

A Study on Average Directional Index, Directional Movement Index And Average True Range As A Market Timing Tool And Its Impact on The Result of Technical Analysis

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Abstract- In financial markets, various assets are traded. These are equity, bonds, commodities, etc. Technical analysis is used by people to trade these assets. Technical analysis is an instrument used to predict the prospective course of price of a security or currency pairs determined from market data.

Our study uses the parameters ADX whose longform is Average directional index and Directional movement index to project the moment and the direction of the price of the particular asset.

I. INTRODUCTION

The ethics of technical analysis are a consequence of hundreds of years of financial market statistics. Journalist Charles Dow (1851-1902) gathered and closely studied American stock market data. He believed patterns and business cycles could possibly be found in these statistics, an idea later known as “Dow Theory”. The average directional movement index(ADX) was technologically advanced in the late 70’s by a mechanical engineer named John Wilder to indicate the rate of change in stocks’s prices. ADX is gaining traction in algorithmic trading systems. Also, many trading softwares and brokers are introducing this indicator in their technical analysis tools.

There are thousands of indicators used for trading. This research is concentrating on two indicators which are ADX and DMI. ADX is a momentum-based indicator, it tells the overall momentum of the stock. DMI gives the direction of the stock.

There is one more constraint ATR which is required to compute ADX and DMI.

II. LITERATURE REVIEW

1. According to Vitaliy mike, cristinaluca, georgewilson(2017): the authors have brought in a

system for selection of parameters in an algorithmic trading system, thereby minimising use of excessive parameters and hence boosting performance sureness. In this paper, it has been established that, unlike what most people believe, the time parameter does not need to have equivalent timeframes, each timeframe may have a different period . This study explored existing algorithmic trading systems and focused on intraday trading. The authors preferred this type of trading method for picking the minimum number of parameters that are imperative for the ATS to illustrate a more dependable outcome. Raw data comprising independent variables is used for parameter selection. The ATS system is applied and tested with the suggested method and has appeared to be profit-making in several scenarios.

2. According to M. Anitha, Dr. R. Padmaja: In this study, the authors have attempted to make relative study considering the five of the most widespread indicators of technical analysis using a single security, which is also called a share or a stock. The study recommends employing ADX indicators for better outcomes. With the statistics of the study, we can conclude that technical indicators can have a valuable role in predicting the movement of the security. The ADX also called the Average directional index comes out the most superior among the five technical indicators taken in the study.
3. According to IkhlaasGurrib(2018): The ADX is basically an indicator which is based on an index which is used to decide the trend’s weakness or strongness.It is used with +DI (positive directional indicator) and –DI(negative directional indicator).Direction of stock can be captured through Directional movement index.The strength of the trend can be represented by the reading on ADX indicator
4. According to beata szetela,urszulamentel,grzegorzmentel and yuriybilan(2020): The paper examined the nature of the index with different conditions. The two vastly common are the upwards and downwards trends. Moreover, we explored if the index action shifts in the interval with a high rate of change in price. In

circumstances where the Average Direction level surpasses mid 20's, there are noticeable variations in the conclusions of the analysed experiments in the rising market compared to the falling market level. It is also understandable when distinguishing the phase of dominant directional movement action within the whole category. Our outcomes demonstrate that the stock market is distant from meeting the hypothesis of the beneficial market assumption and yet vulnerable to arbitrage.

III. RELATED TERMINOLOGIES OVERVIEW

ATR: Made by the same person who formulated the ADX and DMI, John wilder. The Average true range also called as ATR which is used to determine the volatility of the asset. Other than DMI and ADX, it is used in various other indicators also.

$$TR = [(H - L), Abs(H - Cp), Abs(L - Cp)]$$

$$ATR = \left(\frac{1}{n}\right) \sum_{i=1}^n TR_i$$

Where:

TR_i= A particular true range
 n =The time period used

DMI: The directional movement index (DMI) is an indicator that recognizes in which way the value of an asset is going. This indicator will do this by comparing previous highs and lows and drawing two lines: a positive directional movement graph line (+DI) and a negative directional movement graph stroke(-DI).

ADX: This value indicates the rate of change of price, i.e.,trend strength. It cannot give the direction which the price will follow. ADX will range between 0 and 100. This indicator comes under the category of lagging indicators. Lagging indicators give confirm signals only after the price action has taken place.

$$+DI = \left(\frac{Smoothed + DM}{ATR}\right) \times 100$$

$$-DI = \left(\frac{Smoothed - DM}{ATR}\right) \times 100$$

$$DX = \left(\frac{|+DI - -DI|}{|+DI + -DI|}\right) \times 100$$

$$ADX = \frac{(Prior ADX \times 13) + Current ADX}{14}$$

Where:

+directional movement=current high-previous high
 -directional movement=previous low-current low

$$Smoothed \pm_{DM} = \sum_{t=1}^{14} DM - \left(\frac{\sum_{t=1}^{14} DM}{14}\right) + CDM$$

CDM=current directional movement

ATR=average true range

Trading system methodology

We have made a set of rules on which our system is based. The rules are:

Buy only if:

- ADX should be above 40.
- The slope of the ADX should be greater than 1 i.e. the ADX line should be facing upwards.
- The DMI+ should be greater than DMI-.

Sell if: any one of the above three rules are violated.

IV. CASE STUDIES

In the following charts of the stocks, the top blue line indicates price of the stock at any given time, then at the bottom are the lines of the ADX and DMI indicators. First line consisting of red and green colours is the ADX line, when the slope of the line is positive(facing above), it has acquired green colour and when the slope is negative(facing down), and then the following two lines are of DMI+ and DMI-.

Case 1: On 4th august,2021, the stock accuracy shipping had a price of 96.25 rupees when our system gave the buy signal and on 9th august,2021, it had the price 110.6 rupees when our system gave the sell signal. Therefore, the profit per share is 14.35 rupees in a period of 5 days.



Case 2: On 5th august,2021, the stock accuracy shipping had a price of 2858.25 rupees when our system gave the buy signal and on 12th august,2021, it had the price 3786.75 rupees when our system gave the sell signal. Therefore, the profit per share is 920.5 rupees in a period of 7days.



Case 5: On 10th august,2021, the stock accuracy shipping had a price of 387.10 rupees where our system gave the buy signal and on 16th august,2021, it had the price 474.30 rupees when our system gave the sell signal. Therefore, the profit per share is 87.2 rupees in a period of 6 days.



Case 3: On 20th march,2021, the stock accuracy shipping had a price of 514.55rupees where our system gave the buy signal and on 9th june,2021, it had the price 549.75 rupees when our system gave the sell signal. Therefore, the profit per share is 35.2rupees in a period of 49 days.



Case 4: On 9th august,2021, the stock accuracy shipping had a price of 1659.45 rupees where our system gave the buy signal and on 20th august,2021, it had the price 1733 rupees when our system gave the sell signal. Therefore, the profit per share is 35.2rupees in a period of 11 days.



V. CONCLUSION

We can conclude from the result of the case studies that technical indicators can play a beneficial and applicable part in the trade execution and our given rules incorporating Average Directional Movement Index (ADX)/ Average Directional Index (ADX) and the directional movement index (DMI) can generate good results in terms of profit.

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