Volatility of Secondary Market with Perspective to Brokers Role: An Empirical Study of Pakistan Stock Exchange

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Abstract
The objective of this study is to explore whether day trading is associated with volatility of stock prices or not. First, attempt is made to refer definitions of day traders given in prior researches. Common points in all these definitions are; the day trader try to complete cycle in same day and prefer low priced, volatile and large volume scrips. Day Trading is a common phenomenon in all over the world and legislators have imposed circuit breakers (Caps) to minimize the shocks of day trading. In Pakistan upper and lower caps are introduced too. Three types of indexes i.e. KSE 100, KSE All and KSE 30 are introduced by Karachi Stock Exchange (KSE). KSE 100 and KSE All indices are selected for the study sample period of the study is January 1, 2011 to December 31st, 2015. First, attempt is made to establish the fact that volatility in stock market exist. In this regard contemporary tools like Augmented Dickey Fuller Unit Root Test (ADF) Auto Regressive Conditional Heteroscedasticity (ARCH) and GARCH models are used. The results confirmed the volatility in the stocks. Then, trading behavior of investors is examined. The data includes price range from PKR 11.26 to PKR 12000 per scrip. Analysis exhibit that up to fifty percent trading is carried out in the scrips having price up to 100, and only 12.5% trading is done in the scrips that has price more than 1000. This trading behavior confirms that most of the investors are involved in day trading which is one of the reasons of stock market volatility.

Introduction
Financial markets (FMs) play two fold roles in betterment of two economic indicators i.e. savings and investment. It provides prospect of cumulative earning for further investment through providing surety of safe return on investment and liquidity to financial...
instruments. Vital financial markets attract the investors and hence economic activities are stirring which ultimately boost the livelihood of the people of a country. Financial markets can be classified in different categories according to their role. On the basis of maturity of financial instrument it can be differentiate between money and capital markets, money market deal with short term instruments like treasury bills, which are normally issued for a period of less than one year while capital market deals with long term or perpetual instruments like bonds and stocks. Maturity of bonds vary case to case however it is not less than one year, and stock of a company has no fixed life. Initial public offering takes place in primary market while existing instruments can be traded in secondary market. On spot completion of transaction is completed in cash markets and opposite is derivative market. Some markets locally perform while other works regionally, nationally or internationally according to their scope. Some transactions concerned with debts only and some deals with equity shares.

Source: Authors of this study

Secondary financial markets (SFMs) are not isolated from financial markets; the difference here is only the scope and functions. SFMs focus on economic functions especially saving and investment either through IPO which is not the scope of this study or through trading of already issued securities. Typical financial market executes following three functions (Fabozzi et.al. 2002):

**Price Settlement**

SFM provide opportunity to investors and borrowers to meet and determine the price of a financial asset or fix a rate of return. If there are few investors than definitely
they demand extra ordinary return. In case of few borrowers and large number of investors the rate of return remains very cheap. But in financial market ample number os borrower and investors exist all the time therefore rate of return determine justifiably.

**Liquidity**

The most important function that a financial market plays is to provide procedure and place for selling of financial assets. If this feature does not exist than no one will invest his/her money in securities.

**Reduction of Transaction Cost**

Investor and borrower both know that they can find out concerned interested party in financial market so that they have not consumed much amount on searching on their desired person, which ultimately reduce their transaction cost.

In secondary financial markets brokers or intermediaries play important role for example, initial public offering (IPO) can be completed in primary market through banks. On the other hand already issued shares can be traded through brokers in stock exchange. Intermediaries play double role in the market. They act as an agent of their clients, provide them required information, provide advice and bought and sold in the light of instructions given by their clients. At the same time they also invest their own money in attractive stocks and generate profit. Some investor put their amount on long term basis they are interested in security of their investment and a constant return on their investment. While the others are interested in frequent trading and concern with capital gain. Brokers fall in this second category and involves in day trading. On the one hand day trading has positive aspects because it provides liquidity opportunity to investors at the same time it creates volatility in the market. Trading summary of Pakistan Stock Exchange reveals that thousands of transactions are completed on each day.

**Table 1** Summary of Trading in Pakistan Stock Exchange

<table>
<thead>
<tr>
<th>Date</th>
<th>Volume</th>
<th>Value</th>
<th>Trades</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 12, 2016</td>
<td>121682980</td>
<td>7085543657</td>
<td>56014</td>
</tr>
<tr>
<td>February 11, 2016</td>
<td>112990820</td>
<td>6998026344</td>
<td>60811</td>
</tr>
</tbody>
</table>

A brief summary is given hereunder in table 1, which shows that 56014 transactions are completed on 12\textsuperscript{th} February, 2016 last working day of the week.

Source: Pakistan Stock Exchange (2016)

Some measures were taken time to time to prevent any untoward situation. In this
connection legislative authority has introduced upper lock and lower lock to avoid extreme fluctuation in the market. The government also tried to encourage long-term investment. In this regard income tax ordinance provide incentive if an investor resale its securities after holding in one year than twenty-five percent of profit will be exempted from payment of capital gain tax.

Due to advancement in technology investors have opportunity to invest in international market or in any stock exchange on which s/he rely. So if in any stock market brokers involved in fraud and breach the trust the investors have opportunity to shift in another exchange. This movement of investors caused the adverse condition of economy. So it is necessary to maintain investors trust through fair dealing. During trading some brokers involve in illegal activities which breach the trust of investors and investors hesitate to invest in stocks. According to a news (Daily Jang 16th Feb. 2016) chief executive of a brokerage house has opened an brokerage house and offer lucrative rate of return with the intention of fraud. Six hundred and twenty three (623) peoples came in his trap and lost 553.229 million rupees. The broker has sold out the shares of his client’s without taking their permission. NAB has taken action against him. On the same page news concerned with broker appeared. According to news an inquiry is being conducted by Cyber Crime Circle of FIA against a well-known broker of Pakistan stock exchange in Employees Old Age Benefit Institution (EOBI) fraud case, about their criminal role in trading of shares.

**Most Common Types of Securities Frauds**

Some common illegal activities are depicted underneath.

**Insider Trading**

Sometime brokers claim that s/he has inside information about company and recommend clients to invest their amount in suggested companies. This practice is prohibited by law and recognize as fraud.

**Guaranteed Winner**

Another way of fraud is to assure the investor to achieve a lucrative profit.

**Unauthorized Trading**

Brokers utilize accounts of clients without obtaining permission.
Misrepresentation
In this case brokers provide wrong information and analysis which misguide the investors.

Ineptitude
It means a negligence of brokers which caused the loss to client.

Churning
It means to force to clients to buy excessive stocks with the intention to generate commission.

Due Diligence
It is primary responsibility of a broker to analyse market carefully before providing any type of guidance to its client.

Suitability
Brokers’ do not care about the suitability of securities for its clients. They are only interested in completion of the transaction so that they can get their commission.

Pump and Dump
In this case brokers create and artificial demand for stock that s/he possess in large quantity and when s/he feel that price of the stock reached its maximum level due to fake campaign s/he sold out his/her stocks and vanish out from the scene.

Another significant issue is; buying and selling securities require specific knowledge. The terminologies, procedure and trading requirement is difficult to understand for a common people in a country like Pakistan where literacy rate is not very distinguished.

Study Background
Investment in stocks is not similar to invest in gold, foreign exchange, real state or in a bank account. In later cases potential investor can directly approach to seller or bank and after fulfilling basic formalities s/he complete his transaction. But in former case investors need the assistance of a broker registered with stock exchange. Investment in stocks also needs lengthy procedures. Many researches have been done on stock exchange in different dimension but very little work has been done to explore the role of brokers in volatility of stock market.
Problem Statement

Stock brokers complete transactions as desired by their clients. At the same time, they invest or divest amount from the market on their own accord as their personal transactions. There are two types of investment; one group of investors put their amount into stock for a long period and waits for dividend from profit of company, or intends a capital gain. On the other second group take interest in capital gain in short run. Brokers fall under second category and are mostly involved in day trading. They hunt opportunities and due to frequent transactions price of stocks fluctuate rapidly. Hence it is important to know the effect of day trading on volatility of stock market otherwise a large number of investors lose their investment and avoid investment in securities again which is not a good sign for the economy.

Many researches have been conducted to explore the importance of secondary financial markets, but very little attention is paid on role of brokers and procedures of trading in financial markets. Therefor it compels the researcher to focus these two areas in this research.

Research Questions

In this research attempt will be made to find out the answers of the following questions:

1. Does investor needs the services of a broker?
2. Does brokers are making investment for capital gain?
3. Does brokers are making investment for dividend?
4. Does Day Trading impact equally on all stocks?

Objectives of the Study

In this research attempt will be made:

1. To explore whether day trading is associated with volatility of stock prices.
2. To gauge the magnitude of volatility among KSE 100 index and KSE All index.
3. To study the persistence of shocks among the KSE 100 and KSE All indexes

Research Hypothesis

After thorough review of related literature, the following hypotheses are formulated:

H1: day trading significantly affects volatility of stock market
H2: There is a positive correlation between stock price volatility and the volume of trades under taken by day traders.

H3: Data is stationary.

H4: There is an ARCH effect in the series

H5: There is a GARCH effect in the variables/series.

Stable financial market attracts the investors. This research will highlight the role of brokers in volatility of financial markets; hence will prove beneficial for government to make rules to prevent such types of trading. The research will also investigate the existing trading procedure and attempt will make to find out more investor friendly mechanism. The student will also find this research beneficial for their studies.

**Limitations of the Study**

This research will have to complete in a semester therefore due to time and cost constraints study will exclude cash market, future market derivative, debt, and other types of financial markets and will be limited to Pakistan Stock Exchange only.

**LITERATURE REVIEW**

Financial markets provide an opportunity to investors and lenders to meet and execute their transactions this facility promote investment and stimulate economic growth. Many types of financial assets like stocks, bonds, mutual funds, certificates derivatives are traded in financial markets. According to Jalloh (2009) financial markets perform an important function of mobilization of money in the economy through intermediaries. Sawlikar (2014) highlighted the facilities that a stock exchange provides. For examples Capital market helps in fund raising, derivatives market helps in risk transferring, money market provides liquidity and currency market deals with international trade. Money market facilitates short-term requirements of funds. He also discussed the role of brokers and mentioned the brokers perform transactions either for their clients or for themselves. A stock broker is a person who is registered with stock exchange for this purpose and is liable to deposit security amount with stock exchange. Stock exchange issued a license to work as broker after registration this license automatically transfers to legal heir if a registered broker dies. Legal heir can work as registered broker but s/he cannot sell this license to someone else. Mostly stock brokers involve in day trading which caused high frequency of trading and consequently stock and market as well become volatile. Day trading is a strategy to buy and sell shares at same day
(Kyrolainen, 2007). However, a well-organized data set is required to trace out whether the securities sold out are bought on same day or not. Wang et al. (2014) further refine the definition of day trading and argued that day trader has zero inventory at the end of the day. As Ching et al. (2009) discussed in their research that day-traders increase the volatility and consequently market become disorder. In day trading brokers sell out their securities as they feel it profitable and buy the securities if they found them cheaper. As Zhang (2010) discussed in his research that high frequency of trading has a positive impact on volatility of market. Technology changed the way of trading and stock exchange also accepts this phenomena. In past people contact with brokers for buying and selling stocks but now they can do so via internet (Srivastava, S. 2011). On internet investor can found prices of the stock and can place an order with his/her broker.

There are various stakeholders in financial markets like; financial institutions, government, and economy as a whole. Government makes regulations for financial markets for the financial protection of the investors. Financial institutions offer their services as intermediaries and also act as an investor. Supply and demand mechanism play dominant role in price settlement. Brokers have in a position to disturb supply or demand of stocks and create volatility in the market.

Shehper (2014) identified that overvalued stocks, low margin requirements, aggressively increased interest rates brokers loan and poor banking structure caused failure of stock market. He argued that regulators impose price limits as one of circuit breakers to protect the market from risky conditions.

**Role of Financial Institution**

A financial institution works as an agent that provides financial services for its clients. Financial institutions operate under the law of the land and provide different types of services to their clients. The trade on behalf of their clients, and some time provide advisory services as well. Some financial institutes perform on the instructions of their clients and in return charge commission. While some institutes buy stocks and other financial securities from the market and generate a pool. This type of institutes not gives the stock or securities of other companies to their clients rather they coin their own certificates and hand it over to investors as their claim. Chung at el. (2008) said that due to advancement in technology internet provided access to a mass of community to interact with stock exchange. Due to this accessibility individuals involved in day trading.
A day trader usually close his/her position each day to avoid any risk arise in next day. Day traders normally follow momentum strategy, they buy securities when price goes down and sold their securities when prices go up. In the view of economic demand and supply theory this practice helps in stability of the market. But problem arises when artificial demand and supply appears in the market. It is very difficult to trace out weather demand is genuine or it is a result of pump and dump policy of brokers.

While day traders create volatility in the market at the same time liquidity of securities is a blessing of day traders. When brokers place limit orders it create liquidity while market order diminish liquidity. Jones (n.d.) explained three types of orders, i.e. market order, limit order and stop order. Market order executes transaction but do not guarantee a specific price. Limit order is opposite to market order it guarantees a specific price but timing of execution of order is uncertain. In case of stop order investor specify a price at which market order become effective.

Chung (2009) argued that a day trading influences the stock market transactions. These are the day traders who with their strategies bring volatility in stock prices. Future day trading has both its positive and negative impact and with the support of internet online trading worldwide has been raised.

Beside day trading many other factors like, inflation, rate of interest, economic conditions of a country and political conditions affect volatility. Prices of scrips fluctuate rapidly in stock market. Therefor it is very difficult to forecast price or return of financial assets accurately. Volatility is essential factor for all stakeholders. Projecting volatility is a critical and crucial financial matter which has required ample concentration. It is said that prediction about return of a financial asset is not forecastable but volatility can be predicted through careful working.

Tageldin (1996) studied stock market with perspective to religion. He argued that religion support also plays an important role in the functioning of stock market or equity market. Brokers role has different perspective and rights in Jews, Christianity and other religions but in Islam it has been closely observed by Islamic Shariah. Due to the element of gharar which means excessive uncertainty and it is prohibited in Islam because in kind of transaction loss of one party is near to confirm. Shariah lays special emphasis that client must be sufficiently informed about the use of their money, both quantitatively and qualitatively. It also gives equal importance on the matter of avoiding risk. There is vast literature in support and against on the role of broker from religious point of view.
brokers are just keenly interested in the attainment of its economic as well as social targets; they want to achieve their target by hook or crook and consequently any negative hot rumour circulated by market brokers. But these are all overlooked by the argues that to run the stock market efficiently and accurately where mobilization of liquid capital can be possible quickly and accurately so as to get highest return. Thus there is a greater need in regulating the involvement of broker in concluding and finalizing a financial deal and transaction and the size of the commission the charge simultaneously with internal efficiency (operational efficiency) and external efficiency (informational efficiency) of secondary financial market The former relates to accessibility of information to all participants in time and at least cost, whereas the latter refers to transaction costs and speed of concluding and finalizing financial deals and transactions.

Stock market volatility is also known as systematic risk. Schwert (1989) used historical data of stock market to examine volatility and find out that during financial crises (for example stock market crash of 1987, East Asia crises of 1997, and bond default of Russia in 1998) volatility of stock market vividly rises and at the time of uncertainty like missile crises of Cuba in 1962.

Reider (2009) argues that volatility forecasting is essential for:

(i) Risk Management
(ii) Allocation of assets and
(iii) Anticipation of expected volatility in the future.

In risk management fund manager measure expected loss of portfolio and estimate correlation and volatility of stock in future. In the light of this measurement he/she allocate financial assets in such a way that safeguard his/her investment. He further suggests that the simplest method of volatility assessment is to use historical standard deviation. One observation is that squared returns are positively auto correlated. It means if price of a stock witnessed that today it was moved significantly than there is a chance that a big movement will witnessed tomorrow too. He further suggest that Autoregressive Conditional Heteroscedasticity) ARCH model is the simplest one for volatility estimation.

Nishadet. al. (2015) argue that variance overtime is a simplest measure of volatility in return of an asset. But there is a problem with variance analysis that it does not account for variation of volatility over time. They further argue that investor is not interested in return only but also worried about variation in return during investment period. So investor has interest in conditional variance during investment duration. After detailed
discussion he suggests that models of ARCH family are suitable to calculate volatility. Therefore ARCH and GARCH models are applied on the data in this studies.

RESEARCH METHODOLOGY

Research methodology is a debate of philosophies, Approaches, Strategies, Choices, Time Horizons and techniques and procedures of data collection and analysis. Selection of research philosophies depends on ontology, epistemology and axiology way of thinking. Saunders (2009) discussed in detail different aspects of philosophical views. The three terms discussed earlier are different conducts of selection of research process. It is very problematic to classy these philosophies according to some definite approaches. Pragmatism based on research questions and in this philosophical view it is possible to do with multiple choices of ontology, axiology and/or epistemology. Objectivism and subjectivism are two aspects of ontology and deal with business and management researches. In objectivism act and actors are two different realities if actors replaced with some other one the act remain the same. Subjectivism argues that action of every person is different from each other’s. Like brokers some are engaged in day trading and some are interested only in completion of transaction according to the will of their clients. For this study epistemology is suitable because the study will analyses the facts obtained from stock exchange.

Day trading activities will be observed through number of transactions completed per day and volume of transactions. While volatility of stock can be measured through calculating midpoint of ask and bid price (Chou, 2015). For this study volatility of stock price will be measured through applying GARCH and ARCH models on daily index value of KSE100 and KSE all index.

With the help of large data research will test the role of brokers as day trader and its impact on stock market volatility, therefore deductive approach will be adopted. From research strategy perspective, all the required data will be obtained from record of stock exchange therefore this study will be archival research. All data is quantitative in nature therefore mono method will be used. It is a cross sectional study, data will be collected quantitatively from website of Pakistan Stock Exchange.
**Table 3.1: Research Philosophies**

<table>
<thead>
<tr>
<th>Research approaches</th>
<th>Philosophical debates for the approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Methods</td>
<td>Mixed method is believed to be rooted in pragmatism (Denscombe, 2007; Johnson and Onwuegbuzie, 2004); but Barrett (2010) asserts the opposite and considers critical realism to be the theoretical foundation of mixed method research.</td>
</tr>
<tr>
<td>Qualitative approach</td>
<td>Guba and Lincoln (1994) identified four paradigms that compete in qualitative research, namely; positivism, post-positivism, critical theory and constructivism. However, other scholars (McNabb, 2008; Denzin and Lincoln, 2005) assert that interpretive and critical paradigms are central to qualitative approach. A detailed analysis of these debates is fully discussed amongst other scholars (Guba and Lincoln, 1994; Denzin and Lincoln, 2005).</td>
</tr>
<tr>
<td>Quantitative approach</td>
<td>Scholars (Polit and Beck, 2008; Steen and Roberts, 2011) assert that positivist and naturalist are philosophies for quantitative approach. Furthermore, Alvesson and Skoldberg (2009) add post-positivism, social constructionism, and critical realism as other philosophical stances.</td>
</tr>
<tr>
<td>Qualitative vs. Quantitative approach</td>
<td>The debates stretch further from which different philosophies is best for a single research approach (i.e. pragmatism against critical realism for mixed methods); to whether a particular philosophy is for qualitative or quantitative approach (i.e. positivism for qualitative vis-à-vis quantitative). This is best demonstrated in research findings by amongst other scholars (Bryman, 1984; Becker, 1995).</td>
</tr>
</tbody>
</table>

Source: Mkansi & Acheampong (2012)

**Source of Data**

In Pakistan first stock exchange was established just after thirty five day of its independence i.e. 18th September 1947 and incorporated on March 10, 1949 as a company limited by guarantee. Initially five companies were listed with a total paid up capital of Rs.37000000. Initially KSE 50 index was introduced; it was based on fifty companies. In 1995 100 Index and in September 2008 30 Index was introduced. In October 1970 second stock exchange was established in Lahore and called Lahore stock exchange. In October 1989 third stock exchange was established in Islamabad. Finally in On January 11, 2016 above three stock exchanged merged in one stock exchanged and named Pakistan Stock Exchange.

Time series data is obtained from web source of Karachi Stock Exchange. The data is available in All index, 100 index and 30 index categories, denoted as KSE all index, KSE100 respectively. Two different set of data is used for this study. Set one consists on daily high and low prices and daily volume of shares. After in-depth interviews of six
respondents including senior officers of investment companies and experts of the fields KSE 100 index is selected for the study. Sample period is selected Jan 1, 2015 to December 31, 2015. There are 21991 observations. Although required information is available on different websites like Pakistan stock exchange, Business recorder and many other, but one difficulty is common with all these sources that is data is either available on day by day or company to company basis which data compilation through web sites is very time consuming job. The researcher approaches to different brokerage firms dealing in stocks for obtaining compiled data with their permission to utilize it for the study and one of them has provided the required data in compiled form as desired by the researcher. The second set consists on data of KSE 100 and KSE All indices covering period of five years from Jan1, 2011 to December 31st, 2015. According to reports of Security Exchange Commission of Pakistan (SECP) five hundred and sixty (560) companies are listed in thirty-five (35) different sectors. The sum of their paid up capital was Rs.1189.52 billion and market capitalization was Rs.7421.03 billion during sample period. Average daily turnover was 219.22 million shares during this period. Karachi Stock Exchange remains in operation total 248 days approximately 21 days per month and 5 days in a week during sample period, the detail is as under:

<table>
<thead>
<tr>
<th>Month</th>
<th>Working days</th>
<th>Month</th>
<th>Working days</th>
</tr>
</thead>
<tbody>
<tr>
<td>February, 2015</td>
<td>19</td>
<td>August, 2015</td>
<td>20</td>
</tr>
<tr>
<td>March, 2015</td>
<td>21</td>
<td>September, 2015</td>
<td>19</td>
</tr>
<tr>
<td>April, 2015</td>
<td>22</td>
<td>October, 2015</td>
<td>21</td>
</tr>
<tr>
<td>May, 2015</td>
<td>20</td>
<td>November, 2015</td>
<td>21</td>
</tr>
<tr>
<td>June, 2015</td>
<td>22</td>
<td>December, 2015</td>
<td>21</td>
</tr>
</tbody>
</table>

Source: Pakistan Stock Exchange (2016)

Two different software are used for analysis. For set one Statistical Packages for Social Sciences (SPSS) is used to find out correlation between price variation and volume of trade. For second set of data Eviews is used to compute, ARCH and GARCH.

During extensive surfing of web site of Pakistan Stock Exchange it was noted that data is presented in different colors. The researcher asked about colors to one of its respondent during interview, the respondent answered that data is presented in green color if prices are high as compare to last day closing price (LDCP). Red color is used if prices are low as compare to LDCP. For those scrips whose prices remain unchanged blue color is
used.

To evaluate volatility of stocks researchers used various models and tools. Each model has its own merits and limitations. Engle (1982) suggest Autoregressive conditional Heteroscedasticity (ARCH) model to measure volatility, this model account for the variation in prices of stocks over time period. Bollersleve (1986) used extended form of Engle’s model and introduced; Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model. This model is suitable for various types of financial time series. GARCH model consider symmetric reaction of volatility for negative and positive shocks both. Another extended form of ARCH model is GARCH-M model which is used to measure volatility. The model states that yield is a function of variance. The concept behind this model is that risky assets yield high return as compare to non-risky or less-risky assets. To overcome the problem of leverage effects (shocks of news) of GARCH, two extended forms Exponential (EGARCH) and Threshold (TGARCH) models are introduced. TGARCH deals negative and positive shocks asymmetrically. But the model established the rule that the factors will be greater than or equal to zero.

EGARCH has no such limitations, the model deals negative and positive shocks according to their size and magnitude and provide positive estimated coefficients. It conclude that zero leverage effect indicate that model is symmetric. In case, leverage effect is less than zero than it indicated that bad news generate high volatility than good news. If leverage effect is greater than zero than it indicated that bad news generates low volatility as compare to good news. Another generalized error model EGARCH-GED is used if leptokurtic condition exists in the data.

**EMPIRICAL ANALYSIS AND FINDINGS**

The basic assumption to calculate p-value is that the data is normally distributed. Therefore skewness and kurtosis tests are applied to check the symmetry of observations. As the data is large therefore Jarque-Bera test is also applied to check normality of the data. Table 4.1 shows the results of skewness and kurtosis.
Descriptive Statistics

Figure 4.1 Jarque-Bera Statistics KSE 100

<table>
<thead>
<tr>
<th>Series: KSE100</th>
<th>Sample 1 1240</th>
<th>Observations 1240</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>21981.27</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>21870.34</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>36228.88</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>10842.26</td>
<td></td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>8504.984</td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>0.156749</td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1.455592</td>
<td></td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>128.3130</td>
<td></td>
</tr>
<tr>
<td>Probability</td>
<td>0.000000</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.1 shows a positive skewness (0.156749), and positive kurtosis (1.455592). The results of JarqueBera test (128.3130) shows that, at 99% level of confidence interval (9.921) KSE 100 index don’t show a normal distribution.

Figure 4.2 Jarque-Bera Statistics KSE ALL

<table>
<thead>
<tr>
<th>Series: KSEALL</th>
<th>Sample 1 1240</th>
<th>Observations 1240</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>15700.30</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>15638.02</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>25235.97</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>7549.520</td>
<td></td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>6205.421</td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>0.092107</td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1.364093</td>
<td></td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>140.0232</td>
<td></td>
</tr>
<tr>
<td>Probability</td>
<td>0.000000</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.2 shows a positive skewness (0.0.92107), and positive kurtosis (1.364093). The results of JarqueBera test a show that, at 99% level of confidence interval (9.21) KSE All index doesn’t show a normal distribution.
Figure 4.3 The empirical data of KSE 100 composite index from January 1, 2011 through December 31st, 2015

Figure 4.3 illustrates result of empirical analysis executed on KSE 100 index. Left hand side graph shows an upward movement and graph of right hand side shows volatility clustering in the data; as it is observed that volatility in some where is low and volatility in some where is high ARCH effect in the data is also observed.

Figure 4.4 The empirical data of KSE All composite index from January 1, 2011 through December 31st, 2015

Figure 4.4 illustrates result of empirical analysis executed on KSE All index. Left hand side graph shows an upward movement and graph of right hand side shows volatility clustering in the data; as it is observed that volatility in some where is low and volatility in some where is high ARCH effect in the data is also observed.
some where is high ARCH effect in the data is also observed.

**Unit Root Test**

The stationary of KSE 100 and All Indexes are analyzed through Augmented Dickey Fuller Unit Root Test (ADF). Table 4.3 shows that in both cases the null hypothesis of a unit root is rejected. Therefore it can be concluded that series has no unit root and models of conditional volatility with GARCH-class models can be tested.

**Table 4.3: Unit Root Test**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Remarks</th>
<th>ADF Test</th>
<th>Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSE100</td>
<td>Series is stationary at first difference</td>
<td>I(1)</td>
<td>Rejected.</td>
</tr>
<tr>
<td>KSE All Index</td>
<td>Series is stationary at first difference</td>
<td>I(1)</td>
<td>Rejected.</td>
</tr>
</tbody>
</table>

Table 4.3: *This table represents the summary of the Unit Root Test by using Eviews 8.0 for KSE100 and KSE All indexes.*

**ARCH Effect Test**

Table 4.4 demonstrates the results of ARCH effect test for KSE 100 and KSE All indexes.

**Table 4.4: ARCH EFFTETC TEST**

<table>
<thead>
<tr>
<th>Variable</th>
<th>F-statistic</th>
<th>Obs* R-squared</th>
<th>Probability of F-statistics</th>
<th>Probability of Obs*R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKSE100</td>
<td>225159.5</td>
<td>1232.239</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>DKSEAll Index</td>
<td>228667.1</td>
<td>1232.334</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Table 4.4: *This table provides the summary of the Eviews 8.0 output and it reports the ARCH effect test of KSE 100 and KSE all Indexes.*

ARCH test is exhibiting the positive result, the F-statistics of KSE 100 Index is 225159.5 and probability is less than 0.05 so, it can be concluded that there is an ARCH effect in KSE 100 Index. Similarly, ARCH test of KSE All index is showing the positive result and the F-statistics of KSE All Index is 228667.1 and probability is less than 0.05 so, it can be concluded that there is an ARCH effect in KSE All Index too. Due to limitation of ARCH its extended version GARCH model is applied. The detailed results are depicted in Appendix-I.
The GARCH (p, q) Model

Following is the Conditional variance equation:

\[ \sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta \sigma_{t-1}^2 \]

\( \sigma^2 \): Conditional variance  
\( \alpha_0 \): Long term average value  
\( \alpha_1 u_{t-1}^2 \): Volatility  
\( \beta \sigma_{t-1}^2 \): fitted variance

GARCH Effect Test

**Table 4.5:** GARCH Estimation Table

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>z-statistics</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKSE100 C</td>
<td>478.9024</td>
<td>112.9793</td>
<td>4.238853</td>
<td>0.0000</td>
</tr>
<tr>
<td>RESID(-1)^2</td>
<td>0.146734</td>
<td>0.146734</td>
<td>10.70614</td>
<td>0.0000</td>
</tr>
<tr>
<td>GARCH (-1)</td>
<td>0.856905</td>
<td>0.856905</td>
<td>71.78079</td>
<td>0.0000</td>
</tr>
<tr>
<td>DKSEAll C</td>
<td>246.1651</td>
<td>52.69478</td>
<td>4.238853</td>
<td>0.0000</td>
</tr>
<tr>
<td>RESID(-1)^2</td>
<td>0.141415</td>
<td>0.013148</td>
<td>10.70614</td>
<td>0.0000</td>
</tr>
<tr>
<td>GARCH(-1)</td>
<td>0.858517</td>
<td>0.012231</td>
<td>71.78079</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Table 4: This table is summary of the Eviews 8.0 output and it reports the GARCH effect test of five major currencies traded in Forex Market of Pakistan.

Estimated Equations

**KSE 100 Index**

\[ \sigma^2 = 478.9024 + 0.146734 u_{t-1}^2 + 0.856905 \sigma_{t-1}^2 \]

**KSE ALL Index**

\[ \sigma^2 = 246.1651 + 0.141415 u_{t-1}^2 + 0.858517 \sigma_{t-1}^2 \]

Correlations

Day trader chooses:

i. Low price scrips  
ii. Volatile scrips and  
iii. Large volume scrips

Historical data obtained for the study (Appendix J) shows that price of scrips range from Rs. 6.11 (minimum) to Rs.12000 (maximum) per scrips. Following table depict that fifty
percent trading done in scrips having prices up to one hundred rupees, which satisfies above low price scrips condition. Therefore it can be concluded that brokers involve in day trading activities which ultimately cause volatility of stock market.

**Table 4.6 Proportionate value of trading**

<table>
<thead>
<tr>
<th>Prices up to</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00</td>
<td>12.5</td>
</tr>
<tr>
<td>20.00</td>
<td>25.0</td>
</tr>
<tr>
<td>50.00</td>
<td>37.5</td>
</tr>
<tr>
<td>100.00</td>
<td>50.0</td>
</tr>
<tr>
<td>300.00</td>
<td>62.5</td>
</tr>
<tr>
<td>600.00</td>
<td>75.0</td>
</tr>
<tr>
<td>1000.00</td>
<td>87.5</td>
</tr>
<tr>
<td>12000.00</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Correlation has also been computed and values of table 4.7 shows that there is a positive correlation between volume and return.

**Table 4.7 Correlations**

<table>
<thead>
<tr>
<th></th>
<th>Return</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return</strong></td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>21915</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
<td>Pearson Correlation</td>
<td>.292**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>21915</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).**
Key Findings

Researchers are in the opinion that day trading is one of the factors that create volatility (Cambellet at. 2001). Literature related to study of volatility categorically establishes positive relation between volatility and volume of trade. Table 4.7 exhibit there is a positive correlation between volatility and day trading. Earlier studies (Jones et al., 1994; Chen & Fong, 2000 and Kyrolainen.P., 2008) also depicted similar results.

ARCH results of Akike info criterion for KSE 100 index is 13.34381, for KSE all 12.55755 and schawarz criterion for KSE 100 index is 13.35622 and for KSE all index 12.56955. Similarly GARCH results of Akike info criterion for KSE 100 index is 13.16605 and for KSE all index value is 12.38561 and Schawarz criterion shows the result for KSE 100 index value is 13.18259 and for KSE All the value is 12.40215. There for it can be calculated that GARCH model is suitable for both indexes.

CONCLUSION AND RECOMMENDATIONS

In the alignment with prior researches ARCH and GARCH models are applied in this study to forecast volatility of stock indices viz a viz KSE 100 index and KSE all index. Data published by Karachi Stock Exchange is used for the study purpose. The outcome of ARCH model on both KSE100 and KSE All indices demonstrate that in the equation of variance the term C and RESIDE (-1)^2 both are significant. The results of GARCH model of KSE 100 and KSE All indices shows that the term RESID (-1) is statistically significant too. Cumulative percentage of daily volume shows that day traders are prefer low priced scrip, which is a sign of day trading. Hence it can be concluded that brokers are involved in day trading and ultimately create volatility in the stock market.

Future Area of Research

This study is based on KSE 100 and KSE all indices. In January 2016 all three Stock Exchanges of Pakistan merged into one stock exchange namely Pakistan Stock Exchange. There is a need to investigate impact of day trading on volatility after merger of stock exchanges.

REFERENCES


Jones, C.P.(n.d.) Investmens Analysis and Management


