The Dynamics of Trading Volume Activity and Stock Returns: A Case of Karachi Stock Exchange (KSE)

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ABSTRACT

This study is about the interralshionship of the trading volume activity and stock returns in the Karachi Stock Exchange (KSE). The monthly trading volume data and also the monthly stock returns were taken for a period of 1995 to 2012. Both the series were found to be stationary at level. The findings of the study show that the trading volume is positively related to the stock returns. Further the results suggest that the ARCH effect is not active i.e the past square residuals have no effect on the stock return volatility or variations. While on the other hand the GARCH effects are present i.e the lagged variances have a significant positive effect on stock returns. The value of λ is negative and significant i.e trading volume volatility has a significant negative relationship with stock returns in KSE.

Key Words: Trading volume, Volatility, Stock returns, causality

INTRODUCTION

The role of information is very much vital for the functioning of the modern day stock markets. The information is processed in any of the efficient markets of the world thus allowing the total capital in the market for a better economic use. The stock markets are very much sensitive to information flow. According to Fama (1991) an efficient market responds quickly, appropriately and fully to the available information in the market. Thus the information, news announcements and the trading patterns in total may become a major source of volatility in the markets.

The role of information can never be denied in the price formation of the stocks. Like other factors which contribute to the price formation, trading volume has an important contribution in explaining the stock prices and also it is a much studied area with in the stock markets since long. Such studies also facilitate the understanding of the microstructure of the financial markets. In this respect an understanding of the relationship between the trading activity, stock returns and their volatilities have gained much importance, and the understanding of such a relationship will further enhance the investment decisions.

According to the efficient market hypothesis, the stock prices and the stock returns are a replica of the available information in the market. With the new information, the market participants change their expectations and cause the prices and the stock returns to fluctuate. Therefore fluctuations in stock prices and stock returns are a reflection of the reaction to the market information. Likewise, the investors also adjust themselves to the trading volume. As according to the market folklore, the trading volume affects the

stock returns and also the stock returns effects the trading volume, in either case it is a reaction to the market news. Thus studying the dynamics of the trading volume and stock returns further augments the microstructure of the stock market.

A number of researchers have studied the interrelationship between the trading volume and the stock returns from various perspectives in the developed markets and also the underdeveloped markets. The study of Granger and Morgenstern (1963) concluded comprehensively the dynamics of the trading volume and the stock indexes. Epps and Eppis (1976) also studied the relationship between trading volume and the square of the price fluctuations. The studies of Clark (1973), Westerfield (1977), Harris (1986) and Tauchen and Pitts(1983) have shown the effects of the Mixture of Distribution Hypothesis (MDH) on the trading volume and stock returns. These studies show as to why the daily trading volume is significantly and positively related to the stock returns and how and why the squared returns are related with the trading volume.

The studies of Osborne (1959) and Rogalski (1978) show comprehensively the relationship between trading volume and the stock returns in the future markets and also in the spot market. Morgan (1976) in his study suggests trading volume as a dominant risk factor in respect of the stock returns volatility in the emerging markets. On the other hand the studies of Bohl and Henke (2003) and Ahmed et al (2005) proved this relationship for most of the developed markets.

To prove the validity of the Mixture of Distribution Hypothesis (MDH) Lamoureux (1990) and Lastrapes (1994) suggested that the volatility decreases as trading volume is included in the GARCH model. Same results have been proved by Bohl and Henke (2003) for Poland, Pyan et al (2000) for the United States markets. Conversely the studies of Ahmed et al (2005) for the Malaysian markets, Salman (2002) for the Turkish markets and Chen et al (2001) for the developed markets argue that the persistence in the stock returns volatility exists by including trading volume in the conditional variance equation. Such a relationship has also been explored by the Stoll and Whaley (1990).Jones et al (1994) concludes a significant relationship between the trading volume and the stock returns volatility for small firms. The individual stock returns and not the stock index are found to be correlated with the trading volume as shown by Meckenzie and Faff (2003).

The financial reforms let the financial institutions to absorb and respond to the changes in the financial environment in any country. The financial reforms have brought improvement to the financial sector in terms of competition, the introduction of new products and also ensures the reduction of taxation by banks along with other financial institutions (Gelb and Honohan 1990). Such reforms bring increased output and enhanced growth rate, reduction in transaction cost and also brings improvement to the financial position of the firms. The financial reforms are adopted by numerous developed and underdeveloped countries across the world so as to have their positive results.

Pakistan has started implementing the financial reforms policy since 1990's. These reforms have upgraded the country rating since then. These reforms have also brought improvement to a number of sectors in the economy and has also helped improve the various financial indicators like the stock prices, exchange rate and the determination of interest rates according to the market mechanisms of the demand and supply. It has also revitalized the Karachi Stock Exchange (KSE) in terms of a better and improved governance practices, risk management and control, the investor's protection and also enhanced the transparency with in the trading activities. As a result, a reduction has occurred in the volatility of stock market, number of listed companies were increased and in the mean while also the capital market has gained a lot of depth since the inception of the financial sectors reforms in the country. These reforms has has put the Karachi Stock Exchange to move in the forward direction. As a result in the year 2002 the "Business Week" declared the KSE 100 index as the best performing index of the world. The KSE 100 index reached a record high level of 14,814 as in December 2007 but due to the unstable political environment since 2008, the escalating militancy in the country along with the ever increasing current account deficit and inflation has put the KSE on a steep decline.

LITERATURE REVIEW

Nowbutsing (2009) has studied the effect of trading volume on the stock returns and volatility in the stock exchange of Mauritius for a period of 2002 to 2008. The various ARCH family models, including the GARCH and GJR-TGARCH were used in this respect in order to test the relationship. A weak form of positive relationship between trading volume and stock returns has been confirmed in the stock exchange of Maritious,Baklaci and Kasman (2010) suggested a positive relationship between trading volume and stock returns volatility in the Turkish stock market. This particular empirical study was based on the daily volume and prices of 25 firms listed in the Turkish stock market during a period of 1998 to 2005. The GARCH (1,1) model was used in this respect in order to confirm this relationship.

The empirical work of Wang (2004) has also confirmed a positive relationship between trading volume and volatility in the United States stock markets. A total of 1789 firms were taken in total to confirm the relationship during a period of 1988 to 2001. The GARCH (1,1) model was applied to check the conditional volatility with in the trading volume and the stock returns volatility.

Fleming et al (2005) argued that the trading volume has much ability to explain the existence of the ARCH effects in the stock returns. The study was based on the 25 firms in the New York Stock Exchange (NYSE) with in a period of 1993 to 2003. The EGARCH and VA-GARCH were applied in this respect to ascertain this particular relationship.

Medeiros and Doornik (2006) in a study of the Brazilian stock exchange has suggested a

positive relationship between trading volume and the stock returns. They also argued in their study that the stock returns volatility is also influenced by the trading volume. This study was based on the data between 2000 and 2005. The empirical methods used to conclude the results were GARCH models, Granger Causality tests, unit root tests and also the correlation analysis.

Mahmood (2007) has studied the Malayasian stock market to reveal the dynamics of trading volume and the banking stock returns. The GARCH modeling was incorporated in this respect. The sample period was divided in two groups. The first was from 1995 to 1997, the before crisis period and the after crisis period of 1997 to 1999. The results revealed that the stock returns are affected by the trading volume. It has also been suggested that there are other variables that contribute to the banking stock returns volatility in the Malaysian stock market.

Khan and Rizwan (2008) has empirically investigated the implications of trading volume and stock returns, and their volatilities in the Pakistani markets. The KSE 100 index was taken as a case study in this respect and the data covered a time period of 2001 to 2007. The Granger Causality tests were used to test the causal relationship and the GARCH models were used to assess the volatility of stock returns in the Karachi Stock Exchange (KSE) because of trading volume. This study states that the trading volume causes the stock returns and also the stock returns are causing the trading volumes in the Karachi Stock Exchange. Also there has been evidences of stock returns volatility because of the trading volume.

Darrat et al (2003) has studied all the stocks including in the Dove Jones Industrial Average (DJIA) for the return volatility because of the different levels of trading activities in the Dow. The EGARCH modeling was used to explore the dynamics of stock returns volatility. The study concluded no positive relationship between the trading volume and the stock returns volatility in the Dow industrial average.

Kumar et al (2009) has studied the stock market in India for 50 stock to reveal the dynamics of trading volume and price discovery in the Indian markets. They conclude that a positive relationship exists between the trading activity and the price discovery in the Indian market. Also a two way causal relationship exists with in the trading activity and the stock returns as has been proved by the Granger Causality tests.

Mubarik and Javid (2009) has studied the Karachi Stock Exchange for a period of 1998 to 2008 to investigate the impact of trading volume on the stock returns and their volatilities. The GARCH-M model has proved that a significant relationship exists between the trading activity and the stock return volatility in the Karachi Stock Exchange. The results also reveal a positive relationship between market returns and the trading volume. It has been also proved in the study that the previous day trading activity is a determining factor for identifying the current day's stock returns in the Karachi Stock exchange.

Ying (1966) documented the relationship between trading volume and equity

stock returns. His study proved a positive relationship between trading volume and that of stock returns. Later on Harris (1986) proved again a positive relationship between the trading volume and price movements. Lamourex and Lastrapes (1990) studied a few highly actively traded stocks in the New York Stock Exchange to assess the information effects of trading volume on the variances of stock returns. The results prove that trading volume leads to the price volatility in the NYSE. Likewise the studies of Clark (1973), Tauchen and Pitts (1983) and Najung and Yung (1991) all confirm a positive correlation with in the trading volume and the stock prices.

DATA AND METHODOLOGY

Monthly trading volume and monthly 100 index returns of the Karachi Stock Exchange (KSE) has been taken for this study. The data covers a time period from January 1995 to December 2012.All the data was collected from the IFS (International Financial Statistics) and the website of the Karachi Stock Exchange (KSE). Karachi Stock Exchange is one of the biggest stock exchange of the country and also KSE 100 index is the representative index of the KSE. KSE 100 index includes companies holding 85% market capitalization. The relationship of the stock returns and trading volume is of greater importance to the researchers and also variations in the stock returns is a subject which is much appealing to the researchers and investors as well. Augmented Dickey Fuller (ADF) test is used to ascertain the data stationarity. Since both the trading volume and stock returns series should assume a constant mean and variance otherwise the regression results will be spurious so for this purpose ADF tests are used. Correlation is used to assess the relationship between the two series. Granger Causality assess whether a single time series can cause the other or not. The GARCH estimates are used to ascertain the conditional volatility within the two series. The compounded monthly index returns are calculated as

$$Srt = 100*(Pt /Pt-1)$$

Statioinarity Checks

Most of the time series data are assumed to be non stationary. In order to conduct a valid time series tests we must assume that the series we are using must be stationary otherwise the results will be spurious. A stationary time series must satisfy the following three basic requirements. First a time series must have a constant expected value, secondly a time series under consideration must have a constant variance, thirdly a time series should have a constant covariance with itself. The estimated results from a non stationary time series will have no economic meaning i.e a non stationary series will give spurious results.

So it must be determined first that whether the time series has got stationarity or not. The most popular test used for this purpose is the Augmented Dickey Fuller (ADF) test. The ADF test is used in order to determine whether there is a unit root in the time series or not.

Augmented Dickey_Fuller tests whether ρ is equal to 0 or not.

$$\Delta srtt = \alpha + \gamma Trend + \rho srtt\text{-}1 + E\Omega \Delta Yt\text{-}1 + \acute{\varepsilon}t \quad (1)$$

the ADF tests the null hypothesis (H0) against the alternative (H1) hypothesis

H0: Each time series has a unit root

H1: Each time series does not have a unit root

Table 1. Augmented Dickey-Fuller Test Results

Series	Test Statistic	Probability Value	5% Critical Value	H_0 Hypothesis
T_V	-6.721200	0.0000	-2.8748	Rejected
SRTs	-14.49044	0.0000	-2.8748	Rejected

The results of the Augmented Dickey-Fuller Test are presented in Table 1. The reported results suggest that there is no evidence of a unit root in both the series as the Dickey Fuller test statistics for both the series are less than the 5% critical values. So the null hypothesis of non stationarity is rejected. Hence both the series are stationary at level.

Correlation Analysis

Correlation shows the strength of the relationship between variables. The correlation coefficient shows how the two series are related. It can be computed as

$$\mathbf{r = Cov(X, Y)/ sx\ sy \quad (2)}$$

H_0 : The correlation is equal to 0 (r=0)

H_1 : Correlation coefficient is not equal to 0 ($r \neq 0$)

Table 2. Correlation between srt and trading volume

Series	Correlation Coefficient	Prob. Value	H_0 Hypothesis
T_V	0.302	0.000**	Reject

** shows 5% significance level

The results show a positive relationship with in trading volume and stock returns. A significant relationship has been found between these variables at 5% significant level.

GARCH Estimates

Here several models are discussed to test the effect of trading volume volatility on the

stock returns and volatility. The Autoregressive Conditional Heteroscedasticity (GARCH) estimates are used to model the conditional variance. To understand the relationship between trading volume, monthly stock returns and variance two models are estimated one without trading volume and the other with trading volume changes in both the variance and mean form.

Here ω, β, α, ? 1, ? 0 are the constant parameters. While ε2t-1 , srtt-1 , σ2t-1, t_vt are innovations, lagged returns, variance and interest rate volatility respectively.

Model 1:

$$Srtt = ?\ 0 + ?\ 1srtt\text{-}1 + \varepsilon t \quad (3)$$

$$\sigma 2t = \omega + \alpha\ \varepsilon 2t\text{-}1 + \beta\ \sigma 2t\text{-}1 \quad (4)$$

Model 2:

$$Srtt = ?\ 0 + ?\ 1srtt\text{-}1 + ?\ 2t\_v + \varepsilon t\text{-}1 \quad (5)$$

$$\sigma 2t = \omega + \alpha\ \varepsilon 2t\text{-}1 + \beta\ \sigma 2t\text{-}1 + \lambda t\_vt \quad (6)$$

Table 3. Estimates of Model 1 and Model 2

	? 0	? 1	? 2	Ω	α	β	λ
Model 1	0.015340 (2.285262) (0.0223)	0.021206 (0.260469) (0.7945)	--	0.000594 (0.867711) (0.3856)	0.033751 (1.010206) (0.3124)	0.895875 (8.461154) (0.0000)	--
Model 2	-.078685 (-0.779215) (0.4359)	-0.076934 (- 0.511002) (0.6093)	1.94E-10 (2.569592) (0.0102)	0.007551 (1.426548) (0.1537)	0.150000 (0.907540) (0.3641)	0.600000 (2.177809) (0.0294)	-1.51E-11 (- 1.893797) (0.0583)

In the mean equation (4) the estimate of ? 2 is positive and significant. This suggests that trading volume can predict the stock returns in the Karachi Stock Exchange (KSE). The Model 1 variance equation shows that past square residuals are positively related to stock returns but the results are insignificant as given in Table 3. The same results are reported for the past square residuals even in Model 2. The past variances on the other hand in Model 1 and Model 2 positively and significantly related to stock returns in the KSE. This shows that the ARCH effect is not active i.e the past square residuals have no effect on the stock return volatility or variations. While on the other hand the GARCH effects are present i.e the lagged variances have a significant positive impact on stock returns. The value of λ is negative and significant i.e the trading volume volatility has a significant negative relationship with stock returns in the KSE.

Granger Causality

Granger Causality is used to test whether there is any association between the variables. The Granger Causality is used only if there is any association between the variables and

to see which variable is causing or moving the other variable.

H_0 = Trading volume is not Granger Cause of stock returns

H_1 = Trading volume is a Granger Cause of stock returns

Table 4. Results of Granger Causality

Null Hypothesis	F-Statistic	Probability	α =0.05
T_V is not Granger Cause SRT	1.98954	0.13935	Not Rejected
SRT is not Granger Cause T_V	1.76227	0.17421	Not Rejected

The results suggest that neither trading volume is causing the stock returns nor the stock returns is a granger cause of the trading volume as the results are insignificant at the 5% significance level. The results are given in table 4.

CONCLUSION

This study is about the relationship between trading volume and stock returns in the Karachi Stock Exchange (KSE). The monthly trading volume data and also the monthly stock returns were taken for a period of 1995 to 2012. Both the series were found to be stationary at level. The findings of the study show that the trading volume is positively related to the stock returns. Further the results show that the ARCH effect is not active i.e the past square residuals have no effect on the stock return volatility or variations. While on the other hand the GARCH effects are present i.e the lagged variances have a significant positive effect on stock returns. The value of λ is negative and significant i.e the trading volume volatility has a significant negative relationship with stock returns in the KSE. In conclusion, trading volume can explain the stock returns in the Pakistani markets. Trading volume cause and move stock returns and is a common indicator for investors to take investment decisions. Therefore investment strategies should be designed according to the changes in trading volume.

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