Impact of elimination of uptick rule on stock market volatility

Vivek Bhargava
Alcorn State University

Daniel Konku
Northern Michigan University

ABSTRACT

The uptick rule is a former rule established by the SEC that required that every short sale transaction be entered at a price that is higher than the price of the previous trade. The purpose of this rule was to prevent short-sellers from adding to the downward momentum of a sharp decline by continually selling short, inducing profits, thus contributing to potential crashes. On June 6, 2007, SEC eliminated the uptick rule after a pilot test on 30% of Russell 3000 stocks.

The purpose of this paper is to determine whether the elimination of uptick rule increased the short-term volatility of the market. Using data from DJIA, S&P 500 index, and 30 Dow companies, it is found that both intraday and inter-day volatility went up in response to the elimination of the rule.

Keywords: uptick rule, stock market volatility

INTRODUCTION

A short sale is the sale of a security that the seller does not own. Typically, the seller borrows the security from a broker, a dealer or an institutional investor and sells it in anticipation of a price decline. The seller then returns the security to the lender by purchasing the same amount on the open market, thus profiting from the price decline. Other investors also use short selling to hedge the risk of a long position in the same or related security.

Opinion is divided among academicians and practitioners about the role of short selling in providing liquidity and pricing efficiency to the market. Short sellers provide liquidity by offsetting temporary imbalances in the supply and demand of the securities they trade in. In so doing they reduce the risk that the price paid by other investors is either too high or too low, due to temporary supply or demand disparities. Short sellers also add to market efficiency because their trades reveal to the market the overvaluation of the securities they trade in. Their trades set up a speedy correction of the overvalued security to its true value and, therefore, regulation prevents the market from reflecting the efficient price of a security. Furthermore, it imposes a "cost of waiting" – the earnings lost by the short seller as a result of waiting for an price uptick to trade

Proponents of the uptick rule contend that unregulated short selling may be used as a tool for manipulation when a security is sold short without restraint, thus creating a sell-side imbalance, resulting in an increased momentum of a decline and subsequently, a market crash. The regulatory objective of the uptick rule was to discourage this type of manipulative conduct.

In response to the sudden-price-decline argument, the Securities and Exchange Commission (SEC) originally adopted the "uptick Rule" (more formally known as Rule 10a-1) in 1938 to restrain short selling in a declining market. This followed an official inquiry into the effects of short selling during the market break of 1937. Many analysts also blame the stock market crash of 1929 on short selling, in what has become known as the "bear raid". The uptick rule has remained, perhaps, the most debated rule of the many restrictions on short sales.

On June 6, 2007, SEC decided to eliminate the uptick rule. This decision sparked a new wave of debate among investors and researchers; many argue that the elimination would cause the volatility of the market to increase significantly. The purpose of this paper is to determine the impact of the elimination of the uptick rule on price volatility.

The rule provided that a listed security may be sold short: (i) at a price above the price at which the immediately preceding sale was executed (plus tick), or (ii) at the last sale price, if it is higher than the last different price (zero-plus tick). Conversely, short sales were not permitted on minus ticks or zero-minus ticks, subject to limited exceptions. The uptick rule meant that a trader could not short a stock if the movement prior to the short sale was down. The operation of these provisions is commonly described as the "tick test." The reference price for the tick test is either the last transaction price reported following an effective transaction reporting approved by the SEC or on a particular exchange.[1]

[1] Both the New York Stock Exchange, Inc. (NYSE) and the American Stock Exchange LLC (Amex) have elected to use the prices of trades on their own floors for the tick test.

In adopting the rule, the SEC said it sought to achieve three objectives

(a) allowing relatively unrestricted short selling in an advancing market;
(b) preventing short selling at successively lower prices, thus eliminating short selling as a tool for driving the market down; and
(c) preventing short sellers from accelerating a declining market by exhausting all remaining bids at one price level, causing successively lower prices to be established by long sellers.

Most market participants believe that the elimination of this rule will increase the volatility in the market. Gregory Drahuschak, vice president of Janney Montgomery Scott, wrote in a note to clients in the same week; *"Increased volatility is here to stay as long as the new regulation remains."*

On the March 20, 2008 television episode of Mad Money on CNBC, host Jim Kramer launched a campaign to reinstate the uptick rule, claiming that the elimination of the uptick rule has caused wild swings in the market. So high was the concern that on July 16, 2008, Senator Gary Ackerman, N.Y, introduced legislation in the Senate for reinstating the rule.

Ironically, former SEC Chairman Christopher Cox sent a letter to the Congressman dated January 20, 2009 – the day he left the agency – in which Cox said he supports the reinstatement of the uptick rule. Cox sent the correspondence despite the fact that the SEC declined several appeals to restore the regulation during his tenure as Chairman. Other voices for reinstatement of the rule include NYSE Euronext CEO Duncan Niederauer, and the US House Financial Services Committee Chairman Barney Frank.

Impact of the removal of uptick rule on market participants

a. Individual Investors

The absence of the tick rule could lead to fairly consistent selling pressure as there is no impediment to shorting a security. Extreme selloff patterns that occur during periods of stock market panic could be exacerbated, driving prices lower than fundamental values and increasing volatility. The absence of the uptick rule could lead to more active trading and a wider variety of trading strategies, which in turn could lead to wider spread and a higher short-term volatility. In the long term, however, no significant adverse effect on individual investors is expected, as short sellers buy back stocks to close their position.

The uptick rule only covers short sale of securities listed or traded on an exchange or the NASDAQ's National Market System (NMS). Securities traded on the Over-the-Counter (OTC) markets (National Small Cap, NASD OTCBB and the Pink Sheet) are not subject to short sale restrictions. However, the National Association of Security Dealers (NASD) has its own rules (NASD Rule 3350) covering the short sale of securities traded on that market.[2] Securities traded on the NASDAQ National Market will be affected by

[2] NASD Rule 3330 prohibits short sale by NASDAQ Members in NMS securities at or below the current best (inside) bid as shown on the NASDAQ screen when that bid is lower than the previous best (inside) bid. This is referred to as a "bid test". The rule also includes exemptions similar to those provided under the SEC Rule 10a-1 regulating securities on the exchanges.

any changes in the uptick rule in a fashion similar to those on the NYSE and the AMEX. Securities on the OTC markets should be largely unaffected by the changes.

b. Institutional Investors

It is widely believed that, institutional investors put in a significant amount of buy orders to move a stock to an uptick and then put in their real short sale order. Aitkins et al (1977) investigate the price behavior of short-sell orders on the Australian Stock Exchange (ASX) and report that both market bid and ask prices move systematically upward in the 15 minute interval prior to short trades initiated by market orders. They attribute this to the enforcement of the uptick rule on the ASX.

The SEC requires institutional investors to report information concerning short sales of securities electronically on its EDGAR system. Even though this information will not be made publicly available until after two weeks, such public disclosure may increase volatility when it is eventually made public. This is because less sophisticated investors will likely emulate the trades of the institutional investors.

The purpose of this paper is to determine whether the intra-day and inter-day volatility increased after SEC eliminated the uptick rule on June 6, 2007. This is accomplished by measuring the pre- and post-elimination date volatility using four different methods. One should expect intraday volatility to increase more than the daily volatility. Two different methods are used to measure intraday volatility. In addition, the daily historical volatility and the daily conditional volatility are used to measure inter-day volatility. It is found that the volatility goes up significantly for both indexes and a number of stocks, especially the intraday volatility for the 50 day trading period.

LITERATURE REVIEW

The uptick rule and the general issue of short sale remain the most debated issues in finance literature. More than seven decades after adoption, academic research and analyst opinions still remain divided over the usefulness of the rule. In 1991, the House Committee released a report on short selling which stated that the "effects of short selling on the securities markets are not widely understood" and that "many people have questioned the effectiveness of the uptick rule." Nearly two decades after the Committee expressed these concerns, the impact of the short sale rules have not been understood any clearer, neither have market participants stopped questioning their effectiveness.

Short sellers trade when they believe stocks are overpriced or that there is some adverse news about the stock. In the presence of constraints binding short sales, stocks can be overpriced because these constraints prevent adverse information or opinions from being freely expressed in security prices. Consistent with this argument, Jones et al (2002) find that stocks that enter the borrowing market for shorting have high valuations, high market-to-book values and subsequent negative excess returns. Furthermore, the excess returns are higher than the cost of shorting, making an arbitrage possible to the shorter but not to the lender.

Miller (1977) argues that restrictions on short selling increase the price of risky assets above those that would occur without any restrictions. He showed that an increase

in aggregate demand occurs because if restrictions bar investors from shorting overpriced securities, the most rational alternative is to avoid holding the stock.

Chen et al (2002) and Figlewski (1981) find evidence consistent with the Miller hypothesis. Using data from mutual fund holdings, Chen reports that stocks whose change in breadth in the prior quarter are in the lowest deciles of the sample underperform those in the top deciles by 6.38% in the twelve months after formation.

Jarrow (1980) examined the influence that short sale restrictions have on relative risky asset prices. He showed that relative risky asset prices could rise or fall due to short sale constraints. However, if investors hold a homogeneous belief about future prices, short sale constraints will only increase risky asset prices.

Diamond and Verrencchia (1987) model the effect of short sale constraints on the speed of adjustment of security prices to private information. They observe that constraints eliminate some informative trades but do not bias prices upwards. They also find that prohibiting traders from shorting securities reduces the adjustment speed of prices to private information, especially bad news.

Ho (1996) reports that volatility of stock returns increases when short sales are severely restricted on the Singapore Stock Market. There is also evidence that short sale restrictions suppress asymmetric effects. More recently, Bris et al (2007) did a more comprehensive global comparison of 46 equity markets to determine the effect of short sale restrictions on market efficiency. They report evidence that prices incorporate negative information faster is countries where short sales are allowed and actually practiced and that short sale restrictions inhibit downward price discovery.

Market developments and the elimination of the uptick rule

There have been considerable developments in the securities markets that have compelled the SEC to reconsider regulations on short sales. The most notable among them were the decimalization of trade prices, the Commodity Futures Modernization Act 2000 that lifts the ban on securities futures, and the growing number of securities that trade outside the NASDAQ markets and therefore are not subject to the tick test.

Prior to the elimination of the uptick rule in June 2007, the SEC had temporarily suspended the short sale price test in May 2005 on a subset of the Russell 1000 Index on a pilot basis to determine the effect of unrestricted short selling on market volatility, price efficiency and liquidity (SEC Regulation HSO).

Werner et al (2007) find significant increase in short sale activity for both NYSE and NASDAQ pilot stocks but returns and volatility at the daily level are no more affected than the control samples. Avramov et al (2006) propose a trading-based explanation for the asymmetry in price volatility; volatility increases (decreases) following stock price declines (increases). They show that selling activity governs the asymmetric volatility in individual stock returns. This finding is consistent with those of Hellwig (1980) and Wang (1993) who show that non-informational trading activity leads to enhanced volatility while informed trading leads to a decline in volatility.

This paper employs the intuition of the preceding argument. This study hypothesizes a decrease in volatility when prices are on the in volatility uptrend after the elimination of the uptick rule and an increase when prices are on the downtrend. Until the elimination of the uptick rule, the informed trader could only have short by entering a

price higher than the last trade, thus pushing the price even further away from its true value. After the elimination of the rule, the informed trader does not have to wait for an "uptick" to short an overvalued stock.

If enough of the informed traders start to sell their stocks or short borrowed stocks, prices would go on the downtrend. Uninformed traders will lose their confidence in long positions and join the selling hysteria. The combined effect of all the widespread selling would drive down prices below fundamental values. Under the uptick rule the short sellers could not have put in a sell order below the last price. Therefore, it is expected that the net effect of the elimination will be an increase in the overall volatility and hence riskiness of the market.

DATA AND METHODOLOGY

Data is obtained for the Dow Jones Industrial Average (DOW) and the S&P 500 index (GSPC) and all the 30 Dow companies. Intraday and Inter-day volatility as well as returns and calculated and F-test is conducted to test whether the post uptick rule elimination volatility is higher than the pre uptick rule elimination volatility. Two test periods are considered: 30 trading days and 50 trading days before and after the elimination of rule date.

Intraday volatility is measured using two methods. The first method is the Parkinson (1980)

$$\sigma^2_{ID,t} = 0.3607 * [\ln(H_t / L_t)]^2 \quad (1)$$

Where σ^2 is the intraday volatility, H_t and L_t are the daily high and low prices.

This paper also used the Garman and Klass (1980) method is also used to measure the intraday volatility. According to this method the volatility can be found using the following equation.

$$\sigma^2_{ID,t} = 0.5(H_t - L_t)^2 - 0.386(C_t - O_t)^2 \quad (2)$$

Where C_t and O_t are the open and close prices for day t. In this method not only the high and the low prices are considered but open and close prices are also taken into account to measure intraday volatility.

Inter day volatility is measured using two methods. The first is the daily historical volatility and is determined by the following equation

$$HSD = \sqrt{\sum_{t=1}^{T} \frac{(P_t - \bar{P})^2}{T-1}} \quad (3)$$

t = 20 trading days

Where HSD is the historical standard deviation, Pt is the price on day t and $\bar{P}$ is the average price. Historical standard deviation is calculated using a 20 trading day history.

Finally, this paper uses GARCH (1, 1) to find the daily conditional variance and use that as an additional measure of volatility.

$$P_t = \mu_{t-1} + \varepsilon_t \quad (4)$$

$$\varepsilon_t | I_{t-1} \approx N(0, \sigma_t^2)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1} + \alpha_2 \sigma_{t-1}^2$$

where μ_{t-1} is the mean P_t conditional on past information and σ_t is the measure of volatility. Numerous previous studies show that conditional variance from the GARCH (1, 1) model is the appropriate volatility measure for studies such as this one.

To determine whether the volatility has increased post elimination of uptick rule period, a simple F-test is performed.

$$H_0 : \quad S^2_{pre} = S^2_{Post} \tag{5}$$

$$H_a : \quad S^2_{pre} \neq or < S^2_{Post}$$

$$F = \frac{S^2_{Post}}{S^2_{Pre}}$$

where S^2 is the volatility. The null hypothesis is that the pre and post June 6, 2007 volatilities are the same and the alternate hypothesis is that they are different.

RESULTS

This paper attempts to determine whether the elimination of uptick rule resulted in an increase in volatility. Using four different methods of determining the intraday and the inter-day (daily) volatility, tests are conducted to determine whether the volatility has increased after the elimination of the uptick rule. To conduct the analysis, two different test periods are used: 30 trading days and 50 trading days. The DJIA, the S&P 500 index and the 30 stocks that form the DJIA are used in this analysis

Table 1 gives the volatility measures for the pre and post 30 day and 50 day periods using the four different measurement methods. It is interesting to note that for both the indexes as well as all the 30 stocks the post period volatility is more than the pre period volatility. This result is true for the intraday, volatility, historical volatility as well as the conditional volatility. These results are as expected and the volatility actually did go up after the elimination of the uptick rule. F- test is performed to determine whether the differences in volatility between the pre and the post period time are statistically significant.

Table 2 gives the results for the F test. F test shows that for a 30 day period, when historical inter day volatility is used, the volatility is significantly higher in the post rule period for both indexes and 11 of 30 DJIA stocks. This significance is not found when the other three methods are applied to determine volatility.

Results significantly change when 50 trading day period is used. It is found that volatility is significantly higher for both indexes using all 4 methods. For intraday volatility, when Parkinson (1980) volatility measure is used, it is found that volatility is significantly higher for 18 of 30 Dow stocks. When Garman and Klass (1980) measure is used, it is found that the volatility is significantly higher for 27 of the 30 Dow stocks. When inter-day volatility measures are used, it can be seen that significance can be found in seven Dow stocks when daily historical volatility is used and four stocks when conditional variance using GARCH is used.

It is also interesting to know that for DuPont, Honeywell and Hewlett Packard, volatility does not change significantly with either of the time periods, or any of the four methods. For Wal-Mart, Pfizer, MMM, Coca cola, Johnson and Johnson, Intel, Home Depot, and GM, volatility is significantly higher only when G&K is used over a 50 day period.

Overall, it can be concluded that volatility went up after the elimination of uptick rule and historical volatility increase was significant for 30 day study period and intra-day volatility increase was significant for a 50 day study period.

CONCLUSIONS

On June 6, 2007, SEC eliminated the uptick rule that prohibited short selling on a downtick. Short selling was only allowed when the previous tick had been an uptick. A number of analysts and academicians believed that the elimination of this rule would result in increased market volatility and lower prices as investors would try to short sell in declining markets. The purpose of this paper is to determine whether the volatility actually increased in the short run in response to the elimination of this rule.

Two different time periods are used in this study. The first period consists of 30 trading days before and 30 trading days after the elimination date and the second period consists of 50 trading days before and after the date of the elimination. Periods longer than these are not considered, as the farther away one moves from the elimination date there is more likelihood that factors other than elimination of uptick rule will have an impact on volatility. It is also believed that the intraday volatility will increase more than inter day volatility. Therefore, four different methods to measure volatility are used – two each for the intraday and daily volatility. Intraday volatility is measured by the method proposed by Parkinson (1980), which uses the daily high and low prices and the method developed by Garman and Klass (1980), which uses the high, low, open, and close price to determine intraday volatility. In addition, daily historical volatility as well the daily conditional variance using GARCH (1,1) modeling is used for inter-day volatility.

DJIA and S&P 500 index are used to determine the impact on volatility of the overall market in response to the elimination of uptick rule. In addition to the two indexes, the impact on volatility of the 30 companies that constitute the Dow is also analyzed. The reason for picking these 30 stocks is that they are among the most actively trades stocks and will be impacted most by elimination of this rule.

It is found that for both periods, that is, 30 trading days and 50 trading days, the volatility goes up for both the indexes and all the Dow companies irrespective of the method used for measuring volatility. This increase in not statistically significant for all cases. For the 30 day period, the historical volatility goes up significantly for 17 of 30 Dow companies. For the 50 day period, it is found that the intraday volatility goes up for 27 of the 30 Dow companies.

In a nutshell, volatility is higher in post rule period, but significance is not found all the time. Furthermore, intraday volatility seems to have increased more than the inter day volatility.

REFERENCES

Aitkins, M.J., Frino, A., McCorry, M.S., and Swan, P.L., (1977). "Intraday Price Behavior Surrounding Short Sales: Evidence from the Australian Stock Exchange," *Working Paper*, University of Sydney

Avramov, D., Chordai, T., and Goyal, A, (2006), "The Impact of Trade on Daily Volatility", *Review of Financial Studies*, 9, 1241 – 1247

Bris, A.B., Goetzmann, W.N., and Zhu, N. (2007). "Efficiency and the Bear: Short Sales and Markets Around the World*", Journal of Finance*, 3, 1029 - 1079

Chen, J., Hong, H., and Stein, J.C., (2002). "Breath of ownership and stock returns". *Journal of Financial Economics* 66, 171 - 205

Diamond, D., Verrecchia, R., (1987). "Constraints on short-selling and asset price adjustment to private information." *Journal of Financial Economics* 18, 277 – 311

Deither, K.B., Lee, K.H., and Werner, I.M. "It's SHO Time! Short-Sale Price Tests and Market Quality", *The Ohio State University Working Paper* No. 2007-03-002

Garman, M.B., and Klass, M.J., (1980) "On the Estimation of Security Price Volatilities From Historical Data," *Journal of Business*, 53, 67-78.

Hellwig, M.F., (1980), ''On the Aggregation of Information in Competitive Markets,'' *Journal of Economic Theory*, 22, 477–498.

Ho, K.W., (1996). "Short sales restrictions and volatility: the case of the Stock Exchange of Singapore." Pacific-Basin Finance Journal 4, 377-391

Jones, C.M., and Lamont, O.A. (2002). "Short-sale constraints and stock returns."Journal of Financial Economics 66, 207 – 239

Parkinson, M., (1980). "The Extreme Value Method for Estimating the Variance of the Rate of Return." Journal of Business, 53, 1, 61-65

Stiglewski, S., (1981). "The informational effects of restrictions on short sales: some empirical evidence. Journal of Financial and Quantitative Analysis" 4, 463 – 476

Wang, J., (1994), ''A Model of Competitive Stock Trading Volume,'' Journal of Political Economy, 102, 127–168

Table 1: Volatility for Pre and Post event period

		Parkinson		G&C		Historical		GARCH (1, 1)	
		Post	Pre	Post	Pre	Post	Pre	Post	Pre
DOW	30 day	0.00537	0.00480	0.00010	0.00009	222.46	124.84	0.00945	0.00716
	50 day	0.00697	0.00472	0.00019	0.00009	212.15	162.19	0.01035	0.00682
GSPC	30 day	0.00357	0.00262	0.00004	0.00002	26.424	13.094	0.01011	0.00779
	50 day	0.00513	0.00264	0.00008	0.00002	25.073	14.994	0.01144	0.00728
AA	30 day	0.01027	0.00780	0.00047	0.00023	2.790	1.179	0.02274	0.02062
	50 day	0.01230	0.00710	0.00065	0.00019	2.309	1.183	0.02336	0.02035
AIG	30 day	0.00377	0.00349	0.00005	0.00005	1.560	0.539	0.00902	0.00583
	50 day	0.00686	0.00365	0.00027	0.00005	1.472	0.838	0.01260	0.00603
AXP	30 day	0.00709	0.00466	0.00016	0.00008	1.732	0.900	0.02015	0.01106
	50 day	0.00983	0.00493	0.00037	0.00009	1.604	1.320	0.02194	0.01206
BA	30 day	0.00518	0.00509	0.00009	0.00009	2.359	1.740	0.01167	0.01143
	50 day	0.00708	0.00500	0.00020	0.00009	2.519	1.602	0.01351	0.01157
C	30 day	0.00625	0.00472	0.00014	0.00009	1.463	0.855	0.01555	0.01193
	50 day	0.00877	0.00489	0.00032	0.00009	1.341	0.815	0.01739	0.01159
CAT	30 day	0.00638	0.00618	0.00014	0.00013	2.762	1.588	0.01457	0.01503
	50 day	0.00848	0.00591	0.00028	0.00013	2.512	1.874	0.01443	0.01495
DD	30 day	0.00604	0.00534	0.00014	0.00010	1.564	0.815	0.01355	0.01237
	50 day	0.00811	0.00574	0.00025	0.00011	1.262	0.770	0.01357	0.01230
DIS	30 day	0.00514	0.00502	0.00010	0.00008	0.421	0.597	0.01113	0.01125
	50 day	0.00699	0.00479	0.00017	0.00008	0.532	0.513	0.01309	0.01075
GE	30 day	0.00526	0.00427	0.00010	0.00006	0.834	0.460	0.01263	0.01003
	50 day	0.00651	0.00405	0.00015	0.00006	0.821	0.585	0.01344	0.00982
GM	30 day	0.00854	0.00843	0.00024	0.00024	1.545	1.444	0.02362	0.02204
	50 day	0.01138	0.00868	0.00048	0.00026	1.478	1.167	0.02539	0.02218
HD	30 day	0.00602	0.00643	0.00012	0.00014	1.524	0.985	0.01389	0.01336
	50 day	0.00761	0.00651	0.00024	0.00015	1.426	1.765	0.01429	0.01252
HON	30 day	0.00602	0.00643	0.00012	0.00014	1.524	0.985	0.01389	0.01336
	50 day	0.00761	0.00651	0.00024	0.00015	1.426	1.765	0.01429	0.01252
HPQ	30 day	0.00604	0.00509	0.00013	0.00010	0.957	0.542	0.01352	0.01067
	50 day	0.00799	0.00522	0.00026	0.00011	1.032	0.728	0.01540	0.01049
IBM	30 day	0.00604	0.00509	0.00013	0.00010	0.957	0.542	0.01352	0.01067
	50 day	0.00799	0.00522	0.00026	0.00011	1.032	0.728	0.01540	0.01049
Intc	30 day	0.00714	0.00598	0.00017	0.00013	0.759	0.608	0.01449	0.01288
	50 day	0.00810	0.00597	0.00025	0.00013	0.714	0.629	0.01550	0.01313
JNJ	30 day	0.00399	0.00395	0.00006	0.00006	0.834	0.669	0.00760	0.00744
	50 day	0.00449	0.00366	0.00008	0.00005	0.699	0.882	0.00770	0.00743
JPM	30 day	0.00687	0.00415	0.00017	0.00006	1.453	0.741	0.01649	0.01192
	50 day	0.00955	0.00441	0.00034	0.00008	1.328	0.912	0.01818	0.01199
KO	30 day	0.00455	0.00388	0.00007	0.00005	0.681	0.583	0.00834	0.00814
	50 day	0.00588	0.00433	0.00013	0.00008	0.720	0.746	0.00903	0.00812
MCD	30 day	0.00549	0.00496	0.00011	0.00009	1.061	0.847	0.01101	0.01096
	50 day	0.00719	0.00512	0.00022	0.00010	1.026	0.976	0.01151	0.01089
MMM	30 day	0.00523	0.00501	0.00010	0.00010	1.370	1.201	0.01236	0.01230
	50 day	0.00602	0.00462	0.00014	0.00009	1.434	1.771	0.01232	0.01226

Table 1 Continued

MO	30 day	0.00486	0.00439	0.00009	0.00006	1.521	0.953	0.00989	0.00913
	50 day	0.00681	0.00449	0.00020	0.00007	1.386	1.201	0.01091	0.00955
MRK	30 day	0.00687	0.00562	0.00017	0.00013	1.011	1.130	0.01523	0.01274
	50 day	0.00834	0.00551	0.00027	0.00012	0.897	1.398	0.01492	0.01388
MSFT	30 day	0.00573	0.00460	0.00011	0.00007	0.639	0.360	0.01311	0.01213
	50 day	0.00685	0.00506	0.00019	0.00010	0.600	0.517	0.01341	0.01219
PFE	30 day	0.00506	0.00414	0.00009	0.00006	0.548	0.447	0.00909	0.00890
	50 day	0.00559	0.00439	0.00011	0.00007	0.503	0.435	0.00976	0.00890
PG	30 day	0.00403	0.00411	0.00006	0.00006	0.751	0.693	0.00886	0.00899
	50 day	0.00553	0.00378	0.00012	0.00006	0.797	0.671	0.00922	0.00868
T	30 day	0.00690	0.00557	0.00016	0.00010	0.698	0.662	0.01361	0.01251
	50 day	0.00839	0.00528	0.00026	0.00010	0.742	0.574	0.01415	0.01194
UTX	30 day	0.00501	0.00425	0.00008	0.00006	1.476	0.856	0.01209	0.00978
	50 day	0.00662	0.00433	0.00015	0.00007	1.307	0.935	0.01285	0.00927
VZ	30 day	0.00565	0.00518	0.00010	0.00009	0.723	0.793	0.00932	0.01049
	50 day	0.00726	0.00517	0.00024	0.00010	0.772	0.911	0.01074	0.01037
WMT	30 day	0.00475	0.00493	0.00009	0.00010	0.787	1.161	0.01218	0.01246
	50 day	0.00598	0.00498	0.00013	0.00009	0.984	0.935	0.01311	0.01233
XOM	30 day	0.00670	0.00506	0.00014	0.00008	2.902	1.222	0.01592	0.01301
	50 day	0.00867	0.00487	0.00028	0.00008	2.523	1.222	0.01732	0.01281

Table 1 gives the volatility for DJIA, S&P 500 and 30 Dow Stocks for 30 and 50 day Pre and Post elimination of uptick rule day, that is, June 6, 2007.

Table 2: F test Results

	30 Days				50 Days			
	Park	**G&K**	**Hist**	**GARCH**	**Park**	**G&K**	**Hist**	**GARCH**
DOW	1.12	1.15	1.78[c]	1.32	1.48[c]	2.17[a]	1.31	1.52[c]
GSPC	1.36	1.67[c]	2.02[b]	1.30	1.95[a]	3.83[a]	1.67[b]	1.57[c]
AA	1.32	2.04[b]	2.37[b]	1.10	1.73[b]	3.43[a]	1.95[a]	1.15
AIG	1.08	1.09	2.89[a]	1.55	1.88[a]	5.36[a]	1.76[b]	2.09[a]
AXP	1.52	1.99[b]	1.92[b]	1.82[b]	1.99[a]	3.99[a]	1.22	1.82[b]
BA	1.02	1.01	1.36	1.02	1.41[c]	2.27[a]	1.57	1.17
C	1.33	1.62[c]	1.71[c]	1.30	1.79[b]	3.38[a]	1.65[b]	1.50[c]
CAT	1.03	1.05	1.74[c]	0.97	1.43[c]	2.22[a]	1.34	0.97
DD	1.01	1.33	0.62	1.35	0.82	1.31	0.53	1.10
DIS	1.02	1.16	0.70	0.99	1.46[c]	2.10[a]	1.04	1.22
GE	1.23	1.52	1.81[c]	1.26	1.61[b]	2.57[a]	1.40[c]	1.37
GM	1.01	0.99	1.07	1.07	1.31	1.83[b]	1.27	1.14
HD	0.89	0.71	0.69	0.85	0.81	1.44[c]	0.63	1.03
HON	0.81	1.44	0.63	1.03	1.02	1.00	0.72	1.11
HPQ	1.02	1.00	0.72	1.11	1.24	0.81	0.56	0.61
IBM	0.99	1.06	1.68[c]	1.02	1.40[c]	2.53[a]	1.19	1.03
Intc	1.19	1.30	1.25	1.12	1.36	1.98[a]	1.13	1.18
JNJ	1.01	1.04	1.25	1.02	1.22	1.58[b]	0.79	1.04
JPM	1.66[c]	2.67	1.96[b]	1.38	2.16[a]	4.53[a]	1.46[c]	1.52[c]
KO	1.17	1.38	1.17	1.03	1.36	1.70[b]	0.96	1.11
MCD	1.11	1.31	1.25	1.00	1.40[c]	2.30[a]	1.05	1.06
MMM	1.04	0.99	1.14	1.00	1.30	1.66[b]	0.81	1.00
MO	1.11	1.38	1.59	1.08	1.52[c]	2.93[a]	1.15	1.14
MRK	1.22	1.38	0.89	1.20	1.51[c]	2.22[a]	0.64	1.07
MSFT	1.25	1.49	1.77[c]	1.08	1.35	1.95[a]	1.16	1.10
PFE	1.22	1.47	1.23	1.02	1.27	1.53[b]	1.16	1.10
PG	0.98	0.90	1.08	0.99	1.46[c]	2.22[a]	1.19	1.06
T	1.24	1.55	1.06	1.09	1.59[b]	2.75[a]	1.29	1.18
UTX	1.18	1.37	1.72[c]	1.24	1.53[b]	2.25[a]	1.40[c]	1.39
VZ	1.09	1.13	0.91	0.89	1.40[c]	2.41[a]	0.85	1.04
WMT	0.96	0.93	0.68	0.98	1.20	1.46[c]	1.05	1.06
XOM	1.32	1.72[c]	2.38[b]	1.22	1.78[b]	3.62[a]	2.06[a]	1.35

a, b, and c are significance levels at 1%, 5%, and 10% respectively.
This Table reports the F – significance test to determine whether the post elimination rule volatility has increased when compare the pre elimination rule period.