The Lahore Journal of Business
9 : 1 (Autumn 2020): pp. 59–85

Noise Trading and Single Stock Futures: Modifying Sentana & Wadhwani's Model

Imran Riaz Malik[*], Attaullah Shah[**]

Abstract

Derivatives, and their influence on the dynamics of underlying stock markets, is an interesting topic of debate, which predates their introduction. The unresolved influence of derivatives on their underlying stock markets still intrigues many. In this regard, researchers/stakeholders are still curious about the (de)stabilizing influence of derivatives on the overall market. In disposition of these observations, two contradicting hypothesis have been studied widely and have remained the focus of attention in several theoretical and empirical studies. These hypotheses are explained in several ways. Among many, one explanation refers to the destabilizing influence of derivatives, due to the enhanced involvement of noise traders, after the introduction of derivatives. This aspect remains the topic of discussion for this study. After the formal introduction of the SSFs (Single Stock Futures) in Pakistan, this topic became a cause of concern for the stakeholders of this market as well. Hence, this study attempts to tap into this aspect of the de(stabilization) debate, by proposing a modified version of the famous Sentana & Wadhwani (1982) model. In order to tap the potential shortcomings of the S&W model, this study contributes to the extant literature in several ways: 1) It adds the feature of trading volume in the model to analyze and study the potential movement of noise traders from spot to futures market, due to the ease of trading that the futures markets offer, 2) the new, modified model adds a lagged term for returns in order to tap the potential asynchronous inefficiencies, 3) it considers the Generalized Error Distribution (GED) instead of the Gaussian Distribution, in order to realize the fact that returns are not normally distributed. Generally speaking, the modified version of the model not only extends the original model in terms of its explanation, but also empirically tests this aspect in the Single Stock Futures (SSFs) market of Pakistan. This model tested whether SSFs promote, or inhibit the noise trading post-SSFs. After putting it to test, the newer model did not report any negative or positive impact of the introduction of SSFs on the underlying stocks. This may conclude that the proclaimed (de)stabilizing role of the SSFs, in the context of Pakistan, is not justified. This may also imply that the

---

[*] Director Research/Associate Professor of Finance at IQRA University Islamabad Campus, Islamabad, Pakistan.
[**] Associate Professor of Finance at Institute of Management Sciences, Peshawar, KPK, Pakistan.

stringent regulatory frameworks, post the Global Financial Crisis, (GFC) for the resumed SSFs, are not justified and require revision.

Keywords: Noise trading; SSFs, S&W model, leptokurtic.

JEL Classification: G13, G14, G15, G17

1. Introduction

It is widely accepted that the enhanced regulations can never completely eliminate the risk that trickles down and is inherited due to economic activities (Kuprianov, 1995). The extant literature of financial economics consists of comprehensive discussions on the different aspects, and forms of risk. These discussions include, for example, the nature of the risk, different forms and their interconnectedness with other market dynamics etc., and the very reason of its existence, and how to reduce it, to highlight a few. The risk associated to the financial markets is often termed as volatility. The debate on this topic comes into the lime light whenever the market witnesses a severe form of volatility. When it comes to exposing the inherent nature of risk averse investors (individual or institutional), the volatility in the prices of assets of interest, tends to be a factor that causes unrest for them. Risk, volatility, destabilization are the common terminologies that are often used interchangeably in the literature that concerns this topic. Therefore, this study follows the same approach.

When it comes to observing and analyzing the activities of noise traders and futures markets, the extant literature that will help to connect the missing dots is scarce. Since their introduction in the late 1970's, the futures markets and their (de)stabilizing impact has remained a topic of attention for the concerned stakeholders of the market. Due to the importance of the futures markets, and their potential ability to destabilize the market, researchers have tried to give this area of study critical importance. The futures markets act as the stimuli that affect the trading behavior of the market participants. Broadly speaking, the rational and irrational speculators[1] are the categories of traders that trade in the markets. In this context, rational speculators base their investing decisions on the accounting and/or economic fundamentals. On the other hand, irrational investors, often termed as noise traders, make their decisions based on the market noise (Black, 1986). They often make use of

[1] The terms irrational speculators and noise traders are used interchangeably throughout this manuscript, while positive feedback trading and negative feedback trading defined as different forms of noise trading.

technical analysis tools to identify the trends and patterns in the market. The strategies used by noise traders could be fragmented and simplified down to two simple classifications - positive feedback trading strategies, and/or negative feedback trading strategies. One common aspect of these trading strategies lies in their ability to follow the trend chasing strategies. If an investor buys stocks on uptick and sells on downtick, it is referred to as positive feedback trading strategy. On the contrary, if an investor buys on downtick and sells on uptick, it is termed as negative feedback trading strategy. The probability that the activities of the feedback traders will deteriorate the market functioning is higher than the vice versa happening. Research has established that the presence of noise traders provides liquidity to the market, while also being an anecdote to market destabilization. This aspect is the baseline that is set when it comes to the stabilization and destabilization hypothesis concerning the futures markets.

The interaction of rational and irrational traders stimulates the price movements. Moreover, the activities of rational traders are supposed to stabilize the market in terms of the reduction in the volatility, which might be the result of noise trading (De Long, Shleifer, Summers, & Waldmann, 1990). Yet, this phenomenon might not always be this common. It seems plausible that the interaction of rational and irrational traders may trigger the movement of prices towards or away from their intrinsic values. In this situation, there is a possibility that irrational traders may liquidate their position, which will return the prices to the level of equilibrium (Delong et al., 1990b). The interaction of rational and irrational investors is modelled by Sentana and Wadhwani (1992), who introduced, and laid the basis of the heterogonous trading model. This model observes and identifies the activities of noise traders. By use of this model for the US market, they identified positive feedback traders who actively influenced the market.

Several studies (Cutler, Poterba, & Summers, 1990; De Long et al., 1990a; Lebaron 1992; Shiller, Fischer , & Friedman, 1984, Shiller, 1990; Thaler, 1999) model the activities and the interaction of utility maximizers and noise traders. The work of the aforementioned authors led Sentana and Wadhwani (1992) to formulate a new framework, which is famously known as the heterogeneous trading model. This model concurs and then describes that autocorrelation is synonymous to the presence of the feedback traders. Furthermore, this model also links autocorrelation with volatility, which implies that the presence of feedback traders can be correlated with the instability in the market. Following this line of observation and arguments, this paper is an attempt to propose a newer model that investigates the association of the migration of feedback traders with the (de)stabilization hypothesis. It is noteworthy that the current S&W model does not discuss the migration/transfer of investors, who follow feedback trading strategies, and tend to associate it with the introduction of futures markets. This scenario leaves ample room for the contribution that this study aims to make. In a jest, the objective of this study is to look for migration of feedback traders in post-futures period from the spot market to futures markets, and it also attempts to observe whether this particular migration of traders stabilizes the spot market or not. This study modifies S&W's (1982) model by adding the features and measures to observe the migration of feedback trading activities from one market to another, by referring to and making use of the concept of trading volume. This study highlights Sharpe (1964) and Lintner's (1965) CAPM framework for rational traders, instead of referring to the mean-variance equation, which has been used by the original version of the SW's model, so as to depict the behavior of a rational investor. The CAPM framework by Sharpe (1964) and Lintner (1965) is better in the sense that they make presumptions about the existence of the risk free rate for efficient portfolio diversification, as well as the consensus on the distribution of stock returns. Hence, using the CAPM framework will help us better understand the phenomenon of migration of feedback traders from one market to another, and the corresponding (de)stabilization that is caused due to this.

There are several studies that make use of the first and the second order moment of the distribution of stock prices in order to check the aspect of derivatives markets and (de)stabilization hypothesis. Although the use of first moments helps in predictability, at the same time, it lacks the ability to explain the change in the efficiency aspect. Recent studies mostly refer to the second moment in order to measure the change in volatility, and interpret the increase in volatility as de-stability. The change in volatility observed by using the second moment could be attributed to noise trading, and not to the prompt arrival of critical information. This study contributes in the literature that pertains especially to derivatives by attempting to validate the hypothesized association of migration of feedback, with the (de)stabilization in the underlying market. An increase in the feedback trading is expected post-SSFs if, and only if, the presumption of the use of SSFs by positive feedback traders is held true. Also, if volatility experiences an increase post SSFs, this would support the idea that that the introduction of SSFs brings upon de-stability in the market. On the contrary, if the utility maximizing agents use the SSFs for arbitraging activities, which may help in bringing the stock prices close to their intrinsic values, then positive feedback trading should ideally experience a decrease, post SSFs. This result would be in support of the claim (Cox, 1976) that future markets tend to provide an additional route of information. And, the simultaneous increase in the volatility will affirm the argument (Ross, 1989) that the futures market helps stabilize the overall market. To do the same, this study makes use of a framework that associates the autocorrelation patterns with volatility. The autocorrelation pattern could be the results of market frictions, and/or the strategies followed by feedback traders. This is an aspect that is also considered in the proposed model in this study. Thus, this model accounts for market frictions as well as the measure of feedback trading strategies. The research questions arising from this discussion are: Does the introduction of SSFs serve as a catalyst for noise traders to migrate from spot markets to futures markets? And, do these migration changes destabilize their counterparts?

Once the SSFs were introduced in Pakistan Stock Exchange (PSX) in July 2001, the stakeholders of the futures markets showed their concern with regards to their influence on the overall market. In this context, when the role of the hedging instruments, after banning of short selling was taken into consideration, the SSFs were looked upon as a benefitting instrument in the market. This led to immense trading activity in these instruments between the years of 2004 and 2005. To the extent that the SSFs constituted about 40 to 50% volume of the overall market. It is imperative to understand that the futures markets are easy to trade in. They have low transaction costs, which tends to attract noise traders. With this ability to attract noise traders, it also creates problems for the regulators of the market. Obviously, in order to present efficient and un-exploitable trading opportunities, the market makers have to observe and direct the market mechanism. Interestingly, the same happened in PSX, after it witnessed a crisis in 2005 and 2008. The market participants, and the other observers started blaming the nature and trading tactics of the noise traders in the market. This scenario occurred in response to the influence of national/ international crisis at that time. This observation is also based upon some previous empirical evidences that came into the lime light, as concurred by Bohl and Siklos (2008). They claimed that the frontier and emerging economies usually more likely to fall prey to the activities of the noise traders, as compared to the economies of developed countries.

After freezing the futures markets during the Global Financial Crisis, and the overall market for quite some time, the resumption of market had a new story to tell. The SSFs were resumed, but with strict regulations in comparison to the former ones. The strict regulations appear to be the resultant of the operational drag/ or overprotective attitude by the Pakistan Stock Exchange. The resumed SSFs, but with strict regulations, not only hamper the futures ability to provide liquidity, but also shatters its image as an effective risk hedging tool. On the other hand, the natural settings provide a situation to study the role of the futures' markets, with respect to their ability to engage noise traders and their activities. Initially, a few studies[2] were conducted in order to observe and check the role of the stringent regulations on the resumed/new SSFs, from different dimensions. These studies showed a beneficial impact of the futures during the time of the crises. This leads us to raise another question, with respect to the role of the former SSFs, during the deteriorating time of the PSX in 2008. Hence, with this disposition, this study is also an attempt to investigate the stability impact of the parallel SSFs on the underlying stocks, with an old model that is modified for its value in this natural experiment. The study achieves this objective by taking a sample of the SSFs and non-SSFs in PSX, at the time of their introduction in July 2001. By applying the modified version of the S&W model, this study tested the potential movement of the noise traders from spot to futures markets. This is considering these traders in their capacity as individuals who may decrease the volatility in the underlying stocks, post-SSFs. This study concludes that there is no convincing evidence of the migration of noise traders from spot to futures markets. Therefore, the study concludes that the introduction of SSFs cannot be attributed to the change in volatility in the underlying market. Hence, the stringent regulations for the newer SSFs are not justified. These results will be helpful to SECP and KSE in reviewing the regulations for the newer, yet under-explored status of the futures markets in Pakistan.

The organization of this paper is as follows: The review of futures markets (SSFS, index futures and USFs), noise trading, trading volume and volatility dynamics are summarized in section 2. This is followed by section 3, which elaborates the data and methodology of the paper, while extending/modifying the S&W model. Section 4 critically reviews the analysis of the results. Conclusion and policy recommendations for the SECP and PSX are provided in section 5.

---

[2] Malik, Shah and Khan (2019; 2013, 2012), Malik and Shah (2018, 2017, 2016, 2014) Khan, Shah and Abbas (2011) and Khan (2006)..

2. Review of Relevant Literature:

This section provides an insight into the extant literature written on the topic which revolves around the different aspects of futures markets, and their influence on the spot market. The history of evolution of futures markets shows scarce work done on the topic under consideration. Although the discussion undertaken in the previous studies predates the introduction of futures, yet shown exponential growth after the formal introduction of futures markets with respect to some areas than others. The main argument that is linked with the introduction of the futures market is its potential for (de)stabilization of the market. Owing to a variety of reasons, this potential for (de)stabilization has been hypothesized and tested in different markets, from different dimensions. Theory suggests that apart from providing liquidity, the presence of the futures markets attract noise traders, mainly due to their lucrative characteristics. Noise traders possess a strong tendency to increase the volatility of the market. Another argument (Cox 1976; Ross, 1989) elaborates that since the futures provide an alternative route of transferring information to the spot market, they should ideally be considered beneficial for the market. This benefit comes into play as the existence of the futures tend to act as a stabilizing agent, which helps to increase the market efficiency. These contradicting theories require empirical testing, for them to hold true and serve as a basis for effective policy making.

The following sections provide the details needed to understand the theoretical underpinnings, and main aspects of the model. The first section, named "Autocorrelation and feedback trading", puts forth the revelation that autocorrelation patterns in the stock returns represent the presence of feedback traders in the market. The studies included in this section show the chronological evolution of this argument. The second section describes that these feedback traders are the main reason for the de-stabilty experienced by the market. The studies added in this section also provide empirical evidence of the linkages that exist between the presence of noise traders, and the destabilization of the market. The third section is based on the Lead-Lag Relationship between the spot and the futures markets. The studies included in this section are aimed at identifying the leading and lagging markets that exist among the spot and futures markets. Since the trading volume is added in this study to fathom whether these noise traders migrate from spot to futures markets, the next section titled as Autocorrelation, Volume and Volatility, is added to observe the linkages among these three terms. This discussion is critical in order to understand the S&W model, as well as its modified form, which is the core concept of this manuscript.

2.1. Autocorrelation and Feedback Trading:

The studies show that autocorrelation patters can be a result of feedback trading strategies that are being adopted by individual, and institutional investors, in any financial market. The positive and negative autocorrelations have their particular interpretations in the context of the matters that pertain to the discipline of finance. They can show movement away and the movement towards the ideal equilibrium point. This study links the futures markets with the activities of the feedback traders, and the destabilization caused by them. Thus, this is the reason why the model proposed in this study takes into consideration the market frictions and the feedback trading activities, separately, and then incorporate them in the model accordingly and appropriately. This helps us identify the nature of the noise traders that the market deals with, and their potential impact on the underlying market as well.

Some of the studies that were found to be relevant tended to shed light on the association of autocorrelation with feedback trading. For example, Vetale (2000) commends that noise trading activities follow trend chasing strategies. As mentioned earlier, previous work gauges feedback trading through the autocorrelation of stock returns, and the studies of LeBaron (1992) and Campbell, Grossman and Wang (1993), along with many others, reflected this for the US market. The extant literature written about financial futures presents different conceptual frameworks that show the evolution, and the presence of feedback trading strategies, especially when considering the concept of asset prices. These studies are typically built upon one another, and the theories presented in them are interlinked. Various studies on the discipline (Cutler et al., 1991; Shiller et al., 1984) validate the presence of autocorrelation in the asset prices, and argue that this confirms the presence of feedback trading strategies. On the other hand, there are also a few studies that attempt to link autocorrelation patterns with the changes in volatility. For example, LeBaron (1992) made use of mean and variance equations to indicate that the values of autocorrelation change with volatility. This implies that feedback trading strategies may possibly be linked with destabilization in the market. This relationship is discussed and validated in other studies[3] as well. Hence, the model of S&W is also an extension of this relationship.

[3] Xie, C., Zhu, Z., & Yu, C. (2012).

2.2. Noise Trading and Destabilization:

Extant literature presents a few studies[4] that have attempted to provide evidence of the existence of linkages between noise trading and volatility. For example, Hou and Li (2014), Antoniou, Koutmos, and Pericli (2005) and Antoniou et al., (1998) studied the futures markets, and linked them with volatility and feedback trading. They support the notion that the futures markets stimulate the influence of rational traders, over irrational ones. When taking into consideration the concept of index futures, Koutmos (2002) affirms that the investors in futures markets are actively involved in feedback trading strategies. Recently, Antoniou et al. (2005) used Sentana and Wadhwani's (1992) framework to re-confirm the association that exists among the various feedback trading strategies and the simultaneous destabilization caused in the six countries that are inn question. By using the index data of these countries, they show a decrease in the feedback trading, post the introduction of index futures. Similarly, Antoniou, Koutmos and Pescetto (2011) have also tested Shiller's (1990) hypothesis to test the memory of feedback traders, and affirm that they indeed possess a longer memory time. Recently, Chau, Holmes, and Paudyal (2008) also provided limited evidence of investors following feedback trading in the Universal Stock Futures (USFs), for both pre- and post-USFs. They argue that futures stabilize the market by reducing the activities carried out by of noise traders.

2.3. Lead-Lag Relationship and Futures Markets:

Various empirical analysis are still being conducted in the active markets around the globe in order to understand the solid foundations for futures' role, in influencing the underlying market. The first strand of the studies[5] analyzed focus on the aspect of lead-lag relationships. For example, a few studies[6] favor futures markets over spot markets when it comes to leading the overall market, and they also have their plausible explanations to it. On the other hand, a few studies[7] have found evidence that is contradictory to this, and show that futures do elevate the volatility in the market. Because futures have some inherent flexibilities for investors, they absorb and process information quicker than their

---

[4] Alan, N. S., Karagozoglu, A. K., & Korkmaz, S. (2016), Miles, S. (2013), Gregory, R. P., Rochelle, C. F., & Rochelle, S. G. (2013)

5 Ullah, H., & Shah, A. (2013), Kang, S. H., Cheong, C., & Yoon, S. M. (2013), Jamal, N., & Fraz, A. (2013).

6 Stoll & Whaley (1990) and (Kawaller, Koch, & Koch, 1987), Xu, F., & Wan, D. (2015).

7 Antoniou et al (1998) and Antoniou and Holmes (1995)

counterparts. Albeit, this could lead to market destabilization as well, which at times may be called economical destabilization. They explain the phenomenon of increased volatility after the introduction of futures as an act to provide the underlying market with an additional route to derive the information, thus supporting the work of Ross (1989). On the other hand, it is argued[8] that derivatives do not destabilize the market (Bohl, Diesteldorf, & Siklos, 2008; Edwards, 1988a, b; Schwert, 1990). In an attempt to conclude this enigma, Kumar and Mukhopadhyay (2007) conclude that the futures do change the structure of volatility. This discussion is still an ongoing debate in the academic circles of the relevant concerned parties.

2.4. Autocorrelation, Volume and Volatility:

As this study adds a new variable to evaluate the actual migration of feedback traders from one market to another, it is important to review a few studies[9] that have taken care of trading volume, as an influence in this framework. When it comes to testing the relationship between trading volume and volatility, Gygax, Henker, Liu and Loong (2008) tried to establish that they have checked the specific movement of noise traders in the spot and futures markets. They reported a decrease in the trading volume and volatility after the SSFs contracts' had been listed. Taking into account several markets, Chen, Firth and Rui (2001) came up with the empirical evidence of the existence of a relationship between the trading volumes and the change in the structure of volatility. In the same manner, Girard and Biswas (2007) also found a negative relationship among the stated variables, when studying the emerging and mature markets. Moreover, evidence of this has also been shown by Chen and Daigler (2008), who attempted to empirically observe the association between the trading volume and the structure of volatility. Their findings show similarities with some older studies that date back to the decades of the 80's and 90's. Furthermore, there are some other studies as well, which aim to run the empirical checks to find any similar aspects in other respective economies. For example, while studying this relationship across the introduction of different futures markets, Danielsen, Van Ness and Warr (2009) reported similar results as discussed before. They established that it is the futures markets that attract the short selling activity from spot to futures markets. These studies depict that there exists a relationship between volume and volatility as well. Recently,

8 Ergen, I., & Rizvanoghlu, I. (2016),
9 Xu, C. (2014), Siddiqi, M. F., Nouman, M., Khan, S., & Khan, F. (2012)

Foucault, Sraer and Thesmar (2011) concurred that the trading activity (trading volume) of noise traders is related with the volatility in the market. The addition of trading volume in the S&W framework is expected to help in the identification of the migration of feedback traders. Moreover, it is also going to help gauge the moderating impact of volatility, especially in the presence of feedback traders.

When it comes to the relationship between autocorrelation and trading volume, Laopodis (2005) and Campbell et al. (1993) concluded that the autocorrelation increases as there is a decline in the trading volume. These findings are in accordance with the trading behavior of rational traders, in the sense that they accommodate the destabilizing behavior of irrational traders. Change in the demand for stocks by noise traders can occur in both low and high frequencies. High frequency shifts in demand are signaled by the daily trading volumes. With the help of volume, the changes in demand at lower rates cannot easily be detected because there could possibly be some other reasons for specific trends in volume to prevail e.g. deregulations of commissions, institutional trading, etc.

The literature review suggests that this framework has been studied in different fragments, within different markets, over time. From these fragmented pieces of work, this study formulates and provides a new framework that links all the above mentioned aspects. This will help in the formulation of an extended theoretical framework, as well as new a methodological dimension to study this aspect, in the domain of interest.

3. Data & Methodology:

SSFs were introduced in Pakistan in middle of the year 2001. On the onset, only 10 stocks made it through to be recommended for trading on the futures market. This later on accumulated to 46 stocks, up until the era of GFC hit the Pakistani market as well. It is the prerogative of the Securities and Exchange Commission of Pakistan (SECP), and the PSX that they can review and revise the trading regulations for Pakistan's financial market as a whole. Also, it must be known that these decisions are reviewed and re- implemented after every six months. These revisions essentially decide the fate of a stock, for its trading on and off the market. This paper considers only those stocks, for which two years' worth of data is available for both sides of the contract's listing date. Since every SSF has a different introduction date, the accumulation of the data ranges from 1999 to 2008. This study includes data that spans over the period from June 1999 to March 2008. The input variables for the model are the daily closing prices, trading volumes and the risk-free rates. Moreover, this study uses high frequency data of the daily closing prices and the trading volumes. Also, these variables are collected for both SSFs, and non-SSFs. This criterion to collect this specific data was met by 23 SSFs stocks only. To take care of the accuracy of the risk-free rate, 3 month's T- bill rates were taken into consideration. Information of the bi-monthly RFR are available with State Bank of Pakistan (SBP). There was a possibility that the endogeneity bias would occur if we only used the main sample for SSFs, therefore, this study made use of the control samples as well. This was done by selecting the non-SSF against each of the SSF's considered. This activity is called control sampling. The criterion used for the selection of the control sample is to take a measure of the firm size, trading volume, and sector, with respect to the event date of SSFs. The selection of SSFs over the index futures owes to the following two aspects. Firstly, the data that is based on the index futures is not available for the period under study. Secondly, as mentioned by McKenzie, Brailsford and Faff (2001), unlike the SSFs, the direct trade of index futures is not empirically possible. Furthermore, it is easier to alter the regulations of SSFs, as compared to those of the index. The daily prices are converted into daily returns in order to avoid the issue of stationarity.

In order to answer the aforementioned question, the following empirical model was extended[10] on to the framework of the S&W model. The proposed model checks the validation of whether the volatility structure changes in the underlying stocks, owing to the corresponding SSFs contracts' listings. The algebraic expression of the proposed model is as follows:

$$ER_{it} = \propto + \beta_1 VarER_{it} + \{\varphi_{0,1} + \varphi_{0,2}(D_t)\}ER_{it-1} + \{\varphi_{1,1} + \varphi_{1,2}(D_t)VarER_{it}ER_{it-1} + \{\varphi_{2,1} + \varphi_{2,2}(D_t)\}Vol_{it} + \varepsilon_t;\ \ \varepsilon_t \sim N, t, or\ GED(0, \sigma_t^2) \tag{3.1}$$

This equation is different from that of the S&W model in the sense that it makes use of the trading volume in order to analyze whether there is a migration of feedback traders from one market to another. The following variance equation is used to observe the changes in the volatility structure after the introduction of SSFs.

$$\sigma_t^2 = \alpha_{0,1} + \alpha_{0,2}D_t + \alpha_1\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2 + \delta X_{t-1}\varepsilon_{t-1}^2 \tag{3.2}$$

---

[10] The workings of the derivation of this equation are not added in this paper. The derivation of the model can be obtained from the authors of this study.

This variance equation is called the GJR-GARCH process, which is used to study dynamic volatility. This study makes use of the non-parametric WSRT and MWUT for further analysis, which summarizes the results of the regression for each stock.

4. Results

The results of this study are presented in the form of descriptive and inferential statistics. The first two tables (Table 1 & 2)[11] show the descriptive statistics of this study, while the remaining tables show the inferential statistics of the study.

The proceeding tables (3 and 4) show if there exists an ARCH effect in the series of return or not. The coefficients of the proposed model are as follows: $\propto, \beta_1, \varphi_{0,1}, \varphi_{0,2}, \varphi_{1,1}, \varphi_{1,2}, \varphi_{2,1}, \varphi_{2,2}\ \alpha_{0,1}, \alpha_{0,2}, \alpha_1, \beta, \delta$. These coefficients are tested for their statistical significance. The general overview affirms the use of the GARCH model with GED distribution.

The results of the SSFs and non-SSFs are presented in Table 5. It is observed that the average returns of SSFS, as well as non-SSFs are negative for the values of $\varphi_{0,1}$ and $\varphi_{0,2}$. Twenty two percent of the SSFs are significant with a negative sign for $\varphi_{0,1}$, while only one stock (i.e., MCB) possesses a positive sign, while twenty six percent of the SSFs are significant for the value of $\varphi_{0,2}$. The market frictions measured for the values of $\varphi_{0,1}$ and $\varphi_{0,1} + \varphi_{0,2}$ are -2.25 (0.02). This result shows that the market frictions are not same in pre- and post-SSFs market conditions. Moreover, twenty three percent of the non-SSFs are significant, with a negative value for $\varphi_{0,1}$, while only two stocks (i.e., Dawood and Pkdata01) carry a positive sign. Furthermore, eighteen percent of the non-SSFs are significant, with a negative value for $\varphi_{0,2}$, while only two (i.e., sel and shell) stocks carry a positive sign. The market frictions measured for $\varphi_{0,1}$ and $\varphi_{0,1} + \varphi_{0,2}$ are -.05 (0.10). These values reveal that the market frictions are not the same in pre- and post- market conditions of non-SSFs. The results of the MWUT show a value of 0.05 (0.96). This value is sufficient for us to believe that the change for both SSFs and non-SSFs can be considered to be the same.

The coefficients $\varphi_{1,1} and\ \varphi_{1,2}$ are used to measure the effect of the feedback trading strategies. The average values of both $\varphi_{1,1} and\ \varphi_{1,2}$ are positive, as denoted in the relevant table. It can be observed that the value

[11] These tables (3 & 4) could be obtained from the authors of the study.

of $\varphi_{1,1}$ is insignificant for all the cases, yet the value of $\varphi_{1,2}$ is significant for only one non-SSF. The results of the SSFs show that there is no change in the feedback trading level from the market conditions that were pre to post SSFs. This could be confirmed from the WSRT value of -1.34 (0.18), for the pre and post coefficients of $\varphi_{1,1,}$ *and* $\varphi_{1,1,} + \varphi_{1,2}$. Moreover, the averages values for $\varphi_{1,1}$*and* $\varphi_{1,2}$ are also positive in nature. It is obvious to note that twenty three percent of the stocks are negative and significant for the value of $\varphi_{1,1}$, while only one stock (i.e., shell) shows a significant and positive value. Moreover, eighteen percent of the stocks show a positive and significant value for non-SSFs for the value of $\varphi_{1,2}$, but eighteen percent of the stocks show a negative sign, and are significant for the value of $\varphi_{1,2}$. The study employed MWUT in order to test whether SSFs actually promote the feedback traders, or do they behave otherwise. The MWUT value for this test is -0.50 (0.62). This value can be deemed enough to refute the claims against SSFs parallel standing with noise trading.

The movement of feedback trading activities from the underlying stocks to SSFs is measured through the values of $\varphi_{2,1}$and $\varphi_{2,2}$. It can be observed in the tables that the averages for these coefficients are near zero. The results of the non-parametric WSRT test show that there is no change in the feedback trading activities from pre- to post-SSFs. This implies that there is no change in the feedback trading activities from pre- to post-SSFs, in the underlying stocks. The coefficient $\varphi_{2,1}$ is significant for ninety one stocks, while sixty one percent of the stocks are significant for the value of $\varphi_{2,2}$. This shows that a good percentage of stocks are statistically significant for the variable of interest. A similar scenario is observed for non-SSFs. The average values for $\varphi_{2,1}$and $\varphi_{2,2}$ are positive, and near zero. However, eighty two percent of them are positive and significant for the value of $\varphi_{2,1}$. Similar results are also obtained for the value of $\varphi_{2,2}$. This shows that eighty-six percent of non-SSFs are statistically significant for this particular coefficient. Again MWUT is used to check the statistical significance of change in the trading volume (attributed to migration of feedback trading activities due to the introduction of SSFs). The estimates show that the changes experienced in the post-SSFs period, corresponding to post-non-SSFs, is insignificant. This leads us to believe that the introduction of SSFs are not the reason for the migration of the feedback trading activity from spot to futures market. There might be some other reasons as well, which are brought into the focus of this study. These reasons can be studied separately in the future studies.

This paragraph discusses the change in the volatility coefficients from pre- to post-SSFs periods, for both SSFs and non-SSFs. This unconditional volatility in the variance equation is used as the coefficient in order to observe the destabilizing impact. As a general observation, again the averages are near zero from both the dimensions (negative and positive). For the purpose of validating the potential changes in the pre- to post-SSFs, again the non-parametric WSRT is used on the values of $\alpha_{0,1}$ and $\alpha_{0,1} + \alpha_{0,2}$. The results reveal that the introduction of SSFs neither stabilized, nor destabilized the underlying stocks. It is interesting to note that a hundred percent of the SSFs stocks are significant, yet only thirteen percent have a significant value of $\alpha_{0,2}$. In the case of non-SSFs, the scenario does not deviate much. As is obvious in Table 5, eighty six percent of non-SSFs show significant volatility, yet only twenty three percent have a significant $\alpha_{0,2}$. This coefficient is also analyzed by the WSRT for recording the changes across the introduction of SSFs, for non-SSFs stocks. The probability value shows that the changes across non-SSFs, against the contracts' listing dates is also insignificant. Finally, the non-parametric value of MWUT reveals that unconditional volatility in post periods for both the panels is the same, and no statistically significant difference is identified. This implies that it is a challenging task to link the concept of the migration of feedback trading, to the changes in the dynamics of volatility of the futures market. The claim of stakeholders of the market is thus nullified, and strict regulations for newer SSFs do not make their valid case.

It is interesting to note that the literature is scarce when it comes to checking the ability of futures in the promotion/inhibition of noise trading. Only a few studies exist that are relevant to this critical aspect. The results of this study contradict the results of Chau et al. (2008). They show that USFs reduce the potential impact of noise traders, which means that futures stabilize the market by promoting rational traders to trade in the market. In another study, Chau et al. (2011), report that noise traders are a part of ETFs, in the overall trade in the US market. The results of this study are also in contrast to the observations of Antoniou et al. (2005). Unlike the studies of Chau et al. (2008) and also in the case of this very study, they blame the index futures to be the main reason for the increase in noise trading. They believe that in developed economies, the futures markets can stimulate the destabilizing impact of the futures markets. It is interesting to note that the feedback trading strategies are considered to be more prominent in emerging and frontier markets, as was substantiated by the observations of Bohl and Siklos (2008). However, this seems not to be the case in PSX.

5. Conclusion and implications:

This paper contributes to the existing literature by extending the work of the S&W model. The model takes care of the migration effect of feedback traders from futures to spot market, and the non-normal behavior of stock returns. The migration effect confirms the hypothesis that it is the feedback traders, who are the actual reason of (de)stabilization of the market. Whereas, taking care of the non-normality of the data improves the estimation performance of the model. Furthermore, the evidence for these results is taken from an economy that has already observed the introduction and resumption episode of SSFs. Stringent regulations implemented on the notion of the activities of noise traders make it a perfect case for the testing of a newer and improved model. As part of the N11 countries, Pakistan has also shown a bright potential to become a better and more prosperous economy. After taking a lead from the studies conducted for the resumption episode of SSFs, this paper investigates the influence of noise trading on the financial markets of Pakistan, with the introduction of SSFs. The results have shown some new insights that will be helpful in the decision making processes of investors and policy makers. Based upon the results of the study, the following conclusions can be drawn: Firstly, the results of the study do not provide any convincing evidence of futures markets attracting noise traders. The idea that noise traders may have moved towards SSFs is still doubtful. This is consistent with the notion that the banning of SSFs, and the stringent regulations by SECP and PSX for newer SSFs, needs re-establishment and revision. The stringent regulations appear to be the outcome of the operational drag (when any entity over reacts in response to the occurrence of an unfavorable event). This situation is confirmed for both the SSFs and the non-SSFs. This may also suggest that policy makers at SECP and PSX need to loosen the regulations for investors to consider investing in the markets and eventually attract economic growth. This will help in the provision of accessible liquidity to the market, alongside it being a hedging instrument as well. Secondly, the newer model has an advantage over the previous model. This model also shows whether or not the noise traders move from spot to futures markets. This addition in the newer model can help the analysts at SECP and PSX to determine the trading pattern/behavior of the noise traders in the market. This information can also be used for the purpose of awareness in the public, as well as the development and implementation of rules and regulations to nullify the negative impacts of noise traders. The same could also be said about the use of the non-normal GED distribution. Several studies have validated the fact that assuming or guessing the normal distribution of stock returns results in biased estimates. The use of other non-normal distributions improves the estimation performance of these econometric techniques. This aspect will be helpful for analysts who are associated with independent firms, as well as SECP and PSX. In the same vein, the original model did not consider the asynchronous trading patterns of the time series data that might have been understood as an indication of feedback trading in the previous model. This model also took care of that by adding a lagged term, hence, improving the overall estimation performance of the model. Therefore, it could be asserted that this study has important policy implications for independent analysts (mutual fund and pension fund managers etc.) and the regulatory bodies of PSX.

References:

Antoniou, A., Koutmos, G., & Pericli, A. (2005). Index futures and positive feedback trading: evidence from major stock exchanges. *Journal of Empirical Finance, 12*(2), 219-238.

Antoniou, A., Koutmos, G., & Pescetto, G. (2011). Positive feedback trading: evidence from futures markets. *Global Business and Economics Review, 13*(1), 13-25.

Antoniou, A., Holmes, P., & Priestley, R. (1998). The effects of stock index futures trading on stock index volatility: An analysis of the asymmetric response of volatility to news. *The Journal of Futures Markets* (1986-1998), *18*(2), 151.

Alan, N. S., Karagozoglu, A. K., & Korkmaz, S. (2016). Growing pains: The evolution of new stock index futures in emerging markets. *Research in International Business and Finance, 37,* 1-16.

Black, F. (1986). Noise. *The Journal of Finance, 41*(3), 529-543.

Bohl, M. T., & Siklos, P. L. (2008). Empirical evidence on feedback trading in mature and emerging stock markets. *Applied Financial Economics, 18*(17), 1379-1389.

Bohl, M. T., Diesteldorf, J., & Siklos, P. L. (2015). The effect of index futures trading on volatility: Three markets for Chinese stocks. *China Economic Review, 34,* 207-224.

Campbell, J. Y., Grossman, S. J., & Wang, J. (1993). Trading volume and serial correlation in stock returns. *The Quarterly Journal of Economics, 108*(4), 905-939.

Chau, F., Holmes, P., & Paudyal, K. (2008). The impact of universal stock futures on feedback trading and volatility dynamics. *Journal of Business Finance & Accounting, 35*(1-2), 227-249.

Chau, F., Deesomsak, R., & Lau, M. C. (2011). Investor sentiment and feedback trading: Evidence from the exchange-traded fund markets. *International Review of Financial Analysis, 20*(5), 292-305.

Chen, G. m., Firth, M., & Rui, O. M. (2001). The dynamic relation between stock returns, trading volume, and volatility. *Financial Review, 36*(3), 153-174.

Chen, Z., & Daigler, R. T. (2008). An examination of the complementary volume–volatility information theories. *Journal of Futures markets, 28*(10), 963-992.

Cox, C. C. (1976). Futures trading and market information. *The Journal of Political Economy*, 1215-1237.

Cutler, D. M., Poterba, J. M., & Summers, L. H. (1991). *Speculative dynamics and the role of feedback traders*. (No.w3243). National Bureau of Economic Research.

Danielsen, B. R., Van Ness, R. A., & Warr, R. S. (2009). Single stock futures as a substitute for short sales: Evidence from microstructure data. *Journal of Business Finance & Accounting, 36*(9-10), 1273-1293.

J. Bradford De Long, Andrei Shleifer, Lawrence H. Summers and Robert J. Waldmann (Aug., 1990a), *Journal of Political Economy, 98* (4), 703-738

J. Bradford de Long, Andrei Shleifer, Lawrence H. Summers and Robert J. Waldmann (Jun., 1990), *The Journal of Finance, 45* (2) 379-395

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1991). The survival of noise traders in financial markets. *Journal of Business*, 1-19.

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1990a). Noise trader risk in financial markets. *Journal of political Economy*, *98*(4), 703-738.

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1990b). Positive feedback investment strategies and destabilizing rational speculation. *the Journal of Finance*, *45*(2), 379-395.

Edwards, F. R. (1988a). Futures trading and cash market volatility: Stock index and interest rate futures. *The Journal of Futures Markets* (1986-1998), *8*(4), 421.

Edwards, F. R. (1988b). Studies of the 1987 stock market crash: Review and appraisal. *Journal of Financial Services Research*, *1*(3), 231-251.

Ergen, I., & Rizvanoghlu, I. (2016). Asymmetric impacts of fundamentals on the natural gas futures volatility: An augmented GARCH approach. *Energy Economics*, 56, 64-74.

Foucault, T., Sraer, D., & Thesmar, D. J. (2011). Individual investors and volatility. *The Journal of Finance, 66*(4), 1369-1406.

Girard, E., & Biswas, R. (2007). Trading volume and market volatility: Developed versus emerging stock markets. *Financial Review, 42*(3), 429-459.

Gregory, R. P., Rochelle, C. F., & Rochelle, S. G. (2013). Positive feedback trading: Google trends and feeder cattle futures. *Journal of Applied Business Research*, *29*(5), 1325-1332.

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

Gygax, A., Henker, T., Liu, W.-M., & Loong, K. W. (2008). *Migration of Trading and the Introduction of Single Stock Futures on the Underlying US Stocks.* Paper presented at the 21st Australasian Finance and Banking Conference in Sydney Australia.

Hou, Y., & Li, S. (2014). The impact of the CSI 300 stock index futures: Positive feedback trading and autocorrelation of stock returns. *International Review of Economics & Finance, 33*, 319-337.

Jamal, N., & Fraz, A. (2013). Relationship of Single Stock Futures with the Spot Price: Evidence from Karachi Stock Exchange. *Research journal of the institute of business administration karachi-pakistan*, *8*(1), 52.

Kang, S. H., Cheong, C., & Yoon, S. M. (2013). Intraday volatility spillovers between spot and futures indices: Evidence from the Korean stock market. *Physica A: Statistical Mechanics and its Applications*, *392*(8), 1795-1802.

Kawaller, I. G., Koch, P. D., & Koch, T. W. (1987). The temporal price relationship between S&P 500 futures and the S&P 500 index. *The Journal of Finance*, *42*(5), 1309-1329.

Khan, S., Shah, A., & Abbas, Z. (2011). Impact of Single Stock Futures Trading on Stock Price Volatility of Underlying Stocks: Empirical

Evidence from Pakistan's Stock Market. *Journal of Basic and Applied Scientific Research, 1*(11), 2000-2008.

Khan, S. U. (2006). Role of the Futures Market on Volatility and Price Discovery of the Spot Market: Evidence from Pakistan's Stock Market. *Lahore Journal of Economics, 11*(2), 107-121.

Koutmos, G. (2002). Testing for Feedback Trading in Index Futures: A Dynamic CAPM Approach. Available at SSRN: https://ssrn.com/abstract=314509

Kumar, K. K., & Mukhopadhyay, C. (2007). Impact of futures Introduction on Underlying Index Volatility Evidence from India. *Journal of Management Science (New York, USA), 1(1)*, 26-42.

Kuprianov, A. (1995). Derivatives debacles: case studies of large losses in derivatives markets. *FRB Richmond Economic Quarterly*, *81*(4), 1-39.

Laopodis, N. T. (2005). Feedback trading and autocorrelation interactions in the foreign exchange market: Further evidence. *Economic Modelling*, *22*(5), 811-827.

LeBaron, B. (1992). Some relations between volatility and serial correlations in stock market returns. *Journal of Business*, 199-219.

Lintner, J. (1965). The Valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistic*, *47*(1). http://dx.doi.org/10.2307/1924119

Malik, I. R. and A. Shah (2018). Single Stock Futures and their Impact on Risk Characteristics of the Underlying Stocks: A Dynamic CAPM Approach, *South Asian Journal of Management Sciences.12*(1), 46-6.

Malik, I. R. and A. Shah (2019). Gains and Costs Associated with Resumption of SSFs with Stringent Regulations: A Modified Approach, *Pakistan Business Review 20*(4), 953-970.

Malik, I. R. and A. Shah (2017). The Impact of Single Stock Futures on Market Efficiency and Volatility: A Dynamic CAPM Approach. *Emerging Markets Finance and Trade" 53*(2), 339-356.

Malik, I. R., & Shah, A. (2016). Resumption of Single Stock Futures (SSFs) with Stringent Regulations and their Impact on Risk

Characteristics of the Underlying Stocks. *Business and Economic Review*, *8*(2), 1-22.

Malik, I. R. & Shah, A. (2014). Investor behavior and future markets: A dynamic CAPM augmented GJR-GARCH process approach with non-normal distributions. *Pakistan Journal of Applied Economics in Volume 24* (2), 122-142

Malik, I. R., Shah, A., & Khan, S. U. (2013). Single Stock Futures Trading and its Impact on Feedback Trading and Volatility: A Case Study of Pakistan. *Forman Journal of Economic Studies*, *9*(2) 81-107

Malik, I. R. & Khan, S. (2012). Gains and Costs Associated with Introduction of Equity Derivatives: Empirical Evidence from Pakistan. In *eighth conference of Asia-Pacific Association of Derivatives (APAD)*. Busan, Korea.

McKenzie, M. D., Brailsford, T. J., & Faff, R. W. (2001). New insights into the impact of the introduction of futures trading on stock price volatility. *Journal of Futures markets, 21*(3), 237-255.

Miles, S. (2013). Constant-collateral pyramiding trading strategies in futures markets. *Financial Markets and Portfolio Management*, *27*(4), 381-396.

Ross, S. A. (1989). Information and volatility: The no-arbitrage martingale approach to timing and resolution irrelevancy. *The Journal of Finance*, *44*(1), 1-17.

Schwert, G. W. (1990). Stock market volatility. *Financial analysts journal*, 46(3), 23-34.

Sentana, E., & Wadhwani, S. (1992). Feedback traders and stock return autocorrelations: evidence from a century of daily data. *The Economic Journal*, *102*(411), 415-425.

Sharpe, W.F. (1964) Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *Journal of Finance, 19*, 425-442.

Siddiqi, M. F., Nouman, M., Khan, S., & Khan, F. (2012). Liquidity effects of single stock futures. *American Journal of Scientific Research*, 80, november 2012, ISSN, 2301-2005.

Shiller, R. J. (1990). Market volatility and investor behavior. *The American Economic Review, 80*(2), 58-62.

Shiller, R. J., Fischer, S., & Friedman, B. M. (1984). Stock prices and social dynamics. *Brookings Papers on Economic Activity, 1984*(2), 457-510.

Stoll, H. R., & Whaley, R. E. (1990). The dynamics of stock index and stock index futures returns. *Journal of Financial and Quantitative Analysis, 25*(4), 441-468.

Tarique, J. & Malik, I. R., (2018). *The Impact of Index Futures on Market Efficiency and Volatility of Spot Index: An Empirical Evidence from Emerging Economies (BRICS).* Proceedings of the 32nd IBIMA Conference. Seville, Spain.

Thaler, R. H. (1999). The end of behavioral finance. *Financial analysts journal*, *55*(6), 12-17.

Ullah, H., & Shah, A. (2013). Lead-lag relationship in spot and future market: evidence from pakistani stock market KSE-100 Index. *Business Review, 8*(1), 135-148.

Vitale, P., 2000. Speculative noise trading and manipulation in the foreign exchange market. *Journal of International Money and Finance 19*, 689 – 712.

Xie, C., Zhu, Z., & Yu, C. (2012). *A study of feedback trading in stock index futures: An empirical analysis on Asian markets*. Proceedings of 2012 IEEE Fifth International Conference on Advanced Computational Intelligence (ICACI) (pp. 900–902).

Xu, F., & Wan, D. (2015). The impacts of institutional and individual investors on the price discovery in stock index futures market: Evidence from China. *Finance Research Letters, 15*, 221-231.

Xu, C. (2014). Trading Patience, Order Flows, and Liquidity in an Index Futures Market. *Journal of Futures Markets, 34*(8), 731-756.

Table 1: Preliminary Stats – Full Panel of SSFs

Sr #:	Stock	Mean	Median	Minimum	Maximum	Skewness	Kurtosis	Jarque-Berra	Prob.
1.	ACBL	0.000	-0.000	-0.133	0.037	-2.522	31.254	34254.700	0.000
2.	BOP	0.000	-0.000	-0.093	0.044	-0.962	10.324	2386.922	0.000
3.	DGKC	0.001	-0.000	-0.073	0.050	-0.178	5.308	226.968	0.000
4.	DSFL	-0.001	-0.000	-0.213	0.065	-2.936	48.221	86559.690	0.000
5.	ECL	-0.000	-0.000	-0.085	0.083	-0.245	11.496	3014.491	0.000
6.	FABL	0.001	-0.000	-0.083	0.039	-0.930	9.774	2053.738	0.000
7.	FFC	0.000	-0.000	-0.034	0.034	-0.039	7.035	678.058	0.000
8.	HUBC	-0.000	-0.000	-0.075	0.064	-0.326	8.845	1439.940	0.000
9.	IBFL	0.000	-0.000	-0.120	0.058	-0.606	17.365	8650.505	0.000
10.	KESC	-0.001	-0.000	-0.059	0.082	1.119	9.262	1840.783	0.000
11.	LUCK	0.001	-0.000	-0.040	0.045	0.259	3.965	49.986	0.000
12.	MCB	-0.000	-0.000	-0.070	0.057	-0.377	7.479	858.653	0.000
13.	MLCF	0.001	-0.000	-0.049	0.055	0.315	3.927	52.308	0.000
14.	NBP	0.000	0.000	-0.077	0.031	-0.845	10.088	2209.776	0.000
15.	NML	0.000	-0.000	-0.125	0.067	-0.487	11.087	2761.653	0.000
16.	PIA	-0.000	-0.000	-0.069	0.109	0.841	8.633	1438.719	0.000

Table 1: Preliminary Stats – Full Panel of SSFs (Continued…)

Sr #:	Stock	Mean	Median	Minimum	Maximum	Skewness	Kurtosis	Jarque-Berra	Prob.
17.	PIOC	0.000	-0.000	-0.0860	0.039	-0.090	4.857	144.946	0.000
18.	POL	0.001	0.001	-0.021	0.025	-0.500	5.003	208.679	0.000
19.	PSO	-0.000	-0.0003	-0.079	0.055	-0.220	8.797	1407.039	0.000
20.	PTCL	-0.000	-0.0003	-0.055	0.061	0.004	8.717	1360.679	0.000
21.	SNGPL	0.000	-0.0003	-0.076	0.096	0.103	10.246	2187.600	0.000
22.	SSGC	0.000	-0.0002	-0.047	0.035	0.238	4.138	63.322	0.000
23.	TELE	-0.000	-0.0003	-0.136	0.047	-0.489	11.722	3203.425	0.000

Table 1 shows preliminary statistics for the panel of Single Stock Futures (SSFs). The preliminary statistics include some of the descriptive statistics about first four moments as well assumption of normality.

Table 2: Preliminary Stats – Full Panel of non-SSFs

Sr #:	Stock	Mean	Median	Minimum	Maximum	Skewness	Kurtosis	Jarque-Berra	Prob.
1.	GARTON	-0.000	-0.000	-0.105	0.041	-3.349	36.274	47952.280	0.000
2.	BKHB06	0.000	-0.000	-0.153	0.031	-5.924	78.493	243070.400	0.000
3.	CHERAT	0.000	-0.000	-0.096	0.031	-0.501	9.970	2063.763	0.000
4.	CRESCENT	0.000	-0.000	-0.201	0.176	-0.320	32.044	35129.490	0.000
5.	DAWOOD	-0.000	-0.000	-0.148	0.010	-1.743	34.298	41279.200	0.000
6.	FECTO	0.002	-0.000	-0.073	0.073	0.340	5.985	390.157	0.000
7.	GARTON	0.001	-0.000	-0.105	0.123	0.651	15.389	6459.198	0.000
8.	HMBL	0.000	-0.000	-0.147	0.031	-3.418	45.052	75553.120	0.000
9.	KEL01	0.000	-0.000	-0.092	0.055	-0.335	10.810	2557.415	0.000
10.	KEL06	-0.000	-0.000	-0.026	0.028	0.208	4.213	68.399	0.000
11.	KOHAT	-0.000	-0.000	-0.171	0.031	-3.604	46.061	79346.830	0.000
12.	MARI	0.000	-0.000	-0.025	0.031	0.314	3.347	21.389	0.000
13.	PKDATA01	-0.000	-0.000	-0.125	0.196	0.720	28.676	27527.540	0.000
14.	PKDATA04	0.002	-0.000	-0.041	0.064	0.448	4.792	167.022	0.000
15.	PNSC	0.001	-0.000	-0.160	0.221	1.179	15.185	6411.223	0.000
16.	SECPL	-0.001	-0.000	-0.062	0.076	0.537	8.0006	1088.916	0.000
17.	SEL	-0.001	-0.000	-0.036	0.037	0.127	3.695	22.672	0.000
18.	SHELL	0.000	-0.000	-0.100	0.031	-0.900	18.402	10010.990	0.000
19.	SILKBANK	0.000	-0.000	-0.065	0.084	0.540	6.374	522.429	0.000
20.	SONERI	0.000	-0.000	-0.136	0.039	-3.759	46.113	79724.330	0.000
21.	SSGC	0.000	-0.000	-0.071	0.137	1.375	22.054	15426.940	0.000
22.	TELE	0.000	-0.0003	-0.071	0.137	1.375	22.054	15426.940	0.000

Table 2 shows preliminary statistics for the panel of Single Stock Futures (non-SSFs). The preliminary statistics include some of the descriptive statistics about first four moments as well assumption of normality.

Table 3 and 4:

Can be available upon request.

Table 5: Inferential Statistics for Panel A: SSFs and Panel B: non-SSFs

Averages	Panel A: SSFs	Panel B: non-SSFs
$\varphi_{0,1}$	-.0423 (-.0309)	-.0620 (-.049)
$\varphi_{0,2}$	-.0259 (-.019)	.004 (-.002)
Comparison across event dates	-2.251 (.024)	-.049 (.961)
Stock count $\varphi_{0,1}$	6	7
Stock count $\varphi_{0,2}$	6	6
Stock Count +ve (-ve) $\varphi_{0,1}$	1 (5)	2 (5)
Stock Count +ve (-ve) $\varphi_{0,2}$	0 (6)	2 (4)
Comparison – Post Analysis	-1.635 (.102)	
$\varphi_{1,1}$	3.380E1 (2.305E1)	1.146E2 (2.475E0)
$\varphi_{1,2}$	6.154E1 (3.517E1)	4.221E1 (1.795E1)
Comparison across event dates	-1.338 (.181)	-.373 (.709)
Stock Count $\varphi_{1,1}$	0	8
Stock Count $\varphi_{1,2}$	1	8
Stock Count +ve (-ve) $\varphi_{1,1}$	0 (0)	3 (5)
Stock Count +ve (-ve) $\varphi_{1,2}$	1 (0)	4 (4)
Comparison – Post Analysis	-.500 (.617)	
$\varphi_{2,1}$	.000 (.000)	.000 (.000)
$\varphi_{2,2}$	.000 (.000)	.000 (.000)
Comparison across events	.000 (1.000)	.000 (1.000)
Stock count $\varphi_{2,1}$	21	18
Stock count $\varphi_{2,2}$	14	19
Stock count +ve (-ve) $\varphi_{2,1}$	21 (0)	18 (0)
Stock count +ve (-ve) $\varphi_{2,2}$	14 (0)	19 (0)
Comparison – Post analysis	.000 (1.000)	
$\alpha_{0,1}$	.000 (.000)	.000 (.000)
$\alpha_{0,2}$	-.000 (.000)	-.000 (.000)
Comparison across event dates	.000 (1.000)	-.272 (.785)
Stock count $\alpha_{0,1}$	23	19
Stock count $\alpha_{0,2}$	3	5
Stock count +ve (-ve) $\alpha_{0,1}$	23 (0)	19 (0)
Stock count +ve (-ve) $\alpha_{0,2}$	3 (0)	5 (0)
Comparison – Post Analysis	-.604 (.546)	