The Relationship Between Trading Volume and Stock Returns

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Abstract

This study examines the relationship between trading volume and stock returns. The sample of the study consists of 266 stocks traded at the Colombo Stock Exchange (CSE) from 2000-2008. This study follows the conventional methodology used by Jagadeesh and Titman (Jagadeesh and Titman, 1993). The study revealed that stock returns are positively related to the contemporary change in trading volume. Further, it was found that past trading volume change is negatively related to stock returns. Investor misspecification about future earnings or illiquidity of low volume stocks can be the reason for the negative relationship between trading volume and stock returns.

Key words: trading volume, stock returns, Colombo Stock Exchange

1. INTRODUCTION

Fama points out that a market is weak-form efficient if all the information contains in past stock prices fully reflect in current prices (Fama, 1970, 1991). This implies that past security prices can not be used to predict the future price changes and hence, technical analysis tools have no value. In contrast, technical analysts believe that information contained in past security prices is not fully incorporated in current security prices, and hence, they believe that by observing the past security prices, information can be obtained on future security prices. Therefore, it is an interesting topic in finance to ascertain whether a market is week-form efficient.

Technical analysts strongly believe that "It takes volume to make price move" (Kapoff, 1987). The early studies on volume-price relation suggest that there are positive relations between the absolute value of daily price changes and daily volume for both market indices and individual stocks. (see, for e.g., Ying, 1966; Westerfield, 1977; Rutledge, 1984). The early studies on volume-price relation examined contemporaneous relationships between trading volume and absolute price changes. Hence, they have little relevance on the predictability of future stock prices.

Adding a new paradigm to the trading volume-price relationships, Gervars, Kaniel and Mingelgrin (KGM) investigate the role of trading activities in terms of the information it contains about future prices (Gervars, Kaniel and Mingelgrin, 2001). In other words they are interested in the power of trading volume in predicting the directions of future price movements. They find that individual stocks whose trading volume usually large (small) over period of a day or a week, tend to experience large (small) returns over the subsequent month.

Literature reveals that most of the studies on volume-price relationships have been done based on developed markets. Therefore this study is to empirically examine the trading volume-price relationships in emerging market of Colombo Stock Exchange. This study has two objectives, first, to empirically examine the contemporary relationship between the trading volume

change and stock returns. Second, to empirically examine the information content of past trading volume in predicting the future direction of stock returns.

The study used monthly stock prices and trading volume of 266 companies during the period from February 2000 to December 2008. This study follows the conventional method widely adopted on the momentum literature (Jegadeesh and Titman, 1993) to form volume based trading strategies. The study finds that trading volume is positively related with stock returns in the contemporary period and the relationship is negative when the past trading volume is related with stock returns.

This paper is organized as follows. In the next section literature relate to trading volume–price relationship is briefly described. Sample, data, hypotheses and method of computation explain in section III. In the section IV, main results are presented while last section concludes the paper.

2. REVIEW OF LITERATURE

Studies on volume–price relation go back to 1950s. Osborne shows a theoretical relation between volume and price (Osborne, 1959). Most of the early studies find positive correlation between the absolute value of daily price changes and daily volume for both market indices and individual stocks. Granger and Morgenstern conduct an early empirical study based on New York Stock Exchange (NYSE) composite index from 1939-1961(Granger and Morgenstern, 1963). He finds that there is no relation between absolute value of daily price changes and daily volume. However, subsequent studies find a relationship between absolute price change and volume change (see, e.g., Ying, 1966; Corouch, 1970; Epps and Epps, 1976; Haris, 1986). In recent studies researchers have found contemporary and lag relation between stock returns and trading volume (see, e.g., Chen, Firth and Rui, 2001; Khan and Rizwan, 2001; Lee and Rui, 2002; Pisedtasalasai and Gunasekarage, 2008).

Taking a new approach to volume–return relationship GKM developed visibility hypothesis based on viewpoints of Miller and Mayshar (Miller, 1977; Mayshar, 1983). Visibility hypothesis holds that when investors have diverse opinions about the value of a stock, the traders who bought the stock are optimistic about its value. Further, when the stock's supply is limited by short selling or margin trading then the opinion of the pessimistic investors will not incorporate into the stock price and the stock price will be bias. GKM point out that under such situation, any positive shock in number of traders giving attention to the stock (GKM named as increase in the stock's visibility) will increase demand for the stock (because number of buyers increase). However, supply for the stock will remain constant (no excess in sales). Hence, volume and price move positively. Therefore, the visibility hypothesis suggests that under market constraints, if more traders' attention is attracted on a stock its trading volume and price will increase.

Visibility hypothesis is first tested by GKM and subsequently by Huang and Heian (Huang and Heian, 2010). GKM examine the relationship between current trading volume with future returns for NYSE from 1963 to 1996 for both daily and weekly data. Number of shares traded is used as the measure of trading volume. Portfolios are formed in accordance with the Jegadeesh and Titman approach (Jegadeesh and Titman, 1993). They formed high, medium

and low volume portfolios based on daily and weekly data and without rebalancing kept these portfolios for 1, 10, 20, 50 or 100 trading days. Study finds that portfolios with high trading volume tended to be followed by high returns and vice versa. This high-volume return premium is true when the formation period is day or a week. It lasted at least 20 trading days and at most 100 trading days.

Huang and Heian examine the risk adjusted high value premium based on all firms listed on NYSE and AMEX from August 1963 to December 2005 (Huang and Heian, 2010). They use the conventional method widely used by momentum literature (Jegadeesh and Titman 1993) to test the strategy. Formation period is 26 weeks and the holding period varied from 1 week to 52 weeks. They find statistically significant abnormal returns for high volume minus low volume portfolio for holding periods 1-4 weeks. However, they further to find that as the holding period increase beyond 8 weeks, abnormal returns decrease significantly.

3. DATA AND METHODOLOGY

3.1 Data

All the data used in the study is taken from the CSE data library. The sample period covers 9 years from February 2000 to December 2008. The sample of the study includes all the listed stocks in the CSE. This sample includes even delisted stocks in order to address the problem of survivorship bias[1]. Therefore the total sample includes 266 companies.

3.2 Methodology

Volume return-relationships are examined in two ways. First, the contemporary relation between changes in volume-return is examined and next the relationship between past trading volume and future stock returns are examined. Change in volume and monthly stock returns are computed as follows.

The variables used in the study are mainly monthly individual stock prices and number of stocks traded. Percentage monthly returns are computed using individual stock prices as follows.

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \times 100$$

$R_{i,t}$ = Capital gain returns of the i [th] share in the month t.

$P_{i,t}$ = Price of the i [th] share at the end of month t.

$P_{i,t-1}$ = Price of the i [th] share at the end of the previous month.

Percentage monthly returns are adjusted for dividends, right issues and bonus issues on the basis of reinvestment assumption at the end of the month in which ex-date occurred. The following formula is used to compute the monthly trading volume changes.

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1 Kothari, Shanken and Sloan show that the data selection biases including a survivor bias significantly affected on the anomalies (Kothari, Shanken and Sloan, 1995).

$$\frac{(Vol_{i,t} - Vol_{i,t-1})}{Vol_{i,t-1}}$$

Where,

$Vol_{i,t}$ = the trading volume of company i for month t

$Vol_{i,t-1}$ = the trading volume of company i for previous month

In order to examine the contemporary change in volume-return relationships, each month stocks are ranked and grouped into three portfolios as high volume (HV), middle volume and low volume (LV) portfolios based on their volume change during the past 3, 6 9 and 12 months and their average returns are computed for 3, 6 9 and 12 months under each period. Next, the relationship between past trading volume and future stock returns are examined. Each month stocks are ranked and grouped into three portfolios as HV, middle volume and LV portfolios based on their volume change during the past 3, 6, 9 and 12 months and their average returns are computed for next 3, 6, 9 and 12 months under each period.

3.3 Hypotheses

If the change in trading volume carries information on stock returns, there should have a significant relationship between change in volume and stock returns. Average returns of HV and average returns of LV portfolios are compared to detect relations between trading volume change and stock returns. Therefore, the null hypothesis (H0) and the alternative hypothesis (H1) are developed as follows.

H_0: $E(R_{HV} - R_{LV}) = 0$

H_1: $E(R_{HV} - R_{LV}) \neq 0$

Where,

R_{HV} = average returns of high volume portfolio

R_{LV} = average returns of low volume portfolio

The null hypothesis explains that HV portfolio and LV portfolio has the same expected returns while the alternative hypothesis explains that expected returns of HV portfolio is different from that of LV portfolio.

3.4 Test of significance

The significance of the returns difference on trading volume portfolios is measured using the paired sample t –tests. The t – values are computed as follows.

$$t = \frac{R_{HV} - R_{LV}}{\sqrt{VarR_{HV}/n + VarR_{LV}/n}}$$

4. RESULTS

This study has two objectives. First, to examine the contemporary relationship between trading volume and stock returns and the second objective is to examine the relationship between past period trading volume and current stock returns (lag volume relationship).

4.1 Contemporary trading volume effect

The table 1 shows average monthly returns of HV, LV and high minus low volume (HmLV) portfolios for 16 tests. Each month stocks are ranked and divided into three portfolios based on 3,6,9 and 12 month change in trading volume and under each change in volume portfolio average returns are computed for 3, 6, 9 and 12 months.

Tab. 1 - Contemporary Trading Volume Effect from 1995-2008. Source: own

J=Formation Period, K= Holding Period		K=3	K=6	K=9	K=12
		K=3	**K=6**	**K=9**	**K=12**
J=3	HV	1.90	2.00	1.80	1.72
	LV	0.17	0.58	0.87	1.07
	HmLV	2.07***	1.42***	0.93**	0.65***
J=6	HV	1.08	2.02	1.83	1.72
	LV	0.51	0.41	0.80	1.03
	HmLV	0.57***	1.61**	1.03***	0.69***
J=9	HV	1.26	1.47	1.92	1.78
	LV	0.77	0.91	0.75	1.00
	HmLV	0.49***	0.56***	1.16***	0.78***
J=12	HV	1.14	1.42	1.47	1.76
	LV	0.97	0.97	1.01	0.91
	HmLV	0.17***	0.45***	0.46***	0.85***

** Significantly different from zero at the 5% level.
*** Significantly different from zero at the 1% level.

At a first look, the table reveals that all the HV portfolios reflect positive average returns and they outperform the average returns of LV portfolios. Portfolios formed based on 3 month trading volume change and their 3 months returns show highest returns difference between HV and LV portfolios (2.07% at t=11.86). The lowest returns difference between high and low volume portfolios reports when portfolios formed based on 12 month average trading volume change and held for 3 months. The HV portfolios outperform the LV portfolios for all the test portfolios reported in the table. Therefore, table 1 shows that there is a contemporary relationship between trading volume change and stock returns.

4.1 Lag trading volume effect

Tab. 2 - Lag Trading Volume Effect from 1995-2008. Source: own

J=Formation Period, K= Holding Period		K=3	K=6	K=9	K=12
	P1	0.74	1.12	1.25	1.37
J=3	P3	0.77	1.26	1.40	1.47
	P1-P3	-0.03	-0.13	-0.15	-0.10
	P1	0.63	1.10	1.28	1.36
J=6	P3	0.92	1.46	1.55	1.61
	P1-P3	-0.29***	-0.36***	-0.27***	-0.25***
	P1	0.64	1.17	1.32	1.45
J=9	P3	0.88	1.49	1.64	1.08
	P1-P3	-0.24**	-0.32***	-0.31***	0.23***
	P1	0.69	1.11	1.33	1.39
J=12	P3	0.84	1.55	1.68	1.66
	P1-P3	-0.15***	-0.44***	-0.35***	-0.27***

The table 3 reflects average monthly portfolio returns when portfolios are formed based on past period trading volume changes. Each month from February 2000 to December 2008, stocks are ranked and form into 3 equally weighted portfolios based on 3, 6,9 and 12 month past change in trading volumes. Subsequently, average portfolio returns are computed for the next 3, 6, 9 and 12 months for each portfolio in the formation period. This makes 16 different test portfolios. At a glance, the table shows that low volume portfolios outperform the high volume portfolios for all the portfolios reported in the table. The average returns difference is not statistically significant for the portfolios with formation period 3 months. The average returns differences of all the other portfolios reported in the table generate statistically significant negative excess returns.

The outperformance of LV portfolio over the HV portfolio is contrary to the previous findings (see, Gervars et al., 2001; Huan and Heian 2010). Further, the finding is not in accordance with the sequential arrival of information theory of Copeland (1976) and mixture of distribution hypothesis of Epps and Epps (1976). The outperformance of HV portfolio returns by LV portfolio returns can be justified with two reasons. First, the higher (lower) future returns of LV(HV) stocks can be due to investor misperceptions about future earnings. Lee and Swaminathan found negative relationship between trading volume and returns and they pointed out that (Lee and Swaminathan, 2001):

… analysts provide lower (higher) long-term earnings growth forecasts for low(high) volume stocks. However, low (high) volume firms experience significantly better (worse) future operating performance. Moreover, we find that short-window earnings announcement returns are significantly more positive (negative) for low (high) volume firms over each of the next eight quarters.

The same pattern is observed in this study also and as Lee and Swaminathan pointed out that this can be due to investor misperceptions about future earnings of low volume firms (Lee

and Swaminathan, 2001). As a result of that market is "surprised" by the systematically higher (lower) future earnings of low (high) volume firms.

The second justification for the negative relationship between trading volume and return is the liquidity of the assets. Datar, Naik and Radcliffe find negative relationship between future stock returns and liquidity measured by stock turnover rate for all non financial firms on the NYSE from July 31, 1962 through December 31, 1991 (Datar, Naik and Radcliffe, 1998). As Dater et al. point out the negative sign between stock return and trading volume confirms that illiquid stocks offer higher average returns than liquid stocks (Dater et al., 1998). This fact is relevant to CSE also because researchers have found that most of the stocks at CSE do not trade frequently (see, e.g., Samarakoon, 1996; Pathirawasam and Idirisinghe, 2011).

5. CONCLUSION

This study examines the trading volume effect on stock returns at Colombo Stock Exchange from 2000-2008. The study adds some important findings for the existing literature as trading volume effect is proven on extensively in developed markets while little evidence on developing markets.

This study examines the relationship between trading volume change and stock return in two stages. First contemporary relationship between trading volume change and stock returns are examined and next, the relationship between past period trading volume change and stock returns are examined.

The study finds that contemporary trading volume change is positively relate with the stock returns. However, the relation between past period trading volume change and current period stock returns is negative. This means stocks with low trading volume change outperform the stocks with high trading volume change in the subsequent period. The outperformance of high volume portfolio returns by low volume portfolio returns can be justified with two reasons. The higher (lower) performance of low volume (high volume) stocks can be due to investor misspecification about future earnings. Or else, illiquidity of low volume can be the reason for outperformance of low volume stocks.

As the trading volume has predictive power on stock returns, investors can make trading volume based strategies to make profits and theoretically this provides evidence of weak form inefficiency of the CSE.

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