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ROLLING SETTLEMENT AND MARKET EFFICIENCY OF NSE

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Abstract

The study makes an attempt to test the weak form efficiency of National Stock Exchange of India at the time of rolling Settlement. Rolling Settlement was introduced in NSE on 2nd July 2001. Autocorrelations and Ljung -Box tests were applied to find out the efficiency of the market in absorbing the structural changes that took place in the rolling settlement. The closing price of Nifty, Nifty junior, Midcap 200 and CNX 500 were selected for 30 days before and after the introduction of rolling settlement. The data were collected from nseindia.com. The empirical results exhibit that National Stock Exchange of India is efficient in absorbing the structural changes that took place in the rolling settlement. This ensures the weak form of market efficiency.

Introduction

In the early period, trades were settled on account period settlement which was combined with “badla” system of carrying forward futures positions. It distorted the price discovery process. The carry forward system encouraged leveraged trading by postponement of settlement and generated significant systematic risk in settlement arrangement and large number of brokers default. After the securities scam of 1992, badla system was considered to be speculative and inequitable. SEBI banned badla in 1994. This led to a slump in the market and SEBI felt that there was a need to introduce some form of carry forward facility with safeguards for investors. A Modified Carry Forward System was introduced in October, 1997. Modified Carry Forward System was also not a fool-proof method to prevent malpractices by brokers and with the Ketan Parek scam in 2001, badla came to a dead end.

FII's were allowed to make portfolio investment in India in 1992. Most of the developed countries adopt rolling settlement. It put pressure on Indian securities market to introduce rolling settlement. To make the market equivalent to the global markets and get rid of

all the inconveniences associated with carry forward system, a migration from account period settlement to rolling settlement became inevitable.

A rolling settlement is one in which trades outstanding at the end of the day have to be settled at the end of T+X time frame work. T is the trade date and X is the days as specified by SEBI. In this settlement, payments are quicker than in the weekly settlements. Thus, investors benefit from increased liquidity. On Jan 15, 1998, SEBI made T+5 rolling settlement mandatory for institutional investors, namely, domestic FIS, Banks, Mutual Funds and FII's in respect of eight securities for which dematerialised trading was made compulsory. On 24th April 1998, SEBI added 22 more companies to the list of stocks eligible for compulsory demat trading by institutions with effect from 1st June, 1998. The stocks were selected on the basis of five parameters- trading volume, institutional holdings, extent of dematerialisation, incidence of bad delivery problems and the distribution of registrars. The system was introduced in those exchanges which are connected to a depository. NSE has good communicating network system and rolling settlement of T+5 days was

introduced immediately following the order of SEBI. In January 2000 rolling settlement was made compulsory for trades in 10 securities selected on the basis of the criterion that they were in the compulsory demat list and had a daily turnover of about Rs. 1 crore or more.

Cycles in Rolling Settlement

T+5 cycle

T+5 settlement was introduced in NSE's major stocks on 2nd July, 2001. In a rolling settlement of a T+5 period, trades were settled in 5 days from the date of transaction. This means all open positions on a trading day were settled on the fifth working day after the trading day. 'T' denotes the trading day and T+1 denotes the first day after trading. NSE offers rolling settlement in about 300 securities.

T+3 cycle

With a view to deriving benefits of increased efficiency of the rolling settlement and to ensure speedier settlement, the SEBI decided to shorten the rolling settlement cycle from T+5 to T+3. The compulsory rolling settlement on T+3 bases commenced on 1st April, 2002. Investor must complete or settle their security transactions within three business days. This settlement cycle is known as 'T+3' i.e trade date + three days. Both the U.S and the UK follow a T+3 rolling settlement system

T+2 Cycle

In the light of experience gained with the working of T+5 and T+3 settlement, it was considered desirable to shorten the settlement period to T+2. The NSE has shifted to a T+2 rolling settlement cycle from 1st April, 2003 to bring the domestic market on par with the most advanced global markets in the world. Under the new trading cycle, all transactions are closed in two trading days after the deal is struck against the existing three trading days. The German stock exchanges follow a T+2 settlement cycle.

T+2 Trading Activity Cycle

Day	Time	Description of Activity
T		Trading day
T+1	By 11 a.m	Custodial confirmation of all trades facility of an exception window for late confirmations to be provided.
	By 1.30 p.m	Processing and downloading of obligation files to brokers/ the custodians
T+2	By 11.a.m	Pay – in of securities and funds.
	By 1.30 p.m	Pay-out of securities and funds.

Data : Autocorrelation and Ljung – Box tests are applied on the Nifty, the Nifty Junior, the Midcap 200 and the CNX 500 for 30 days before and after the introduction of T+5, T+3, and T+2 rolling settlement. . The period is specified below

Settlement	Period
T+5	21 - 05 - 2001 – 10 -08 -2001
T+3	14 - 02 – 2002 —13 – 05 -2002
T+2	17 – 02 – 2003 —15 –05 –2003

Methodology

Auto-correlations ACF(k) and Ljung-Box statistics

Autocorrelations and Ljung -Box tests were applied to find out the efficiency of the market in absorbing the structural changes that took place in the rolling settlement.

Auto-correlation is a reliable measure for testing either dependence or independence of random variables in a series. The population autocorrelation coefficient is estimated by using the sample autocorrelation coefficient. The autocorrelation coefficient must be zero if the population is completely independent. If no

significant autocorrelations are found in the series, then the series is considered as random.

The autocorrelation function ACF(k) for the time series Y_t and the k-lagged series Y_{t-k} is defined [Stephen A. DeLurgio, 1998] as :

$$ACF(k) = \frac{\sum_{t=k+1}^n (Y_t - \bar{Y})(Y_{t-k} - \bar{Y})}{\sum_{t=1}^n (Y_t - \bar{Y})^2}$$

Where \bar{Y} is the overall mean of the series with n observations

Ljung Box statistics is also used to test whether the auto correlations for all lags up to lag K is equal to zero. The value of the Ljung Box statistics can be compared with the Chi-square table to assess its significance. Ljung-Box(LB) statistics is defined as

$$LB = n(n+2) \sum_{k=1}^m \left(\frac{r_k^2}{n-k} \right) \approx \chi^2 m$$

where m is lag length and r_k is autocorrelation coefficient at lag k. For applying these tests, closing prices of the Nifty, the Nifty Junior, Midcap 200 and CNX 500 were collected one month before and after the introduction of rolling settlement.

The empirical results are given in the **Table 1, 2 and 3 respectively.**

Results

Table-1 shows that for T+5 settlement, the auto correlation coefficient for the Nifty and the Nifty Junior is significant only for lag 12 and its magnitude is 0.316 and 0.292 respectively. For the Midcap 200, the auto correlation coefficient is significant for lag 1 and its magnitude is 0.227. All the auto correlation coefficient for CNX 500 is insignificant. Fifty – seven autocorrelation coefficients are insignificant in T+5 settlement, indicating 95 per

cent of auto correlation is insignificant. Both autocorrelation and Ljung –Box test results prove that market is efficient at 5% level.

Table- 2 clearly shows that the auto correlation coefficients are insignificant for all the 15 lags in T+3 settlement for the Nifty and Nifty Junior lag 2 is significant and its magnitude is -0.326. For the Midcap 200 and the CNX 500, lag 2 and lag 11 are significant. Out of 60 lags in T+3 settlement, 5 lags are significant, indicating 92 per cent of autocorrelation is insignificant. Here the market seems to be efficient in absorbing the T+3 settlement, Ljung Box test results are also insignificant at 5% level except Midcap 200.

For T+2 settlement, the auto correlation coefficient for lag 15 only significantly differs from zero in the Nifty. For the Nifty Junior and the CNX 500, the auto correlation coefficient of lag one is significant for T+2 settlement and its magnitude is 0.329 and 0.323. Lag one and lag eight is significant for the Midcap 200.

Conclusion

Out of 180 lags, 167 lags are insignificant. The percentage of insignificant auto correlation coefficient is 93 per cent. It proves the weak form of market efficiency. The test results of Ljung - Box statistics show zero auto correlation in the Nifty, Nifty Junior and CNX 500 returns series. This outcome strengthens the results of auto correlation test. NSE has established an effective communication system to ensure availability of adequate, up-to-date and correct information to investors to enable them to take informed decisions.

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Table-1
Auto-Correlation And Ljung – Box Statistics For T+5 Rolling Settlement On
NSE – Nifty, Nifty Junior, Midcap 200 and CNX 500

NIFTY			NIFTY JUNIOR		MIDCAP 200		CNX 500	
LAG	ACF (K)	LB	ACF (K)	LB	ACF (K)	LB	ACF (K)	LB
1	0.197	2.442	0.156	1.5	0.227*	3.189	0.180	2.014
2	-0.122	3.403	-0.184	3.630	-0.053	3.366	-0.066	2.288
3	0.045	3.532	0.049	3.787	0.087	3.853	0.054	2.473
4	-0.191	5.958	-0.070	4.112	0.015	3.868	-0.203	5.164
5	-0.241	9.875	-0.076	4.498	-0.125	4.912	-0.234	8.805
6	-0.097	10.529	-0.061	4.753	-0.014	4.925	-0.008	8.810
7	-0.152	12.153	-0.133	5.978	-0.212	8.028	-0.219	12.141
8	-0.058	12.393	-0.105	6.749	-0.212	11.204	-0.103	12.884
9	0.105	13.195	0.048	6.917	0.044	11.345	0.075	13.293
10	-0.046	13.355	-0.114	7.877	0.020	11.374	-0.048	13.460
11	0.036	13.453	0.023	7.918	-0.075	11.796	0.012	13.471
12	0.316*	21.178	0.292*	14.457	0.130	13.087	0.252	18.337
13	0.006	21.181	-0.061	14.750	-0.046	13.254	-0.011	18.347
14	0.086	21.784	-0.087	15.350	-0.001	13.254	0.025	18.398
15	0.103	22.667	0.167	17.628	0.104	14.147	0.194	21.487

* indicates t value significant at 5% level LB — Ljung –Box statistics
ACF - Auto correlation

Table-2
Auto-Correlation And Ljung – Box Statistics for T+3 Rolling Settlement On
NSE – Nifty , Nifty Junior, Midcap 200 and CNX 500

LAG	NIFTY		NIFTY JUNIOR		MIDCAP 200		CNX 500	
	ACF (K)	LB	ACF (K)	LB	ACF (K)	LB	ACF (K)	LB
1	-0.167	1.75	-0.031	.060	0.030	.056	-0.100	.617
2	-0.154	3.27	-0.326*	6.779	-0.419*	11.132	-0.305*	6.501
3	-0.079	3.68	-0.024	6.816	-0.052	11.307	-0.053	6.683
4	0.116	4.57	-0.096	7.418	0.093	11.878	0.114	7.531
5	-0.078	4.98	-0.087	7.924	-0.048	12.035	-0.087	8.041
6	0.075	5.37	0.060	8.166	-0.021	12.065	0.038	8.138
7	-0.007	5.37	0.051	8.345	0.044	12.197	-0.007	8.141
8	0.019	5.40	0.156	10.072	0.127	13.328	0.034	8.221
9	0.134	6.70	0.021	10.105	0.062	13.608	0.103	8.992
10	-0.042	6.83	-0.090	10.699	-0.021	13.639	-0.011	9.001
11	-0.213	10.29	-0.218	14.255	-0.254*	18.477	-0.275*	14.652
12	-0.129	11.59	-0.134	15.639	-0.186	21.128	-0.168	16.809
13	0.132	12.96	0.191	18.497	0.189	23.918	0.151	18.593
14	0.092	13.65	0.069	18.880	0.146	25.622	0.104	19.456
15	-0.049	13.85	0.050	19.086	-0.086	26.228	-0.080	19.982

* indicates t value significant at 5% level LB — Ljung –Box statistics
ACF- auto correlation

Table-3: Auto-Correlation And Ljung – Box Statistics For T+2 Rolling
Settlement On NSE – Nifty , Nifty Junior, Midcap 200 and CNX 500

LAG	NIFTY		NIFTY JUNIOR		MIDCAP 200		CNX 500	
	ACF (K)	LB	ACF (K)	LB	ACF (K)	LB	ACF (K)	LB
1	0.254	4.054	0.329*	6.712	0.391*	9.492	0.323*	6.454
2	0.074	4.405	0.040	6.812	0.062	9.734	0.082	6.882
3	-0.182	6.559	-0.069	7.117	-0.020	9.760	-0.161	8.553
4	-0.143	7.926	-0.064	7.388	-0.018	9.780	-0.127	9.613
5	-0.098	8.571	0.023	7.424	-0.015	9.795	-0.131	10.748
6	-0.199	11.286	-0.124	8.464	-0.140	11.128	-0.145	12.183
7	-0.089	11.837	0.005	8.466	0.010	11.135	-0.063	12.458
8	0.096	12.500	0.132	9.698	0.250*	15.559	0.147	13.983
9	0.075	12.911	0.158	11.501	0.128	16.742	0.070	14.331
10	0.015	12.929	0.035	11.592	0.013	16.754	-0.002	14.331
11	0.020	12.958	0.108	12.474	0.097	17.460	0.077	14.776
12	0.100	13.726	0.069	12.836	0.158	19.381	0.098	15.505
13	0.033	13.811	-0.014	12.851	0.006	19.383	0.030	15.574
14	-0.139	15.365	-0.057	13.113	-0.120	20.532	-0.138	17.089
15	-0.249*	20.494	-0.026	13.364	-0.056	20.789	-0.191	20.064

* indicates t value significant at 5% level LB — Ljung –Box statistics.
ACF- Auto correlation