

Relative Strength Index for Developing Effective Trading Strategies in Constructing Optimal Portfolio

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Abstract

Today's investors' dilemma is choosing the right stock for investment at right time. There are many technical analysis tools which help choose investors pick the right stock, of which RSI is one of the tools in understand whether stocks are overpriced or under priced. Despite its popularity and powerfulness, RSI has been very rarely used by Indian investors. One of the important reasons for it is lack of knowledge regarding how to use it. So, it is essential to show, how RSI can be used effectively to select shares and hence construct portfolio. Also, it is essential to check the effectiveness and validity of RSI in the context of Indian stock market. EPS and P/E ratio tend to reflect the profitability of a stock. It is also important to find which of the above better reflects the profitability of the organization so as to make better decisions regarding investment. In this case 20 stocks are chosen from NSE, 10 of which are based on highest P/E ratio and remaining 10 are based on highest EPS. Here, the portfolio consists of stocks both for short term investment and long term investment. For short term investment, we find 14 day RSI for all 20 scripts and for long term investment 56 day RSI is being found out for all the 20 scripts. RSI values are calculated for the time period 2011 January to 2013 December. Ten scripts that are chosen based on RSI from the 20 scripts are included in the portfolio.

In order to find the validity of RSI in Indian stock markets, we evaluate the performance of short term investments by computing 14 day RSI for the chosen short term investment stocks at a future point of time (March 2014), and the performance is evaluated by comparing it with the initial 14 day RSI. In this case most of the results proved positive, thus showing that RSI is valid in Indian stock markets. Also out of the 10 selected scripts six are the ones which have highest P/E ratio, this indicates that P/E ratio is a better indicator of profitability when compared to EPS.

Keywords: RSI, Trading, Strategies innovation policy, innovative capacity, innovation strategy, competitive advantage, road transport enterprise, benchmarking.

INTRODUCTION

Relative Strength Index

Investment in stock market is common scenario for making capital gains. One of the major concerns of today's investors is regarding choosing the right securities for investment, because selection of inappropriate securities may lead to losses being suffered by the investor. In order to reduce the risk of incurring losses and increase the return many tools are available, of which RSI is a powerful analytical tool which will help the investor choose the right combination of securities for their portfolio construction thus reducing the risk and increasing the return. RSI is developed J. Welles Wilder, the Relative Strength Index (RSI) is a momentum oscillator that measures the speed and change of price movements. RSI is an extremely popular momentum indicator that has been featured in a number of articles, interviews and books over the years. RSI oscillates between zero and 100. Traditionally, and according to Wilder, RSI is considered overbought when above 70 and oversold when below 30. Signals can also be generated by looking for divergences, failure swings and centerline crossovers. RSI can also be used to identify the general trend.

Calculation

$$RSI = 100 - 100 / (1 + RS).$$

$$RS = \text{Average Gain} / \text{Average Loss}.$$

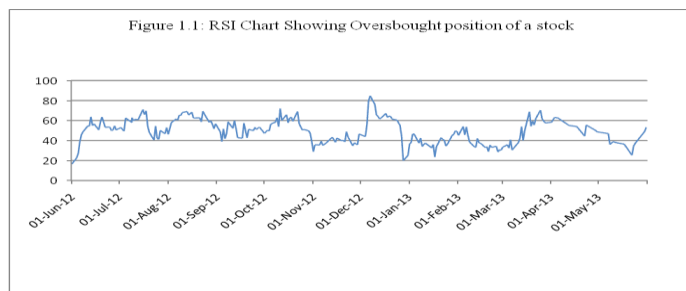
$$\text{Average Gain} = \text{Sum of Gains over the past 14 periods} / 14.$$

$$\text{Average Loss} = \text{Sum of Losses over the past 14 periods} / 14$$

Here, RSI can be based on any number of periods, the default number of periods suggested by Wilder is 14. For short and medium term trading, the number of periods used will be low when compared to that of long term trading. Generally 9 day RSI and 14 day RSI are used for short and medium term investments, whilst 56day RSI, 100 day RSI and 200day RSI may be used for long term investment. In case of long term investment the period under consideration will also be long. For example, 56day RSI for a stock may be computed on two year data of the stock and 200 day RSI for a stock may be computed on eight year data. It is not necessary to use daily data for the computation of RSI in case of long term investments as it may involve lots of computations, instead weekly or monthly data can be used for the computation of RSI in long term.

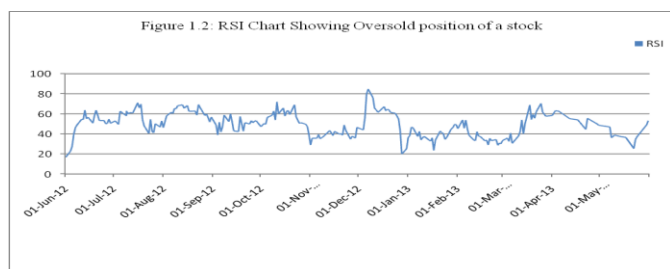
Overbought and Oversold

If the RSI value of a stock goes beyond 70, it indicates that the stock is being overbought and soon its prices would come down. So, when the RSI value of a stock approaches 70, it is best to sell it. The value of the stock may or may not decrease immediately, but it will come down within a short period of time. The following chart shows the price movement of Bosch Limited by means of RSI.



From the above chart we can see that the RSI value has crossed 70 by the first week of December itself, but it held its upward trend for another two reaching 90, before it began its downward trend. It is better to sell once RSI value reaches 70 itself, because one cannot be sure when the trend reverses.

If the RSI value of a stock goes below 30, it indicates that the stock is being oversold and soon its prices would increase. So, when the RSI value of a stock goes below 30, it is suitable to buy it. The value of the stock may or may not increase immediately, but it will increase within a short period of time. The following chart shows the price movement of Lakshmi Mill Limited by means of RSI.



From the above chart, we can see that, the RSI values of Lakshmi Mill goes below 30 during the beginning of may and it nears 25 before trend reversal occurs (upward trend). It is suitable to buy this stock as soon as the RSI value goes below 30.

Divergence

Disagreement between the price and the indicator is called as divergence. Divergence, as stated by Wilder suggests a potential reversal of trend, divergence may be bullish or bearish. A bearish divergence occurs when the security records a higher high and RSI forms a lower high. RSI does not confirm the new high and this shows weakening momentum. In case of bearish divergence, the momentum shifts downwards in due course of time. A bullish divergence occurs when the security records a lower low and RSI forms a higher low. RSI does not confirm the new low and this shows increasing momentum. In case of bullish divergence, the momentum shifts upwards in due course of time. Before considering divergence as trade signals, one must be very careful. Because, it must be noted that divergences are misleading in a strong trend. A strong uptrend can show numerous bearish divergences before a top actually occurs.

Failure swings

Another indicator suggested by Wilder is failure swings. Failure swings may be both bullish and bearish. Failure swings focus solely on RSI for signals and ignore the concept of divergences. A bullish failure swing forms when RSI moves below 30 (oversold), bounces above 30, pulls back and holds above 30 and then breaks its prior high. It is basically a move to oversold levels and then a higher low above oversold levels. A bearish failure swing forms when RSI moves above 70, pulls back, bounces, fails to exceed 70 and then breaks its prior low. It is basically a move to overbought levels and then a lower high below overbought levels.

Apart from the proposals made by Wilder, other technical analysts have also made certain proposals so as to enhance RSI. One such proposal is made by technical analyst Constance Brown. He suggests that in a bullish market the RSI tends to fluctuate between 40 and 90 with 40-50 range acting as support point. The ranges may vary depending on RSI parameters, strength of trend and volatility of the underlying security. In a bearish market RSI tends to fluctuate between 10 and 60 with the 50-60 zone acting as resistance range.

RSI is a versatile momentum oscillator that has stood the test of time. Despite changes in volatility and the markets over the years, RSI remains as relevant now as it was in Wilder's days. and Cardwell takes RSI interpretation to a new level. While Wilder's original interpretations are useful to understanding the indicator, the work of Brown

LITERATURE REVIEW

Reena Baral, Abhishek Kumar Chintu (2013), Technical Analysis serves the investment decision-maker by pointing the direction that is most likely to produce the desired results and to meet the expectations of the investors. Technical indicators are capable of playing a useful role in timing the entry and exit of stock market. RSI is one of the best tools available. Whenever there is a decrease in share price, RSI value decreases indicating share holders that it is a strong buy signal and vice versa. **Terence Tai-Leung Chong, Wing-Kam Ng, Venus Khim-Sen Liew(2014)**, "Revisiting the Performance of MACD and RSI Oscillators", It has been found that the predictive ability of RSI and MACD works well in most of the exchanges throughout the world. It is found that the MACD and RSI rules consistently generate significant abnormal returns in most of the developed and developing markets. Investors can generate significant profit by using these tools while making investment decisions. **Renaud Beaupain, Lei Meng, Romain Belair (2010)**, "The Impact of Volatility on the Implementation of RSI", This paper examines the impact of volatility (measured as an exponentially-weighted moving average) on the implementation of a trading rule, based on the relative strength index (RSI) in the Chinese stock markets. In particular, using tick-by-tick data from the Shanghai stock exchange, the authors investigate how sensitive is the choice of RSI boundaries to different volatility regimes. The study reports empirical evidence that the return and the risk of our portfolios, in regimes of high and low volatility, are not significantly affected by the boundaries imposed to this technical indicator. However, we show that within each volatility regime some techniques provide a more desirable return-risk package than others. **Adrian Taran-Morosan (2011)**, "The relative strength index revisited", the relative strength index (RSI) is one of the best known and most widely use technical analysis indicators. In this paper, the study empirically tests the functioning of the RSI in its classic form, on a set of data and to reconfigure the indicator by also taking account of the trading volume in its calculation formula. After adjusting the RSI with the trading volume, the study tests its new form on the same set of data. Finally, it compares the obtained results by applying the classic form of the indicator with those obtained by using the adjusted form. It concludes that RSI works perfectly in current form but its performance can be improved by considering additional factors such as volume.

METHODOLOGY

Need For Study

This paper offers investment and trading solutions to the investors in short run and also in long run. Investors often get confused on choosing securities for investment. RSI is a powerful tool which helps investors to make investment decision. To add credence, testing and validation of RSI will be of help, particularly for portfolio construction. The use of

RSI helps in minimizing the risk and maximizing the return in respect of the portfolio.

Problem Definition

The research problem undertaken for this study is to provide inputs trading strategies. In many cases, investors suffer due to wrong selection of securities in a portfolio. Selection of inappropriate securities may lead to losses being suffered by the investor. In order to overcome this, many tools are available of which RSI is a powerful analytical tool which will help the investor choose the right combination of securities for their portfolio construction.

The scope of the study is confined to select 20 companies listed NSE. Selection of listed scripts is based on Earnings Per Share and Profit/Earning parameters. And the period of study is from 2011 to 2013.

Primary Objective of this study is test the validity of RSI results in trading strategies in short term and in long term. Along with primary objective the following secondary objectives are considered for the study.

Secondary Objectives

1. To evaluate the performance of RSI in case of short term investments.
2. To find the validity of RSI in Indian stock markets.
3. To find if P/E ratio or EPS better reflects the profitability of an organisation.

Research design is descriptive and analytical in nature. The data used is secondary data. It is data of price moving pattern of twenty scripts listed in NSE, chosen based on EPS and P/E ratios. Tools for analysis include, Relative Strength Index (14 day) and Relative Strength Index (56 day)

Data cleansing or data cleaning is the process of detecting and correcting corrupt or inaccurate data from a database. In this case inconsistent data and redundant data are carefully found out and removed. Here, the data in which RSI is computed had some data which are repeated. The repeated data were found out and removed. Similarly, in certain cases, irrelevant data was found between relevant data. These irrelevant data were also found out and removed.

Initial data analysis doesn't deal with answering the original research question, instead it deals with Quality of data, Quality of measurement instrument, Initial transformations etc. Here the quality of data is found to be good and accurate. It has been verified from more than one source. RSI is the measurement instrument to be used and it is found to be one of the most reliable measurement instruments. Missing data has been identified at certain instances and they have been filled.

Main data analysis is focused on answering the research question. Here our main aim is to find suitable stocks for investment using RSI. RSI is calculated using the following formulae,

$$RSI = 100 - 100 / (1 + RS^*)$$

RS = Average of 14 days' up closes / Average of 14 days' down closes. (for short term investment purpose).

RS = Average of 56 days' up closes / Average of 56 days' down closes. (for long term investment purpose).

The current RSI values of 20 stocks are given below:

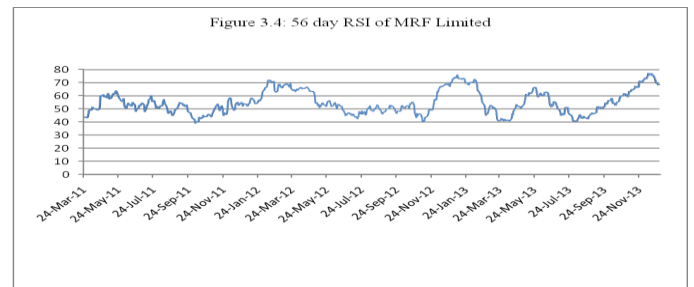
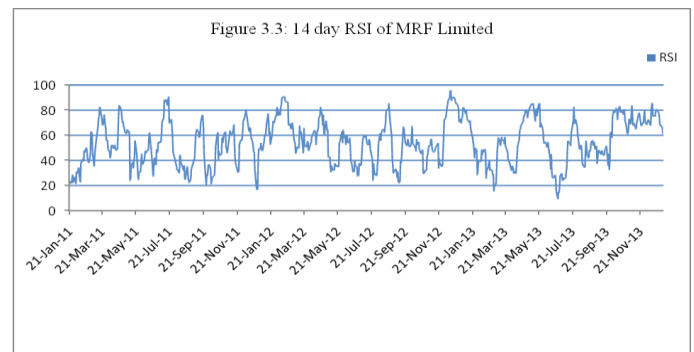
RSI values as of 31/12/2013

COMPANY NAME	CURRENT EPS	CURRENT P/E RATIO	14 DAY RSI	56 DAY RSI
MRF	1890.72	11.73	61.08	69.096
TIDE WATER OIL	807.39	9.48	66.944	59.552
STRIDES ARCOLAB	597.86	0.61	5.167	27.707
LAKSHMI MILL	368.33	4.29	36.291	47.92
BOSCH	292.29	35.99	74.275	63.012
JK BANK	243.81	6.23	73.84	67.366
SHREE CEMENTS	242.88	21.41	52.114	49.900
GODFREY PHILLIP	184.76	17.05	28.77	48.737
UB HOLDINGS	169.44	0.15	70.566	59.603
INFOSYS	167.46	23.10	62.673	61.799
TGB BANQUETS	0.07	734.29	46.666	52.437
SUN PHARMA	0.95	661.16	39.663	39.901
RUCH INFRA	0.02	607.50	53.191	44.702
TAJ GVK HOTELS	0.10	592.50	71.562	60.887
FEDERAL MOGUL	0.41	469.27	53.698	46.6107
BAJAJ ELECTRIC	0.60	410.67	88.203	74.052
FUTURE RETAIL	0.21	386.90	62.424	50.351
NITINFIRE PROTECTION	0.18	322.22	51.339	55.188
GMR INFRA	0.09	294.29	79.591	54.505
BF UTILITIES	2.03	267.64	80.421	3.238

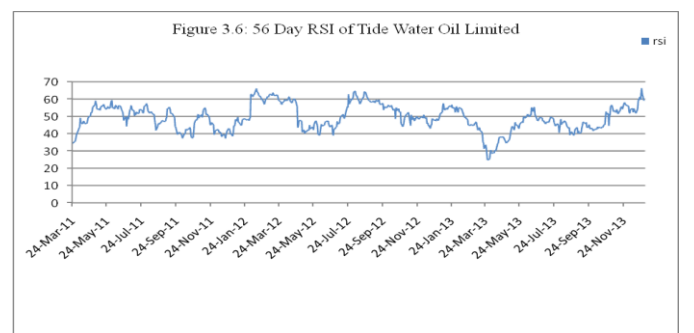
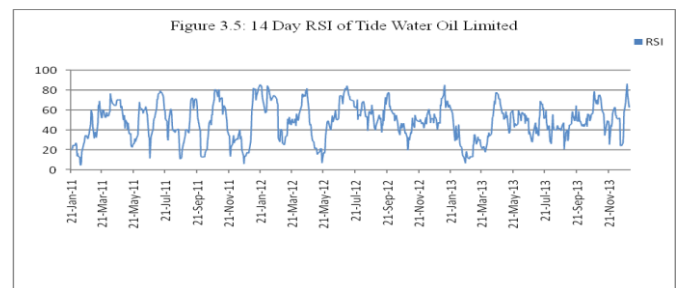
RSI Chart

The 14 day and 56 day RSI chart of the twenty stocks which are under consideration are given below.

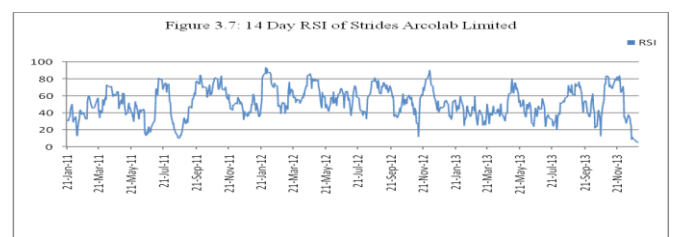
MRF Limited

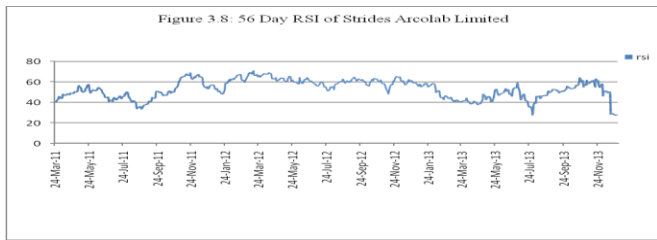


Tide Water Oil Limited

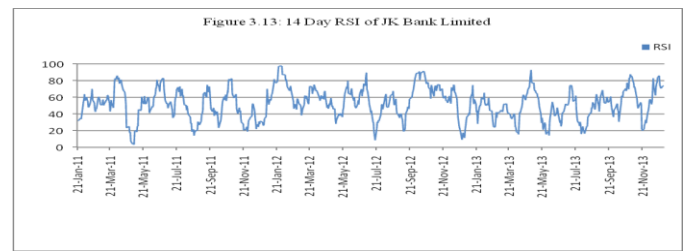


Strides Arcolab Limited

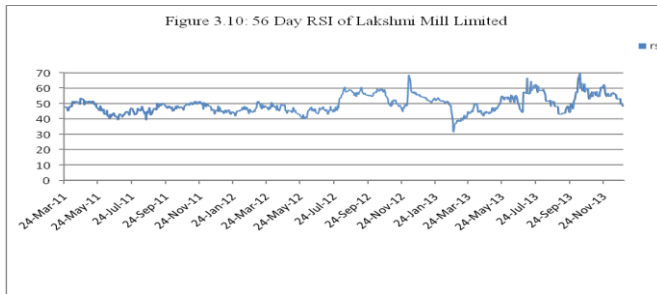
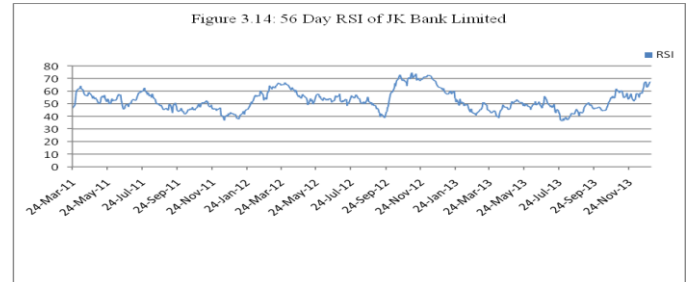
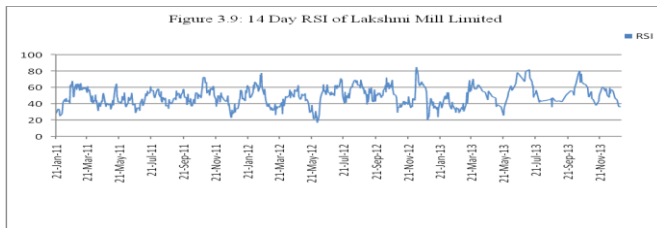




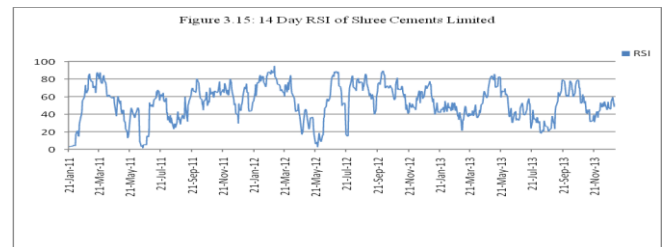
JK Bank Limited



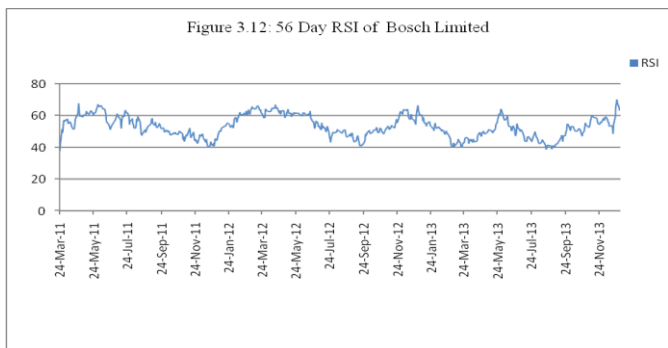
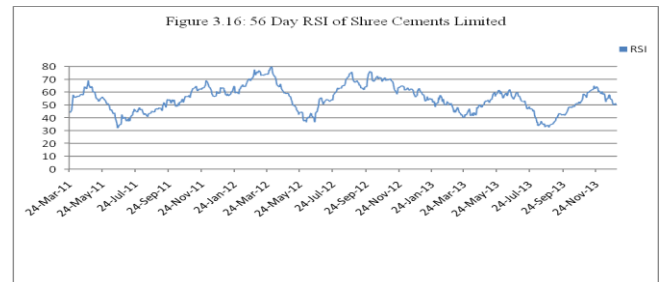
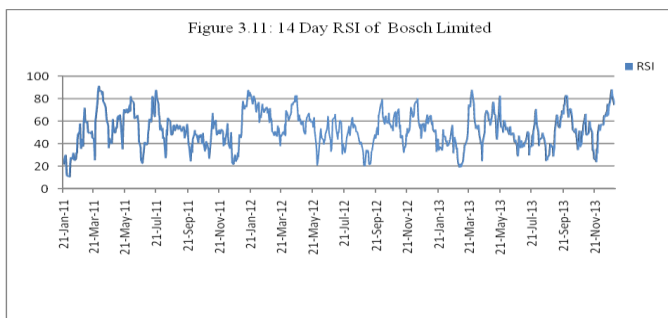
Lakshmi Mill Limited



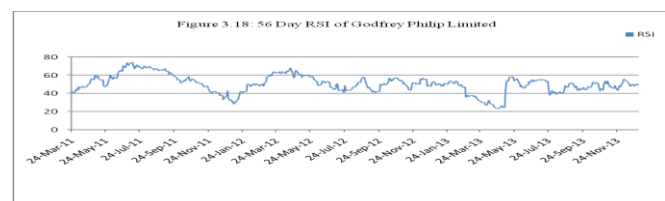
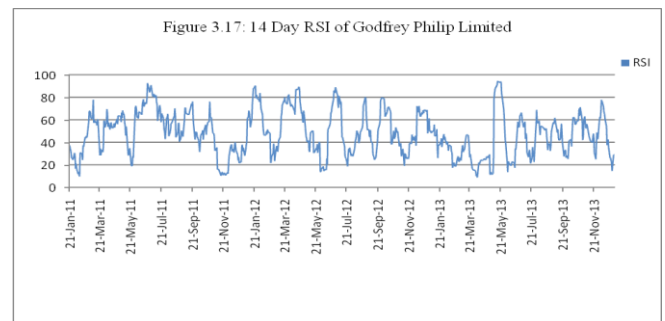
Shree Cements Limited



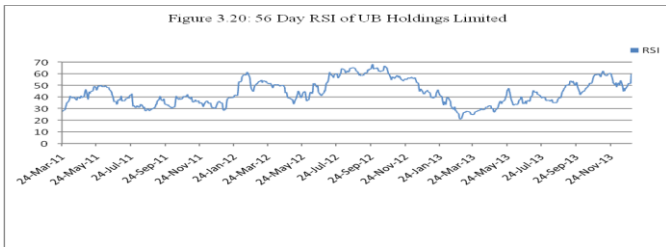
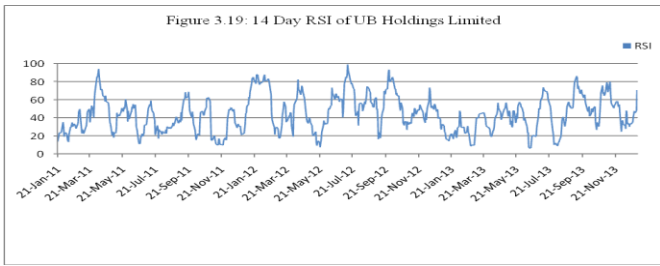
Bosch Limited



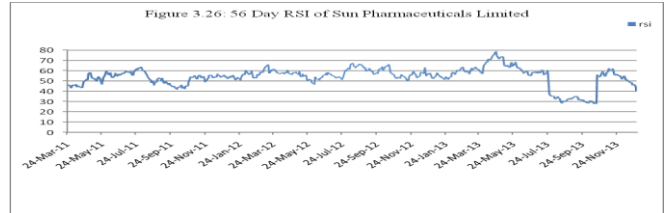
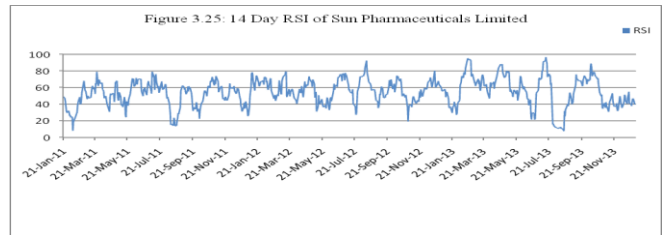
Godfrey Phillip Limited



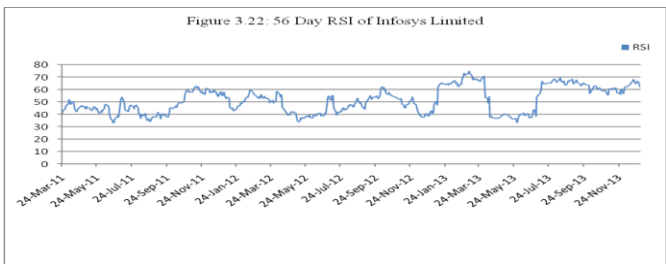
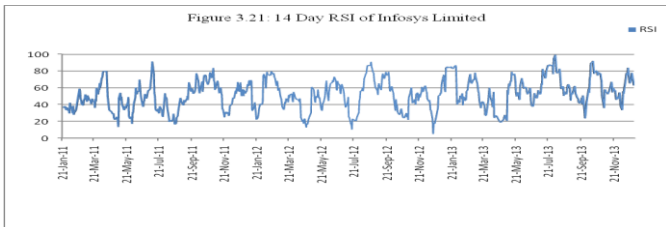
UB Holdings Limited



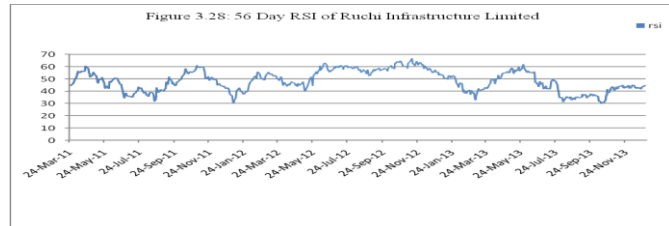
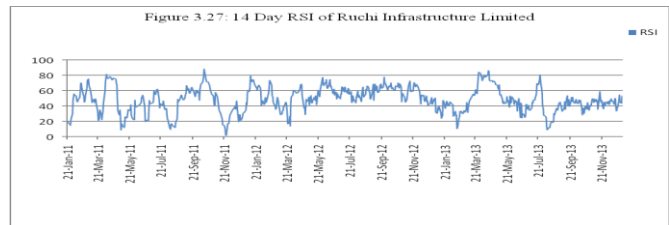
Sun Pharmaceuticals Limited



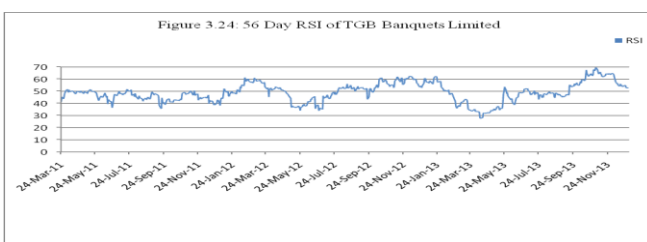
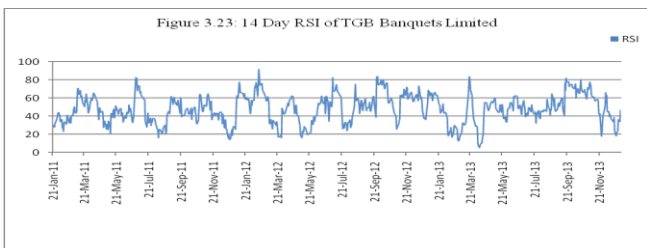
Infosys Limited



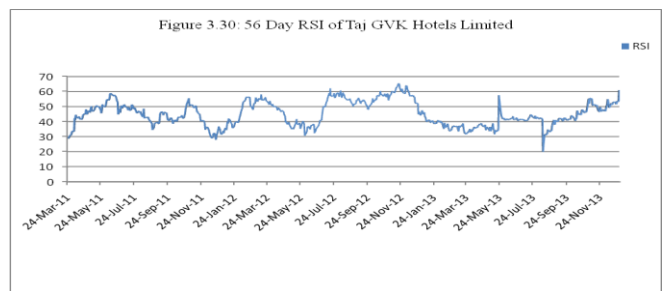
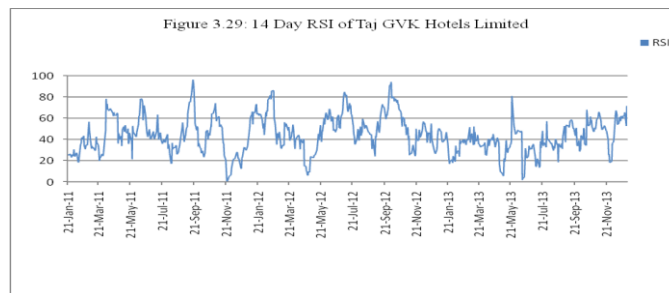
Ruchi Infrastructure Limited



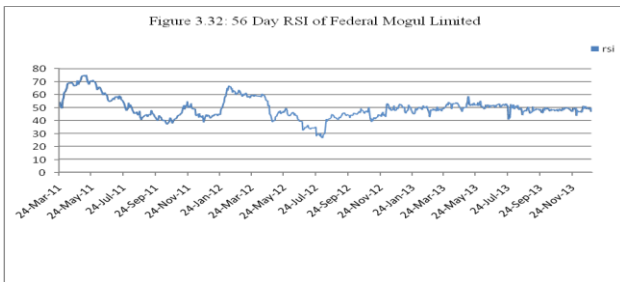
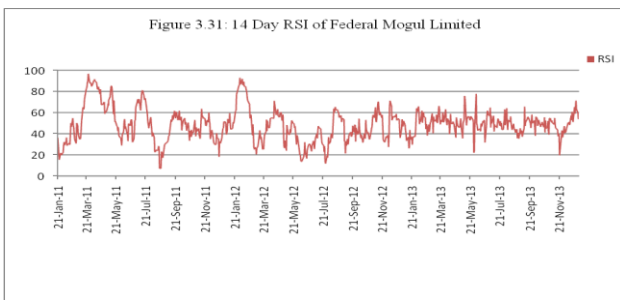
TGB Banquets and Hotels Limited



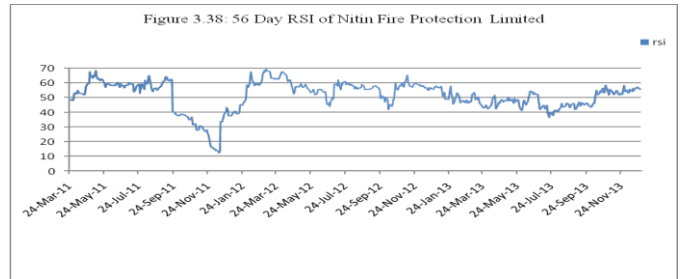
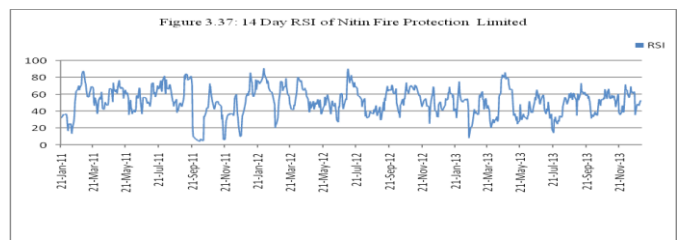
Taj GVK Hotels Limited



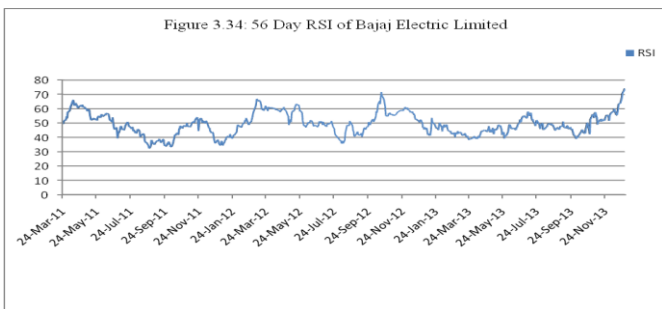
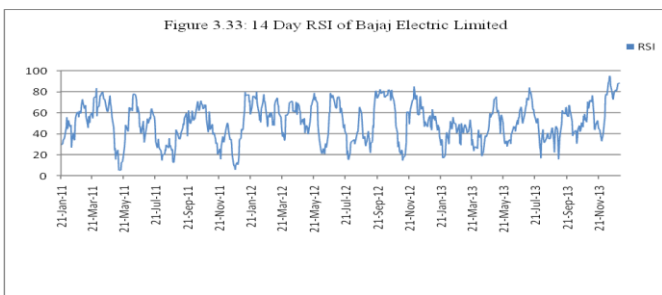
Federal Mogul Limited



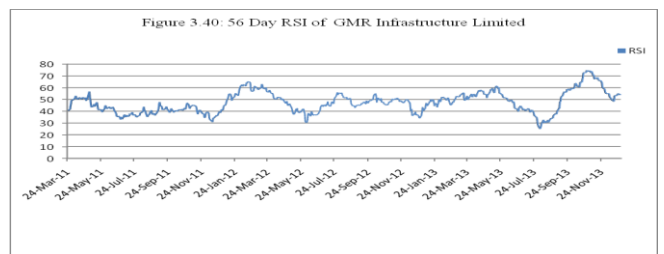
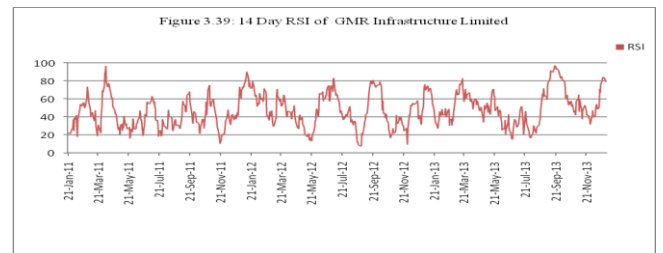
Nitin Fire Protection



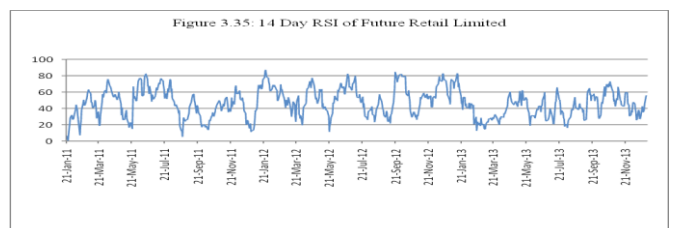
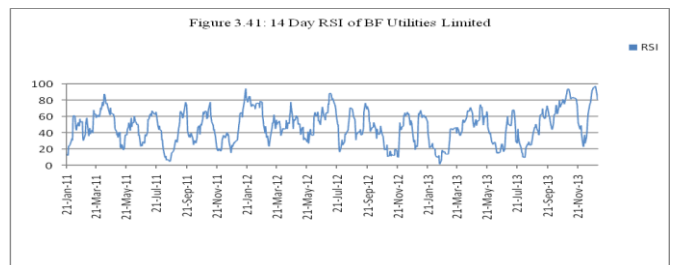
Bajaj Electric Limited



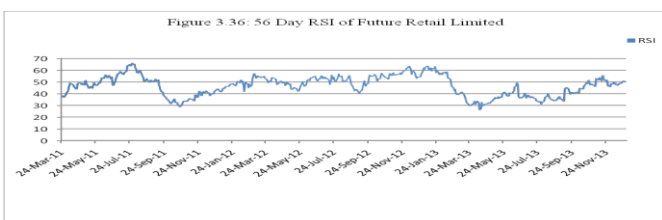
GMR Infrastructure Limited

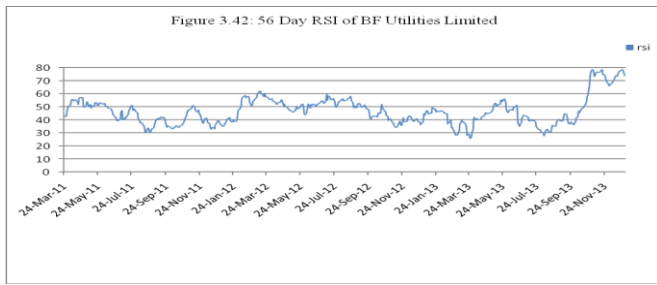


BF Utilities Limited



Future Retail Limited





Interpretation

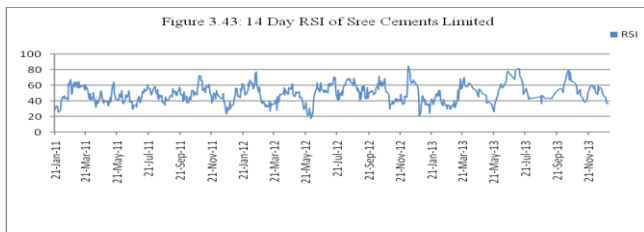
Based on the buy/sell indicators developed by Wilder and by means of basic stock selection principles, the stocks are chosen both for short term investment and long term investment.

Short term Investment:

The following stocks have been chosen for short term investment: Sree Cements Limited, Nitin Fire Protect Limited, Godfrey Phillip India Limited, TGB Banquets Limited and Sun Pharmaceuticals Limited

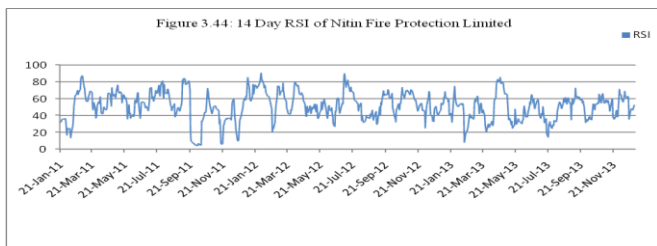
Now, let us see why the above stocks have been chosen by viewing their RSI charts.

Sree Cements Limited



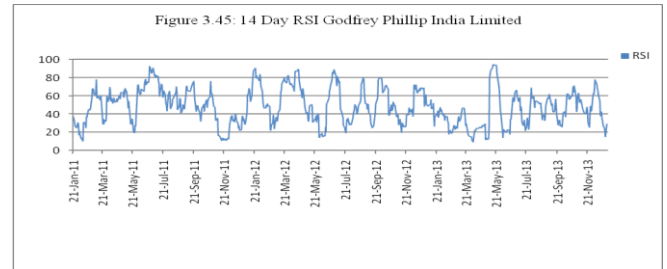
In this case, we can see that, it is quite rare to see the graph drop below 40, and whenever it has dropped to such an extent it has come back strongly. At this point of time the RSI value is 36, so we can expect it to increase significantly within a short period of time. Although it may extent its downward trend for a week or two, it will change its momentum within a short period of time. Also, in this case the standard deviation or risk is low when compared to many other stocks, so we choose this stock for short term investment.

Nitin Fire Protection Limited



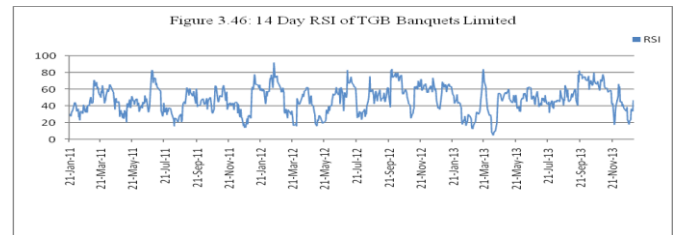
The RSI graph shows a strong upward trend in case of Nitin Fire Protect. RSI value is just above 50 and it signifies that, the market is strong for this particular stock, so it is suitable to invest in this stock for short term till the RSI value reaches 70. It may not be suitable to invest in this stock for long term given its high rate of fluctuation which signifies high risk.

Godfrey Phillip India Limited



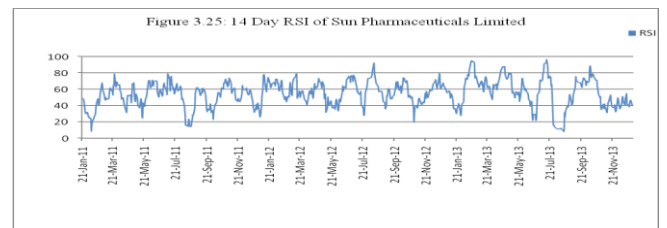
The RSI graph of Godfrey Phillip has just reached its lower low and currently its trend is upward but still RSI value is under 30 which mean it is still over sold. Also the upward trend is expected to be sustained for quite some time, so one can invest in Godfrey Philip for short term till RSI value reaches 70, it is a safe bet.

TGB Banquets and Hotels Limited



The RSI graph of TGB Banquets has reached its lower low by the end of November and currently its trend is upward. Although there is a significant volatility in the movement of the RSI graph, The current RSI value is around 46 and the upward momentum is likely to be sustained till it reaches the overbought level, so it is advisable to invest in TGB Banquets for short term.

Sun Pharmaceuticals Limited



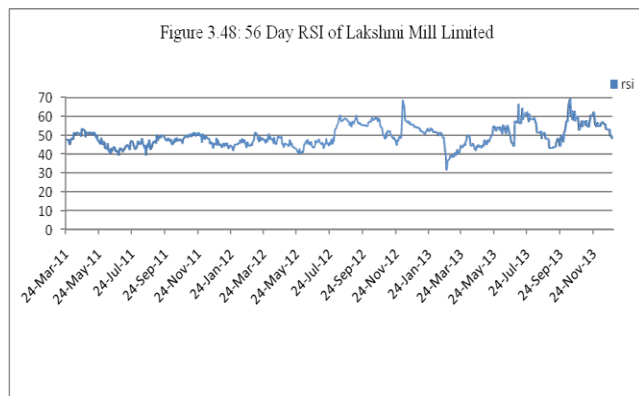
In case of Sun Pharmaceuticals, there has been some variability in the movement of RSI values. The RSI value reached lower low 30 by the end of September, and since

then, there has been a slight increase and the RSI value hovers around 40. However, the momentum can be expected to shift upwards as the graph has already hit the lower bottom and is unlikely to shift downwards.

Long Term Investment

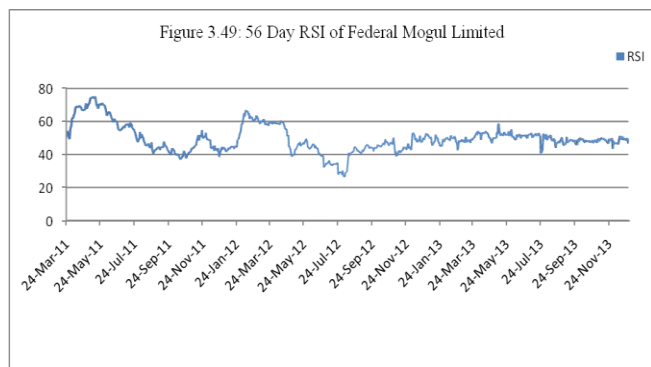
The following stocks have been chosen for long term investment. Laxmi Mill Limited, Federal Mogul Limited, UB Holdings Limited, Future Retail Limited and Ruchi Infrastructure Limited

Laxmi Mill Limited



The RSI graph of Laxmi Mill shows that its performance has been consistent. It was only once during the considered time period that the graph dropped below 40. Its performance has been strong over the past few years. Also, the standard deviation is low which signifies lower risk. These factors make Laxmi Mill suitable for long term investment.

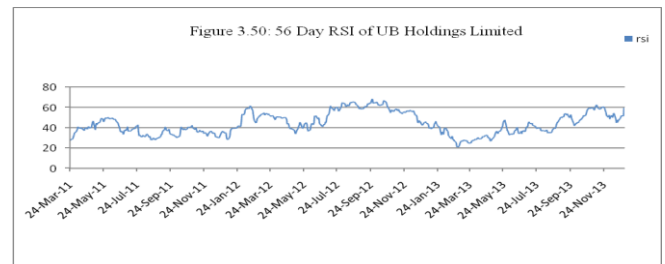
Federal Mogul Limited



The RSI graph of Federal Mogul has been constantly above 40, and it has experienced only once a significant dip below 40. As a matter of fact the graph has stayed between 40 and 60 for most of the time, this shows that the performance of Federal Mogul has been consistent for the past three years and the risk is low. Consistent performance and low risk are the

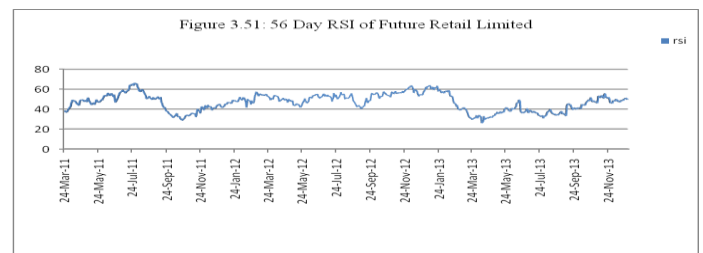
factors that induce the investor to invest. So, we can say that Federal Mogul is safe for long term investment.

UB Holdings Limited



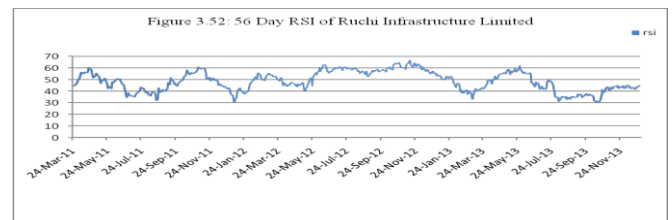
The current trend of UB Holdings is bullish failure swing. Irrespective of the trend, the performance has been consistent other than for a bearish failure swing during September 2012 to March 2013. Since the performance has been quite consistent and the risk being acceptable, we go for UB Holdings for long term investment.

Future Retail Limited



Future retail, like the other chosen stocks for long term investment has shown consistent performance and its risk is low. During the past three years, the graph has stood above 40 during most of the time period, there has only been two significant drops. Also, the current momentum is upward, so Future Retail will prove to be a good long term investment.

Ruchi Infrastructure Limited



The RSI graph of Ruchi Infrastructure has both upward trends and downward trends, but during most of the time the trend has been upward and the movement has been positive. Also, the current trend is upward. It is also to be noticed that the risk is acceptable as the volatility is quite low, so Ruchi Infrastructure may make a suitable long term investment.

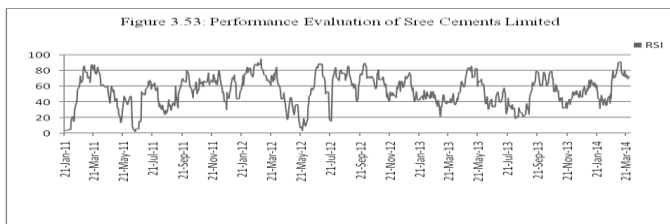
Portfolio

NAME	SYMBOL	RSI
LAXMI MILLS	LAKSHMIMIL	47.920
FEDERAL MOGUL	FMGOETZE	46.61
UNITED BREWERIES HOLDINGS	UBHOLDINGS	59.603
FUTURE RETAIL	FRL	50.351
RUCHI INFRASTRUCTURE	RUCHINFRA	44.702
SREE CEMENTS	SHREECEM	52.114
NITIN FIRE PROTECTION	NITINFIRE	51.339
GODFREY PHILLIPS	GODFRYPHLP	28.77
TGB BANQUETS AND HOTELS	TGBHOTELS	46.66
SUN PHARMACEUTICALS	SUNPHARMA	39.66

Performance Evaluation of Short Term Investment

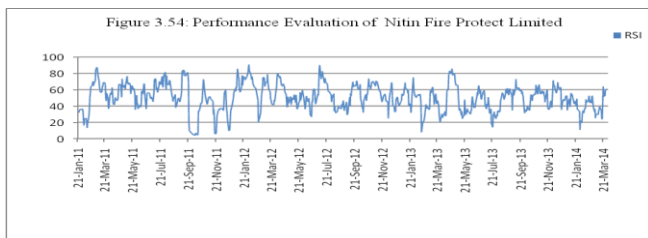
The performance of short term stocks has been evaluated by checking with their RSI graph after a period of three months. These are the results obtained:

Sree Cements Limited



It can be clearly seen that from the position in December 2013 the graph experienced a few ups and downs, but then, the trend of the graph shifted upward and it breached the 70 mark. The point at which reversal of trend occurs is 90, although one might sell the stock when the RSI reaches 70. In this case, the stock selection has been accurate.

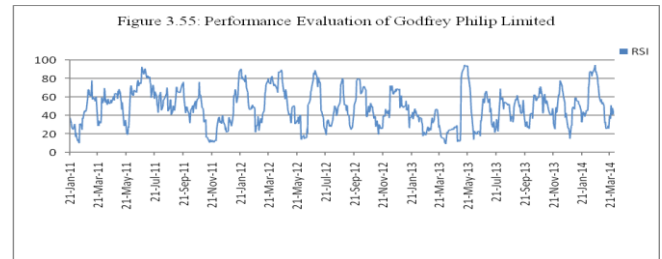
Nitin Fire Protection Limited



In case of Nitin Fire Protect, although, the graph took a dip immediately after December 2013, it has improved since then and the trend is currently upward and soon the RSI graph is expected to breach the 70 mark. The current RSI value is 61. As there is an improvement in the position of graph, when

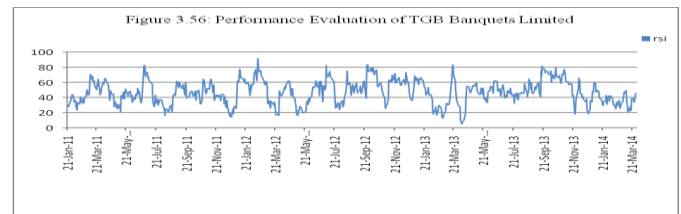
considering its position in December 2013, we may consider this investment as profitable.

Godfrey Phillip India Limited



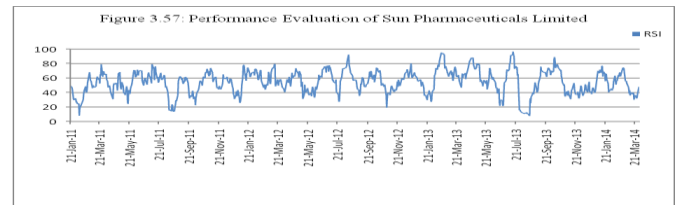
In case of Godfrey Philip, we can see that the graph has bounced back strongly during January 2014 from its downward trend in December 2013. The graph simultaneously breaches the 70 mark and keeps on increasing; it changes its trend only after it has breached 90. Investment in Godfrey Philip has proved successful and very fruitful.

TGB Banquets and Hotels Limited



In case of TGB Banquets, the trend was upward initially during January 2014, but since then the trend became downward with the graph reaching its lower low during February. After that there was a slight improvement in the graph and its current position is similar to its position in December 2013. This investment, unlike other short term investments has not performed up to expectation.

Sun Pharmaceuticals Limited



The RSI graph shows that there has been a significant improvement in the performance of Sun Pharma after December 2013 as it has breached the 70 mark twice. Its current mark is around 47, but it is obvious that one would sell the stock once it has breached the 70 mark. SO, investment in Sun Pharma has proved fruitful. In this case, it is to be noted that, in case of short term investments, out of the five chosen stocks, by means of evaluation we have received positive results for four stocks.

FINDINGS

RSI can be effectively used in the construction of portfolio. It can be used both for short term investment and long term investment. It accurately predicts the buy and sells signals for different stocks. RSI in most cases successfully predicts the future trend of the stocks. Although many researchers have been conducted on RSI across different stock markets around the world, no significant research has been done using RSI in Indian Stock Market. Now in our research, the results of short term investment indicate that RSI can also be successfully used in Indian stock market. The study also shows that P/E ratio is a better indicator of profitability when compared to EPS. The study has also listed the following signals for the twenty stocks for short term and long term investment.

Table 4.3: Short term and Long term RSI signal for the 20 Stocks

COMPANY NAME	SIGNAL	
	SHORT TERM	LONG TERM
MRF LIMITED	SELL	SELL
TIDE WATER OIL	SELL	HOLD
STRIDES ARCOLAB	SELL	HOLD
LAKSHMI MILL	BUY	BUY
BOSCH LIMITED	SELL	SELL
JK BANK LIMITED	SELL	SELL
SHREE CEMENTS	BUY	HOLD
GODFREY PHILLIP	BUY	BUY
UB HOLDINGS	HOLD	BUY
INFOSYS LIMITED	HOLD	HOLD
TGB BANQUETS	BUY	HOLD
SUN PHARMA	BUY	SELL
RUCH INFRA	BUY	BUY
TAJ GVK HOTELS	SELL	SELL
FEDERAL MOGUL	SELL	BUY
BAJAJ ELECTRIC	SELL	SELL
FUTURE RETAIL	BUY	BUY
NITIN FIRE PROTECTION	BUY	HOLD
GMR INFRASTRUCTURE	SELL	HOLD
BF UTILITIES	SELL	SELL

CONCLUSION

From the results obtained, we can clearly find that RSI is one of the most effective technical analysis tools available, it can be effectively used to create a portfolio. Just as it performs well in other stock markets around the world, it also works well in Indian stock market. It has also been found out that P/E ratio better reflects the performance of an organization

when compared to EPS. Although RSI in itself is a very powerful analytical tool, using fundamental analysis and other technical analytical tools along with it gives better results.

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