DOI: 10.7763/IPEDR. 2012. V55. 3

Short Selling Stabilizes the Market Evidence from China

[a]Muhammad Suhail Rizwan[1] & [b]Muhammad Junaid Iqbal

[a]PhD Scholar, National University of Sciences and Technology (NUST), Islamabad, Pakistan.
[b]MS Scholar, Shaheed Zulfikar Ali Bhutto Institute of Science and Technology (SZABIST), Islamabad, Pakistan

Abstract. Short sellers are frequently held responsible for stimulating a strong bearish trend in the markets and enhancing panic in falling markets. Whereas, financial and economic theories advocate the stance that short sellers play an informational role in the market, make it efficient and correct the over or under reaction of the market. In order to check the volatility or stability caused by short selling, unique case of China's Shanghai Stock Exchange has been examined in this study. China's regulators allowed short selling for the first time in 2010. This historic reform provided us an interesting data set. By using asymmetric TGARCH model on daily return data of Shanghai Stock Exchange 50 index from January 5, 2007 to June 11, 2012, and by taking into account Day-of-the-Week effect, financial crisis, and regional as well as international spillovers, robust evidence in favor of short selling have been found by this study. Short selling reduces the volatility of the market and stabilizes it. Our findings have implications for China's regulators and investors, who can use the result of this study in policy making and portfolio development respectively.

Keywords: Short selling, Volatility, SSE 50 Index, TGARCH Model

1. Introduction

Regulators in many countries e.g., USA, Spain, Italy, Germany and Taiwan, banned short selling during global financial crisis 2007-09 and European debt crises 2009-10 as they were of the view that short selling would depress the prices of securities even further. Firm managers and media speculate a lot about negative externalities of short selling. Despite several studies contended against short selling, economic theory and finance literature mostly conclude that short selling plays a very important role in accurate valuation of stocks. Economic theory suggests that if short selling is constrained then negative information will not be incorporated in the market in advance and it will be evident only when the market is ready to fall. Rich amount of research evidences are available on positive aspects of short selling. Boehmer et al (2008) advocates the view that short sellers are informed as a group. Their study found out that weightily shorted stocks have lower risk adjusted returns in comparison to lightly shorted stocks. This shows that short selling is adding to market efficiency by incorporating negative information into stocks.

Miller (1977) argued that constraints applied on short selling tend to increase the degree of overpricing relative to intrinsic values. Most recent study evaluating the impact of short selling constraints is carried out by **Bohl et al (2012)** in Taiwan. By estimating several versions of an asymmetric GARCH model including a Markov switching GARCH model, they provided robust evidence that short selling restrictions increase the volatility of stock returns. One aspect, however, is still to be explored; how introducing short selling for the first time actually changed the volatility of the market? We intend to explore this aspect by following same methodology adopted by **Bohl et al (2012**). Stock market of China provides an interesting data set in this regard. China stock markets developed rapidly in 1990s, when Shanghai Stock Exchange and Shenzhen Stock Exchange were established. Chinese stock market topped the world in initial public offering (IPO), and also overtook the Japanese market in terms of market capitalization (**Lilai and Oh 2011).** Short selling was prohibited in Chinese Stock Markets before March 31, 2010. China regulators were reluctant to allow short selling because they believed that short selling will cause downturn and distortions in market. On March 30, 2010, the China Security Regulation Committee (CSRC) allowed short trading for the first time (**Zhou and Wong 2012).** CSRC allowed short selling on test run basis in 90 selected stocks in Shanghai Stock Exchange and Shenzhen Stock Exchange. This reform gives us a unique data set for studying the impact of maiden

[1]*Corresponding author- Email:* suhail.rizwan26@gmail.com

short selling on market volatility. As short selling was allowed in the market in 2010, therefore we can use **Bohl et al (2012)**'s methodology on the China stock exchange. Chinese regulators allowed short selling for the first time and up to the best of our knowledge, no study on this issue has been conducted so far to check if short trading activity benefited the market and vice versa. This study could be useful for the regulators as well as investors to answer this question and to check the effect of short selling on market stability. Our empirical analysis focuses on SSE 50 index due to the fact that SSE 50 index comprises of the firms for which short selling has been allowed. Those firms account for almost 80% of market capitalization of SSE 50 index. Regional and international influence has been studied by using Hang Seng Index (HIS) Hong Kong, Taiwan Weighted Index (TWII), and S&P index of USA, respectively. Data of the indices have been collected from Yahoo Finance. Daily data from January 5, 2007 to June 11, 2012 including closing prices of stock indices is used in this study. All indices have specially been converted to US dollar for nullifying the currency effect. Daily exchange rate of Chinese Yuan (CNY), Taiwan Dollar (TWD), and Hong Kong Dollar (HKD) are taken from http://www.oanda.com.

2. Methodology

Our purpose is to model returns of the Shanghai Stock Exchange 50 Index (SSE 50) using conditional volatility models. Most widely used asymmetric conditional volatility models include Exponential GARCH (EGARCH) and Threshold GARCH (TGARCH). Results given in this paper are from TGARCH model although EGARCH model is also estimated and results remained robust. EGARCH results can be reproduced on request.

We used following TGARCH model for our investigation:

$$r_t^{sse} = \alpha_0 + \sum_{i=1}^{4} \alpha_i DoW_{it} + \alpha_5 r_{t-1}^{sse} + \beta_1 r_{t-1}^{us} + \beta_2 r_t^{tai} + \beta_3 r_t^{hk} + \beta_4 fc_t + \varepsilon_t \quad (1)$$

$$h_t = \omega + \gamma_1 \varepsilon_{t-1}^2 + \gamma_2 h_{t-1} + \gamma_3 I_t \varepsilon_{t-1}^2 + \gamma_4 D_t I_t \varepsilon_{t-1}^2 + \sum_{i=1}^{p} \theta_i \varepsilon_{t-1}^2 \quad (2)$$

$$I_t = \begin{cases} 1 \ if \ \varepsilon_{t-1} < 0 \\ 0 \ if \ \varepsilon_{t-1} \geq 0 \end{cases}; \ D_t = \begin{cases} 1 \ March\ 31st, 2010 \ to \ end \ of \ sample \\ 0 \ 1st \ Jan\ 2007 \ to \ March\ 30, 2010 \end{cases} \quad fc_t = \begin{cases} 1 \ after \ August\ 9, 2007 \\ 0 \ before \ August\ 9, 2007 \end{cases}$$

Index returns are defined by $r_t = ln\, P_t - ln\, P_{t-1}$ and $\varepsilon_t = N(0, h_t)$ is random component of the stock index returns. $\sum_{i=1}^{4} \alpha_i DoW_{it}$ is the Day-of-the-Week dummy with value 1 for Tuesday, Wednesday, Thursday and Friday, $i = 1, \ldots, 4$. r_{t-1}^{sse} is lagged term of the SSE index which enables us to detect autocorrelation in the data. Stock returns of S&P 500 r_{t-1}^{us}, Taiwan Weighted Index r_t^{tai} and Heng Seng Index r_t^{hk} are used to check whether there is spillover effect in the returns from these markets. Notice that US returns are lagged but others are contemporaneously[2] related to dependent variable because stock markets in Taiwan and Hong Kong trade in the same time zone, while U.S. market is lagged as New York is 12 hour behind. Every index has lagged squared residual terms in the conditional variance equation as volatility realized is known only at the completion of the day trade. I_t takes value of 1 if return innovation is negative and 0 otherwise. fc_t dummy is to capture the effect of global financial crisis and it takes value 0 before 9th August 2007 and 1 after 9th August 2007 when there is the breakdown in the banking system accelerated by the announcement made by BNP Paribas that it was backing off activity in three hedge funds that specialized in US mortgage debt and this announcement triggered the global financial crisis. Conditional volatility equation is a version of asymmetric GARCH model which is forwarded by **Glosten et al (1993)** and which is modeled to check the different effect of negative and positive innovation on volatility by use of a dummy variable I_t. In case this dummy turns to be significant and positive it will imply that negative shock has greater effect as compared to positive shock of same magnitude. Most important coefficient for our research is γ_4. If γ_4<0 and significant then we can conclude that short selling has a dampening influence on the volatility during falling markets. If γ_4= 0 it means there is no effect of short selling on market volatility and if γ_4>0 then short selling increased the market volatility during falling markets. With the dummy variable D_t

[2]We also estimated return spillover effects of Taiwan and Hong Kong indexes with lags but lagged return spillovers turned to be insignificant which indicated that return spillovers are contemporaneous as modeled by Bohl M.T et al (2012).

regulatory change is modeled. This dummy takes value of 1 after 31st March 2010 till the end of the sample in which short sale trading is allowed and takes value of 0 from start of the sample till 30th March 2010 when short sale trading was prohibited. To check the volatility transmission from regional and international market $\sum_{i=1}^{p} \theta_i \, \varepsilon_{t-1}^2$ are the lagged squared error terms of Taiwan, Hong Kong and U.S., indices are used respectively.

3. Empirical Results

Table 1 shows the descriptive statistics describing distributional properties of index returns. The index returns are gently skewed. However the leptokurtic nature of the distributions of index return is confirmed by the excess kurtosis. Meanwhile null hypothesis of normal distribution is rejected for all the index returns at 1% level of significance.

Table 1: Descriptive Statistics

Statistic	China	Taiwan	USA	Hong Kong
Mean	-7.24E-05	-0.000197	-0.000356	-0.000178
Median	0.000717	0.001081	0.000673	6.98E-05
Maximum	0.093295	0.069208	0.109572	0.134068
Minimum	-0.09917	-0.069342	-0.094695	-0.135511
Std. Dev.	0.021348	0.016126	0.016119	0.019453
Skewness	-0.2671	-0.263928	-0.111754	0.039862
Kurtosis	5.208890	4.908446	9.822201	9.649852
Jarque-Bera	253.9241	192.7725	2290.792	2174.489
Probability	0.000000	0.000000	0.000000	0.000000
Sum	-0.08547	-0.232199	-0.419715	-0.209828
Sum Sq. Dev.	0.537295	0.306595	0.306329	0.446156

Table 2 presents Box-Pierce Q statistics for the Raw Returns and shows that, except US market, very low or insignificant autocorrelation, in general up to 24 lags, is found in all the other markets. On the other hand highly significant autocorrelation is found in squared returns of all the markets when Box-Pierce Q test is applied, as shown in Table2(2). This attests that a sound conditional heteroscedasticity is present in the data hence the GARCH model is the prudent model for this data **(Bollerslev, 1986).**

Table 2: Box-Pierce Q Test Results

Q-Statistics	SSE	US	TAI	HK
1. Q Test for Autocorrelation of Raw Returns				
Lag(6)	6.2144	20.631***	8.3876	3.7195
Lag(12)	10.175	34.157***	20.218*	23.5**
Lag(18)	11.419	54.443***	26.156*	28.939**
Lag(24)	15.481	72.81***	37.145**	30.416
2. Q Test for Autocorrelation of Squared Returns				
Lag(6)	90.794***	501.53***	89.734***	431.47***
Lag(12)	170.96***	988***	203.19***	756.33***
Lag(18)	227.78***	1239.4***	297.08***	835.59***
Lag(24)	323.04***	1444.5***	342.04***	953.48***

*,**,and *** shows significance at 10%, 5% and 1% level of significance.

Table 3: TGARCH Result

Mean Equation		Variance Equation	
Coefficient	r_t^{sse}	Coefficient	h_t
α_0	0.005729*** (0.0080)	ω	0.00000917*** (0.0001)
α_1	-0.003767*** (0.0050)	γ_1	0.034181*** (0.0159)
α_2	-0.002116* (0.0938)	γ_2	0.899923*** (0.0000)
α_3	-0.002730** (0.0383)	γ_3	0.076449*** (0.0003)
α_4	0.000712 (0.5969)	γ_4	-0.095100*** (0.0001)
α_5	0.031405 (0.2337)	θ_{us}	0.006558 (0.2183)
β_1	-0.069946** (0.0401)	θ_{tai}	-0.009225 (0.1927)
β_2	0.066994** (0.0450)	θ_{hk}	0.007285 (0.1842)
β_3	0.567842*** (0.0000)		
β_4	-0.004375** (0.0318)	Log Likelihood	3193.982

Note: values in parenthesis are probabilities. *,**,and *** shows significance at 10%, 5% and 1% level.

Parameter estimates of both mean and variance equation are summarized in **Table 3**. By analyzing coefficients estimates of mean equation we can see that consistent to previous literature on Chinese market we found significant negative Day-of-the-week effect for Tuesday, Wednesday and Thursday (**Bohl. M. T. et al 2010**). Coefficients for regional and global spillover effects in returns also turns out to be significant but magnitude of the spillover effect from regional and international markets differs. Coefficient estimate β_4 is statistically significant. This is negative effect of global financial crisis on China's stock market. Turning to estimation results of variance equation, significant positive coefficient of γ_1 suggests that unexpected stock returns (ε_{t-1}^2) increase the volatility in the market. Moreover, significant positive estimate of coefficient γ_2 tells us that volatility in the China market is highly persistent. The evidence for asymmetry is significant. As γ_3 is significantly positive, we can conclude that negative innovation in the market has greater impact in comparison to positive innovation of the same magnitude. Volatility spillover effects of all the regional, i.e., Taiwan (θ_{tai}) and Hong Kong (θ_{hk}) as well as international markets, i.e. USA (θ_{us}) remained insignificance. Turning to the empirical findings on effect of short trading on volatility, which is our main interest here, we can confidently conclude that the short selling reduced the volatility in the market as γ_4 is statistically significant and negative at 1% level of significance. Two important points are worth mentioning here. First short selling was allowed in China during the time of global financial crisis when markets all over the world were under downward pressure. It is generally argued that short sellers depress the market further during bearish times but this argument has significantly been proven false at least in the China's stock market. Second, purpose of using TGARCH model was to check the impact of the short selling on volatility during falling markets (TGARCH term is multiplied with short selling dummy "$D_t I_t \varepsilon_{t-1}^2$") so once again this is evident that when markets plunge, short selling decreases the market volatility and plays its part to stabilize the market.

4. Conclusion

This paper contributes to the debate on effect of short selling on volatility of stock market. Our empirical results show that when market falls, short selling has a counter effect on volatility. Our analysis also shows that investors' response to information is also changed. Previous research on Chinese market by **Yeh and Lee (2000)** showed good news seeking behavior of investors in China but as China stock markets are now opened to international investors, information asymmetry exists in the market. Furthermore, global financial crisis has a negative effect on the Chinese market but this effect is not very large as for as its magnitude is concerned. Chinese markets are being affected by regional markets positively but negatively by the international markets. Argument by **Bohl. M. T. et al (2010**) that Day-of-the-Week analogy can be attributed to absence of short selling is also nullified by our results as this analogy still persists in the market. Our findings validate reforms of Chinese regulators to allow short selling. It played a positive role in stabilizing the market even during the time of global financial crisis. Furthermore investors find it beneficial as they can build their portfolios after considering dampening effect of short selling on their risk. Further research can be conducted on China's unique data set to check the causality relationship between short

selling and volatility. A study can be conducted to know the effect of companies' performance on short selling. Effect of short selling on intraday volatility in the Chinese market is another future research area.

5. References

[1] Boehmer, E., Jones, C. M., Zhang, X. (2008). Which Shorts are Informed? *The Journal of Finance*, 63 (2).

[2] Bohl, M. T., Essid, B., Sikols, L.P. (2012). Do short selling restrictions destabilize stock markets? Lessons from Taiwan. *The Quarterly Review of Economics and Finance*, doi:10.1016/j.qref.2012.02.001

[3] Bohl, M. T., Schuppli, M., Siklos, P.L. (2010). Stock Return Seasonalities and investor structure: Evidence from China's B-Share markets, *China Economic Review* 21 (2010) 190-201.

[4] Bollerslev, T. (1986). Generalized Autoregressive Conditional Heteroscedasticity. *Journal of Econometrics*, 31,307-327.

[5] Glosten, L. Jagannathan, R & Runkle, D. (1993). On the relation between the expected value and volatility of the nominal excess return on stocks. *Journal of Finance*, 48, 1779-1801.

[6] Lilai, X., Oh, K. B. (2011). The stock market in China: An endogenous adjustment process responding to the demands of economic reform and growth. *Journal of Asian Economic*s, 22, 36–47.

[7] Miller, E., (1977). Risk, Uncertainty and Divergence of Options. *Journal of Finance*, 32(4), 1151-1168.

[8] Yeh, H.Y., and Lee, S. T. (2001). The interaction and volatility asymmetry of unexpected returns in the greater China stock markets. *Global Finance Journal*, 11, 129-149.

[9] Zhou, K., Wong, S.C.M. (2012). Impact of Short Selling on China Stock Prices. *Handbook of short selling*, Academic Press, Elsevier Inc. (pp. 269-278).