

Role of trading volume in Technical analysis: An empirical Investigation

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Abstract

The study has examined the price- trading volume nexus in the technical analysis context. Specifically the study has examined the information content in the trading volume. Granger causality test has employed to test the information content in the trading volume. The study has found that trading volume contains information to foresee the future price movements

1 .Introduction

Academia has widely debated the issue of price- trading volume dynamics. The initial work on price-volume relationship done by Granger and Morgenstern (1963) concludes that there is no correlation between price and trading volume. However, later studies have found that there is a significant relationship between price and volume. According to C.C Ying (1966), Price and volumes of sales in the stock market are joint products of a single market mechanism; hence price volume analysis in the market is essential to understand the market dynamics. Jonathan M Karpoff (1987) has identified four major reasons for the price volume analysis in the financial market. They are: a) the volume provides an insight into the structure of financial market, b) It is important for event studies that use a combination of price and volume data, c) Price Volume relation is critical to the debate over the empirical distri-

bution of Speculative prices d) Price Volume relation has significant implication for research on future markets. In the existing literature on price-volume, comes in three forms: (a) its relation with bid-ask spread (b) its relation to price changes (c) its relation to information. However, the present study focus on the information content of the variable such as share price and trading volume. The study has focused on role trading volume in technical analysis. Technical analysis focuses on the prediction of future market price based on the past market statistics. So it indicates that past market statistics contain the information regarding the future price movement On the other hand, the concept of market efficiency informs that current price fully reflects the information and hence nobody can make abnormal profit (Fama, 1970). However, later studies questions the reflection of every information in the price without any time lag. Brown and Gennings (1989) explain that if the investors are homogeneously informed, the technical analysis has no value. But in the competitive market environment, it is not possible to inform every investor equally. Blume, Easley and O'Hara (1994) informs that if the price adjustment process is not immediate, the market statistics will contain information. Most of the time, in the market environment, price adjustment is not quick because of the inability of the system for the information dissemination.

2. Technical Analysis and Trading Volume

According to technical analysis literature, investors focus on past price to make effective investment decision. Price statistics of a security may or may not provide quality of trading information but the trading volume provides a clear insight on trading activity. Combination of past price information and volume activity gives clear information on future price movement. Hence, the technical analyst use trading volume to confirm trend and trend reversal. If stock price increases along with the trading volume it ensures the strength of the market movements..Kraus and Stoll (1972) Hess and Frost (1982) have argued that large volume of sale and purchase of a security causes the increase and decrease in price. It should be noted that Price cannot obtain complete information from the market.. But in the actual market, the situation is altogether different and investors get different market signals. If the traders analyze the price with the volume, they can distinguish the signal, noise as well as news in the market. . The empirical study finding of Young (2000) was a turning point in the price volume relationship as well as in technical analysis. His contribution is as follows; (i)Price and volume rise- it signals an uptrend,(ii)Price declines but the volume rises- It signals a downtrend(iii) Price is rising but the volume is declining hence it signals the weak uptrend,(iv)Price is declining and the volume also is declining. It signals a weak downtrend.Informed traders do not require technical analysis but for uninformed traders technical analysis is a necessity to understand the signals based on the market price.

3. Review of Literature

The study done by Blume,et al (1994) shows that trading volume has price sensitive information. Granger and Morgenstern(1963), C.C Ying (1966),Crouch(1970), Clark(1973), Epps &Epps (1976),Harris(1983) also support that the trading volume has price sensitive information. However, most of these studies are based on the developed markets like U.S and U.K. and very few studies are based on the emerging market. (.Moosa and

Loughani (1995) Basci,et al (1996), Pisedtasalasai and Gunasekarage (2007).).Moreover, almost all of these studies are related to price changes. However, these studies are either related to volume and absolute price changes or volume and price change per se and some studies are related to bid-ask spread. Information related studies on trading volume are very limited in the emerging markets; especially the studies related to technical analysis and trading volume are limited. .Antonioni et al(1997), provide a clear linkage among technical analysis, trading volume and market efficiency. Technical analysts believe that history of past prices reflects the information on future price movement and technical analysis is a pervasive activity as it can be seen in all levels of analysis. This apparent paradox has been analyzed by considering the past prices and volume. Jiang Wang (2002) informs that the price and volume are the two important variables in the market analysis. The behaviour of volume is closely related with the behaviour of price through which investors can learn a great deal about price as well as economic fundamentals. Numerous studies have been done on the price- trading volume relationship but majority of the studies have concentrated on the developed market. However, it should be noted that a few studies have focused on the price- trading volume relationship and its involvement in the technical analysis. Hence, the present study focuses on price –trading volume relationship within the context of technical analysis. Specifically, the study examines whether the trading volume contain information to consider as an effective tool of technical analysis.

4. Data & Methodology Data

The Data consist of thirty six individual stocks in Nifty for a period of five years (2002-2007). The remaining fourteen stocks in Nifty have been excluded from the analysis as those stocks do not have a history of consecutive five years in the Nifty. Closing price data and volume have been taken for the analysis. Turnover has been taken to represent the volume since turnover reduces the variation in the series. Total 1259 observations of each stock have been taken to

test the casual relationship between price and volume vice versa.

Granger Causality Test

The study has used Granger Causality test to identify the causality between the price and trading volume. Granger (1969) introduced the concept of causality and which become Granger Causality later., It is a standard econometric tool to. measures the causality between two variables. Regression analysis does not provide the direction of the influence or causality. However, Granger causality test identifies both unilateral and bilateral causality between two different variables. If the variable 'X' granger causes variable 'Y' and the variable 'y' does not cause the variable 'X', there will exist unilateral granger causality. At the same time, if two variables cause each other, there will be bilateral granger causality. It should be noted that data set should be stationary before the application of Ganger causality test.

Stationary Test

In econometric analysis the selected data set should be stationary in nature. Otherwise it brings out the spurious relationship or correlation among the variables. Generally, the price data obtained from stock market is not stationary. The study has used Augmented Dickey Fuller test to check the stationary of the closing price data.

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum \Delta Y_{t-i} + \epsilon_t$$

$$Y_{t-1} = (Y_{t-1} - Y_{t-2})$$

Augmented dickey fuller test is a version of dickey fuller test and it has used for complicated set of time series models. ADF test removes the autocorrelation among the variables and tests the stationarity status of the time series. The test found that the closing price series of stocks are not stationarity. Hence,, return is calculated to make the price series stationary by using following equation.

$$R_t = [\ln (P_t) - \ln (P_{t-1})]$$

$\ln (P_t)$ denotes the logarithm of closing price at the time of t. and it is stationary in all the cases.

5. Causal Relation between Trading Volume and Stock Price

The Granger causality test has been used to test the causal relationship between trading volume and stock price. Causal relationship means whether the stock price causes the trading volume or the trading volume cause the trading volume. In analysis, the stock price and trading volume have regressed each other. Lag length is determined according to Akaike information criterion. Table 6.6 has shown the lag length along with test result. The study has used the following equation of Granger Causality for the purpose of analysis

$$V_t = \lambda_0 + \sum_{i=1}^m \lambda_i R_{t-i} + \sum_{j=1}^n \beta_j V_{t-j} + \epsilon_{1t}$$

$$R_t = \gamma_0 + \sum_{i=1}^m \lambda_i R_{t-i} + \sum_{j=1}^n \beta_j V_{t-j} + \epsilon_{2t}$$

Causality from return to volume is tested by putting $\lambda_i = 0$ as null hypothesis and granger causality from trading volume to return is tested by putting the null hypothesis $\beta_j = 0$. To test these joint hypothesis F test has been used, which measure the overall significance of the estimated regression coefficient. If the calculated value is more than the critical value, the null hypothesis will be rejected. If the calculated value is less than the critical value, the null hypothesis will be accepted.

Trading Volume on Share Price

Table 1 explains the granger causality test results (trading volume on share price). Cetin Ciner (2002) has shown that volume contains the information to predict the future price movements. Shyh-wei Chen (2008) has found that a long term relationship exists between the share price and trading volume.

Table 1
GRANGER CAUSALITY TESTS OF SELECTED STOCK IN NIFTY (Volume on price)

S.No	STOCKS NAME	F STATISTICS	LAG
1	ACC	42.8128994994431*	7
2	BAJAJAUTO	95.8249764702482*	9
3	BHEL	64.092795321323*	9
4	BPCL	1.605175536	7
5	SEMENCE	3.20075671970827**	12
6	CIPLA	2.98249601104626***	9
7	DABUR	49.2934033528028*	5
8	DRREDDY	11.3257593982928*	9
9	GAIL	3.46746194304564**	6
10	GRASIM	54.2877243413373*	9
11	GUJAMBCEM	1.486639598	7
12	HCLTECH	14.1922542534191*	7
13	HDFC	32.8731773851932*	8
14	HDFC BANK	41.2734408991784*	7
15	HEROHONDA	3.07446299482345***	7
16	HINDPETRO	0.894070824	7
17	HINDLEVER	8.89203208992294*	5
18	ICICIBANK	2.51011044777703***	7
19	INFOSYS	37.6225569951432*	12
20	IPCL	2.7596918995352***	6
21	ITC	33.7531148933392*	10
22	M&M	0.654695038	8
23	MTNL	15.9106790125744*	5
24	NATIONALUM	1.833483265	5
25	ONGC	20.1357458539631*	8
26	PNB	2.8560672049963***	7
27	RANBAXY	21.5202287580674*	9
28	RELIENCE	4.37053531453287**	8

29	SAIL	2.53736953046169***	4
30	SATYAMCOMPUTERS	33.3868282117774*	8
31	SBIN	0.628460523	8
32	SUNPHARMA	24.4444916108832*	8
33	TATAPOWER	2.618760183209127***	6
34	VSNL	16.0059456223665*	7
35	WIPRO	40.8394131946961*	10
36	ABB	42.8128994994431*	10
*Significant at 1% level, ** significant at 5% level, ***significant at 10% level			

So, the study has begun with the hypothesis that trading volume granger causes the share price in Indian stock market since the other studies are based on foreign markets.

The Stocks of ABB, ACC, BAJAJAUTO, BHEL, DABUR, DRREDDY, ONGC SUNPHARMA, VSNL, GRASIM, HCLTECH, HDFC, HINDLEVER, INFOSYS, ITC, MTN, RANBAXY, SATYAMCOMPUTERS, WIPRO, HDFC BANK are significant at one percent level itself. A Few stocks such as BPCL, GUJAMBCEM, HINDPETRO, M&M NATIONALUM and SBIN are not significant even in ten percent level. As per the analysis, there is no bilateral causal relationship between price and volume. Only unilateral relationship exists between price and trading volume. The F statistic is highly significant in almost all stocks in the case of volume causing price. Hence, the study rejects the null hypotheses and trading volume does not causes the price (V to $R - \beta_j = 0$)

Share Price on Trading Volume

Table 2 explains the granger causality test results (trading volume on share price). The study has begun with the hypothesis that the share price does not granger causes trading volume. BAJAJAUTO, BHEL, BPCL, DABUR, RELIENCE are a few number of stocks significant at 1% level of significance. However, DRREDDY, GAIL, GRASIM, GUJAMBCEM, HCLTECH, HDFC, HDFC BANK, HEROHONDA, HINDPETRO, HINDLEVER, ICICIBANK, SAIL, SATYAMCOMPUTERS, SBIN, NATIONALUM, ONGC, PNB, RANBAXY have shown that share price does not granger cause the trading volume, since F statistics is highly insignificant in the case of price causing volume. The study accepts the null hypothesis that the price does not cause trading volume (R to $V - \lambda_i = 0$). Hence, the price does not have any casual relation with trading volume.

Table 2
Casual Relation between Price and Trading Volume

S.N	STOCKS NAME	F STATISTICS	LAG
1	ACC	2.007860748	7
2	BAJAJAUTO	13.0199877624004*	9
3	BHEL	8.4359100247523*	9
4	BPCL	6.70731764714792*	7
5	SEMENCE	0.06952473	12

6	CIPLA	2.46024413283621***	9
7	DABUR	8.82997135954791*	5
8	DRREDDY	1.090440311	9
9	GAIL	2.072788942	6
10	GRASIM	0.124284067	9
11	GUJAMCEM	0.199706746	7
12	HCLTECH	2.267967949	7
13	HDFC	2.15654722	8
14	HDFC BANK	0.096927108	7
15	HEROHONDA	1.025279739	7
16	HINDPETRO	1.187272363	7
17	HINDLEVER	2.219883966	5
18	ICICIBANK	0.469002391	7
19	INFOSYS	3.51000609477651**	12
20	IPCL	0.008145464	6
21	ITC	1.423932752	10
22	M&M	0.382955872	8
23	MTNL	4.71315241108813**	5
24	NATIONALUM	0.694915526	5
25	ONGC	0.881699458	8
26	PNB	0.102309563	7
27	RANBAXY	0.120104019	9
28	RELIENCE	10.9991020933148*	8
29	SAIL	0.249711395	4
30	SATYAMCOMPUTERS	0.584260081	8
31	SBIN	1.90786145	8
32	SUNPHARMA	1.22326867	8
33	TATAPOWER	0.211037672	6
34	VSNL	1.448228719	7
35	WIPRO	1.114476227	10
36	ABB	2.007860748	10

*Significant at 1% level, **significant at 5% level, *** significant at 10% level

The study investigates the casual relationship between the price and trading volume in the National Stock Exchanges (NSE). As per this analysis, trading volume granger causes price in almost all stocks, which means that trading volume contains the information about the future price movement. Hence, the price and volume relationship is not contemporaneous but it is a lagged relation.

Conclusion

In technical analysis, trading volume-price nexus plays an important role in predicting the future price movements. Even though, past price analysis is the key in technical analysis but volume gives an assurance of the trend given by the past price movement. The study has found that trading volume causes the share price but not share price causes the trading volume. This indicates that trading volume contains information to predict the future price movements. Hence, the study accepts that trading volume plays a significant role in the field of technical analysis.

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