INVESTIGATING MORNING STAR CANDLESTICK PATTERN: A CASE OF BSE SENSEX COMPANIES

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ABSTRACT:
The approaches of technical analysis are used to explore how supply and demand for any financial securities impact the price, volume, and implied volatility. Technical analysts work on the principle that past trading activity and price changes of an asset can be valuable indicators of future price movements. The core of technical analysis is the evaluation of price and volume. Researchers have created hundreds of patterns and signals to improve technical analysis trading across the industry. In financial technical analysis, a candlestick pattern is a price movement portrayed graphically on a candlestick chart that some believe may predict a certain market movement. Indicators are statistics used to assess present conditions and forecast financial and economic trends. A moving average (MA) is a stock indicator that is widely used in financial and technical analysis. The purpose of this research is to see if the Morning Star candlestick pattern is independent or reliant on the moving average indicator and volume for the 30 firms listed on the Bombay Stock Exchange in India (BSE). According to the study, Morning star patterns appear after a period of continuous decline in stock prices for some firms, and the prices rise again, indicating an uptrend and making it easier for traders to acquire the company's shares however Morning star patterns do not appear for all companies. As a result, we may say that the Morning Star candlestick pattern is generally effective, whereas it is ineffective for others. It is concluded from the research that A Morning Star candlestick pattern has a large impact on both the 50 moving average indicator and the 100 moving average indicator, but not on volume,

Keywords: Candlestick Patter, Morning Star, Moving Averages, Volume

Technical Analysis:
Price trends and patterns on charts are used in trading profession with an objective to assess an investments and discover trading opportunities. According to technical analysts the past trading activity and variations in the price of an asset might be useful in predicting the future movements in price. The investigation of price and volume is one of the essential of technical analysis. Technical analysis approaches are used to examine variations in price, volume, and implied volatility and how price is affected by supply and demand for securities. Technical analysis is frequently used to produce short-term trading signals using various charting tools, but it may also be used to improve the assessment of a security's strength or weakness in relation to the larger market or one of its sectors. This data aids analysts in bettering their overall valuation estimate (HAYES, Technical Analysis, 2021).

Price Patterns:
Multiple patterns and trade signals have been generated by researchers to enhance technical analysis trading across the sector. To foresee and trade market fluctuations, technical
analysts have devised a variety of trading strategies. Some indicators are primarily concerned with identifying the current market trend, such as support and resistance levels, whilst others are concerned with determining the strength of a trend and its chances of continuation. Trend lines, channels, moving averages, and momentum indicators are some of the most commonly utilised technical indicators and charting patterns (HAYES, Technical Analysis, 2021).

Transitions between rising and declining trends are frequently suggested by price patterns in technical analysis. A price pattern is defined as a recognised pattern of price movement that may be determined using a sequence of trendlines and/or curves (HAYES, Introduction to Technical Analysis Price Patterns, 2021).

**Candlestick Pattern:**

A candlestick pattern is a price movement represented graphically on a candlestick chart that some believe might anticipate a particular market movement in financial technical analysis. The recognition of the pattern is subjective; therefore charting tools must rely on predetermined rules to match the pattern. There are 42 recognized patterns that can be classified as simple or complicated (Candlestick pattern).

A candlestick is a visual representation of information regarding the price movement of an item. Candlestick charts are one of the most popular types of technical analysis because they allow traders to quickly evaluate price data using only a few price bars (16 candlestick patterns every trader should know, 2020).

**Morning star Candlestick pattern:**

In a dark market decline, the morning star candlestick pattern is seen as a symbol of hope. It's a three-stick pattern with one short-bodied candle sandwiched between two long red and green candles. Because the market gaps both on open and close, the 'star' will typically have no overlap with the longer bodies.

It indicates that the selling pressure from the first day has subsided and that a bull market is approaching. (16 candlestick patterns every trader should know, 2020)

A morning star appears after a declining trend and marks the beginning of an upward journey. It's a symptom of the prior price trend reversing. Traders look for the formation of a morning star, and then use additional indications to confirm that a reversal is taking place (CHEN, 2021).

**Indicators:**

Indicators are those statistics which are mostly used to quantify existing states and forecast financial and economic developments. In the sphere of investing, indicators are often technical chart patterns derived from a security's prices, volume data, or an open interest. Moving averages, moving average convergence divergence (MACD), relative strength index (RSI), and on-balance-volume are all common technical indicators (OBV) (TEAM, 2021).

**Moving Average:**

A moving average is a statistical computation that is used to study data points by calculating the averages of different subsets of the entire data set. A moving average (MA) is a stock indicator extensively employed in technical analysis in finance. The purpose of determining a stock's moving average is to smooth out price data by creating an average price that is constantly updated. The effects
of random, short-term variations on the price of a stock over a specific time frame are reduced by computing the moving average. (Fernando, 2021). A moving average (MA) is a technical indicator that is used to determine a stock's overall direction, or trend. It's a bullish (bearish) sign for the stock if the MA is moving in a positive (negative) direction. (TEAM, 2021).

LITERATURE REVIEW:

This research (Manoharan, M, 2019) on 17 selected Indian NIFTY 50 companies, reviewed the usage and efficiency of candlestick technical analysis. This study could be expanded to include a variety of different ranking criteria. It states that Return-based performance, as well as the stock-specific strategy, will produce more reliable findings. It concludes that Candlestick technical analysis can be a beneficial trading technique if a solid stop-loss method is used to restrict losses, resulting in a significant boost in efficiency.

The purpose of this literature (Romeo, 2015) into the formation of candlestick patterns was to identify the many candlestick patterns and their accuracy as it assists investors in determining whether candlestick patterns are reliable while making trading decisions. This research is based on the Nifty index for the last five years. According to the past five years of the Nifty index, candlestick patterns are not 100 percent accurate. And technical indicators aren't really supportive of these trends. Therefore it is concluded from this research that investors should examine other aspects in addition to candlestick patterns. It aids in the improvement of precision.

This literature (Hércules Antonio do Prado, 2013) have been developed several strategies in an attempt to forecast asset pricing behavior by examining the behavior of the financial market. One of these strategies is the candlestick chart, which was developed in the 18th century. As a result, applying patterns formed for other markets, times or activities to other markets, times, or actions is not encouraged. Such findings do not support the notion that candlestick patterns may accurately anticipate the future behaviour of stocks listed on the Ibovespa stock exchange. However, this study discovered statistically significant evidence of some patterns' predictive capacity, which may indicate that the technique needs to be tailored to the market in which it would be employed.

The article (Noor Azlinna Azizan, 2010) presents a research paper on technical analysis trading rules that produce abnormal futures price returns. For the timeframes examined, it reports abnormal returns over and beyond those generated by a passive buy-and-hold strategy for FKLI, FCPO, Soyoil, Soybean, and Corn futures. Bollinger Bands Z-Test (BBZ), a novel technical analysis trading model based on standard deviation, is developed in this study. It is suggested that BBZ tries to catch big price swings that are more than one standard deviation. It states that it is feasible to earn anomalous returns in excess of those obtained by a passive buy-and-hold strategy by employing mechanical technical trading techniques to discover new trends early.

The purpose of this study (Shiu, 2011) is to investigate the ability of candlestick two-day patterns to forecast and to determine how to improve performance. The study's data set includes daily starting, high, low, and closing prices, as well as daily volumes of all electronic securities traded on the Taiwan Stock Exchange between 1998 and 2007. The findings of this study suggest that the harami pattern can collect information regarding short-term price movements in the Taiwan stock market due to demand and supply, since the harami signals' performance is mainly favourable. In addition, this is the first time the Quantile Regression Model has been applied to a candlestick analysis. The support or resistance level, according to this study, is a crucial factor to consider when analysing the efficiency of a reversal pattern. This is because technical analysts believe that investors are eager to sell at the peak of the market and buy at the bottom (Brock et al., 1992). As a result, future candlestick trading study should concentrate on this topic.

STATEMENT OF PROBLEM:

In the case of securities/equity, currency trading, or financial derivatives, a morning star candlestick pattern can accurately anticipate or explain price fluctuations. When there is a weakening in a downtrend, it seems as a warning indicator. Once a morning star pattern is identified, investors should pay close attention to it in order to profit from a good trend reversal position.
The objective of this study is to investigate whether the Morning Star candlestick pattern is independent or dependent on the moving average indicator and volume for the 30 companies listed on the Indian stock exchange, namely the BOMBAY STOCK EXCHANGE (BSE).

OBJECTIVE OF THE STUDY:
- To study the statistical analysis and morning star candlestick pattern.
- To study the relationship between morning star pattern and its impact on the Indian stock market i.e. BSE.
- To study the impact of morning star pattern on moving average indicator & volume.
- To determine the possible price fluctuations based on past price action pattern and indicator for the potential investment.

HYPOTHESES OF THE STUDY:
- Null Hypothesis (Ho):- Morning Star candlestick pattern is independent of moving average & volume.
- Alternate Hypothesis (H1):- Morning Star candlestick pattern is not independent of moving average & volume.

RESEARCH METHODOLOGY:
This research study subjects to the statistical analysis of equities on the BSE with reference to the morning star candlestick pattern. In this research study, we exclusively used secondary data in the form of charts, tables, and graphs from various journal publications, periodicals, and internet searches.

The study is descriptive in nature and a convenient sample technique was adopted. The data for this study was collected during the last 11 years, from January 1, 2010 to March 31, 2021, with a sample size and population of 30 BSE listed companies. The research takes into account the daily candlestick pattern charts of 30 BSE listed companies (investing.com).

In this study we investigate whether the morning star candlestick pattern is independent or reliant on the moving average indicator and volume.

DATA ANALYSIS:
Data is evaluated with appropriate methodologies in order to make it more understandable and valuable. Data is tabulated using extra tools such as charts, graphs, and other graphics as needed.

METHODOLOGY OF ANALYSIS:
The INVESTING.COM website provided the daily candlestick pattern charts of 30 BSE-listed firms. The observed and expected frequency for the Moving average indicator and volume were calculated. We compare our estimated value to the chi-square test value which is 3.841 for a 5% level of significance.

The study's variables include a bullish engulfing pattern as an independent variable, as well as 50 MA, 100 MA and volume as dependent factors.

DATA ANALYSIS:
The given table shows that during the period of January 2010 till December 2021, the morning star candlestick pattern occurrence in case of 30 stocks of BSE SENSEX in daily candlestick chart pattern:
it has been observed that the Morning Star Candlestick Pattern is vastly successful for three of the 30 BSE-listed companies. HDFC Bank, Hindustan Unilever Ltd and Tata Consultancy Services. All companies where pattern is found more than 50% of occasion is considered as success ratio of the morning star pattern. The Morning Star Candlestick Pattern is a lesser successful (less than 50%) for 3 of the 30 BSE listed firms. HDFC, State Bank of India and Sunpharma Ltd are the three companies which have shown most of the time pattern is failed.
Hypothesis testing for independent of 50 moving average (MA):

- The Morning Star Candlestick pattern is seen 158 times above the 50MA (Moving Average), with 112 times the pattern being successful and 46 times the pattern being unsuccessful above 50 MA.
- Similarly, the Morning Star candlestick pattern has been seen 266 times below the 50 MA, with 195 times of success and 71 times of failure.

Based on the observed frequency the expected frequency is computed in below mention table:

<table>
<thead>
<tr>
<th>Observation frequency</th>
<th>Success</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>above 50</td>
<td>112</td>
<td>46</td>
</tr>
<tr>
<td>below 50</td>
<td>195</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>307</td>
<td>117</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expected frequency</th>
<th>Success</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>above 50</td>
<td>114</td>
<td>44</td>
</tr>
<tr>
<td>below 50</td>
<td>193</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>307</td>
<td>117</td>
</tr>
</tbody>
</table>

Computation of Chi-square value:

<table>
<thead>
<tr>
<th>Fo</th>
<th>Fe</th>
<th>Fo-Fe</th>
<th>sq</th>
<th>Sq(Fo-Fe)/Fe</th>
</tr>
</thead>
<tbody>
<tr>
<td>112</td>
<td>114</td>
<td>-2</td>
<td>4</td>
<td>0.035087719</td>
</tr>
<tr>
<td>195</td>
<td>193</td>
<td>2</td>
<td>4</td>
<td>0.020725389</td>
</tr>
<tr>
<td>46</td>
<td>44</td>
<td>2</td>
<td>4</td>
<td>0.090909091</td>
</tr>
<tr>
<td>71</td>
<td>73</td>
<td>-2</td>
<td>4</td>
<td>0.054794521</td>
</tr>
</tbody>
</table>

0.201516719

We can accept the Null Hypothesis because the result value i.e. 0.201516719 is less than the Chi-Square tabulated value for a 5% level of significance, which is 3.841. 50 Moving Average is not influencing the Morning Star Candlestick Pattern for the given data.

Hypothesis testing for independent of 100 moving average (MA):

- The Morning Star candlestick pattern has been observed 47 times above the 100 MA (Moving Average), with 32 times being successful and 15 times being unsuccessful in observation frequency.
- Similarly, the bullish engulfing candlestick pattern is seen 219 times below the 100 MA, with 163 times the pattern succeeding and 56 times the pattern failing.

Based on the observed frequency the expected frequency is computed in below mention table:

<table>
<thead>
<tr>
<th>Expected frequency</th>
<th>Success</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>above 100</td>
<td>34</td>
<td>13</td>
</tr>
<tr>
<td>below 100</td>
<td>160</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>194</td>
<td>72</td>
</tr>
</tbody>
</table>
Computation of Chi-square value:

<table>
<thead>
<tr>
<th>Fo</th>
<th>Fe</th>
<th>Fo-Fe</th>
<th>sq</th>
<th>Sq(Fo-Fe)/Fe</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>34</td>
<td>-2</td>
<td>4</td>
<td>0.117647059</td>
</tr>
<tr>
<td>163</td>
<td>160</td>
<td>3</td>
<td>9</td>
<td>0.05625</td>
</tr>
<tr>
<td>15</td>
<td>13</td>
<td>2</td>
<td>4</td>
<td>0.307692308</td>
</tr>
<tr>
<td>56</td>
<td>59</td>
<td>-3</td>
<td>9</td>
<td>0.152542737</td>
</tr>
</tbody>
</table>

0.634131739

We can accept the Null Hypothesis because the value 0.634131739 is less than the Chi-Square tabulated value which is 3.841 for a 5% level of significance. The 100 Moving Average is not impacting the Morning Star Candlestick Pattern.

Hypothesis testing for independent of Volume:

<table>
<thead>
<tr>
<th>Observed Frequency</th>
<th>Success</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>above volume</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>below volume</td>
<td>160</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>163</td>
<td>56</td>
</tr>
</tbody>
</table>

Morning Star candlestick pattern is found 5 times above the Volume in observed frequency, with 3 times being successful and 2 times being unsuccessful. Similarly, the Morning Star candlestick pattern appears 214 times below Volume, with 160 times of success and 54 times of failure.

Based on the observed frequency the expected frequency is computed in below mention table:

<table>
<thead>
<tr>
<th>Expected frequency</th>
<th>Success</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>above volume</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>below volume</td>
<td>159</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>163</td>
<td>6</td>
</tr>
</tbody>
</table>

Computation of Chi-square value:

<table>
<thead>
<tr>
<th>Fo</th>
<th>Fe</th>
<th>Fo-Fe</th>
<th>sq</th>
<th>Sq(Fo-Fe)/Fe</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>-1</td>
<td>1</td>
<td>0.25</td>
</tr>
<tr>
<td>160</td>
<td>159</td>
<td>1</td>
<td>1</td>
<td>0.006289308</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>54</td>
<td>5</td>
<td>49</td>
<td>2401</td>
<td>480.2</td>
</tr>
</tbody>
</table>

481.4562893

INTERPRETATION:

We have to reject the Null Hypothesis since the value 481.4562893 is more than the Chi-Square value which is 3.841 at a 5% level of significance and the Alternate Hypothesis will be accepted as the Morning Star Candlestick Pattern is dependent on Volume.

CONCLUSION:

This study states that Statistical analysis is used to forecast future price fluctuations, which is beneficial to traders who want to make money. Traders use technical analysis tools on the chart to discover entry and exit points for potential trades. We used the Moving Average Indicator tool in this study to forecast future price fluctuations. The moving average indicator is one of the most common indicators used to support candlestick patterns.

From the study it can be concluded that Morning star patterns arise after a period of continuous fall in stock prices for some firms, and the prices rise again, suggesting an uptrend and
making it easier for traders to acquire the company's shares therefore after a drop in stock price, investors should wait for the appearance of the Morning Star candlestick pattern before buying shares or stocks since it indicates that an uptrend is about to begin, however morning star patterns do not appear for all of the companies.

As a result, we can state that the Morning Star candlestick pattern is mostly effective whereas for others, it is ineffective. From data analysis it has been concluded that A Morning Star candlestick pattern has a significant impact on both the 50 moving average indicator and the 100 moving average indicator, but not on volume. This study provides in depth knowledge about the Morning Star candlestick pattern and the moving average indicator.

REFERENCES:
2. 16 candlestick patterns every trader should know. (2020, January 02). Retrieved from ig.com: https://www.ig.com/en/trading-strategies/16-candlestick-patterns-every-trader-should-know-180615