A STUDY ON TRADING ROBOT CHART PATTERN RECOGNITION & RISK ANALYSIS

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Abstract: Abstract: The purpose of this paper is to review the market technical charts and their correlation to past market chart to demonstrate the profitability pattern in stock , future , commodities and currencies market by evidence on the profitability technical pattern analysis. The empirical literature is categorized into two groups, 'early' and 'modern' studies, according to the characteristics of testing procedures. Early studies indicate that technical trading strategies are profitable in foreign exchange markets and futures markets, but not in stock markets. Modern studies indicate that technical trading strategies consistently generate economic profits in a variety of speculative markets at least until the early 1990s, most empirical studies are subject to various problems in their testing procedures. e.g. Data snooping, ex post selection of trading rules or search technologies, and difficulties in estimation of risk and transaction costs. Future research must address these deficiencies in testing in order to provide conclusive evidence on the profitability of technical trading strategies by profitability pattern analysis.

I. INTRODUCTION

Currently most of all countries have their own stock exchange. In India the BSE (Bombay Stock Exchange), NSE (National Stock Exchange), MCX (Multi Commodities Exchanges) and MCX-SX are major stock exchanges. The BSE, NSE are dealing with the stock and their future contracts. As well as MCXn is for commodities contracts and MCX-SX is for currencies future contracts. The Global foreign exchange (Forex) market is a financial market for trading Currencies. All the market have their specified currencies instruments where people are trading 24hour in a day in all those instrument with exchange to another with change in price.

Their exchange rate is recorded in time, price and volume format. Which can be reviewed as price as well as graphical manner, the most convinced ways of viewing the price is Japanese candlestick representation, which shows the time in one axis with respect to price. This is the representation of price movement in graph is somehow representation of human behaviour. The study of the price movement through candlestick analysis is known as technical analysis. Some patterns are repetitive in nature, because human behaviour of greed and fear consistently fluctuating from human civilisation which can be better traced in the form of candlestick pattern analysis.

1.1. Motivation

The introduction of trading robot to Indian market in last year and also the wide application of trading robots globally, including algorithmic trading has brought considerable benefits to transaction efficiency.

Many designers have developed trading robots, and have also claimed that these programs can replace human analysis and keep making profits by themselves. To boost the performance of trading robots, it is important to grasp how these programs works by recognising the profitability patterns. Generally, human traders consider many market factors before they place an order. In electronic financial trading markets, these factors can be categorized into technical index, timeframe and market environment. In this research, our plan is to investigate how these trading robots make decisions to manage orders against the categorized indicators and by judging the candlesticks. So we will focus on the entirely trading robot chart Patterns analysis.

1.3. Research Goals

My prime goal is to find out the candlestick pattern and their behavioural outcome at occurrence through trading robot .Any financial instrument always either follow the trend and or consolidate, then after either a trend reversal or continuation may occur. In order to cover the research topic, the research questions focus on the how the candlesticks are formed and how they reflects the market behaviour to a specific price change, How can one predict the accuracy of next candlesticks?

What should be done if the next candlestick does not happen with robot prediction?

How to handle the stop loss level according to the candlesticks?

Answers to those questions have been presented as follows. The candlesticks and their meanings and what they tell about the price action. How a trend is followed by the patterns and how the algorithm can find out the patterns.

1.4. Challenges of research

The challenge is to find the perfect entry label and to find out the profit and stop loss label. The primary challenge of this research is the difficulty of applying fundamental analysis to robot programming. As

market movement is decided by the publishing of economic events, this information is difficult to code as MQL4 to simulate human behaviours.

The second challenge is the simulation problem. In human trading, traders change their minds while following market environment changes. It is difficult for developers to code those complex behaviours into trading robots, and most robots cannot automatically change internal parameters. This will certainly influence the experiment results, and reduce the effectiveness of trading robots.

II. BACKGROUND

"In electronic financial markets, algorithmic trading or automated trading, also known as black-box trading or robot trading, is the use of computer programs for entering trading orders with the computer algorithm deciding on aspects of the order (such as the timing, price, or quantity of the order), or in many cases initiating the order without human intervention". (Wikipedia, 2011).Algorithmic trading started in early 1970s in financial markets, with symbols that the New York Stock Exchange (NYSE) adopted: Designated Order Turnaround (DOT) and the Opening Automated Reporting System (OARS). The DOT system directly built a relationship between traders and trading desks, and executed electronic transactions at the trading. The OARS assisted traders to make decisions on settling orders. Algorithmic trading was adopted by NYSE because MYSE market owned a value of more than 100 million dollars, with over 15 trading portfolios of baskets of orders. With such a large volume, computers are necessary to handle trading instead of humans. In the 1980s, algorithmic trading was widely used in financial markets. Stock index arbitrage trading mean that traders bought or sold stocks such as S&P500 futures and simultaneously bought or sold a series of NYSE stocks, where the portfolio was highly relevant to the futures. The NYSE trading robot was enacted by a computer. When the direct spread was large enough to be profitable, the computer executed orders automatically.

In late 1980's and 1990's, the development of the telecom network made the financial market completely electronic. In the U.S. stock market, decimalization changes the minimum share price from 1/16 dollar to 0.01 dollars. This regulation changes market microstructure and reduces price spread, and thus reduces market liquidity. Papadamou and Stephanides (2005) consider that this probably promoted the development of algorithmic trading. With more and more electronic trading, more algorithmic trading strategies have become possible. These strategies include arbitrage, statistical arbitrage, trend following and regression. Computers can effectively implement these trading strategies by monitoring different markets and analyzing the historical data.

2.1 Time Frame

In order to consistently make money in the markets, robot needs to learn how to identify an underlying trend and trade around it accordingly. Common clichés include: "trade with the trend", "don't fight the tape" and "the trend is you friend" .Trends can be classified as primary, intermediate and short term. However, markets exist in several time frames simultaneously. As such, there can be conflicting trends within a particular stock depending on the time frame being considered. It is not out of the ordinary for a stock to be in a primary uptrend while being mired in intermediate and short-term downtrends.

Typically, beginning or novice traders lock in on a specific time frame, ignoring the more powerful primary trend. Alternately, traders may be trading the primary trend but underestimating the importance of refining their entries in an ideal short-term time frame. Market is the reflection of time verses money so its prime factor to determine to enter and exit the trade.

Typically, using three different periods gives a broad enough reading on the market - using fewer than this can result in a considerable loss of data, while using more typically provides redundant analysis. When choosing the three time frequencies, a simple strategy can be to follow a "rule of four." This means that a medium-term period should first be determined and it should represent a standard as to how long the average trade is held. From there, a shorter term time frame should be chosen and it should be at least one-fourth the intermediate period (for example, a 15-minute chart for the short-term time frame and 60-minute chart for the medium or intermediate time frame). Through the same calculation, the long-term time frame should be at least four times greater than the intermediate one (so, keeping with the previous example, the 240-minute, or four-hour, chart would round out the three time frequencies).It is imperative to select the correct time frame when choosing the range of the three periods. Clearly, a long-term trader who holds positions for months will find little use for a 15-minute, 60-minute and 240-minute combination. At the same time, a day trader who holds positions for hours and rarely longer than a day would find little advantage in daily, weekly and monthly arrangements. This is not to say that the long-term trading robot would not benefit from keeping an eye on the 240-minute chart or the short-term trader from keeping a daily chart in the repertoire, but these should come at the extremes rather than anchoring the entire range.

2.2 Technical Analysis Vs Fundamental Analysis

While technical analysis concentrates on the study of market action, fundamental analysis focuses on economic forces of supply and demand that cause price to move higher, lower, or stay the same. The fundamental approach examines all of the real events factors affecting the price of a market in order to determine the intrinsic value of the market. The

intrinsic value is what the fundamental indicates something is actual worth based on the law of supply and demand. If the intrinsic values are under the current market price, then the market is overpriced and should be sold. If the market price is below the intrinsic value, then the market is undervalued should be brought.

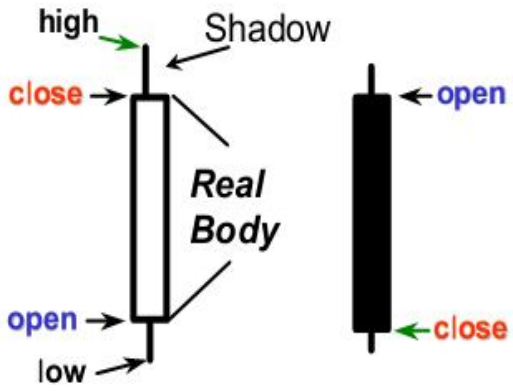
Both of these approaches to market forecasting attempt to solve the same problem, that is, to determine the direction price are alike to move. They just approach the problem from different directions. The fundamentalist studies the cause of market movement, while the technician studies the effect. The technician, of course, believes that the effect is all that he or she wants or needs to know and that the reasons, or the cause, are unnecessary. The fundamentalist always has to know why.

Most Traders classify themselves as either technician or fundamentalist. In reality, there is a lot of overlap. Many fundamentalists have a working knowledge of basic tenets of chart analysis. At the same time, many technicians have at least a passing awareness of the fundamentals. The problem is the charts and fundamentals are often in conflict with each other. Usually at the beginning of important market moves, the fundamentals do not explain or support what the market seem to differ the most. Usually they come back into at some point, but often too late for the trader to act.

III. CANDLESTICK PATTERN

A candlestick chart is a style of bar-chart used primarily to describe price movements of a Security, Derivative or currency over time. It is a combination of a line-chart and a bar-chart, in that each bar represents the range of price movement over a given time interval. It is most often used in technical analysis of equity and currency price patterns. They appear superficially similar to box plots, but are unrelated. Drawing the daily bar chart line requires open, high, low, and close. The vertical line on a bar chart depicts the high and low of the session. The horizontal line to the left of the vertical line is the opening price. The horizontal line to the right of the vertical line is the close.

The thick part of the candlestick line is called the real body. It represents the range between that session's opening and closing. When the real body is black (i.e., filled in) it means the close of the session was lower than the open. If the real body is white (i.e., empty), it means the close was higher than the open.



The thin lines above and below the real body are the shadows. These shadows represent the session's price extremes. The shadow above the real body is called the upper shadow and the shadow under the real body is known as the lower shadow. Accordingly, the peak of the upper shadow is the high of the session and the bottom of the lower shadow is the low of the session.

It is easy to see why these are named candlestick charts since the individual lines often look like candles and their wicks. If a candlestick line has no upper shadow it is said to have a shaven head. A candlestick line with no lower shadow has a shaven bottom. To the Japanese, the real body is the essential price movement. The shadows are usually considered as extraneous price fluctuations.

3.1 Bearish patterns

Bearish reversal patterns can form with one or more candlesticks most require bearish confirmation. The actual reversal indicates that selling pressure overwhelmed buying pressure for one or more days, but it remains unclear whether or not sustained selling or lack of buyers will continue to push prices lower. Without confirmation, many of these patterns would be considered neutral and merely indicate a potential resistance level at best. Bearish confirmation means further downside follow through, such as a gap down, long black candlestick or high volume decline. Because candlestick patterns are short-term and usually effective for 1-2 weeks, bearish confirmation should come within 1-3 days.

One of the most significant goals of technical analysis is to identify changes in direction of price action. Important to note is that with candlesticks a reversal pattern does not necessarily suggest a Because candlesticks give visual insight into what the market is market psychology, one of the most useful aspects of candlestick analysis is its ability to suggest changes in the sentiment of the market, and reversals in trend. We call these candle formations Reversal Patterns.

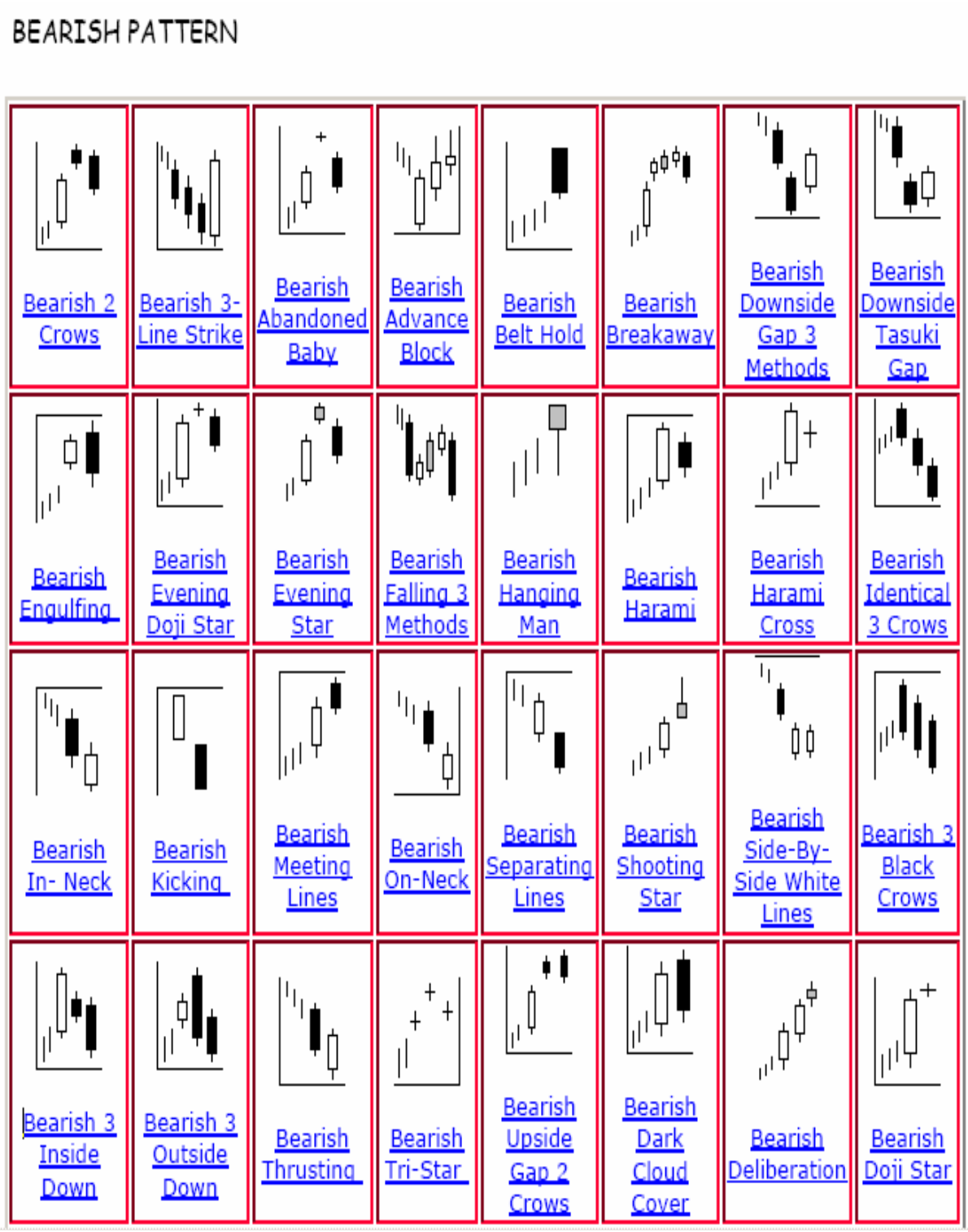


Fig-1

3.2Bullish Patterns

Patterns can form with one or more candlesticks most require bullish confirmation. The actual reversal indicates that buyers overcame prior selling pressure, but it remains unclear whether new buyers will bid prices higher. Without confirmation, these patterns would be considered neutral and merely indicate a potential support level at best. Bullish confirmation means further upside follows through and can come as a gap up, long white candlestick or high volume advance. Because candlestick patterns are short-term and usually effective for only 1 or 2 weeks, bullish confirmation should come within 1 to 3 days after the pattern.

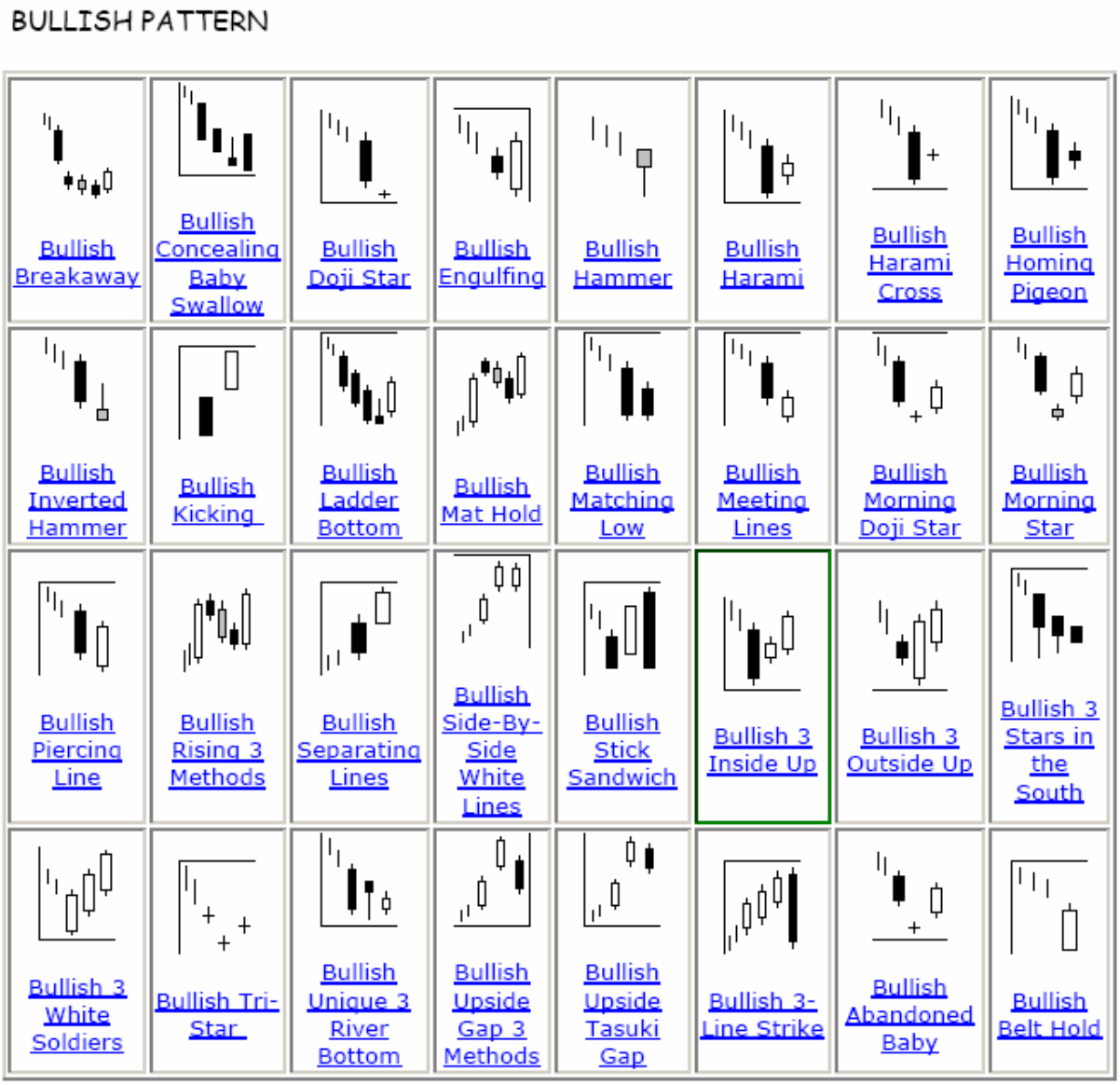


Fig-2

3.3 Breakout Patterns

Breakouts occur in all types of market environments. Typically, the most explosive price movements are a result of channel breakouts and price pattern breakouts such as triangles, flags or head and shoulders patterns. As volatility contracts during these time frames, it will typically expand after prices move beyond the identified ranges. Behind all patterns the market reacts to news and sentiments at that time the trend leads to breakout. So it is essential for a trader or trading robot to find out the breakout patterns. The following are the major breakout patterns for a trading robot.

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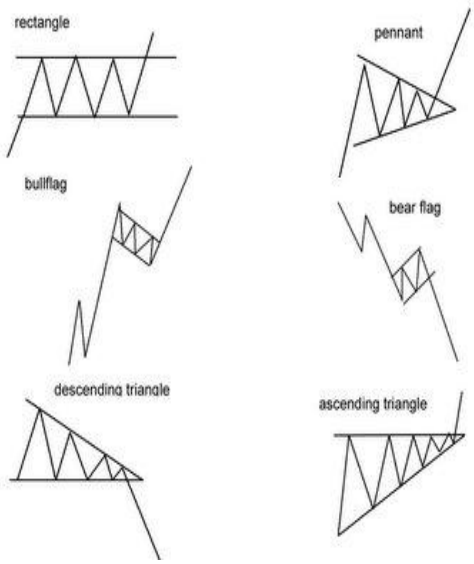

Fig-3

IV. APPROACH FOR IMPROVING TRADING ROBOTS

As per general rule a robot should be designed to make position according to long term patterns.
A robot can automatically place the short position if a bearish pattern form during an long uptrend. The most important factors is to identify the short term bearish pattern during an long term uptrend this is the scenario to improve the performance of an trading robot.
A robot can automatically place the long position if a bullish pattern forms during an long downtrend. The most important factors is to identify the short term bullish pattern during an long term downtrend this is the scenario to improve the performance of an trading robot.
To validate a trading robot it should be capable of doing the following task in real time manner to make successful trade. The following manner the trading robot should be designed to make profitable transactions.
It is not in the scope of this study to post the result of the back test or forward test.

4.1 Pattern Reorganisation & Trend Identification

Patterns are the most trusted fac of the market through which a trading robot should know the reason & reaction of the market by analysing the action of the traders. The above listed patterns are the most powerful patterns of a trend which results in trend diversify. A trading robot should be more sophisticated to evaluate the sensitivity of the patterns by comparing with various time frames.
Since there are too many unpredictable market environments that can affect the performance of trading robots, the improved trading robot should catch all the trends found in past trading. These factors can have both negative and positive effects .Like speculation is a very high volume trade to change the patterns for short term. To avoid the speculation one should be always trade on daily chart which minimize the noise like speculation. Other major factor is to identify the trend for find out the next direction of position.

4.2 Risk Management

In the human trading scenario, traders are always confusing the difference between risk control and fund management function. The reason is that risk control includes some important concepts of fund management. However, in the robot trading scenario, there is a clear boundary, in that risk control only pays attention to how much loss can be accepted in trading.

4.2.1 Maximum 30% Drawdown

The Foreign Exchange Market Explained (2011) indicates that even the most experienced trader cannot determine all future market movements. Therefore, the maximum drawdown is programmed in most trading robots, where “A drawdown is the reduction of one's capital
after a series of losing trades.” (Babypips, 2011). This is usually calculated as the gap between the initial capital and the remaining balance of the traders’ account. In other words, traders normally focus on the percentage of drawdown against their accounts.
According to experience, Babypips (2011) believes that a 30 percent drawdown can be accepted by most traders. The reason is described as follows.

Loss of initial capital	Effort of getting back to breakeven
30%	0.3 / (1 - 0.3) * 100% = 43%
50%	0.5 / (1 - 0.5) * 100% = 100%

The above example shows the reason for choosing a maximum of 30% drawdown as a basic Concept for trading robots risk control design. Babypips (2011) indicates that a 30% loss of the total account can remain 70% money for traders, which means traders only require 43% of trading profits of the current account, and they can make the account get back to break even. It is hard to imagine a 50% loss of the initial capital, because traders must trade 100% profits of the current account to get back to their original account balance. Babypips (2011) points out that the more traders’ lose, the harder it is to get back to breakeven. Thus, a 30% maximum total drawdown can be accepted by most of traders.

The relationship between total loss of account and getting back to the original account balance can be presented by the formula below.

Pay back rate (Difficulty) of getting back to break even = Lost / (Account Size - Lost) * 100%

4.2.2Maximum 2% Loss of Each Trade

A 30% maximum drawdown applied to traders’ accounts can help them to limit risks, but the loss of each trade is difficult to identify. Babypips (2011) assumes an experienced trader who has the ability to handle 70% trades can also lose all the money in his account. The reason is he has applied a false calculation in his risk control system. This website tutorial uses a statistical method and indicates that a 30% loss is not evenly distributed in all the transactions. This means that in the first 30 losses out of 100 transactions, the loss can be continued. This situation can be more complex for risk control calculation.
However, Snellgrove (2008) notes that failure trades will tend to be averaged distributed in a large number of transactions, so the relationship between the maximum drawdown and the maximum loss of each trade can be presented by the formula below.

Total Loss Percentage = 100% - (1 - Lost Percentage

of each trade) ^ Trades * 100%

Through experiments, Babypips (2011) considers that more than 20 continuous lost transactions is rare in real forex trading. According to the above formula, a maximum 2% lost from each trade is more acceptable for most of traders. The following examples prove this concept.

CONCLUSION AND FUTURE WORK

The effectiveness and sensitivity of robot trading is both interrelated and contradictory. Excessive sensitivity of trading robots makes more trading opportunities, but is also likely to reduce profit performance. The sensitivity analysis is based on chart reviews, which present the correlation between false trading signals and market trends. Greater market volatility can produce more trading opportunities and can also increase the trading success rate, thus increasing the account. Parameter selection increases trading opportunities, but it also reduces the success rate because of increased noise.

1. Improved trading software should be able to work with any potential time frames. In this research, the indicator modification only focused on the major time frame instead of medium or minor time frames. The future work will cover more time frames.
2. In future work, more parameters will be involved in reorganisation of short term trend breakout pattern to make position in the short time frame. And their performance analysis, such as the relationship between modelling quality, paper profit, and transaction cost.
2. It is necessary to add the most sensitive technical indicators to maximize the profitable transaction like MACD, RSI & Moving Averages.
3. Future study should create a forward test for the improved trading robot.

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