Comparative Analysis of Reverse Martingale And Cumulative Win Strategies Using Ichimoku Kinko Hyo Indicator

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Abstract.
Given the dearth of prior research on the practical implementation of money management strategies in the foreign exchange market, making it arduous to ascertain profitable money management comparisons, this study places its focus on the amalgamation of money management strategies and technical indicators. The research specifically explores the utilization of two money management strategies, namely reverse martingale, and cumulative win strategy, in conjunction with Ichimoku Kinko Hyo serving as the chosen technical indicator. The primary aim of this research endeavor is to identify the most lucrative money management combination within a three-year timeframe. The study centers on the EURUSD currency pair, employing the H1 timeframe for analysis. The research methodology encompasses four essential stages: data collection, data processing, strategy testing, and result analysis. Subsequently, the acquired EURUSD data will undergo amalgamation utilizing the One-Way ANOVA method to determine the presence of statistically significant disparities between the two combinations. The outcomes of this investigation underscore the supremacy of the cumulative win strategy and Ichimoku Kinko Hyo combination, exhibiting a remarkable Return on Investment (ROI) surpassing alternative combinations, soaring to an impressive figure exceeding 2860%.

Keywords: Cumulative win strategy, foreign exchange market, Ichimoku Kinko Hyo, money management strategy,and reverse martingale.

I. INTRODUCTION

Foreign Exchange or Forex represents a global market that facilitates the trading of foreign currencies by participants from diverse nations [1]. It stands as one of the most liquid financial markets worldwide, with the Bank of International Settlements reporting an average daily trading volume of $5.1 trillion in April 2016 [2]. Market participants include banks, corporations, investment managers, and individuals, commonly referred to as traders, who aim to profit from price fluctuations resulting from the market's liquidity [3]. These fluctuations give rise to bullish trends and bearish trends. Traders utilize various technical and fundamental analysis techniques, combined with money management strategies, to identify trends and mitigate trading risks.Technical indicators play a vital role in analyzing and understanding Forex market movements [4]. The market offers a wide range of indicators, including Ichimoku Kinko Hyo. The utilization of the Ichimoku Kinko Hyo method for generating trading signals yielded impressive results. The method exhibited a remarkable average hit ratio of 66.84%, indicating a high rate of successful trades. Investors employing this approach achieved an average accumulated return of 20.39%, showcasing its profitability potential. Additionally, the method displayed a low average maximum drawdown of 8.38%, indicating effective risk management.

Furthermore, the study revealed a commendable Sharpe ratio of 1.22, highlighting a favorable balance between returns and volatility [5].Money management is a critical aspect of trading, and several strategic concepts are employed to optimize trading outcomes [6]. Three such concepts are the Fatal Martingale, Reverse Martingale, and Cumulative Win Strategy. The Fatal Martingale involves doubling the position size after each loss, aiming for a single trade to recover previous losses, but it carries high risks [7]. On the other hand, the Reverse Martingale increases position size after a winning trade to maximize profits during favorable market conditions [8]. Lastly, the Cumulative Win Strategy gradually increases position size after consecutive profitable trades, capitalizing on the momentum and compounding returns over time [9]. Each strategy offers distinct approaches to money management, catering to different trading styles and

risk tolerances. Each strategy employs a unique concept and approach. By combining technical analysis, money management strategies, and proper timing, traders can make informed decisions on buying or selling positions in the Forex market.

However, identifying the most profitable combination of indicators and money management strategies remains a challenge due to the vast array of available options. Existing research and journals primarily focus on technical indicators in Forex trading, with limited studies specifically addressing money management. For instance, studies such as [10] and [11] only examined trading strategies without incorporating money management strategies. Therefore, this study tries to give more contributions to money management analysis for forex trading. This research aims to compare the reverse martingale strategy and cumulative win strategy in Forex price movements using the Ichimoku Kinko Hyo indicator. By examining the profitability of these money management strategies, the study aims to contribute to the identification of the more profitable combination with the Ichimoku Kinko Hyo indicator. Through this research, we seek to bridge the gap in the existing literature by shedding light on the optimal money management approach within Forex trading.

II.   METHODS

A series of events took place in and around 2018, including an economic crisis in Europe, a significant decline in stock performance [12], the subsequent Covid-19 pandemic, and the Russian invasion of Ukraine [13]. Due to the unstable conditions caused by these events, the chosen data for analysis is from a period when Europe was relatively stable, specifically from 2015 to 2017. Based on the EURUSD data from 2015 to 2017, two distinct money management strategies are applied consisting of cumulative win strategy and reverse martingale. The entry and exit points will be determined with the aid of the Ichimoku Kinko Hyo indicator.

Following the completion of the tests, a comparison will be conducted using the One-Way ANOVA method to ascertain the most effective money management system for utilization in the Forex market with the EURUSD currency pair in the year 2016, specifically focusing on the H1 timeframe and employing the Ichimoku Kinko Hyo indicator. The collected data will encompass various variables, including date, time, price, as well as position of the Tenkan Sen and Kijun Sen lines. Data collection will occur when the Tenkan Sen and Kijun Sen lines intersect, thereby generating buy or sell signals. In this scenario, data extraction will be carried out utilizing the MQL4 programming language within the MetaTrader 4 platform. The selection of MetaTrader 4 for data collection is attributed to its support for multiple brokers and the availability of its programming language, MQL4, which enables users to modify and test within the MetaTrader 4 program.
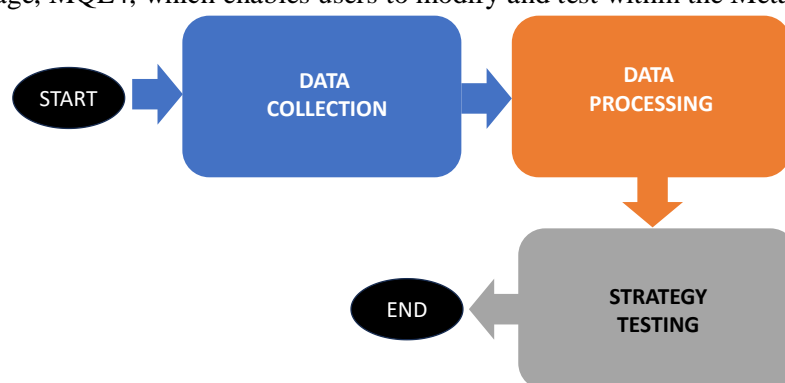

Fig 1. The Research Flow

This research flow is divided into three primary stages: data collection, data processing, testing, and analysis, as illustrated in Fig. 1. The online data collection process will be conducted through the MetaTrader 4 program utilizing the MQL4 programming language. Data will be collected via the FBS-Demo server, focusing on the EURUSD currency pair within the H1 (hourly) timeframe whenever there is a crossover between the Tenkan Sen and Kijun Sen lines, both in upward and downward directions, leading to buy or sell signals using the Ichimoku Kinko Hyo indicator. The variables to be collected encompass date, time, price, Tenkan Sen position, and Kijun Sen position. The data collection period will span one year, commencing

from January 4, 2016, until December 31, 2016. The choice of the EURUSD currency pair for data collection stems from its status as the most frequently traded currency pair in the global market [14]. To interpret trends in online trading, the Japanese Candlestick charts are typically employed. These Japanese Candlestick charts encompass four significant data points: the open price, the close price, the high price, and the low price [15].

During the data collection process, four rules will be applied to gather the required data: (1) When the Tenkan Sen line crosses below the Kijun Sen line, data will be collected at the subsequent open price, and the status will be marked as "sell." (2) When the Tenkan Sen line crosses above the Kijun Sen line, data will be collected at the subsequent open price, and the status will be marked as "buy." (3) When the Tenkan Sen line and Kijun Sen line are in proximity and exhibit the same status as the previously collected data, no data will be collected. (4) No stop loss level, trailing stop, or take profit level will be applied to transactions during the data collection process. In Fig. 2, the Tenkan Sen line is depicted in a striking red, while the Kijun Sen line is illustrated in a captivating blue. At point A, the initial condition materializes as the Tenkan Sen line gracefully descends beneath the Kijun Sen line, signifying a compelling sell indication. Moving to point B, the third condition emerges where both lines converge closely, culminating in a subsequent sell signal following the preceding sell status at point A. Consequently, data about point B is excluded from the collection. Finally, point C elegantly showcases the second condition, wherein the Tenkan Sen line gracefully ascends above the Kijun Sen line, providing an enticing buy opportunity.

Fig 2. Ichimoku Kinko Hyo Chart

The collected data will undergo a pre-processing phase that involves calculating the variance between consecutive data points. This variance computation allows for the determination of the profit or loss associated with each transaction, without considering the implementation of any money management system. By examining the differences between successive data points, it becomes possible to assess the fluctuations in prices and evaluate the financial outcome of each trade. The next step involves subjecting the processed data to strategy testing, specifically exploring the effectiveness of the reverse martingale and cumulative win strategies in money management. The WPS Spreadsheet program will be employed to conduct these tests, comparing the outcomes against those obtained without utilizing any money management system. The system testing will adhere to the specified conditions: (1) Entry conditions will be derived from a comprehensive analysis of price data, coupled with the corresponding buy, or sell status derived from the collected data. Exit conditions will be based on the subsequent data point's price. (2) The lot size per transaction will commence at 1 lot and will dynamically adjust according to the chosen money management system, whether it be the reverse martingale or cumulative win strategy. The profit or loss yielded by each money management system will be meticulously calculated, facilitating a comparative assessment of their profitability. Additionally, the Return on Investment (ROI) for each system will be computed, offering insights into the cost and rewards generated by both approaches. To calculate the Return on Investment (ROI) for the above two money management strategies is computed using the following formula:

$$ROI = \frac{Gain\ on\ Investment - Cost\ of\ Investment}{Cost\ of\ Investment}$$

(1)

Furthermore, to provide a projection of capital growth, an initial capital of US$10,000 will be considered. The ideal ratio between capital and lot size per transaction is 1:10. This means that for every unit of capital invested, it is recommended to trade with a lot size that is ten times smaller. This ratio serves as a guideline for achieving a balanced approach to risk management and position sizing in trading. By adhering to this ratio, traders aim to allocate their capital effectively while minimizing the potential impact of individual trades on their overall portfolio. The resulting profit calculations and ROI assessments will be presented in visually informative charts, utilizing the charting features available in the WPS Spreadsheets program. Additionally, the One-Way ANOVA (Analysis of Variance) method will be employed in the system testing phase, utilizing the RStudio program with the R programming language for statistical analysis purposes. The testing is also completed with drawdown measurement. In forex trading, drawdown is the reduction in a trader's account balance from its highest point to the lowest point. It quantifies the largest loss incurred by the trader within a given timeframe. A drawdown is typically presented as a percentage and reflects the degree to which the trading account has diminished from its peak value [16].

III.   RESULTS AND DISCUSSION
3.1 Data Collection
The first stage is data collection. The data collection was performed on the EURUSD currency pair, using the H1 (hourly) timeframe on the FBS-Demo server. The data was collected using the MQL4 programming language in the MetaTrader 4 program, covering the period from the beginning of 2015 to the end of 2017 (3 years). The collected data includes variables such as date, time, status (buy or sell), open price, Tenkan Sen 0, Tenkan Sen 1, Kijun Sen 0, and Kijun Sen. Based on the specified conditions, the data was retrieved through the MetaTrader 4 program, resulting in a .csv file containing 216 rows of data for the year 2015, 260 rows of data for the year 2016, and 199 rows of data for the year 2017, totaling 677 rows of data.

Table 1. Yearly Profit and Loss from 2015 to 2017

Years	Profit	Loss	Total
2015	110	105	215
2016	130	129	259
2017	91	107	198

3.2 Data Processing
From the successfully collected data, it was processed and calculated using formulas in the WPS Spreadsheets program to determine the profit or loss generated from the data. The determination of profit or loss from the data was done using a formula where, if the status is "buy", the profit is calculated by subtracting the open price of the respective row from the open price of the previous row. If the status is "sell", the profit is calculated by subtracting the open price of the previous row from the open price of the respective row. After calculation, it was found that the profit obtained was 52,124 points for the year 2015, 16,944.6 points for the year 2016, and 17,450 points for the year 2017. From the collected data, the average value per transaction was also obtained using a lot size of 1 lot per transaction, which amounts to US$ 241.31 in 2015, US$ 65.17 in 2016, and US$ 87.68 in 2017. From Table 1, it is found that there were 110 profitable transactions and 105 loss transactions out of a total of 215 transactions in the year 2015. In the year 2016, there were 130 profitable transactions and 129 loss transactions out of a total of 259 transactions. And in the year 2017, there were 91 profitable transactions and 107 loss transactions out of a total of 198 transactions. Fig. 3 shows the calculation results of the success percentage per month for each year. It can be observed that the results obtained per month vary each year.

However, it can be noticed that each year, the success percentage in November appears to be smaller compared to other months. Additionally, it is also evident that in July, the success percentage each year is consistently above 50%. The lowest average success rate occurred in November 2015, while the highest

success rate occurred in July 2015. This also indicates that the success rates from June to October are generally higher compared to other months in each year. With high success rates, it suggests a strong trend from June to October each year. Based on the data, the average success rate for each month is calculated to be 49.32% per month, considering the period from the beginning of 2015 to the end of 2017. It can be observed that the average highest loss rate occurs in May and November each year. This is also evident when comparing it with the graph of the winning percentage above, as the loss percentage is higher than the winning percentage each year. Based on the loss percentage data, it is found that the average loss percentage for each month is 50.68% for the 3 years.
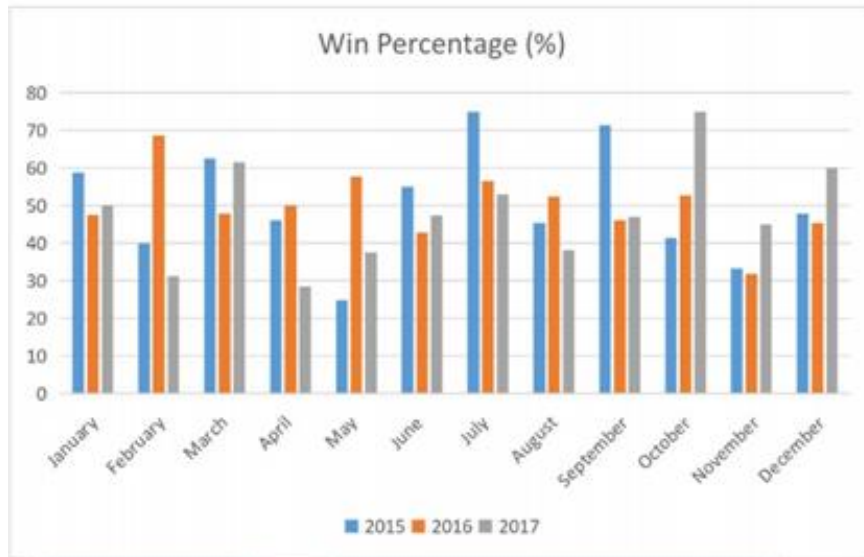

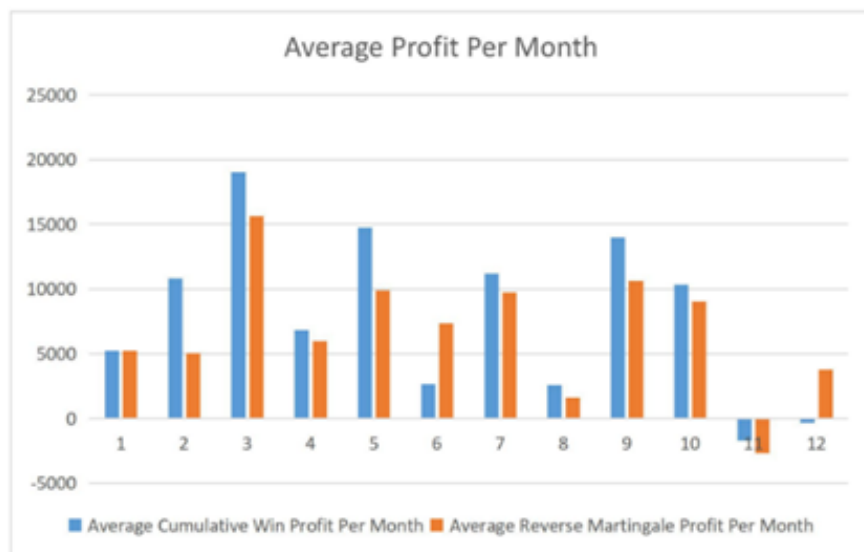**Fig 3.** Monthly Winning Percentage from 2015 to 2017

Fig 4. Monthly Winning Percentage from 2015 to 2017

From Fig. 4, it is evident that the average monthly profit generated by the cumulative win strategy in the money management system is more favorable compared to the reverse martingale. Additionally, from the graph above, it is observed that the average annual profits for both money management strategies are at their lowest in November, followed by August. Furthermore, the months of February to July exhibit the highest average annual profit levels.

3.3 Strategy Testing

After the data processing was completed, the system testing is conducted using the reverse martingale and cumulative win strategy money management strategies by implementing the formulas in the WPS Spreadsheets program. The system testing began by calculating the profit/loss obtained when trading

with a volume of 1 lot per transaction equivalent to US$100,000 without using any money management system. The calculation is done by multiplying the number of points obtained by US$100,000, resulting in a profit of US$86,518.6 over 3 years. Then, the money management system was applied using the same method, which involves multiplying the lot size by the number of points. The results obtained were US$243,725.8 for the reverse martingale strategy and US$286,330.5 for the cumulative win strategy over 3 years. This indicates that the reverse martingale money management system is 2.8 times or 281.7% more profitable than not using any money management, while the cumulative win strategy is 3.3 times or 330.94% more profitable than not using any money management, and 1.1 times or 117.48% more profitable than the reverse martingale money management system. This also demonstrates that even though the average monthly winning percentage is below 50%, the system is still able to generate profits each year. This is because the Ichimoku Kinko Hyo indicator tends to produce larger gains when winning and minimizes losses when losing, as it follows the trend movements.
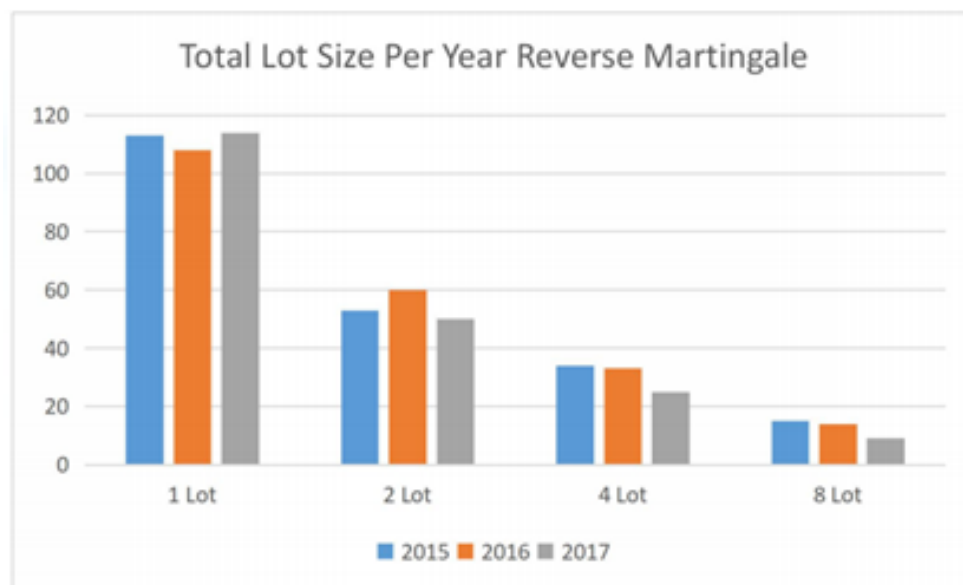

Fig. 5: Reverse Martingale Lot Size from 2015 to 2017

By implementing a money management system, the lot size per trade will vary according to the chosen system. The minimum lot size for both reverse martingale and cumulative win strategy is 1 lot, while the maximum lot size for both systems is 8 lots. Here is a graph comparing the lot size per year for the reverse martingale and cumulative win strategy money management strategies. From Fig. 5, it can be observed that the average number of cycles for the reverse martingale money management system within one year is 12 cycles. Similarly, the average number of cycles for the cumulative win strategy money management system within one year is 4 cycles.

Fig. 6 shows results were then visualized in a line chart comparing the changes in the capital with an initial capital of US$ 10,000 using three different approaches: without using any money management system, using the reverse martingale money management system, and using the cumulative win strategy money management system over 3 years from the beginning of 2015 to the end of 2017. In the above chart, the blue line represents the results without using any money management system, the orange line represents the reverse martingale money management system, and the gray line represents the cumulative win strategy. From the chart, it is evident that the cumulative win strategy is more profitable compared to the reverse martingale strategy. By starting with an initial capital of US$ 10,000, at the end of 2017, the capital grows to US$ 296,330.5 when applying the cumulative win strategy, while it grows to US$ 253,725.8 when applying the reverse martingale strategy. On the other hand, without implementing any money management system, the capital growth reaches US$ 96,518.6.
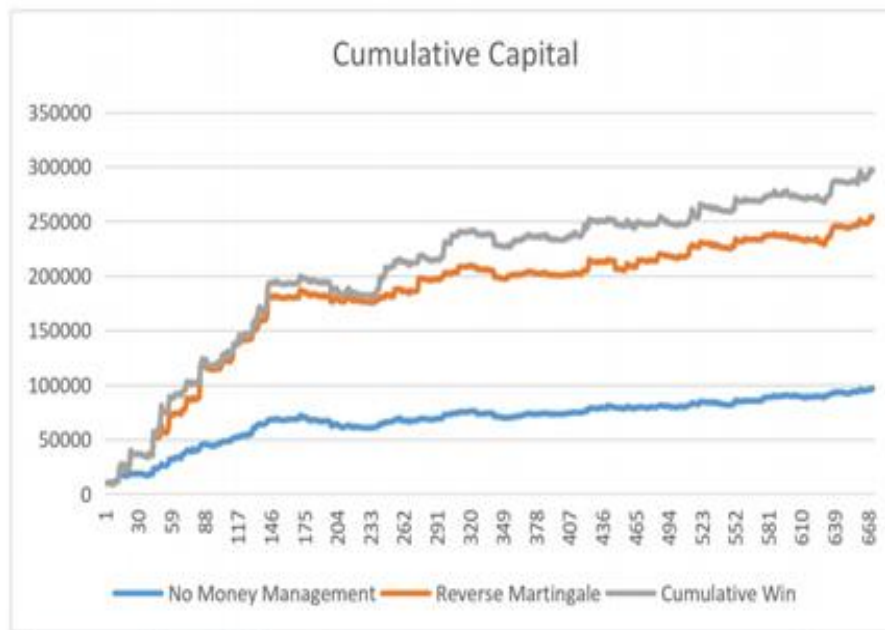
Fig 6. Line Chart of Capital Change from 2015 to 2017

Without using a money management system: 865.18%, Reverse martingale strategy: 2437.26%, Cumulative win strategy: 2863.31% These ROI values represent the returns on investment for three years, starting from the beginning of 2015 until the end of 2017, with an initial investment of US$ 10,000. It indicates that the cumulative win strategy has the highest ROI, followed by the reverse martingale strategy, while not using a money management system resulted in an ROI of 865.18%.Fig. 7 shows a drawdown comparison among money management methods. By experimenting to determine the minimum capital required to trade 1 lot for each money management system, the calculation of drawdown values representing the maximum percentage of losses that can occur when applying the system was performed. The results obtained are -15.718% without using a money management system, -16.158% for the reverse martingale system, and -18.601% for the cumulative win strategy.

lthough there is a significant difference in the change of capital between the two money management strategies, where the cumulative win strategy appears to be superior to the reverse martingale, the statistical analysis using the One-Way ANOVA (Analysis of Variance) method in RStudio shows that there is no statistically significant difference between the two money management strategies. The calculation in RStudio yields a value of Pr(>F) as 0.3679, which is greater than 0.05. This indicates that there is no statistical difference between not using a money management system, the reverse martingale system, and the cumulative win strategy. However, in the calculation of capital growth between not using a money management system, the reverse martingale system, and the cumulative win strategy, the value of Pr(>F) is 2.2e-16, which is smaller than 0.05, indicating a significant statistical difference. This research aimed to find a more profitable combination of money management when combined with the Ichimoku Kinko Hyo indicator. The research can be considered successful based on the results obtained. The cumulative win strategy money management system was found to be 1.1 times more profitable than the reverse martingale system and 3.3 times more profitable than not using any money management system when combined with the Ichimoku Kinko Hyo indicator.
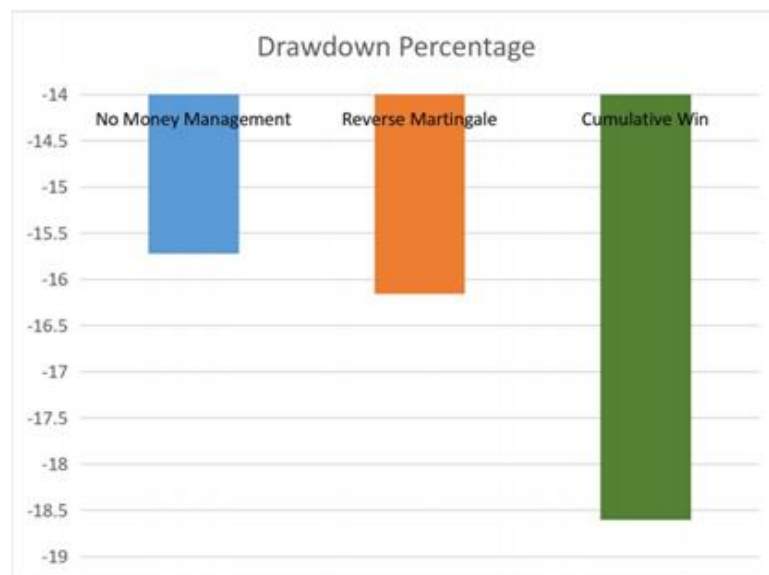
Fig 7. Drawdown Comparison of Money Management Strategy

IV. CONCLUSION

The results of the One-Way ANOVA test conducted in this research indicate a significant difference statistically between not using money management, using the reverse martingale money management system, and using the cumulative win strategy money management system when measured by calculating profit/loss. Additionally, there is a significant statistical difference when calculating capital growth.These findings suggest that combining the cumulative win strategy money management system with the Ichimoku Kinko Hyo indicator can lead to improved profitability compared to other money management strategies. With the completion of this research, a suggestion for future studies would be to compare other money management strategies in combination with different indicators. By using different indicators, it is expected that the more profitable money management strategies may vary from those observed when using the Ichimoku Kinko Hyo indicator. Exploring the effectiveness of different money management strategies with various indicators can provide valuable insights into optimizing trading performance.

V. ACKNOWLEDGMENTS

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