Testing weak-form efficiency in banking sector of Indian stock market by examing the relationship between Delivery Quantity to Total Quantity traded and Returns of Stocks

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***Abstract*—This study is done to test the weak from of market efficiency by examining whether the delivery quantity to total quantity traded (percentage delivery quantity traded) of a stock affects or is affected by its stock return. The paper investigates the relationship between stock return and percentage delivery quantity traded for 13 companies in the banking sector of NSE NIFTY. Unit root test was conducted to ensure stationary of the time series data and granger causality tests were conducted to analyze the relationship between the two for each of the banks. We found that for two of the thirteen companies, stock return is granger causing percentage delivery quantity traded, but there were no instances where the reverse relationship, i.e. stock return being caused by percentage delivery quantity traded, was observed. This suggests that all the past information is fully reflected in the current stock prices and there is no scope for making abnormal returns using past information on percentage delivery quantity traded. Our study thus provides evidence for weak form of market efficiency hypothesis.**

Keywords—Stock return; delivery quantity traded; granger causality test; weak form efficiency.

I. INTRODUCTION

Ever since [1] laid theoretical foundation of the Efficient Market Hypothesis (EMH), there have been an active interest among academicians in empirical testing of efficiency of markets. Many studies have examined the relationship between daily stock index returns and percentage trading volume changes in order to test weak form of market efficiency hypothesis. Apart from the volume of shares, the percentage of delivery quantity traded to total quantity traded (percentage delivery quantity traded) is an important data that needs to be analyzed along with the share price. But, previous studies have not explored the relationship between percentage delivery quantity traded and stock market return in order to test weak form efficiency. Therefore, in this paper, we examine whether the stock return of top 13 banks of the country (in terms of market capitalization) is influenced by the past information on percentage delivery quantity traded.

In [1], Fama postulates EMH which says that there is no possibility of predicting the future prices by analyzing the past data or publicly available new information or through a combination of public and private data. In other words, in an efficient market, the null hypothesis of no predictability should not be rejected. Fama also splits the efficiency into three forms: weak form (where current stock prices fully reflect all historical data), semi-strong form (where current stock prices also reflects any information that is publicly available) and strong form (where current stock price also reflects any insider information about the company)

In a market characterized by the weak form of informational efficiency, an investor cannot obtain excessive earnings by trading based on history of stock prices or other micro and macro variables such as trading volume, price-earnings ratio, dividend yield, interest rates, etc. Thus, if market is efficient in the weak form, stock prices of the banks should reflect all the past information and we should not be finding stock returns to be caused by percentage delivery quantity traded. On the other hand, if a causal relationship exists between the two, it would imply that weak form efficiency does not hold for the market.

When the share price of the stock goes up alongside with the higher percent of deliverable quantity to traded quantity, it specifies that maximum buyers are expecting the share price to rise. Similarly, when the share price of the stock declines with higher percent of deliverable quantity to traded quantity, it indicates that most of the sellers are expecting the share price to decline. Some stocks tend to rise with a significantly lower per cent of total deliverable quantity to traded quantity per cent

which signifies that there is more trader interest in the stock. This is because there is more squaring-off on the same day in the stock implying there is more trader interest in the stock rather than long term investor's interest. Thus, percentage delivery quantity traded is expected to influence future stock price when markets are not efficient. The study therefore uses this data to test the market efficiency.

NSE, the National Stock Exchange of India is one of the two major stock exchanges in the country. NIFTY 50 is its flagship index that includes 50 topmost companies in NSE in terms of market capitalization. In this paper we try to examine the relationship between stock returns and percentage delivery quantity traded for companies in the banking sector that are included in the NIFTY 50.

II. LITERATURE REVIEW

The previous studies related to our paper have been summarized below.

Reference [2] focused on investigating the dynamic relationship between stock return and trading volume of the Banking sector and concluded that there was a significant relationship between trade volume and stock return.

Reference [3] examined and tested the validity of using trading volumes to forecast stock return. They found that high stock price returns when coupled with normal volume implies greater agreement and less uncertainty in the market.

Reference [4] analyzed the significance of trading volume on the movement of past price. The study also found that only the investors who concentrate on the past trading volume could incur profits and could perform better.

Reference [5] investigated the dynamic relation between stock return and volumes. The study found that variation in the relation between return autocorrelation and volume is related to the extent of informed trading.

Reference [6] studied about the dynamic relationship between trading volume and returns from the stock in Egypt and concluded that there is positive auto correlation in Egyptian exchange

Reference [7] examined 50 Indian stocks and took three measures of trading volume namely number of shares traded, number of transaction and value of shares traded. By focusing on the contemporaneous relation between trading volume and returns they analyzed the asymmetric behavior of trading volume in response to change in price.

Reference [8] explores the relationship between trading volumes and stock return and found that Malaysian market satisfies weak form of the efficient of hypothesis. They found that there is a there exists a contemporaneous negative relationship between the past period trading volume and stock return.

Reference [9] The study uses BSE stocks to examine the inter-dependence among stock prices and finds support fort weak form of efficiency during their study period. But they also observed that trading strategies based on historic prices cannot ensure abnormal returns except for those that coincided with underlying drifts.

Reference [10] in their research on stock price and trading volume relationship through Granger causality by using minute data concluded that out of 50 companies, 29 companies showed causality relationship that is bi-directional between stock price and trading volume, 15 companies were found to have uni-directional relationship between the two variables and 6 companies had no causality relationship at all.

Reference [11] in their study on price-volume relationship through Granger Causality test stated that price forecasts are improved by past volume knowledge behavior.

Reference[12] This paper studies about the market efficiency and causal relationship between selected Macroeconomic variables and the Indian stock market by using various test such as Unit Root test, Granger Causality test and , Breusch-Godfrey LM test and the Granger Causality test shows that indication of bidirectional relationship between interest rate and stock market, exchange rate and stock market, international stock market and BSE volume, exchange rate and BSE volume .and also examines that Indian stock market is sensitive towards changing behavior of global market

III. METHODOLOGY

The study has taken daily stock closing prices and percentage delivery quantity of NSE NIFTY 50 banking sector companies for a time period of 24 months from February 2015 to February 2017 from NSE website. Daily log normal returns of the 13 banking stocks were then calculated.

First the data were tested for stationary using unit root test. Non-stationarity in a time-series data can induce error in statistical inferences and hence it is necessary to ensure that both stock return data and percentage delivery quantity data are stationary. Augmented Dickey Fuller (ADF) unit root test is used to test whether a time-series variable is non-stationary and possess a unit root. The null hypothesis is that a unit root is present (data is non-stationary). The null hypothesis was rejected at 5% significance level confirming that both percentage delivery quantity and returns series are stationary.

The stationary data was then subjected to Granger Causality test, which is a test used to explore causal relationship between two time-series data. Granger Causality has an assumption that future cannot cause past but the past can cause the past or future.

Based on this, the test runs two regression models which are given by equation 1 and 2 for each of the stocks.

$$SR_t = \sum_{i=0}^{2} \alpha_i QT_{t-i} + \sum_{j=0}^{2} \beta_j SR_{t-j} + \varepsilon_{1t} \quad [1]$$

$$QT_t = \sum_{i=0}^{2} \gamma_i SR_{t-i} + \sum_{j=0}^{2} \delta_j QT_{t-j} + \varepsilon_{2t} \quad [2]$$

Where,
SR = Stock return
QT= percentage quantity traded
$\alpha_i, \beta_j, \gamma_i, \delta_j$ = coefficients of the model (i.e., the contributions of each lagged observation)
$\varepsilon_{1t}, \varepsilon_{2t}$ = residuals (prediction errors) for each time series.

If α_is, i.e. coefficients of lagged terms of QT, are coming out to be significant in the regression output, then F-statistic of the test would be high which suggests that past values of QT is causing future values of SR. Thus, when p-value of the F-statistics is less than 5%, the null-hypothesis of no granger causality can be rejected.

We developed the following hypotheses for each of the 13 banking stocks in order to subject them to Granger causality test.

HYPOTHESES:

H01a: Bank of India stock return (BISR) is not caused by its delivery quantity traded (BIDP)
H01b: Bank of India delivery quantity traded (BIDP) is not caused by its stock return (BISR)

H02a: Canara bank stock return (CASR) is not caused by its percentage delivery quantity traded (CADP)
H02b: Canara bank percentage delivery quantity traded (CADP) is not caused by its stock return (CASR)

H03a: Federal bank stock return (FSR) is not caused by its percentage delivery quantity traded (FDP)
H03b: Federal bank percentage delivery quantity traded (FDP) is not caused by its stock return (FSR)

H04a: State bank of India stock return (SBSR) is not caused by percentage delivery quantity traded (SBDP)
H04b: State bank of India percentage delivery quantity traded (SBDP) is not caused by its stock return (SBSR)

H05a: Yes Bank stock return [YSR] is not caused by its percentage delivery quantity traded [YDP]
H05b: Yes Bank percentage delivery quantity traded [YDP] is not caused by its stock return [YSR]

H06a: Axis Bank stock return [AXSR] is not caused by its percentage delivery quantity traded [AXDP]
H06b: Axis Bank percentage delivery quantity traded [AXDP] is not caused by its stock return [AXSR]

H07a: Bank of Baroda stock return [BBSR] is not caused by its percentage delivery quantity traded [BBDP]
H07b: Bank of Baroda percentage delivery quantity traded [BBDP] is not caused by its stock return [BBSR]

H08a: ICICI Bank stock return [ICSR] is not caused by its percentage delivery quantity traded [ICDP]
H08b: ICICI Bank its percentage delivery quantity traded [ICDP] is not caused by its stock return [ICDP]

H09a: Indus Bank stock return [INSR] is not caused by its percentage delivery quantity traded [INDP]
H09b: Indus Bank percentage delivery quantity traded [INDP] is not caused by its stock return [INSR]

H010a: Kotak Bank stock return [KSR] is not caused by its percentage delivery quantity traded [KDP]
H010b: Kotak Bank percentage delivery quantity traded [KDP] is not caused by its stock return [KSR]

H011a: Punjab national bank stock return [PSR] is not caused by its percentage delivery quantity traded [PDP]
H011b: Punjab national bank its percentage delivery quantity traded [PDP] is not caused by its stock return [PSR]

H012a: HDFC bank stock return [HDSR] is not caused by its percentage delivery quantity traded [HDDP]
H012b: HDFC bank percentage delivery quantity trade [HDDP] is not caused by its stock return [HDSR]

IV . RESULTS AND DISCUSSIONS

The results of the Granger Causality test are summarized in table 1 and 2 below.

Table No: 1

Null Hypothesis:	F-Statistic	Probability
BISR does not Granger Cause BIDP	1.15497	0.2830
BIDP does not Granger Cause BISR	1.93608	0.1647
CASR does not Granger Cause CADP	0.23629	0.7896
CADP does not Granger Cause CASR	0.22630	0.7976
FSR does not Granger Cause FDP	1.53994	0.1759
FDP does not Granger Cause FSR	0.98241	0.4279
SBSR does not Granger Cause SBDP	3.37286	0.0348
SBDP does not Granger Cause SBSR	2.48863	0.0836
YSR does not Granger Cause YDP	1.09636	0.3577
YDP does not Granger Cause YSR	0.19067	0.9433
AXSR does not Granger Cause AXDP	1.91414	0.0905
AXDP does not Granger Cause AXSR	0.43883	0.8214
BBSR does not Granger Cause BBDP	1.34401	0.2526
BBDP does not Granger Cause BBSR	1.10129	0.3553
ICSR does not Granger Cause ICDP	0.67763	0.6406
ICDP does not Granger Cause ICSR	0.32314	0.8991
INSR does not Granger Cause INDP	0.29643	0.9552
INDP does not Granger Cause INSR	1.30818	0.2443
KSR does not Granger Cause KDP	2.25014	0.0817
KDP does not Granger Cause KSR	0.10540	0.9569
PSR does not Granger Cause PDP	2.83956	0.0375
PDP does not Granger Cause PSR	0.73224	0.5331
HDSR does not Granger Cause HDDP	1.22623	0.2943
HDDP does not Granger Cause HDSR	2.24268	0.1073

From the granger causality result given in table 1 it is found that the stock return of SBI granger causes delivery quantity traded of SBI and that the stock return of PNB granger causes its delivery quantity traded. There was no causal relationship between stock return and delivery quantity traded for the remaining companies. More importantly, for all the thirteen companies, delivery quantity traded does not cause stock return. This suggests that all the past information is fully reflected in the current stock prices of the banks and there is no scope for making abnormal returns using past information on percentage delivery quantity traded. From this we can conclude that market is efficient in weak form.

Table No: 2

Variable 1	Variable 2	Granger Cause(Yes/No)
BISR	BIDP	No
BIDP	BISR	No
CASR	CADP	No
CADP	CASR	No
FSR	FDP	No
FDP	FSR	No
SBSR	SBDP	Yes
SBDP	SBSR	No
YSR	YDP	No
YDP	YSR	No
AXSR	AXDP	No
AXDP	AXSR	No
BBSR	BBDP	No
BBDP	BBSR	No
ICSR	ICDP	No
ICDP	ICSR	No
INSR	INDP	No
INDP	INSR	No
KSR	KDP	No
KDP	KSR	No
PSR	PDP	Yes
PDP	PSR	No
HDSR	HDDP	No
HDDP	HDSR	No

V. CONCLUSION AND LIMITATIONS

Various studies have provided contrasting evidence of weak form efficiency in India and other emerging economy stock markets. Our study finds that weak-form efficiency holds true for Indian stock market as we did not find any evidence for percentage delivery traded causing stock return in the sample we studied. We focused only on the banking sector in our study. As we considered only limited number of banks which were included in the NIFTY index, our study could not identify whether market is inefficient for stocks of banks that have comparatively low market capitalization.

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