stocks that already had higher open positions or volatility in the previous five trading days. Stocks with high–low price variations of more than 15% were included as more volatile. Also, stocks with average MWPL of more than 40% were shortlisted for futures and options ban. Stocks whose combined MWPL crossed 95% of the revised limits came under futures and options ban from 23 March 2020. The penalty amounts for non-compliance were enhanced 10 times the minimum amount specified in the old circular and five times the maximum amounts to deter any violation of the revised rules. Additionally, the cash market margin on the stocks that come under futures and options ban was increased to a minimum of 20% with effect from 23 March 2020 and then progressively increased to 30% and 40% with effect from 26 and 30 March 2020, respectively. It was expected that these revisions in the position limits, the additional margin requirements, and the penal provisions together would put trading activities under severe constraints. The regulatory expectation was that such rigorous constraints would apply strong brakes on excess speculation and help reduce stock price volatility and protect the market from systemic risk.

Motivation for the Study

A journey through the market regulatory history would show that restrictive position limits, increase in margins, and, at times, the outright ban on trading (mostly for commodity derivatives) are common tools used by market regulators to counter excessive speculation and volatility in the markets. They use varying permutations and combinations of these tools based on their own assessment of the magnitude of the problem. Such regulatory actions are based on the "speculative bubble theory," which holds that irrational speculation is instrumental in moving asset prices away from their fundamental, intrinsic value and creating potential risks to orderly trading and settlement in the market. The study by Wei (2015), however, concludes that an increase in the position limit helps to improve market quality. They also add that market quality improvement is possible only when the position limit is at optimal level. Chang et al (2013) conclude that speculators contribute to the liquidity and price discovery positively. Dutt (2005) proposes that position limits should be tailored to contract specifications and various market forces that determine the demand and supply of the commodity. Kyle (1989) and Kumar and Seppi (1992) argue that position limits help in controlling market manipulations.

However, the effectiveness of such measures is questioned by a number of other researchers. First, there is no empirical, research-based evidence to prove that excessive speculation results in high volatility (Yang and Zhang 2000). Principal arguments against the application of position limits are centred around the reduction in liquidity in the derivatives segment and consequent mispricing and losses to investors (Gastineau 1992). This study further argues that market position limits are ineffective in controlling market manipulation. Sanders (2016) concludes that new limits on speculation in agricultural futures markets are unnecessary. Further, it is also argued that the participants may shift to venues where there is no regulation or only light-touch regulation and that can also result in loss of revenue to the exchanges.

Most of the studies deal with commodity and currency markets. A report by the European Securities and Markets Authority (ESMA 2020), on the review of position limits and position management, concludes that

> position limits are a means to address the potential for large positions in commodity futures and options markets to prejudice orderly market functioning. This is because the capacity of a market to absorb the establishment and liquidation of large positions in an orderly manner is related to the size of such positions relative to the market.

The report further adds that "improperly calibrated position limits may potentially impact the interaction between supply and demand and thereby, affect price discovery." Given this context, this study aims at measuring the impact of revision in margins and MWPLs on stock prices, volatility, and liquidity in both cash and futures and options markets. The outcomes of the study may serve as a valuable feedback to regulators and market participants.

A look at the above arguments on position limit as a regulatory tool opens up sharp and contrasting views amongst researchers and between researchers and market regulatory authorities. The researchers' divergence is conditioned by the degree of their faith in the market as an efficient mechanism for determining price. While some of them support limited application of regulatory tools to restrict excess speculation, some others, with their absolute faith in efficient markets, argue for no such limits since such tools would interfere with discovering the "right prices," which is an end in itself irrespective of the level or social impact. Regulation-induced distortions on the market, according to them, yield only inferior outcomes. Further, it is important to note that position limit as a regulatory tool had been mainly used in the commodity derivatives markets to avoid squeezes and corners, thereby leading to shortages of commodities that are directly detrimental to the commodity ecosystem, including the producers, consumers, exporters, and so on. However, such tools became handy later on for regulating financial derivatives as well, following the regulatory principle of equivalence; regulatory treatment of similar products.

Conduct regulators are in an unenviable position. Irrespective of any underlying philosophy, they have to ward off market mishaps arising from excess speculation and bubbles, protect investors, and promote market integrity. They also have to be seen as doing something to prevent any market mishaps as regulators cannot afford to "fail." Expectations from these relatively new form of governance agencies, as delegated arms of the state, are high and their perceived failure would impact the market quite adversely (Braun and Gilardi 2006). Everyone wants a regulator to forestall or manage crises, though most hate them during normal times. In that sense, regulators are extended arms of the state and therefore become an at-times needed organ of a "necessary evil." Hence, their preference for an active tool kit on position limits, margin calls and penalties, etc, to keep the markets on track. An analysis based on the actual data can therefore potentially focus on the impact of such regulatory tools on the ground-level situation and to analyse whether the regulatory objectives are achieved and, if so, to what extent.

The objectives of the study are as follows:

(i) To measure the immediate and overall impact of the revision of position limits and the consequent futures and options ban on liquidity.

(ii) To measure the impact of revised position limits on the volatility of stocks.

Research Design

This section provides the details of the sources of data, sample size, the models used for measurement of liquidity and volatility, and the research method applied.

Data: The study is based on the secondary data sourced from the NSE. The immediate impact of the circular imposing restrictive measures is captured by the list of companies that went into futures and options ban with effect from 23 March 2020. The study uses this sample set of eight companies and tracks subsequent repeat bans on the same companies from 20 March 2020 to 25 November 2020 when the position limits were restored to the pre-pandemic levels. Given that some of the companies in this set have gone through a number of ban events (in the range of 1–7) and that too for the different duration (in the range of 1–16 days), the analysis also helps in understanding the impact of multiple bans and for differential duration on the same stock.

Table 1 provides the sample set of companies and details of bans during the period.

Table 1: Sample Set and Ban Period

Name	No of Ban Events	Ban Range (Days)*
Indiabulls Housing Finance	6	2 to 16
Jindal Steel	7	2 to 10
Adani	7	2 to 6
Vodafone Idea	7	2 to 32
PNB	7	2 to 7
PVR	3	2 to 3
NCC	3	2 to 3
Yes Bank	1	1

*Day range of continuous ban period.
Source: NSE website.

The daily data of open, high, low, and close (OHLC) prices along with the traded volumes for the day in the underlying cash market segment are collected for a period of 30 days before the ban. During this period, it has been verified that the sample set of stocks were not subject to ban and hence the period is taken as the "no-ban" period for the purpose of the study. Liquidity and volatility of stocks during the no-ban period is calculated and compared with the ban period events to arrive at the impact of the ban.

Measurement of variables: The study aims at quantifying the impact of the restrictive regulatory measures on market activity, liquidity and volatility. Details of the measures used are as follows.

Liquidity Measures

Liquidity is the ability to transact (both large and small quantity) of security at a fair price and within a short period of time (immediacy). Various measures of liquidity that measure the volume and price impact of transactions are available in literature. This study uses the Amihud (2002) illiquidity ratio that helps quantify the price impact of trading volumes as given in equation (1).

$$\text{Amihud illiquidity} = \text{Average}\left(\frac{|r_t|}{\text{Volume}_t}\right) \quad \dots (1)$$

where,
$|r_t|$ is the absolute return of the day t and,
$Volume_t$ is the product of the closing price and the number of shares traded in terms of rupees.

The use of the Amihud illiquidity ratio will help to understand the impact of futures and options ban on the transaction prices and costs.

The study also uses a volume-based turnover ratio given in equation (2), to measure the liquidity based on traded volumes. Turnover ratio will help to measure the fall in volumes of trade or the impact on trading activity related to the stock that went under futures and options ban.

$$\text{Turnover ratio} = \frac{\text{Shares traded}_t}{\text{Shares outstanding}_t} \quad \dots (2)$$

where,
$Shares\ traded_t$ = The number of shares traded for the respective companies under consideration on day t.

Shares outstanding$_t$ = The number of shares outstanding for the respective companies under considerations on day *t*.

Volatility Measures

Measurement of volatility is important to both regulators and traders/investors in the market. Various measures of volatility developed by authors like Parkinson (1980), Garman and Klass (1980), Rogers et al (1994), and Yang and Zhang (2000) are used in different studies based on OHLC prices. This study attempts to measure the impact of restrictive trading measures on volatility. On scanning the literature related to volatility measures, it is observed that the classical measures provided by Garman and Klass (1980) or Parkinson (1980) ignore the opening price jumps and also assume zero drift in prices. This study, hence, uses the Rogers, Satchell, and Yoon (RSY) model given in equation (3) and the Yang–Zhang model given in equation (4) to measure volatility. The Yang–Zhang model calculates volatility using overnight volatility, open-to-close volatility, and the RSY volatility. These models incorporate the opening price jumps and takes into account the drift in stock prices that is varying with time.

$$\delta RSY = \sqrt{\frac{1}{T}\sum_{t=1}^{T}\left(\ln\left(\frac{h_t}{c_t}\right)\ln\left(\frac{h_t}{o_t}\right) + \ln\left(\frac{l_t}{c_t}\right)\ln\left(\frac{l}{o_t}\right)\right)} \quad \ldots (3)$$

where,

δRSY = RSY volatility

h_t = High price of the respective company on day *t*

c_t = Close price of the respective company on day *t*

l_t = Low price of the respective company on day *t*

O_t = Open price of the respective company on day *t*

l_n = Natural logarithm both overnight volatility and open-to-close volatility

$$\delta_{Yang-Zhang} = \sqrt{\delta^2_{overnightvol} + k\delta^2_{open-to-closevol} + (1-k)\delta^2_{RSY}} \quad \ldots (4)$$

where,

$$\delta^2_{overnightvol} = \frac{1}{T-1}\sum_{t=1}^{T}\left(\ln\left(\frac{o_t}{c_{t-1}}\right) - \text{Avg}\ \ln\left(\frac{o_t}{c_{t-1}}\right)\right)^2,$$

$$\delta^2_{open-to-closevol} = \frac{1}{T-1}\sum_{t=1}^{T}\left(\ln\left(\frac{c_t}{o_t}\right) - \text{Avg}\ \ln\left(\frac{c_t}{o_t}\right)\right)^2, \text{ and}$$

$$k = \frac{\alpha - 1}{\alpha + \frac{T+1}{T-1}}$$

where,

$\delta_{Yang-Zhang}$ = Yang–Zhang volatility

$\delta^2_{overnightvol}$ = Overnight volatility

$\delta^2_{open-to-closevol}$ = Open-to-close volatility

δ^2_{RSY} = RSY volatility

o_t = Open price of the respective companies on day *t*

C_{t-1} = Closing price of the respective companies on day *t-1*

C_t = Closing price of the respective companies on day *t*

Avg ln = Average of the natural logarithm

α = The value of $\alpha = 1.34$

Research method: The liquidity and volatility measures are calculated for the sample stocks in the no-ban period and compared with those of the ban period in both the cash markets and futures market segments. The robustness of differences is tested statistically using the pair t-test to capture and conclude the impact on liquidity and volatility. For the volatility study, we decompose volatility into overnight volatility and daytime volatility using the Yang–Zhang measure of volatility. We also quantify the relative significance of these measures during the ban period. This helps in understanding if the overnight changes to prices are huge as compared to the daily volatility arising due to futures and options ban.

Empirical Results and Discussions

The results are discussed for liquidity analysis and volatility analysis.

Table 2: Liquidity Analysis—Summary Results

Name of the Company	No-ban Period Liquidity Measures		Ban Period Liquidity Measures			
	No-ban Period (Avg) Turnover Ratio	Avg No-ban period (Avg) Amihud Illiquidity Ratio	Ban Period Turnover Ratio Event Day	Ban Period Amihud Illiquidity Ratio Event Day	Ban Period (Avg) Turnover Ratio	Ban Period (Avg) Amihud Illiquidity Ratio
Panel A—Company-wise liquidity measures across ban and no-ban periods						
Indiabulls Housing Finance	0.09770	0.00001	0.05364	0.00001	0.03591	0.00001
Jindal Steel	0.01894	0.00001	0.00789	0.00167	0.00921	0.00003
Adani	0.00397	0.00004	0.00634	0.00028	0.00470	0.00016
Vodafone Idea	0.01866	0.00005	0.01563	0.00002	0.00470	0.00016
PNB	0.00358	0.00003	0.00308	0.00003	0.00275	0.00003
PVR	0.01962	0.00000	0.09086	0.00002	0.06940	0.00002
NCC	0.04440	0.00000	0.04797	0.00024	0.03841	0.00014
Yes Bank	0.09103	0.05997	0.00748	0.00004	0.00748	0.00004
Panel B—Paired t-test significance of liquidity measures						
Means	0.029	0.002	0.024	0.000	0.019	0.000
Variance	0.001	0.000	0.001	0.000	0.001	0.000
Number of observations	41	41	41	41	41	41
t-Stat			0.82	0.84	1.88*	0.99
pvalue			0.42	0.41	0.07	0.33

*Significant at 10% level of significance.

Liquidity analysis: The turnover ratio and the Amihud illiquidity ratio for the sample set are calculated for the no-ban period, the event day, and the company-wise average for each ban event. The descriptive statistics and statistical analysis results are presented in Table 2 in Panels A and B, respectively.

The company-wise volume liquidity measured using turnover ratio shows that liquidity has fallen for most companies on the event day and during the ban period except for two companies in the sample. The mean turnover ratio of all companies has also fallen from 0.029 to 0.024 and further to 0.019 on the event day and during ban period, respectively. The fall in turnover ratio on the first day of the ban is less and not statistically significant. The fall in turnover ratio in the overall ban period fall is greater and is found to be statistically significant at 10% level of significance.

The Amihud illiquidity ratio measuring the price impact of the ban shows that there is a surge in the ratio except for Yes Bank, revealing an adverse liquidity impact both on the event day and the ban period average. The data of Yes Bank, however, show no liquidity price impact, which may be due to stock-specific events or due to the fact that its ban was for one day, only once.

It can be concluded that the ban period impact on liquidity of most stocks is adverse; however, the difference is not found to be statistically significant on the first day of imposition of the ban.

Volatility analysis: The volatility measures that capture the intraday high, low, and overnight volatility using the models mentioned earlier are calculated for each company and across the sample (Table 3).

The daily volatility measures using the RSY and Yang–Zhang models have declined from the no-ban period to ban period both company-wise and across the sample means. The overall mean volatility using the RSY model has fallen from 8.2% to 4.3%, and the Yang–Zhang volatility has also fallen from 9% to 5.4%. Thus, the imposition of futures and options ban helps control volatility. Further, the total volatility calculated was decomposed into the overnight volatility and open-to-close volatility. While the overall mean overnight volatility of the companies has increased from 1% to 3%, the open-to-close volatility has fallen 8% to 2% in the ban period. Statistical robustness tests show that RSY, open-to-close, and Yang–Zhang volatility are significant at 5%. However, the overnight volatility that has increased is not statistically significant.

From the above analysis, it can be concluded that the daily volatility of stocks has been controlled and declines with the futures and options ban, indicating the effectiveness of the regulatory tool in achieving the desired results during market turbulence. Overnight volatility, though increases, is not found to be statistically significant. This could be an indication of global market conditions on play, which, however, may need analysis of variables affecting global markets and their linkages with the Indian market.

Conclusions and Policy Implications

In March 2020, both the Indian and the global capital markets faced unprecedented stock price volatility due to a rise in COVID-19 cases and deaths. In order to ensure orderly trading, control volatility and effectively manage risks, SEBI, like many other market regulators elsewhere, came out with restrictive regulatory measures. It reduced the MWPLs to 50% of the then existing levels along with an increase in the margins on stocks in the cash market segment. This in turn triggered a ban on futures and options in the affected stocks. This research paper is an attempt to analyse and understand the effectiveness of MWPL in controlling volatility and its impact on liquidity. The analysis can also be interpreted as a proxy for impact assessment of regulatory tools in managing extreme turbulence in markets.

Liquidity impact has been analysed using the volume measure of turnover ratio and price impact measure of the Amihud illiquidity ratio. A comparison of the results for the no-ban period with the ban period shows that the turnover ratio has fallen significantly in the latter period. However, the decline in Amihud illiquidity is not statistically significant.

Daily volatility measures of the RSY and Yang–Zhang models show that volatility is reduced and is also statistically significant. However, the marginal increase in overnight volatility is found to be statistically insignificant.

There are 199 single stock securities that trade in the futures and options segment in the Indian markets. The analysis shows that imposition of the very stringent constraints and the consequent ban on futures and options trading has resulted in the inclusion of seven stocks (3.5%) under the futures and options ban on 23 March 2020. The imposition of MWPL has helped control volatility in these stocks with a small impact on liquidity. The result of our study is in line with the finding of the report by ESMA (2020). The price volatility before futures and options ban as compared to the volatility during the ban shows a reduction in volatility. There is also a decrease in the

Table 3: Volatility Analysis—Summary Results

Name of the Company	No-ban Period Volatility Measures				Ban Period Volatility Measures			
	No-ban Period RSY Volatility	No-ban Period ON Volatility	No-ban Period Open-to-Close Volatility	No-ban Period Yang–Zhang	Ban Period RSY Volatility	Ban Period ON Volatility	Ban Period Open-to-Close Volatility	Ban Period Yang–Zhang Volatility
Panel A—Company-wise volatility measures across ban and no-ban periods (%)								
Indiabulls Housing Finance	10.55	0.00	0.79	11.06	3.82	0.63	0.48	6.19
Jindal Steel	5.10	0.15	0.35	6.28	3.70	0.20	0.06	4.77
Adani	4.50	0.10	0.09	5.35	4.28	0.54	0.12	6.03
Vodafone Idea	14.71	0.18	2.45	15.45	5.66	0.07	0.29	6.15
PNB	5.09	0.08	0.20	5.79	1.87	0.00	0.01	1.85
PVR	6.42	0.18	0.24	7.53	4.86	0.05	1.04	5.61
NCC	6.23	0.15	0.32	7.28	4.76	0.45	0.10	7.15
Yes Bank	28.94	0.22	3.45	28.10	14.21	0.00	0.44	13.77
Panel B—Paired t-test significance of volatility measures								
Means	0.082	0.001	0.008	0.090	0.043	0.003	0.002	0.054
Variance	0.003	0.000	0.000	0.002	0.001	0.000	0.000	0.002
Number of observations	41	41	41	41	41	41	41	41
t-Stat					6.111*	-1.138	3.116*	4.025*
pvalue					0.000	0.262	0.003	0.000

*Significant at 5% level of significance.
ON = Overnight.

volumes traded during the ban period. Thus, it can be concluded that imposition of the futures and options ban contributes positively to the goal of controlling stock price volatility that may be induced due to the creation of large speculative positions in the market.

The key limitation of the study is that the sample is limited to the stocks that were affected due to the circular issued on 20 March 2020, when MWPLs were substantially reduced to 50% of the existing levels. The study can, however, be extended to cover different MWPL episodes across different periods from its introduction in 2004. Such a large canvas exploration can be useful to understand the differential impact of the futures and options ban based on the position limit liquidity, volatility, and price discovery.

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