A Study on Price Action Patterns (Inside Bar and Outside Bar) Formed at Prime Numbers with Reference to Equity Stocks

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Abstract - **An investor in the stock market is concerned in analysing the price movement of stocks. Prices in the stock market fluctuate because of continuous buying and selling in the market. The basic approaches used in analysing the share price movements are fundamental and technical analysis. Candle stick patterns provide an immense advantage to investors. As such Technical analysis is a tool that helps to forecast the price fluctuations of stocks. Candlestick is a method of communicating information regarding change in the price of the stock. Candlesticks can show whether the buyer or seller has control over the market. This research paper seeks to understand and study the candlestick patterns especially inside bar and outside bar when they occur at the prime numbers. The study is confined to companies listed in Nifty pharma and is based on historical data and investor perception.**

Key Words: Prime Number Bands, Technical Analysis, Inside Bar, Outside Bar, Intraday Trading.

I. INTRODUCTION

Technical analysis is a tool/method which is used to forecast the probable future price movement of a stock. Along with fundamental analysis, it is one of the two main ways to analyse markets and includes seeing the past market performances in terms of price movements, moving averages, volume, Candle stick chart, Point and figure chart, Relative strength analysis and various statistics.

Chart indicators provide distinctive and brief information and are able to provide data about what is doing at what period of time. Candlesticks patterns been one of the technical tools play a very important role in quantitative trading strategies.

II. CANDLESTICK PATTERNS

In the 1600s, the Japanese have developed a method of technical analysis to analyze the price of rice contracts. This method is called Candlestick Charting in today's terminology. Munehisa Homma (a.k.a. Sakata), a rich Japanese business man started trading at the local rice exchange during 1750.

Japanese candlesticks offer an Opportunity to the trader to perform short-term trading activity. Candlesticks can show whether the trader can buy or short sell the stock as it gives an idea about who has control over the market (the buyers or sellers). The highs and lows are described as supports and resistance levels. The candlestick charts are interpreted based on the pattern observed. There are various types of patterns that can be observed in the candlestick chart.

The paper by Caginalp and Laurent (1998) is one of the first empirical studies on candlesticks. They used a z-test to study and analyze eight three-day reversal candlestick patterns for all S&P 500 stocks over the time-period 1992–96, and claimed that candlestick analysis has a good predictive value.

Another study by Goo et al. (2007) revealed that they utilized the daily data of twenty-five stocks in the Taiwan Top 50 Tracker Fund and Taiwan Mid-Cap 100 Tracker Fund over the time-period from 1997 to 2006, and found that there was a strong support for candlestick techniques. Meanwhile, they suggested that the performance of candlesticks can be more improved further by implementing stop-loss strategies.

Zhu (Zhu, Atri, & Yegen, 2015) concluded that certain candlestick patterns are effective for particular kinds of stocks in the Chinese exchanges. Xie et al. (Xie, Zhao, & Wang, 2012) challenged the academic skepticism and claimed to have demonstrated that candlesticks provide predictive power based on past performance using S&P 500 data.

On the negative side; in a seminal case study, Horton (Horton, 2009) examined candlesticks patterns as a method of intraday technical analysis for 349 stocks from Commodity Systems Inc. (CSI), with 349 randomly selected companies.

Prado, et al (Prado, Ferneda, Morais, Luiz, & Matsura, 2013) replicated a study performed on the U.S. Market, and applied these strategies to the Brazilian market. Not only

was any statistical evidence found to confirm predictive power, but at least one pattern's analysis showing its trend was contrary to the original interpretation of the pattern. A few patterns showed predictive power, but not in the Brazilian market. Marshall et al. (2008) uses the same method to study the Japanese stock market, and their results were also disappointing for candlestick trading strategies

Inside bars are the most consistent multi candlestick patterns in these days. The inside bar pattern forms when a candlestick's high is lower than the previous candlestick's high, and the candlestick's low is higher than the previous candlestick's low. Essentially, an inside bar occurs when one candlestick falls completely within the candlestick before it, as shown in "Inside days." An inside day often signals uncertainty and indecision because neither the bulls nor bears have been able to push price beyond the previous period's range. The outside bar can be either bullish or bearish and how you trade them will depend on your trading strategy. If you trend trade, you will probably only trade the outside bar pattern that conforms to your directional bias in the market.

III.   METHODOLOGY

The stock market trading has become common among common public these days. The days are gone when only

the investment gurus and informed traders traded in the stock market shouting the prices at which they were willing to buy or sell. With the introduction of online trading, it has all been made available to common man and every tom dick and harry is investing in the stocks. This has been good for certain people, who are well versed in investments and stock market trends. Understanding stock market is the key to making good investment. Hence it is crucial to understand the market before stepping in.

The sampling method used for this research is stratified random sampling. There are 10 Indian company listed in Nifty pharma. The samples are drawn from pharmaceutical sector that are listed in NSE i.e., Auro Pharma and Glenmark.

IV.   DATA ANALYSIS

The data is based on the patterns formed during trading. A specific pattern is observed at prime number bands. Wherever this prime number bands are formed, the values are recorded. This study focused on identifying the formation of inside bar and outside bar at prime number bands. The data considered for the study is three months from July to September 2019. The patterns formed are observed and identified of equity stocks of Auro pharma and Glenmark.

Risk Reward Ratio from July-September 2019 of the selected companies

AUROPHARMA   GLENMARK

S.No	Date	Risk to Reward Ratio(RR)	Loss/Stop loss hit	S.No	Date	Risk to Reward Ratio(RR)	Loss/Stop loss hit
1.	02/07/2019	0.72	-	1.	03/07/2019	-	1.45
2.	04/07/2019	-	3.5	2.	05/07/2019	1.30	-
3.	05/07/2019	4.96	-	3.	08/07/2019	1.45	-
4.	08/07/2019	4.45	-	4.	10/07/2019	1.24	-
5.	09/07/2019	7.36	-	5.	11/07/2019	1.96	-
6.	10/07/2019	3.25	-	6.	22/07/2019	1.57	-
7.	10/07/2019	5.85	-	7.	01/08/2019	1.44	-
8.	12/07/2019	2.55	-	8.	09/08/2019	4.86	-
9.	22/07/2019	1.81	-	9.	13/08/2019	2.60	-
10.	23/07/2019	2.74	-	10.	13/08/2019	1.86	-
11.	25/07/2019	2.17	-	11.	16/08/2019	4.15	-
12.	26/07/2019	2.13	-	12.	23/08/2019	-	2.35
13.	26/07/2019	0.81	-	13.	29/08/2019	0.41	-
14.	30//07/2019	3.26	-	14.	04/09/2019	2.79	-
15.	01/08/2019	-	0.9	15.	06/09/2019	4.04	-
16.	07/08/2019	3.025	-	16.	09/09/2019	-	0.3
17.	09/08/2019	2.87	-	17.	11/09/2019	1.48	-
18.	09/08/2019	5.42	-	18.	12/09/2019	2.18	-
19.	13/08/2019	1.66	-	19.	13/09/2019	3.50	-
20.	16/08/2019	-	4.8	20.	19/09/2019	-	4.00
21.	16/08/2019	4.6	-				
22.	05/09/2019	2.5	-				
23.	06/09/2019	1.29	-				
24.	23/09/2019	0.7	-				
25.	24/09/2019	-	1.65				
26.	25/09/2019	2.33	-				
27.	27/09/2019	2.99	-				

Table 1 showing risk-reward ratio of selected Nifty stocks

Fig: 1. Inside bar formed at high of the day across Prime number 431 in 15 minutes timeframe on 13th August 2019 in Glen mark. (Listed in Nifty Pharma, India)

We can also notice here that the following day there was a gap down and the scrip moved down further indicating the power of the patterns formed at Prime numbers.

The following images show the methodology of calculation of profit and loss as and when ever a trade would be executed. The scrip which is considered to display the methodology of calculations is Glenmark (NSE- India).

Data for the month of July 2019. Name of the Scrip: Glenmark											
S.No	Date	Pattern Formed Inside Bar/ Outside Bar	Prime Number Value	Buy/Sell	Time of Entry (pattern Formed)	Entry Price	Stop Loss Price	Stop Loss Hit (Yes/No)	Loss in Rs (If Stop Loss Hit)	Target Price Achieved For the Day	Risk to Reward Ratio(RR)
1	03/07/2019	Inside Bar	443	Sell	09.45 am	442.95	444.40	Yes	1.45	–	–
2	05/07/2019	Inside Bar	439	Buy	10.30 am	439.90	438.10	No		442.25	1.30
3	08/07/2019	Inside Bar	433	Sell	10.00 am	433.25	437.50	No		427.05	1.45
4	10/07/2019	Inside Bar	443	Buy	01.15 pm	443.70	441.05	No	–	447.00	1.24
5	11/07/2019	Inside Bar	457	Sell	10.15 am	455.30	458.50	No	–	449.25	1.96
6	22/07/2019	Inside Bar	421	Buy	11.00 am	424.00	420.50	No	–	429.50	1.57
Total Profit/Loss in the Month of July 2019									1.45		7.52

Data for the month of August 2019. Name of the Scrip: Glenmark											
1	01/08/2019	Outside Bar	419	Buy	03.00 pm	420.30	417.40	No	–	424.5	1.44
2	09/08/2019	Inside Bar	433	Sell	01.45 pm	433.50	435.75	No	–	422.55	4.86
3	13/08/2019	Inside Bar	421	Buy	09.45 am	423.50	419.40	No		434.20	2.60
4	13/08/2019	Inside Bar	431	Sell	02.30 pm	426.45	434.20	No	–	412.00	1.86
5	16/08/2019	Inside Bar	359	Buy	02.15 pm	357.60	356.30	No	–	363.00	4.15
6	23/08/2019	Inside Bar	367	Sell	01.45 pm	365.00	367.35	Yes	2.35	–	–
7	29/08/2019	Inside Bar	383	Sell	09.45 am	380.25	385.40	No		378.10	0.41
Total Profit/Loss in the Month of August 2019									2.35		15.32

Data for the month of September 2019. Name of the Scrip: Glenmark												
1	04/09/ 2019	Inside Bar	373	Buy	11.30 am	375.50	372.40	No	-		384.15	2.79
2	06/09/ 2019	Inside Bar	383	Buy	09.45 am	384.65	382.40	No	-		393.75	4.04
3	09/09/ 2019	Outside Bar	383	Buy	03.00 pm	384.70	381.20	No	0.3		383.45	-
4	11/09/ 2019	Inside Bar	383	Buy	01.00 pm	383.95	382.70	No	-		385.80	1.48
5	12/09/ 2019	Inside Bar	383	Buy	11.30 am	381.55	380.20	No	-		384.50	2.18
6	13/09/ 2019	Inside Bar	367	Buy	11.45 am	367.20	366.00	No	-		371.40	3.50
7	19/09/ 2019	Outside Bar	359	Buy	10.30 am	361.50	357.50	Yes	4.00		-	-
Total Profit/Loss in the Month of September 2019									4.30			13.99

Methodology of Data Analysis:

The data analyzed and mentioned in the above tables was collected from Zerodha Kite trading Platform, India. The price action Patterns of Inside bar and Outside Bars were only considered in analysis. An Inside bar or an Outside bar pattern which was formed across a certain prime number and at high or low of the day was taken into consideration. The time frame was 15 minutes and the Japanese Candlesticks were used to Study the Price action movement. The high or low of the Inside bars or Outside bars penetrated into or out of a certain Prime Number at high or low of the day were given special attention in the analysis.This could provide the readers information on how the buyers and sellers behaved whenever the price of the scrip moved across a prime number and formed certain Patterns like Inside bars and Outside bars. The entry price was assumed to be taken at the closing price of the baby bar and stop loss was put at the low or high of the mother bar depending on if the trade was to buy or sell. The entry was taken after the formation of baby bar in Inside bar Pattern. However few traders wait for the next candle to close below or above the mother bar in general cases. Here, as the pattern was formed around Prime Numbers, the entry was assumed to be taken immediately after the baby bar was formed to indicate the significance of prime numbers and that a trader need not wait for a confirmation of the third candle to close above or below of the mother bar. In case of the outside bar, entry was assumed to be taken after the formation of mother bar only as usual traded by many others.

The target price mentioned in the tables is the highest or lowest price the scrip reached that day after taking a move from the Prime Number after forming an Inside bar or an Outside Bar at the Prime Number. This was done only to illustrate how the price moved suddenly after certain candle stick patterns were formed at prime numbers. The analysis depicts the power of Prime Numbers in trading. In fact, in most of the cases if the patterns were formed at the end of the day, the trend continued in the direction of the patterns formed. Therefore, it was evident that even Swing trading could be done if the traders could find any reliable Candlestick Patterns like Inside bars, Outside bars, Hammers etc. The following images show the patterns formed across a Prime Number band. The images were taken from Zerodha Kite Platform, India.

V.   CONCLUSIONS

The Data analysis shows that Prime Numbers serve as a reliable resistance and support levels for the stocks to be traded. Once a candle stick pattern is formed at prime numbers (like inside bar, outside bar, hammer or a doji), those patterns are found to be more reliable patterns to reverse the trend or set a new trend. Contrary to this the candle stick patterns formed at normal price levels other than prime numbers, the patterns were not found to be more reliable.

Therefore, it is recommended that trading patterns of price at prime numbers fetches good profits to a trader. However, the traders are also recommended to use other technical tools like Moving Average Convergence Divergence (MACD), Bollinger Bands (setting of EMA 50, Standard Deviation:2.1)

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